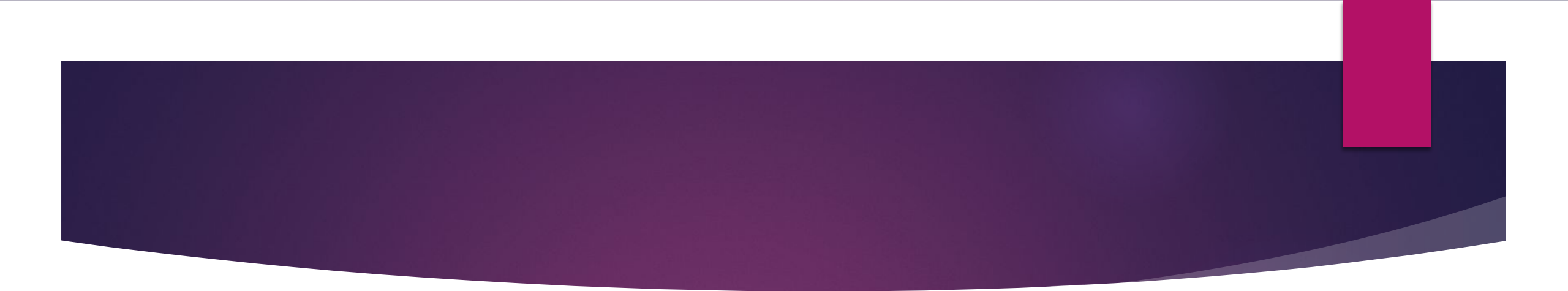


SEMINAR 2.

- 
- ▶ Content
 - ▶ Creating a literature review.
 - ▶ Preparing other sections of a research report:
 - ❖ abstract,
 - ❖ introduction,
 - ❖ materials and methods,
 - ❖ results and discussion,
 - ❖ conclusions.
 - ▶ Including and summarizing research data.

Abstract

- ▶ An Abstract should be viewed as a miniversion of the paper. The Abstract should provide a *brief* summary of each of the main sections of the paper: Introduction, Materials and Methods, Results, and Discussion. As Houghton (1975) put it, "An abstract can be defined as a summary of the information in a document."
- ▶ The Abstract should not exceed 250 words and should be designed to define clearly what is dealt with in the paper.

Abstract

- ▶ The Abstract should
 - ▶ (1) state the principal objectives and scope of the investigation,
 - ▶ (2) describe the methods employed,
 - ▶ (3) summarize the results, and
 - ▶ (4) state the principal conclusions.
- ▶ The importance of the conclusions is indicated by the fact that they are often given three times: once in the Abstract, again in the Introduction, and again (in more detail probably) in the Discussion.
- ▶ Most or all of the Abstract should be written in the **past tense**, because it refers to work **done**.

Abstract

- ▶ The Abstract should never give any information or conclusion that is not stated in the paper. References to the literature must not be cited in the Abstract (except in rare instances, such as modification of a previously published method).
- ▶ Unless a long term is used several times within an Abstract, do not abbreviate the term. Wait and introduce the appropriate abbreviation at first use in the text (probably in the Introduction).

How to Write the Introduction

Suggested rules for a good Introduction are as follows:

- ▶ (1) The Introduction should present first, with all possible clarity, the **nature** and **scope of the problem** investigated.
- ▶ (2) It should **review the pertinent literature** to orient the reader.
- ▶ (3) It should state the **method of the investigation**. If deemed necessary, the reasons for the choice of a particular method should be stated.
- ▶ (4) It should state the **principal results** of the investigation.
- ▶ (5) It should state the **principal conclusion(s)** suggested by the results.

Do not keep the reader in suspense; let the reader follow the development of the evidence.

How to Write the Materials and Methods Section

- ▶ In Materials and Methods, you must give the full details. Most of this section should be written in the past tense.
- ▶ The main purpose of the Materials and Methods section is to describe (and if necessary defend) the experimental design and then provide enough detail so that a competent worker can repeat the experiments.

How to Write the Results

There are usually two ingredients of the Results section. **First**, you should give some kind of overall description of the experiments, providing the "big picture," without, however, repeating the experimental details previously provided in Materials and Methods. **Second**, you should present the data. Your results should be presented in the past tense.

