

China Medical Board

Biomedical Writing Course

**Lessons on Writing and Publishing Scientific Papers,
Part 3**

- The Reference List
 - The Discussion
 - The Introduction
- The Acknowledgments
- Semester Review and Evaluation

Source:

BIOMEDICAL WRITING COURSE

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Lesson Ten

Drafting the Reference List

Introduction to Writing the Discussion

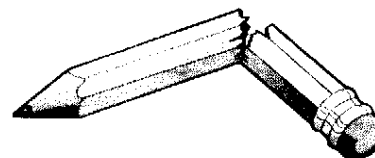
OBJECTIVES OF LESSON TEN

By the end of this week ,you will

1. know more about the content and format of reference lists
2. Be able to prepare a first draft of the Reference section for your own paper
3. Preview CHAPTER 10 IN DAY'S BOOK ("HOW TO WRITE THE DISCUSSION")

ASSIGNMENTS FOR LESSON TEN

1. Read Chapter 12 ("How to Cite the Reference") in Day's book and look at Appendix 1 in that text ("Selected Journal Word Title Abbreviations").
2. Update your literature search on your research topic: find the latest relevant articles, read them, and note both the content of the article and bibliographic information. If you did not obtain all the needed bibliographic information during your previous literature search , do so now so that you have complete information on all references.
3. Following the "instructions to Authors" in your chosen journal, prepare a preliminary list of possible references for your paper. If you have any questions, ask your local instructor, and then submit your list to your local instructor for feedback. This assignment is further explained at the end of this lesson.



COMPOSING THE REFERENCE SECTION

Purposes of the Reference Section

The reference section has 4 major purposes:

1. To provide the interested reader with sources for further information
2. To help the author avoid detail repetition of already published methods, results, and conclusions.
3. To indicate who has been responsible for previous research and findings on this topic
4. To give credibility to statements made in the text.

Zeiger (1991) discusses the purposes of citing reference in each section of the research paper. These are summarized below:

INTRODUCTION: References cited here support statements about what is known about your topic of research; these references provide background information for the reader and indicate the primary works that lead to your research question.

METHODS: References cited here explain well-known methods, explain more fully less well-known methods, and provide background on statistical tests with which the reader might not be familiar.

RESULTS: It is unusual to cite references in the Results section. However, sometimes references are used for a brief comparison of your findings with those of another study when such a comparison doesn't fit well in the Discussion section.

DISCUSSION: References cited here provide evidence of previous studies that support the answer to your research question or explain that answer in the context of the previous work.

Selection of References

In preparing and implementing your research project, you've probably already selected and read many of the references you will use in your paper. Now is the time to update your literature search to ensure that your reference list includes the most recent, most relevant articles. (Although some of your references may be book chapters or other types of publication, we will focus on journal articles in this section because they will compose the bulk of our final list.)

Recently, literature searches have become much easier because of computerized databases like MEDLINE. However, whether you use these databases or a print index, you may find that there are so many articles on your topic that you cannot read them all or cite them all in your paper. The first step in creating a reference list, then, is the selection of appropriate papers and book chapters.

As you look at the literature, consider these criteria before you read the articles available. Some of these criteria may be obvious to experienced researchers but they deserve to be repeated here for the sake of completeness.

- **Does the title and/or abstract lead you to believe that the material in the paper is especially relevant to your own topic?** If not, eliminate it from consideration and go on to the next article.
- **Is the paper published in a reputable journal?** If not, eliminate it from consideration and go on to the next article.
- **Is the paper published in a journal that will be widely available to the readers of the journal that you hope will publish your article?** If, for example, you cite 5 references from Chinese-language journals, these articles are probably not readily available to American or European readers. Therefore, you might want to choose the 2 best of these 5, and use those in your list with several articles from English-language journals.
- **Has the article been published within the last 5-10 years?** Most of your references should be current literature; however, in some cases, an older book or article can be more appropriate than a more current one. For example, Gu et al. (first sample article in Appendix B) cite a book from 1897 because it shows that the proposed technique has been used for many years.
- **Is the article a review article?** Although review articles usually don't contain new research, they are a wonderful source of other relevant references on your topic. you may be able to delete several articles from your reference list by citing a good review article. However, don't cite more than one or two good review articles; most of the articles in the reference list should be reports of original research.

After you have used these criteria to narrow down your list of possible references, find each article that you haven't already obtained and read through it. You will want to read it again more carefully and to take notes on its conclusions if it meets these 3 criteria.

- ◆ It is truly relevant to your article.
- ◆ It reflects good science, so that the results and conclusions are trustworthy
- ◆ It is well-written.

O'Connor(1991, p. 173) gave a helpful list of questions to ask to determine if the article reflects good science and is well-written.. As you are examining each article, ask yourself if the authors have done all of the following:

1. Clearly explained the problem that led to this work
2. Used appropriate methods for answering their research question and clearly described those methods
3. Presented the results with clarity, coherence, logic and precision
4. Provide findings and interpretations that represent an advance in knowledge

In another approach to evaluating references (also recommended in O'Connor 1991), you first look at the Results section, with its tables and figures. If the tables and figures are well constructed and if the findings are both interesting and relevant, then read the rest of the article and decide whether it's a good addition to your reference list..

As with all sections of your paper, consult the Instructions to the Authors before you start preparing your reference list. Some journals limit the number of references that can be used in certain types of articles, and some have specific guidelines for use of references that you must follow if you want to have your article reviewed.

Proper Format for References

According to Morgan(1986), there were , at one time, more than 250 different reference styles for formatting and citing references. This reference chaos was one reason that a group of journal editors developed the "Uniform Requirements" (Appendix A). Although hundreds of journals do follow the "Uniform Requirements," there are still slight variations even among these journals in terms of punctuating and formatting entries in reference lists.

Before you start typing your reference list, look in your chosen journal, first at the "Instructions to Authors" and then at some reference lists in the journal's articles. This will guide you in formatting of the list before you submit the paper.

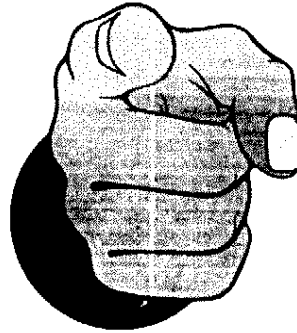
Errors in References

Despite the importance of the reference section, many errors appear in reference lists. You may wish to read the 2 articles at the end of this lesson. In the first, Qian Shouchu, senior editor of the Chinese Medical Journal, describes a study in which he checked the sources of references from 5 accepted manuscripts before they were published. His findings included the following:

- ◆ "The original authors were misquoted in 10% of all references and these errors would have misled readers if they had not been corrected."
- ◆ "5% of the references showed a serious discrepancy between the source being cited and its use in the citing article."

