

Research Methodology

10/22/09

Remaining assignments for OPT 61111 – Research outline

Over remaining weeks of the semester you should meet regularly with your faculty advisor to plan your research project and develop the research outline.

Between November 2-10, schedule an appointment with Dr. Salmon to discuss your project. This is also a graded (complete/incomplete) assignment.

A 1-2 page outline of your research project is due on December 8. No IRB draft is required this semester. An example research outline is attached to end of these notes. It should have the following main parts.

- Project title with names of the investigators
- Your research question
- Significance or justification for your study
- How you plan to collect data and who your subjects will be
- What data you will collect and how you will analyze it

You should list your faculty advisor as the last investigator in the project. The research outline is due in Dr. Salmon's mailbox by **5:00 P.M., Tuesday, December 8, 2008.**

Pending assignment for OPT 6122 – Literature review

The final assignment for this course (OPT 6122) is the literature review. This paper should provide broad coverage of your topic with in-depth consideration of the focus of your research. The literature review must do more than simply summarize articles. It must **integrate and interpret** the knowledge in a way that is relevant to your topic. It should discuss the kind of methods you will employ and address key issues you will need to understand to complete your project. Table 1 summarizes requirements for this paper. The literature review is due in Dr. Salmon's mailbox by **5:00 P.M., Tuesday, December 8, 2008.**

Table 1. Requirements for the literature review

Number of students	Number of words	Number of pages	Number of references
1	2,000	~6	30
2	3,000	~10	50
3	4,000	~12	70

Organize the literature review with the following main sections.

- Heading with the title, names of all authors, faculty advisor and date.
- Introduction
- Paragraphs with headings for the main parts of your literature review
- Conclusion
- References formatted in the OVS style

Summary of deadlines

- Now – Dec 8 Meet frequently with advisor to plan project
- November 2-10 Meet with Dr. Salmon to discuss proposed project
- December 8 Research outline due to Dr. Salmon
- December 8 Literature review due (to advisor and Dr. Salmon)

Dr. Wickham's guide to technical writing

Technical writing requires a clear, concise statement about a relatively limited topic. This style of writing often emphasizes relatively short sentences and paragraphs. Each paragraph usually

focuses on a single aspect of, a single citation about, a question.

In your literature review start off with a broad view of a subject and bring that view to a narrow point at the end.

The literature review cannot just be several small summaries pasted together. It must "analyze, consolidate, and synthesize the literature on a subject of interest." Synthesis (meta-analysis) means an *in depth* consideration of how different articles relate to one another. It also implies that the author of the review will analyze individual reports. Literature reviews usually follow a format of logical organization, with headings and subheadings, chosen by the authors. A conclusions or discussion segment allows the authors to translate their interpretation of the literature into new conclusions. A literature review that does not relate and interpret the literature in new ways is inadequate. The literature cited section is of great importance in a review.

Careful investigators choose to use peer reviewed articles and to publish in peer reviewed journals. Peer review means that an article is given to several different knowledgeable readers who proceed to see if it is logical and provides a path to repeatability. Sending an article off for peer review is not for the timid or weak of ego. Reputable journals give an author his or her money's worth of review. However, the process serves to make each article better and helps to limit the amount of unnecessary and misleading information in the literature.

Many possible literature sources are more likely to not be peer reviewed and, thus, lack relevance. Journals that don't routinely practice objective peer review include throwaways ("Optometry Today"), and those serving groups whose opinions color data collection, analysis and conclusions. Similarly, many web sites are self-serving. One of the problems with information coming off the World-Wide Web is a general lack of peer review. Competent scientists publish data online that they believe accurate, but how do you decide between competent scientist and Joe-from-down-the-street?

A paper is cited in a text passage by a superscript number at the end of an appropriate sentence or section referencing that paper.¹ If multiple references are made in a sentence, a superscript number is placed after each fact or name (i.e. Wickham², Fulk³, etc.). If the reference is at the end of a sentence, the superscript reference number follows the punctuation mark.⁴

Referencing in a text is a key issue in technical writing. There is more than one accepted technique, but at NSUOCO, we *encourage student authors to write in relatively brief, subject-oriented paragraphs*. So, if you are *writing a passage describing a particular paper from the literature*, your reader will find it more easily understandable if you would *reference the first statement directly referring to that paper*. The other style of referencing a paragraph of limited focus is to reference only the last sentence in the paragraph. A lively discussion in a single paragraph having viewpoints coming from several papers will get a bit messy. You definitely will want to avoid run-on paragraphs. Also, keep your sentences as short as possible.