The **results** should be *short and sweet*, without verbiage. Although the Results section of a paper is the most important part, it is often the shortest, particularly if it is preceded by a **well-written Materials and Methods section** and followed by a **well-written Discussion**.

How to Write the Discussion

Components of the Discussion

What are the essential features of a good Discussion? I believe the main components will be provided if the following injunctions are heeded:

- ▶ 1. Try to present the principles, relationships, and generalizations shown by the Results. And bear in mind, in a good Discussion, you *discuss*—you *do not recapitulate*— the Results.
- ▶ 2. Point out any exceptions or any lack of correlation and define unsettled points. Never take the high-risk alternative of trying to cover up or fudge data that do not quite fit.
- ▶ 3. Show how your results and interpretations agree (or contrast) with previously published work.
- ▶ 4. Don't be shy; discuss the theoretical implications of your work, as well as any possible practical applications.
- ▶ 5. State your conclusions as clearly as possible.
- ▶ 6. Summarize your evidence for *each* conclusion. Or, as the wise old scientist will tell you, "Never assume anything except a 4% mortgage."

The Discussion should end with a short summary or conclusion regarding the significance of the work.

How to State the Acknowledgments

As to the Acknowledgments, two possible ingredients require consideration.

- ▶ **First**, you should acknowledge any significant **technical help** that you received from any individual, whether in your laboratory or elsewhere. You should also acknowledge the **source of special equipment, cultures, or other materials**. You might, for example, say something like "Thanks are due to J. Jones for assistance with the experiments and to R. Smith for valuable discussion." (Of course, most of us who have been around for a while recognize that this is simply a thinly veiled way of admitting that Jones did the work and Smith explained what it meant.)
- ▶ **Second**, it is usually the Acknowledgments wherein you should acknowledge any outside **financial assistance**, such as **grants, contracts, or fellowships**. (In these days, you might snidely mention the absence of such grants, contracts, or fellowships.)

How to Cite the References

There are **two rules** to follow in the **References section**, just as in the Acknowledgments section.

- ▶ **First**, you should list only **significant, published references**. References to unpublished data, abstracts, theses, and

other secondary materials should not clutter up the References or Literature Cited section. If such a reference seems

absolutely essential, you may add it parenthetically or as a footnote in the text. A paper that has been **accepted for**

publication can be listed in Literature Cited, citing the name of the journal followed by "***In press.***"

- ▶ **Second**, check all parts of every reference against the original publication before the manuscript is submitted and perhaps again at the proof stage. Take it from an erstwhile librarian: There are far more mistakes in the References

section of a paper than anywhere else.

And **don't forget**, as a final check, make sure that all references cited in the text are indeed listed in the Literature Cited and that all references listed under Literature Cited are indeed cited somewhere in the text.

▶ **Examples of Different Reference Styles**

So that you can see at a glance the differences among the three main systems of referencing, here are three references as they would appear in the References section of a journal.

▶ ***Name and Year System***

Day, R. A. 1998. How to write and publish a scientific paper. 5th ed. Phoenix: Oryx Press. Huth, E. J. 1986. Guidelines on authorship of medical papers. *Ann. Intern. Med.* **104**:269–274.

Sproul, J., H. Klaaren, and F. Mannarino. 1993. Surgical treatment of Freiberg's infraction in athletes. *Am. J. Sports Med.* **21**:381–384.

▶ ***Alphabet-Number System***

1. Day, R. A. 1998. How to write and publish a scientific paper. 5th ed. Phoenix: Oryx Press.

2. Huth, E. J. 1986. Guidelines on authorship of medical papers. *Ann. Intern. Med.* **104**:269–274.

3. Sproul, J., H. Klaaren, and F. Mannarino. 1993. Surgical treatment of Freiberg's infraction in athletes. *Am. J. Sports Med.* **21**:381–384.

▶ ***Citation Order System***

1. Huth EJ. Guidelines on authorship of medical papers. *Ann Intern Med* 1986; **104**:269–74.

2. Sproul J, Klaaren H, Mannarino F. Surgical treatment of Freiberg's infraction in athletes. *Am J Sports Med* 1993; **21**:381–4.

3. Day RA. How to write and publish a scientific paper. 5th ed. Phoenix: Oryx Press, 1998.