- ◆ "Nearly a quarter of the citations contained at least one bibliographic error serious enough to prevent retrieval of the article if the citations had been published as submitted."

Few, if any, copyeditors of biomedical journals actually do this sort of checking; even with computerized databases, they simply do not have time to check every reference. That means that the type of errors Qian found usually are published with the articles.



In the second article, Yankauer cites previous studies showing error rates between 22% and 31.4% in reference lists. He added an instruction about reference accuracy to standard letters, "check your references with the original sources, not with someone else's reference lists, and examine your citation for typographical errors." Errors did not disappear from the references (31 of the 33 papers examined had at least 1 error in their lists), but the error rate did decrease. However, Yankauer concluded, "The number of citation errors is still far too large."

It is the author's responsibility to cite references correctly and quote from them or paraphrase from them accurately. As Huth (1990) says, "You should be able to carry out this verification because you should not cite any documents that you have not seen; such citation would be intellectual dishonesty" (page 180). However, everyone involved in the publication process has an obligation to ask questions about reference citations; authors should pay careful attention to the questions and answer them accurately.

References Other Than Books and Journal Articles

Most of your references will be journal articles or book chapters. However, there are many other types of references, as you see from the reference section in the "Uniform Requirements"(Appendix A). Here, we shall cover briefly some of other common types of references.

To format any type of reference, your best guide is the journal's own "Instructions to Authors." Some journals will give specific instructions about references format; other journals will direct you to the "Uniform Requirements"(Appendix A) as a guide for reference format. Also references format is discussed in the two major style manuals for biomedical writing: (1) Scientific Format and style: The CBE Manual for Authors, Editors, and Publishers and (2) The AMA Manual of Style. Some "Instructions to Authors" indicate which of these two standard manuals is used by the journal's editorial office. Ask your local instructor if you wish to consult either of these manuals. (You may also find these manuals in your institution's library, but you must be sure you are consulting the most current edition; see the bibliography at the end of these first 10 lessons for full bibliographic information about these and other reference books.)

If you look at the reference section in the "Uniform Requirements"(Appendix A) or in one of the two standard style manuals listed above, you will understand that we cannot cover here every type of publication that you may want to cite as a reference. If you come across some type of publication that you need to cite but do not know how to format it,

enter all the information about it in the reference list. Think about what your readers would need to know to find it in their libraries, and make sure all that information is there. It is always better to provide more information than is needed than to provide less information than is needed. If your article is accepted for publication, the journal's copyeditors will format the reference in accordance with their editorial style.

You will rarely be required to use the types of references that we discuss below, but we have included this information here for your convenience.

◆ *Unpublished Material* (Including Personal Communications): Many biomedical journals do not allow unpublished material to be included in the reference list. If you need to give credit to another researcher who has not yet published his or her findings, you can do so by giving the researcher credit in parentheses in the text next to the idea or data you are citing. For example, if you had discussed an idea with a researcher named Li Zhen, and he had given you information that is unpublished but worth mentioning, you can give the information followed by a parenthetical phrase such as "(Z. Li, written personal communication, June 1996)." If you cite unpublished data or personal communications in your text, you must have the written permission from the person cited. O'Connor (1991) suggests that, if you are citing an idea from a conversation, you should write down exactly how you plan to paraphrase or quote the conversation, send it to the person you will be citing, and receive written permission to use it as you have written it.

◆ *Secondary References*: Secondary references are publications from which you get information that originated in another reference. You should always try to find the original source of the idea or data. However, sometimes that is impossible. Some journals forbid the use of any secondary references, which means that you are not allowed to use the idea or data unless you can find the original source. Other journals, however, allow secondary references, and those journals expect you to make the relationship very clear. In the text where you wish to cite the reference, you might put "(Smith 1940, as cited in Jones 1992)" or "findings²¹ as cited in²²". In the reference list, the full bibliographic information should be given for both the original and secondary reference in the following manner: first, provide the information about the original reference in the proper format, then add parenthetical information about the secondary reference, such as "(cited in Jones 1992, p. 43)". finally, put the full information about the place in the reference list. By the way, if you are having trouble finding an older reference that was cited in a more recent one, consider contacting the corresponding author of the more recent reference to ask for a photocopy of the older source.

◆ *Government Documents*: For many government documents, a government agency will serve as both the author and publisher. The style manuals mentioned above explain standard methods for formatting these if there is no sample in your selected journal. Remember to give to the reader all the information you have about the reference, including the document number, the publishing agency, the city of publication, and the relevant page numbers.

◆ *"In press" References*: After a journal has accepted an article but before it is published, the article is considered to be "in press." Since these have been reviewed and accepted for publication, most journals allow these to be placed in the reference list.

If you do list an article as "in press" in your first draft of your reference list, be sure to put the name of the publication in which it will be published. If the "in press" article is published before your new article is printed, give the update information to the journal's editorial office (year of publication plus volume number and page numbers in the journal).

◆ *Dissertations and Theses:* Views differ about whether dissertations should be considered published or unpublished. The "Instructions to Author" for your journal may indicate its policy. Since dissertations are put through rigorous review, they are allowed to be placed on reference lists in many journals. For formatting, see "Uniform Requirements" (Appendix A) or one of the two standard style manuals listed above.

CHAPTER 12 IN DAY'S BOOK ("HOW TO CITE THE REFERENCES")

Here we shall preview and supplement chapter 12 in *How to Write & Publish a Scientific Paper*. you may (1) read the chapter first and then come back to this explanation, (2) read our comments on paragraphs as you read the chapter, or (3) read our comments first and then read the chapter.

On page 51, Day states concisely 2 primary rules for reference:

◆ **Limit the references in the list to the most relevant published references.** It is important to be selective in your reference list because it helps the interested reader and it shows your ability to judge the best and most relevant literature on your topic. Published work is always preferable to unpublished observations because it has greater validity and it is more available to readers. However, some journals allow authors to include some forms of unpublished material in the reference list. As always, depend on the "Instructions to the Authors" in the journal for your best guidelines or follow the relevant guidelines in the "Uniform Requirements" (Appendix A).