Dr. Wickham's important writing hints

1. The term "Data" is plural so write, "Data are;"
2. Humans are identified by who, not that or which, so write, "Subjects who had ... ;"
3. Don't let paragraphs get too long. You will lose your reader;
4. Avoid excessively long sentences. Anytime a sentence occupies two lines of text, it is on the verge of being too long. In a technical article, long sentences make it difficult for the reader to follow the point you try to make. Try to keep your sentences short and direct without making them too choppy;
6. When numbers are between zero and nine use the written word.

7. Avoid the use of jargon, colloquial terms, partisan terms and negativity;
8. Define terminology so a nonclinician can understand what you mean. Also, don't use an acronym (vision therapy = VT) without defining it;
11. Don't use a paper as a reference unless you've read it.
14. If you cite by name in the text, list the first three authors of a paper before switching to et al. (Fulk, Cyert, Jones et al.⁷)
15. Only the first word in a journal article title is capitalized unless a proper name is used. The same is true for a book chapter title. However, in a book title, all words are capitalized;
16. Use the correct abbreviation for a journal title. You can find these using Medline, Index Medicus (hard copy in Library) or by looking at the journal itself;
17. Don't list degrees, worksite, or full names in a citation.
18. Do not change an author's intent/conclusion by noting only partial data;
19. Work overtime to find and eliminate the indefinite "it." This is an "it" that does not refer to any specified or generally understood noun.
20. Use your spell checker religiously, and proofread carefully on top of it;
21. Use "was" for singular and "were" for plural. However, "were" also defines a supposition. For instance, if I were to know you better, I might like you;
23. Explain technical terminology by giving a brief, understandable definition. A good example is TBUT. You shouldn't need more than a sentence or two to explain this term;

Dr. Salmon's comments on scientific writing

Don't say, "... was involved in ..." That's like saying that "... had something to do with ..." Be more specific and discrete. Say what it did.

Avoid unnecessary or excessive use of passive voice. If possible state clearly what you mean with fewer words rather than many.

Example 1

There were a greater number of significant correlations found in Experiment 1 than Experiment 2. (15 words)

Experiment 1 showed more significance correlations than Experiment 2. (9 words)

Example 2

In most other studies performed, extreme hyperglycemia was induced by an injection of somatostatin ...

Most other studies induced extreme hyperglycemia by injecting somatostatin ...

Example 3

only diastolic pressure was assessed

they only measured diastolic pressure

In all emails, say "Project."

Avoid pronoun-antecedant mismatches, especially for singular nouns.

Example

Each patient was given one drop of brimonidine and they waited 30 minutes before the first measurement.

Hyphenate numbers with measurement that are used like adjectives. For example, "a 4-mm diameter pupil."

Example of a research outline.

Element	Example
Project title	Effects of Hormone Treatment after Menopause on Lipoprotein (a)
Research question	What are the effects of treatment with estrogen plus progestin (compared with placebo) on Lp(a) levels in postmenopausal women?
Significance	<ol style="list-style-type: none"> 1. Epidemiologic studies suggest that hormone treatment after menopause may help prevent coronary heart disease, the largest cause of death in women. 2. Lp(a) is an understudied lipoprotein that has been found to be an independent risk factor for coronary disease in several studies. 3. Among conventional lipid-lowering drugs, only nicotinic acid in high doses lowers Lp(a) levels; however previous studies have suggested that hormone treatment may have this effect. 4. There is a need to confirm this finding for the estrogen plus progestin treatment that is now commonly used after menopause, and to extend it to women with existing coronary disease.
Design	<p>Randomized masked clinical trial with one year follow-up.</p> <p>Hypothesis. There will be a greater decrease in Lp(a) levels in the hormone-treated group than in the placebo group.</p>
Subjects	<ol style="list-style-type: none"> 1. Entry criteria. Postmenopausal women with documented coronary disease (evidence of prior myocardial infarction or coronary surgery, or 50% obstruction on angiography). 2. Recruitment. Consecutive sample of all women who qualify in 20 clinical centers, recruited in cardiology clinics and by mailings and advertisements.
Variables	<ol style="list-style-type: none"> 1. Predictor. Randomization to a daily tablet containing conjugated equine estrogen (0.65 mg) and medroxy-progesterone acetate (2.5 mg), or to a placebo identical in appearance. 2. Outcome. Change in serum levels of Lp(a) between baseline and 1 year, after randomization, measured immunochemically with a sandwich ELISA assay that uses a monoclonal antibody to apo(a) as the capture antibody (Strategic Diagnostics, Newark, DE)
Statistical issues	<ol style="list-style-type: none"> 1. Sample size. The number of women in the existing HERS trial available for this ancillary study was 2,763. This allows detection of a reduction in Lp(a) at 2mg/dL with a power of 90% using a t-test and two-tailed alpha of 0.05. 2. Change in serum Lp(a) levels for two groups. Two-tailed t-test.