

# Components of the Research Report

Session 4

C507

Scientific Writing

The background of the slide is a solid blue color. In the lower right quadrant, there are several faint, concentric circles that resemble ripples in water, creating a decorative pattern.

# Research Report

- Also called an original data report
- Most frequent type of scientific paper

# The Conventional Format

- Readers expect to read about your research in the sequence in which the research developed:
  - What question you set out to answer
  - How you sought the answer
  - What was found
  - What your answer is
- A research paper gives information in 4 steps

# Step 1

- The question to be answered can be either an hypothesis to be tested or a problem to be resolved

## Step 2

- How the answer was sought includes the steps taken to test the hypothesis or to resolve the problem

# Step 3

- What was found includes the relevant data from your study, supporting evidence from other papers, and counter-evidence that had to be assessed.

# Step 4

- The answer to the question is whether the hypothesis was supported or the problem was resolved and, if resolved, with what solution.

# The Usual Sequence

- (Abstract and Key Terms)
- Introduction
- Methods
- Results
- Discussion
- Conclusion
- (References)

# The Abstract

- We will devote an entire session to this so will leave it for now, except to say that today a *Structured Abstract* is used.

# The Introduction

- Tell the reader why the research was started
- Do not explain what can be found in any textbook in the field

# The Introduction

- Do not elaborate on terms used in the title of the paper
- Make clear what question the research was designed to answer

# The Introduction

- Most authors close an Introduction with a statement of purpose.
- Some may include a short summary of the study design
- Some may also close the Introduction a short statement of the research findings- do not do this

# Methods

- What did you do?
- The reader will want to know exactly what you did; repeatability is the key concept here.

# Methods- Organization

- Study design is selected (after the hypothesis is stated)
- The subjects to be studied are defined
- Interventions (such as treatments are decided on in detail

# Methods- Organization

- Measurements and other observations to be made are specified, including the methods
- Statistical procedures for assessment of data are selected

# Study Design

- Those that are well known need be specified by title only
- Those that are unusual but have been described should have a citation to the source
- New designs should be described in detail

# Subjects

- Characterize subjects as fully as possible
- Ethical controls should be noted as well
  - Informed consent
  - IRB approval

# Intervention/Treatment

- Describe the intervention fully
  - Control
  - Experimental

# Measurements and Other Observations

- Standard methods for laboratory or other procedures need to be identified only by name and citation
- Variations from these should be described in enough detail to enable duplication by another person
- Unpublished methods must be described in detail and evidence they have been validated presented.

# Statistical Analysis

- Specify the analysis

# Methods- General Comments

- You can always use subheadings in this section, ie:
  - Study Design
  - Subjects
  - Experimental Protocol
  - Statistical Analysis

# Results

- Describe your evidence as efficiently as possible
- Numerical data should be presented in tables or graphs
- The text usually will present no more than group differences

# Discussion

- The first need is to give the answer to your research question
- Evidence from other papers may not be the only evidence you have to present in the Discussion; there may be counter-evidence to be presented and assessed.

# The Discussion

- According to Robert Day (*How to Write and Publish a Scientific Paper*), a Discussion should:
  - Try to present the principles, relationships, and generalizations shown by the Results. (Keep in mind that you *discuss*; you do not *recapitulate* the Results).
  - Point out any exceptions or any lack of correlation, and define unsettled points

# The Discussion

- According to Day (Continued):
  - Show how your results and interpretations agree or contrast with previously published work
  - Don't be shy; discuss the theoretical implications of your work, as well as any possible practical applications

# The Discussion

- And more from Day:
  - State your conclusion, as clearly as possible
  - Summarize your evidence for *each* conclusion. Or, as the wise old scientist will tell you, “Never assume anything except a 4% mortgage.”
- In simple terms, the primary purpose of the Discussion is to show the relationship among observed facts

# The Discussion

- Too often, the significance of the results is not discussed or addressed adequately.
- End the Discussion with a short summary or conclusion regarding the significance of the work

# The Conclusion

- “The research paper is based on principles of critical argument. In the research you are reporting, you have raised a question, gathered evidence bearing on the question, and produced an answer. Therefore, the content of your paper should include all the elements needed for clear and fair argument...”

# The Conclusion

- (Cont) "...and its structure should be built on the natural sequence of question, evidence, and answer fitted into a format that reproduces the sequence of steps in the research."

# The Conclusion

- This summarizes your findings and your thoughts as to the importance of the work you did.