◆ **Check everything.** The reference section should be proofread, letter by letter and character by character, against a copy of the article or book being cited. Also, of course, an author must read carefully and understand every reference that he or she puts in the reference list. Neither reading only the abstract from a computerized database nor reading another article that cites the reference ensures correctness. The abstract or the secondary article may contain errors. Be sure that you understand each article clearly, so that any quotes or ideas you use from it will be correct. The items that should be checked include the following:

- ◆ spelling of all author names and all names of book editors
- ◆ title of the document (article or book chapter)
- ◆ title of the publication in which it appeared (journal or book name)
- ◆ for journal articles: year of publication, as well as volume number, issue number, and beginning and ending page numbers
- ◆ for book chapters: year of publication, place of publication, name of publisher, and relevant beginning and ending page numbers

On pages 51-54, Day summarizes some of the reference styles used by journals. The styles vary widely. Again, the best guidelines for you to follow are (1) any discussion of

reference style provided in the "Instructions for Authors" for the journal and (2) sample reference lists from articles in the journal.

Just before the last paragraph on page 53, there is a nice discussion of creating your own computerized database of articles that you cite. Using such a database can be easier and faster than retyping the reference information for every article you write. It also can facilitate changing the format of the reference list if you need to submit your article to a second journal. But remember that, if a reference is entered incorrectly into such a database, it will always appear incorrectly in your articles unless someone catches the error and corrects it. Therefore, take special care proofreading the information that is entered into your reference database. And remember that many researchers find such databases helpful, but they are certainly not necessary for putting together a good reference list.

As indicated in the lessons on writing the Methods and Results sections, use the "name and year system" described on page 53 as you draft your paper. Thus, your draft reference list should be alphabetized rather than numbered. Then, when you are finished with the paper, if you need to put the reference information in the reference list in the order they are cited, that will not be a hard task to do.

Day covers nicely the three main types of journal citation. We just wish to add one caution here. As you will see, some journals ask the authors to use numbers to cite references in the text. If your selected journal expects you to number the reference and to put those reference numbers in parentheses in the text, you must not use parenthetical numbers for any other purpose. For example, instead of saying "In 21% of the patients (3)....," you need to say "In three (21%) of the patients." Otherwise, the "3" all alone in parentheses looks like a reference citation.

Note that you do not need to worry about ordering a copy of "Uniform Requirements." That document is in Appendix A.

APPENDIX 1 IN DAY'S BOOK: "SELECTED JOURNAL TITLE WORD ABBREVIATIONS"

On pages 187 and 188, Day provides a sample of abbreviations for words as used in the *Index Medicus* abbreviations for journal titles. Your local instructor will have a more comprehensive list. As you type in your journal titles, remember 2 things:

1. If the journal title is 1 word, that word is not abbreviated.
2. If you are not sure of the abbreviation, it is better to write out the whole name of the journal than to guess at an abbreviation.

SELECTED REFERENCES FROM SAMPLE ARTICLES

We have selected references from 2 of the sample articles from Appendix B. The comments on these references serve 2 purposes:

1. To review the possible reasons for including and excluding references from your list
2. To indicate the types of formatting items that you might notice as you're looking through the reference lists of some articles in your selected journal

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THE WRITING ASSIGNMENT

You probably did an extensive literature review before you started your research and added to it as you performed your research. Now you need to look at those articles, chapters, and other text included in that literature review, update your list as needed, and develop a preliminary reference list for your paper. As you write the paper, you may add or delete references.

For now, put the list in alphabetical order (remember to put the surname first, especially for first authors["Qian S" not "Shouchu Qian"]). Check the journal to which you will submit the paper. If all the author names have surnames first, the rule illustrated in

parentheses above applies to all author names. If the authors after the first author are listed by initial plus surname (S. Jones), follow this pattern for Chinese names as well ("S. Qian," not "Qian Shouchu").

Check the journal also for the format of the references (look both at the "Instructions to Authors" and at actual reference lists in research papers similar to yours). Then give your list to the local instructor, who will give you feedback.

PREVIEW OF CHAPTER 10 IN DAY'S BOOK ("HOW TO WRITE THE DISCUSSION")

Day starts this chapter with a warning. He admits that writing the Discussion section can be difficult, and that poorly written Discussion sections often cause editors to reject papers. Don't be overly worried by that warning; instead, just take his good advice so that your Discussion section will be concise and clear. The content of your Discussion ties the rest of the parts together; it answers "so what?" about the why, how, and what questions you answer in the Introduction, Methods, and Results. It's not the quantity of words you use that helps make your point; it is their quality. Strong, precise words will carry your meaning quickly and powerfully to your readers.

Day's list of the components of the Discussion is good. You should note, as you read, how clearly he writes. He does not use long, complex words or sentences. You can understand his points quickly. This text is a model of effective writing.

After you read Chapter 10, read again your own Methods and Results sections. Start to think about how you can state simply and clearly what Day calls "the meaning of your little bit of truth."

In the next lesson, we will give you some more information about writing the Discussion section, and you will move even closer to completing a full draft of your paper.

AN ENDING NOTE : Please feel free to contact your local instructor with questions about this lesson.



Lesson Eleven

Writing the Discussion Section

OBJECTIVES OF LESSON ELEVEN

By the end of this lesson, you will

1. Understand more fully the proper format and content of the Discussion section of research papers
2. Be able to write a first draft of your own Discussion section.

ASSIGNMENTS FOR LESSON ELEVEN

1. Read the paragraph about the content of the Discussion in the "Uniform Requirements" (Appendix A, page 11).
2. Write a first draft of the Discussion section for your paper. For now, cite references in the text by author and year. When the article is completed, you can go back and easily number the references in the order cited if that is the journal's style. This assignment will be explained in more detail at the end of this week's lesson.

Review of Chapter 10 in Day's Book

As you start to write and revise the draft of your Discussion section, remember Day's warning: Don't obscure the meaning of your data by writing a Discussion that is too long or too complicated. If you want readers to read your paper and to understand the important implications of your work, you must write this section clearly and concisely.

Day pointed out six types of information that are appropriate for the Discussion: (1) the principles, relationships, and generalizations shown by your results; (2) any exceptions or lack of correlation that have occurred within your results; (3) comparison of your results with those of related published studies; (4) both the theoretical and practical applications of your work; (5) a conclusion that is as clear as possible given the complexity of your work; and (6) a brief summary of the data that support each conclusion. By including these components in your Discussion, you will quickly show the readers why your work is worth their consideration. The more clearly you explain each component, the more easily your reader will understand why your results are important and relevant.

Writing the Discussion Section

Content of the Discussion

Zeiger (1991) says that the Discussion is the culmination of the paper. This is the section in which you clearly tell the reader what is new and important about your research.

To write your first draft of the Discussion, read again your Results section and ask yourself, "What does this all mean?" Now you provide the answer to the research question that motivated you to do the study.

To answer your research question effectively, you might begin the Discussion with a brief restatement of the research question and then provide a summary of the results with an explanation of how they answer the question. However, don't just list your results; instead, restate them in a meaningful way. This quote from Zeiger (1991) expresses the difference nicely: "The difference is the difference between lining up pieces of a puzzle in a row (summary of results) and fitting the pieces together into a picture (answer supported by relevant results)" (page 167).

After this strong beginning, you can cite other relevant studies and explain how they support your results or suggest why their results differ from yours. Sometimes you will be defending your answer against the findings of other research, and sometimes you will be discussing how previous research supports your interpretation of your study's results.

Also discuss any limitations of your methods or assumptions and the ways in which they might have influenced the results. Rada (1996, page 8) calls this part of the Discussion a "candid critique," which is necessary because "acknowledging gaps in the work makes it more, not less, credible."

Sometimes an exciting and unexpected result will suggest either another research question or a new interpretation. Certainly include these in the Discussion, but don't dwell on them to the point that your readers lose sight of your original research question.

To conclude the Discussion, avoid trite phrases like "Future studies are needed." Although commonly used and sometimes appropriate, such endings are weak statements in what should be the strongest section of the paper. Remember that many readers first look at the Discussion--at the end of the Discussion. If you don't state clearly in the Discussion, what the results mean in terms of answering your question, these people will not take the time to read the rest of your paper. So, at the end of the Discussion, remind your readers about your most important results and conclusions, tell them how widely these conclusions can be generalized, and specify what implications can be drawn.

Tips for Writing the Discussion

The list below provides you with some general advice about writing the Discussion. They are derived from information in various books on biomedical writing (Huth 1990, O'Connor 1991, Zeiger 1991).

- > Focus on the major lines of your argument.
- > Avoid unqualified statements and conclusions that are not completely supported by your data.
- > Use present tense for known or proved facts; use past tense to describe the results of the current study.
- > Beware of extrapolating conclusions from one species to another.
- > Avoid priority statements like "For the first time" (someone may just have published similar findings or may have published them in a journal that you do not read regularly).

Choosing the right words is particularly important in the Discussion to distinguish between speculation and facts. In English, verbs and adverbs can help you make that distinction:

- > "Prove" or "demonstrate" show that you believe very strongly in the truth of the statement to follow.

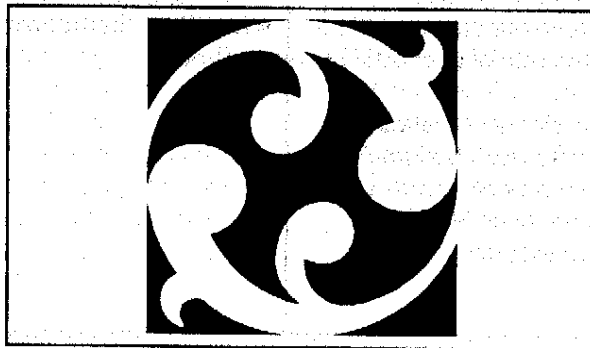
- > "Show," "indicate," and "found" precede answers of which you are less certain (these verbs are frequently seen in the Discussion sections of biomedical papers because these studies rarely definitively "prove" an answer).
- > "Imply" and "suggest" are MUCH weaker than the other verbs listed above; these can be used to introduce implications or speculations.
- > The certainty of an answer can be weakened by using helping verbs and adverbs such as the following: "can" and "will" (a reasonable amount of certainty); "should" or "probably" (a strong implication); and "may," "could," or "possibly" (a weak implication).

The sample sentences below show the importance of word choice in the Discussion. Consider how strongly you believe each of these statements:

- > This new drug decreases blood pressure.
- > This new drug probably decreases blood pressure.
- > This new drug possibly decreases blood pressure.
- > These results prove that this new drug decreases blood pressure.
- > These results suggest that this new drug decreases blood pressure.
- > This new drug does decrease blood pressure.
- > This new drug can decrease blood pressure.
- > This new drug should decrease blood pressure.
- > This new drug may decrease blood pressure.

The Purpose of the Discussion

In summary, the purpose of the Discussion is to answer the research question, explain how the data support that answer, and explain how your answer fits in with existing knowledge. Now let's consider the Discussion sections of 3 of our 5 sample articles to see how they accomplish this purpose. Your local instructor has copies of annotated Discussion sections from articles 3 and 4 if you wish to see them.



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The Writing Assignment

After reviewing the material about writing the Discussion that has been presented here, in the Uniform Requirements (Appendix B, page 11), and in Day's book, write a first draft of your Discussion. Proofread it for typographical errors and give it to your local instructor for feedback. Don't try to make your draft perfect—it will still be revised many times before it is submitted to a journal. In the next weeks, we will proceed to the Introduction and Abstract; finishing a full draft of the Discussion now can help you write those two sections.

AN ENDING NOTE: Please feel free to contact your local instructor with questions about this lesson or assignment.

Lesson Twelve

Recognizing "Stock Phrases" and Writing the Introduction (Part 1 of 2)

OBJECTIVES OF LESSON TWELVE

By the end of this lesson, you will be able to

1. Recognize stock phrases and use them to improve your writing and to make the writing process easier
2. Apply information about standard format and content to your Introduction sections

ASSIGNMENTS FOR LESSON TWELVE

1. Look through at least 2 of the research articles published in the journal you have chosen for submission of your article. (If this is not possible, look through 2 of the articles in your reference list.) From these articles, make a list of at least 3 stock phrases that you might use in your Introduction, Methods, Results, or Discussion; indicate for each phrase where you might use it.
2. Read Chapter 7 ("How to Write the Introduction") in Day's book. If you have any questions, ask your local instructor.

Stock Phrases

The more you read research articles in English-language journals, the more you will realize that there are standard phrases ("stock phrases") that are used in many of these articles. If you begin to look for stock phrases as you read articles in your field of interest, you will find phrases that you can use in your own papers. For scientific writing, it is not essential that every word or phrase be "new"; "creativity" in scientific writing is much less important than clarity. Just as readers are used to seeing articles organized according to the standard format (abstract, introduction, methods, results, discussion), they are also accustomed to seeing certain phrases and they quickly understand the meaning of these phrases.

The following examples of stock phrases were found primarily in 1996 issues of the *Journal of the American Medical Association (JAMA)* and the *Journal of Physical Chemistry*:

STOCK PHRASES FROM INTRODUCTION SECTIONS

- "significant and widespread problem"
- "it is estimated that _____"
- "there is a need for _____"
- "At present, little is known about _____"
- "Recent studies have focused on _____"
- "In this paper, we will establish _____"
- "Previous studies have revealed _____"
- "Evidence suggests _____"
- "The mechanisms that underlie _____ remain unclear"
- "To test whether _____, we _____"

STOCK PHRASES FROM METHODS SECTIONS

- "descriptive statistics"
- "sociodemographic factors"
- "eligible and consenting patients were randomly assigned"
- "We used _____"
- "The experimental apparatus has been described in detail elsewhere."¹⁹
- "We also measured _____"

STOCK PHRASES FROM RESULTS SECTIONS

- "Our findings suggest _____"
- "the dose-response relationship appears to be slightly stronger for _____"
- "We found no clear relationship between _____ and _____"
- "overall response rate"
- "We have calculated _____"
- "Figures 8-10 show _____"
- "Typical data are shown in Figure 7."
- "We found a marked difference between _____ and _____."

STOCK PHRASES FROM DISCUSSION SECTIONS

- "several limitations"
- "There are other possible explanations"
- "efforts should be made to _____"
- "This method could be used to _____"
- "We have shown _____"
- "In the future, we will extend the present studies to _____"
- "Our data leave open the question of whether _____"
- "These data suggest that _____"
- "Our results indicate that _____"
- "One possibility is that _____. Alternatively, _____"
- "It is possible that _____"
- "The experiments show that _____"
- "We have demonstrated that _____"

By suggesting that you look for and use stock phrases, we are NOT encouraging you to copy someone else's writing. Rather, you are taking advantage of standard ways of expressing ideas, although the content of the ideas will differ in every research paper. Using stock phrases will make your writing easier and more clear to the readers of English-language journals.

Chapter 7 in Day's Book: "How to Write the Introduction"

Now that you have written drafts of your Methods, Results, and Discussion, you are in a good position to draft the Introduction that will lead the readers into those sections.

Day starts Chapter 7 with some advice about the order in which to write a scientific paper. We have followed, in the first 11 lessons here, the order suggested by many other experts in scientific writing. Day notes that some experienced writers write the Abstract and Title last. That is what you will be doing in the coming weeks.

The second paragraph on page 33 indicates that it is a good idea to start writing the paper while you are still doing the research work. This timing will be true for some of you in this class, but not for all of you. As you write papers in the future, you should consider his advice: as you are designing and conducting your studies, think about how you will present the your materials and methods in the Methods section and how you may want to present the data in the Results section. By doing this, you will make sure to note all the information for the Methods and Results sections you plan to write.

Other authors, as we shall see in the next lesson, state that the purpose of the Introduction is to provide for the readers the basic research question and the reasons for pursuing it. This is very similar to what Day says, "you should state briefly and clearly your purpose in writing the paper," as well as provide the background information and rationale that led to your research.

Note that the present tense is used for much of the Introduction because you are writing mostly about existing knowledge and the problem that your research is addressing.

Day's 5 rules for a good Introduction are worth reading several times. Be sure you understand these rules and apply them as you are writing this section:

1. Present very clearly the nature and scope of the research problem
2. Review the pertinent literature
3. State the method of investigation
4. State the major findings
5. State the main conclusions

By the way, his reference to "An O. Henry surprise ending" relates to an American author, O. Henry, whose short stories inevitably end with a surprise. In the third paragraph, Day makes a joke based on English grammar by saying that trying to build suspense in a scientific paper "goes over like a double negative at a grammarians' picnic." He's referring to an expression such as "I don't know nothing" (two negatives: "don't" and "nothing"). This type of expression is never pleasing to English grammarians, whether they are in a classroom or on a picnic.

As Day says, you are not writing fiction here; you are trying to write an Introduction that will convince the reader that your research question and answer are important. To do that, some experts recommend that you briefly summarize the important findings and conclusions in both the Abstract and the Introduction.

At the end of the first paragraph on page 35, Day suggests that the Introduction needs a "hook" (something that will make the readers want to read further), and his suggested "hook" is a clearly stated summary of what you want to convey in your Introduction: "Why did you choose that subject, and why is it important?"

The third paragraph on page 35 ends with the statement that "a bit of redundancy with the Abstract is often desirable." You probably have not written your abstract yet, but we think now is a good time to point out the differences between the Abstract and the Introduction. Your Abstract will provide a summary of each section of the paper; one or two sentences will be devoted to each section. Therefore, the Abstract describes the research problem and its background very concisely, whereas the main content of the Introduction is the statement of the problem and background information that gives its context and importance. The "bit of

redundancy" applies to the final parts of both the Abstract and the Introduction, which may succinctly summarize the results and conclusions (both of which will be more fully explained in your Results and Discussion, respectively). Whether the results and conclusions belong in the Introduction is controversial; we will discuss this controversy in more detail in the next lesson.

In the last section of this chapter, Day recommends that you mention in the Introduction any previous presentation or publication of this study. Some journals, however, prefer that you note any previous presentations or partial publications of the material in a footnote. Look at the Instructions to Authors and at articles published in your target journal to see how this situation is handled there. If you have published much of the information in a Chinese-language journal, it is appropriate to cite that publication in the Introduction.

Finally, the last paragraph deals with the problem of defining technical terms and abbreviations. It is particularly important for authors who do not speak English as their first language to tell the readers what they mean by scientific terminology, acronyms, and abbreviations. If you are not sure whether you need to provide an explanation, provide it. The journal editors can always remove an explanation or definition if they think their readers will not need it; however, leaving out a needed definition may confuse or mislead the readers. Remember that acronyms may mean different things in different countries, so take the extra time and effort to define each of these completely.

Each acronym or abbreviation should be explained the first time it is used (often in the Introduction); the full definition is given first, followed by the acronym in parentheses. For example, if the acronym SLE is used throughout your paper, it should look like this the first time it appears: "systemic lupus erythematosus (SLE)." After that, you can use SLE without defining it again. But it is very important that you define every acronym the first time you use it in your paper.

Notes on the Assignments

1. As you look for stock phrases in your journal of choice, you may find a better way to express something that you have already written in your Methods, Results, or Discussion. If this happens, go back to that section and make the change now so that you don't forget to do it. Find at least three phrases that seem to you to be "stock phrases," like those listed above, and give the list to your local instructor for feedback.
2. Read Chapter 7 in Day's book and begin to think about or write the Introduction for your own paper. In next week's lesson, we shall provide some more information about writing an effective Introduction, and we will look at and analyze the Introductions from the 5 sample articles.

AN ENDING NOTE: Please feel free to contact your local instructor with questions about this lesson or assignment.

Lesson Thirteen

Writing the Introduction (Part 2 of 2)

OBJECTIVES OF LESSON THIRTEEN

By the end of this lesson, you will

1. Understand more fully the proper format and content of the Introduction section for research papers
2. Be able to write a first draft of your own Introduction section

ASSIGNMENT FOR LESSON THIRTEEN

Write a first draft of the Introduction section for your paper. This assignment will be further explained at the end of this lesson.

Review of Chapter 7 in Day's Book

The five "rules" for writing a good Introduction are worth repeating. Day says that an Introduction should do the following:

1. Present very clearly the nature and scope of the research problem
2. Review the pertinent literature
3. State the method of investigation
4. State the major findings
5. State the main conclusions

Remember that the purpose of the Introduction is to tell your readers why you chose this topic and why your research is new and important. Without this information, your readers have no reason to continue reading your paper.

The Content of the Introduction

Not all experts agree with Day about the content of the Introduction, which means that you have some choices concerning what you include. If we look at the five rules reviewed above, we can see what is generally agreed on and what is open to debate.

There is no question that, by the time the readers finish your Introduction, you should have presented the background and the rationale for the research question that will compel them to read further. The Introduction must answer the questions "What did you study?" and "Why did you study it?" This covers Rules 1 and 2 above. Therefore, every Introduction should make clear the key background information leading to the research (along with the citation of the minimum number of references to support that information) and should state the purpose of the investigation.

In trying to find the right references to cite, remember that you can cite one or two review articles, which will lead interested readers to other sources. Besides the review articles, you may cite the classic studies on the subject, the most important studies on the subject, and the studies you believe were conducted particularly well, giving great validity to their results.

Be sure to define all the acronyms and abbreviations in the Introduction. This is very important so that everyone who reads the paper--the journal's editors and reviewers--will understand your paper clearly. We will discuss this in more detail later when we get to the final revision stages, but you can save time by putting in all the definitions now as you write the draft.

As when you wrote the Discussion section, you shouldn't number your references at this point. Instead, place in parentheses the author(s) and year of the publication you wish to cite. When you are almost ready to submit your article to the journal, you can number the references or use whatever reference style is preferred by that journal. However, when you are writing several drafts, you want to avoid the time-consuming task of renumbering references with each draft.

The HEART of the Introduction is the QUESTION or PROBLEM that inspired your research. Zeiger (1991) says that the research question can be stated as the purpose of the paper, a statement of the "unknown," or an unanswered problem based on previous studies by you or others. She also lists several phrases you can use to help the reader recognize the research question. These are like the stock phrases that we discussed in Lesson 12. Phrases that defined the research question for the reader include the following:

"We conducted this study to determine . . ."

"The purpose of this study was to . . ."

"Our objective in performing this experiment was to . . ."

"On the basis of previous studies, we asked whether . . ."

Rule 3 from Day's chapter is somewhat controversial. Briefly describing the experimental method or protocol is not considered essential to the Introduction. However, as we see in the samples below, such a description can be provided in the Introduction when it is appropriate.

Day's Rules 4 and 5 are very controversial. Some editors believe strongly that the results and conclusions do not belong in the Introduction (especially if they are already summarized in the Abstract). On page 8 of Appendix A, the Uniform Requirements, the consensus of the participating editors is just the opposite of Day's view on including results and conclusions in the Introduction. Under the heading "Introduction," the Requirements state this: "State the purpose of the article. Summarize the rationale for the study or observation. Give only strictly pertinent references, and do not review the article extensively. Do not include data or conclusions from the work being reported."

Don't be dismayed by this controversy. First, check the Instructions for Authors for the journal you have chosen (your target journal); it may state clearly whether that journal's editors want conclusions in the Introduction. Second, look at some articles recently published in your target journal. Check whether these articles have conclusions in their introductions. Third, you don't find guidance there, you may use your own judgment: (1) if your research (and thus your report) is very complicated, summarizing the results and conclusions in the Introduction may be helpful to the reader, but (2) if your paper is short and not complex, there may be little need to repeat a summary of conclusions that have already appeared in the Abstract. Third, remember that there is almost always a revision process. The journal editor will ask you to modify your Introduction as needed during that revision stage, and you will do well if you follow the editor's advice.

Helpful Hints on Writing the Introduction

In your Introduction, you want to explain your research question well enough that the readers will want to read the rest of the paper, and you want to explain the background well enough that the readers can understand the rest of the paper. To accomplish those two purposes, here are some hints from textbooks on writing scientific papers (Huth 1990, O'Connor 1991, Zeiger 1991).

- > Remember that your Introduction may be the "first impression" that your readers get--make a good impression.
- > Explain the background of your research but don't underestimate the existing knowledge of your readers (if they are reading a scientific journal, they know the basics).
- > The Introduction should not be too lengthy; guidelines include lengths of 1-3 paragraphs, or 250-300 words.
- > Use present tense in the Introduction when you are discussing existing knowledge; use past tense when you are discussing what others did or thought in the past or what you did or concluded from the current study.
- > In the Introduction, it is proper and acceptable to use "I," "we," or "our," if appropriate. For example, it is preferable to write "We conducted this study to determine whether . . ." rather than "This study was conducted to determine whether . . ."



The Writing Assignment

On the basis of what you have learned in Lessons 12 and 13, write a draft of your Introduction section. For now, cite any references in the text by author and year. When the article is completed, you can go back and easily number the references in the order cited if that is the journal's style. Submit your draft to your local instructor for feedback.

AN ENDING NOTE: Please feel free to contact your local instructor with questions about this lesson or assignment.

Lesson Fourteen Writing the Acknowledgments; Summary and Evaluation, Semester 1

OBJECTIVES OF LESSON FOURTEEN

By the end of this lesson, you will

1. Be more familiar with the principles of preparing the Acknowledgments sections for your papers
2. Be able to revise the sections in your paper so that they meet the criteria discussed in the review material below.

ASSIGNMENTS FOR LESSON FOURTEEN

1. Read Chapter 11 ("How to State the Acknowledgments") in Day's book.
2. Look at a copy of your chosen journal and study the Acknowledgments sections of 3 research papers.
3. Write a draft Acknowledgments section for your paper, or write a brief explanation of why none is necessary. Submit this to your local instructor.
4. Fill out the evaluation form and submit it as indicated in the on-line material.

COMPOSING THE ACKNOWLEDGMENTS SECTION

Like a good Acknowledgments section, Day's Chapter 11 on stating the acknowledgments is brief and clear. On page 49, Day summarizes two common ingredients of Acknowledgments sections: (1) the names of those people who have provided significant technical help, as well as the sources that have provided equipment or other experimental materials and (2) the source of any outside support (some journals put this information on the title page).

At the bottom of page 49, the material in parentheses is a joke that you may ignore. The

Acknowledgments section is the section in which you sincerely thank the people, companies, or agencies who have supported the research described in the paper. Notice that the Acknowledgments should not list friends or relatives who were not involved in the research; for example, although thanking a spouse for encouragement is a nice thing to do, it is not appropriate in the Acknowledgments section for a scientific paper.

Day next states that authors show courtesy in the Acknowledgments by expressing their appreciation to those who have aided the research. Read the first paragraph on page 50 carefully to help guide you in writing your Acknowledgments. Also, the Acknowledgments section is a good place to thank colleagues who somewhat contributed to the formulating of an idea, who reviewed the paper, or (in the case of a Department Head or other administrator) who approved the project. These people are not qualified to be authors, but you may want to give them some recognition.

Other books on scientific writing express more strongly Day's advice to "show the proposed wording of the Acknowledgment" to whomever you are acknowledging. Huth (1990) says that it can be a "breach of scientific ethics" NOT to obtain written permission from all those whose names you are listing in the Acknowledgments. First, to acknowledge someone's help may imply that the person endorses the conclusions of the research; if your helpful colleague does not totally agree with your paper, you may embarrass both your colleague and yourself by thanking him or her publicly. Second, the person being acknowledged has a right to see and approve the wording of the acknowledgment; for example, an editor who spent much time improving the English and reorganizing the contents of your paper may not appreciate an acknowledgment that thanks him or her for "clerical support" (which indicates tasks such as retyping or photocopying) and might ask you to change those 2 words to "editing the manuscript."

In the 3rd paragraph on page 50, Day makes the good suggestion that you be specific about which ideas or interpretations you are acknowledging. It's true that you don't want to imply that the person being acknowledged came up with all your conclusions, if he or she actually inspired only one of the major conclusions. However, keep in mind that the Acknowledgments must be brief, so keep any specific description of a contribution down to a phrase of about 4 or 5 words.

Once again, you need to check the "Instructions to the Authors" and some sample Acknowledgments from your target journal before you draft your own. As mentioned above, some journal editors like authors to put grant information in the Acknowledgments; others want that information on the title page of the paper. Also, some journal editors encourage authors to acknowledge the copyright holder of any table, figure, or text that they received permission to reprint in their papers; other journal editors believe that placing the statement "reproduced by permission of _____" with the table, figure, or text is sufficient acknowledgment.

In our experience, most journal editors agree with Day's final point in Chapter 11. They like to see Acknowledgments start with the simple "We thank." Because it is clear and direct, "We thank" is preferable to "We wish to thank," "We would like to thank," or "The authors thank." The last sentence of Day's chapter is another joke that's hard to translate. Fortunately, you don't have to understand the joke to realize that the preferred start of the Acknowledgments is "We thank" (or "I thank" for a 1-author paper).

SEMESTER REVIEW

You have now finished a first good draft of a research paper. During the past weeks, you have written sections for that research paper using the advice given in Day's book and this course packet. Between semesters or early next semester, you may re-read your paper and complete one more revision; you certainly should finish revising the first draft according to the suggestions from your local instructor. Next semester, you will submit your paper to an expert American editor for evaluation and suggestions, then you will revise it once more according to those suggestions and submit it to your target journal. Your local instructors and we will help you through each phase of the process.

We will now review the major points we have covered about writing a scientific paper. We have spent much time on each of the individual pieces of the paper, and now is a good time to step back and look at the "big picture."

In the sections below, we have reviewed some of the major points covered, including the purpose of this course, the importance of using Instructions to Authors, the selection of an appropriate journal, and the appropriate content for the major sections of an IMRAD paper.

Purpose of the Course

As mentioned in the first lesson, **the main purpose of this course is to guide you in the writing of a research paper that has a good chance of being published in an English-language biomedical journal.** As Day said in his Preface to our textbook, "The goal of scientific research is publication. . . . A scientific experiment, no matter how spectacular the results, is not completed until the results are published" (page ix).

The material below reviews the topics covered this semester to fulfill the above-stated purpose.

Using the "Instructions to Authors"

The "Instructions to Authors" provided by a scientific journal often provides important information about the journal, such as the following:

- What is the purpose or scope of this journal?
- What are the requirements for papers submitted (for example, specifying the number of words allowed per paper and the number of copies of the paper and illustrations to be sent to the editorial office)?
- Do submitted papers undergo peer review?

If you look at the "Instructions to Authors" before you start to draft your paper, you will save some revision time and effort later.

Selecting an Appropriate Journal

Here's a review of some of the questions to consider when deciding which is the most appropriate journal for your article.

1. Does the printed "Instructions to Authors" indicate that the format and topic of my paper are appropriate?
2. How large is the journal's circulation?
3. Who reads the journal, and are they the best audience for my paper?
4. What is the average time between acceptance and publication of a paper in this journal?
5. How well are the photographs and other illustrations printed in this journal?
6. Does the journal have high scientific quality but a reasonable acceptance rate (50% or

above)?

7. Is the journal covered by the major abstracting and title-listing services?
8. Does the journal require the authors to pay page charges? Do they charge for printing color figures? If so, can authors with limited budgets request a waiver of these charges?
9. What is the cost of reprints?

The IMRAD Research Paper

Remember that most English-language scientific journals require authors to write their articles according to a standard format called IMRAD: introduction, methods, results, and discussion. Below you will find short summaries covering the four main sections and the other important parts of a research paper (title, author list, abstract, acknowledgments, references).

Title: What is this paper about? The best title "carries the irreducible number of terms needed to accurately describe the content of your paper" (Huth 1990).

1. Accuracy: The title must identify the main topic of your paper.
2. Brevity: The title should be no longer than 10-12 words or 100 English letters, spaces, and punctuation marks. Include everything in the title that is needed, but no more.
3. Effectiveness: Your title is effective if it interests the appropriate readers and helps them locate the paper in standard indexes and databases.

Author List: Who contributed substantively to design and perform this study and to write this paper?

1. Each author should have generated at least a part of the intellectual content of the paper.
2. Each author should have taken part in writing the paper, reviewing it for possible revision, or revising its content.
3. Each author should be able to defend publicly in the scientific community all the intellectual content of the paper.

Abstract: What does this paper tell us (normally in ≤ 250 words)?

To write an effective abstract that will attract the appropriate readers to your paper, follow these guidelines:

1. Use short, simple sentences that contain only the essential words to make your Abstract clear and concise.
2. Avoid abbreviations and jargon.
3. Use signals to indicate which part of the research paper you are summarizing.
4. Use past tense for most of the Abstract. (However, present tense is permitted for the statement of the question and for your conclusions.)
5. Stress the new and important aspects of your study.
6. Follow the guidelines in the "Instructions to Authors" for your target journal. Also, look at 3 or 4 abstracts of research papers in a recent issue of the journal, and use these abstracts as models for your Abstract.

Introduction: What is the background and purpose of this study? What is the central question it attempts to answer?

The purpose of the Introduction is to tell your readers why you chose this topic and why your research is new and important. At the least, an Introduction should do the following: (1) clearly present the nature and scope of the research problem, and (2) briefly review the literature.

Methods: What was done and how was it done?

The Methods section answers 2 basic questions about a scientific study:

1. What was used for this study? (Materials)
2. How was the study done? (Procedures)

Remember to check the "Instructions to Authors" and use published Methods sections as models; use the past tense in the Methods section, and describe the steps of the study in the order in which they were done (chronological order) whenever possible.

Results: What happened? What are the chances that this could have happened by chance?

In Lesson 7, you were given several hints for writing an effective Results section. These include the following:

1. In the Results, either present the data in the text, or guide the reader to illustrations and tables that give the supporting evidence, or both. Try not to have too much overlap or duplication among text, illustrations, and tables.
2. State the main results and their significance in the text part of the Results, but use tables and illustrations to present most of the data.
3. Use the past tense for the Results section.
4. Use few, if any references, in the Results section.

Discussion: On the basis of the results found, what is the answer to the central question posed in the Introduction? How do those results support this answer?

Remember that there are 6 types of information appropriate for the Discussion section:

1. The principles, relationships, and generalizations shown by your results
2. Any exceptions or lack of correlation within your results
3. Comparison of your results with those of related published studies
4. Both the theoretical and practical applications of your work
5. A conclusion that is as clear as possible given the complexity of your work
6. A brief summary of the data that support each conclusion

Acknowledgments: Besides the authors, who else helped perform the study, analyze the results, or write this paper? Who contributed funds, equipment, or supplies to this research?

The Acknowledgments should be brief and follow the guidelines given in the "Instructions to Authors" for your target journal. Only include in the Acknowledgments the names of those who have made some special, substantial contribution to your work. Always obtain written permission from people to use their names in this section.

References: What other studies have been done recently that are relevant to the methods, results, or interpretation of this study? What classic publications contain either the basic methods used or early insights into this topic? What review articles will give readers an overview of the topic and identify more sources of information?

The reference section has 4 major purposes:

1. To direct the interested reader to sources for further information
2. To help the author avoid detailed repetition of already published methods, results, and conclusions
3. To indicate who has been responsible for previous research and findings on this topic

4. To give credibility to statements made in the text

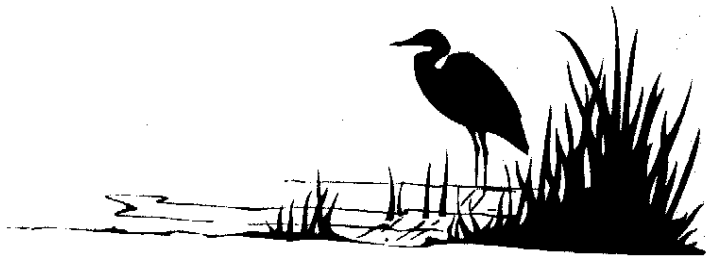
The "Big Picture"

A good research paper is written so that knowledgeable readers know exactly what content each section will cover. And, taken together, all the separate parts come together to form a unified whole. This is your goal: a unified, consistent research paper that is organized in a standard way and that effectively conveys your message to the readers.

AN ENDING NOTE: Please feel free to contact your local instructor with questions about this lesson or assignment.

SEMESTER EVALUATION

Please complete the following evaluation and submit it as indicated in the on-line material. Where possible, we will incorporate your suggestions into the course during the next semester. Also, your suggestions will help us improve the course for future students.



BIOMEDICAL WRITING COURSE -- FIRST SEMESTER EVALUATION

Part A. Please indicate (by circling the appropriate number) the extent to which you agree with the statement below. We would appreciate any comments you can provide to explain your answer.

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
1. The course packet was helpful.					

COMMENTS

2. The textbook by Day was helpful.	1	2	3	4	5
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COMMENTS

3. The online information was helpful.	1	2	3	4	5
--	---	---	---	---	---

COMMENTS

4. The local instructor communicated well.	1	2	3	4	5
--	---	---	---	---	---

COMMENTS

5. The local instructor answered my questions.	1	2	3	4	5
--	---	---	---	---	---

COMMENTS

6. The Internet section worked well.	1	2	3	4	5
--------------------------------------	---	---	---	---	---

COMMENTS

7. I prepared a better first draft of the paper than I could have without taking this course.	1	2	3	4	5
---	---	---	---	---	---

COMMENTS

8. For me, the level of this course was about right.	1	2	3	4	5
--	---	---	---	---	---

(If you disagree with this, please indicate why in the Comments section. Was the level too high or too low?)

COMMENTS

Part B. What do you think were the 2 best things about the first semester of this course?

1.

2.

Part C. If you were to make 2 changes to the first semester of this course, what would they be?

1.

2.

Part D. Additional comments and suggestions (feel free to continue on the back of this page):