INTRODUCTION

The writing of a term paper provides a student with an opportunity to master the scientific literature on a particular topic. Mastery in this context means not merely reading source materials and repeating the information obtained; it also means critically evaluating the available source materials. Each term paper should be a thorough survey and critical evaluation of the relevant literature on the chosen topic.

RESEARCH

Having chosen or having been assigned a term paper topic, the student must conduct a literature search to obtain information from which the term paper will be written. Sources of information may be classified as primary or secondary. Primary sources include articles in scholarly journals, court decisions, trial transcripts, statutes, personal memoirs, government records and the like. Secondary sources include textbooks, encyclopedia articles, review articles, newspapers, news magazines and so forth. THE STUDENT IS EXPECTED TO RELY ON PRIMARY SOURCES IN WRITING HIS TERM PAPER. Secondary sources should be used only as a guide to primary source materials. Reliance on secondary materials is a very dangerous habit. Two cases illustrate the hazards of failing to consult available primary sources:

a.) A staple of the nuclear freeze movement ideology and of New Age consciousness is the Hundredth Monkey Phenomenon. This is the name given to the supposed mysterious spread of learned behavior through a colony of macaque monkeys (Macaca fuscata) on a group of islands off the coast of Japan. Japanese primatologists provided the colony with sweet potatoes as food. According to an account published in the United States [1], one macaque learned how to clean the sweet potatoes by washing them in the sea. Soon this monkey had taught others to do this. The behavior spread throughout the colony, even to other islands with which the sweet potato-washing macaques had no contact (through the operation of telepathy or mass consciousness?) Eventually a skeptic [2] examined the original articles of the Japanese primatologist who had first noted this new behavior. These articles made clear that only a small number of macaques ever displayed the behavior: there was no generalized spread throughout the macaque colony.

Revised 8/19/99
b.) Historical accounts of the development of the polygraph contain an interesting example of mythology. In *Frye v. United States*, the defendant appealed his conviction for murder on the ground that the trial court erred in refusing to hear testimony concerning the results of a polygraph test that allegedly showed that he was telling the truth when he denied committing the murder. The D.C. Court of Appeals affirmed Mr. Frye's conviction and ruled polygraph tests inadmissible in criminal trials. According to polygraph proponents, Frye was pardoned seven years later when another person confessed to committing the murder. For the most part, polygraph proponents seem to have relied on Marston's [3] account of the case. Superficially, this account would appear to be reliable because Marston was the polygraph examiner whose testimony the trial court refused to hear. However, Starrs [4] has recently shown that according to available court records Frye was never pardoned and that no one else other than Frye ever confessed to the murder.

The student will be graded on the depth and thoroughness of his research. In particular for a fifteen- to twenty-page paper the student should develop approximately twenty-five primary references. A ten- to fifteen-page paper should have approximately a dozen references.

To get started, the student must find some initial references to his topic. He should begin by consulting the following:

- Topical and yearly bibliographies published by International Reference Organization in Forensic Medicine and Science (INFORM)(Gelman Library)
- *Science Citations Index* (Gelman and Himmelfarb Libraries)

Depending on his topic, the student may find it useful to also consult one of the following reference works:

- *Biological Abstracts*
- *Chemical Abstracts*
- *CA Selects: Forensic Chemistry*
- *Chemical Titles*
- *Index Medicus*

With the exception of *Index Medicus* which is available in the Himmelfarb Library all of the above publications are in the Gelman Library.

Overall, the most useful tool I have found for searching the recent forensic science literature is Article1st, which can be reached via the Gelman Library’s website.

*Gelman Library > Articles > ALADIN “Article and Other Databases” > Alphabetical List*

Revised 8/19/99
The following are the most important journals in the field of forensic science:

- Journal of Forensic Sciences
- Science and Justice (formerly Journal of the Forensic Science Society)
- Medicine, Science and the Law
- Forensic Science International
- Journal of Forensic Identification
- Zeitschrift fr Rechtsmedizin
- American Journal of Forensic Medicine and Pathology
- The AFTE Journal (AFTE = Association of Firearm and Toolmark Examiners)

Each of these has periodically published indices. Most of the above journals are available in the Gelman Library. The current year’s articles in Forensic Science International are available as pdf files from the Gelman Library’s website.

Gelman Library > Articles > ALADIN “Article and Other Databases” > Electronic Journals (under Article and Other Databases) > ScienceDirect (Elsevier) Web Editions > Journals > Forensic Science International

Most of the journals published by the American Chemical Society are now available online and can be accessed under “Electronic Journals” as above.

The Internet and World Wide Web can also be used for preliminary research. However, given the evanescent nature of web pages and other Internet information sources, these sources in general cannot be cited in term papers. Students can cite material from government websites (e.g. material from the FBI’s Forensic Science Communications). Material from the websites of forensic science professional organizations can also be cited. Students are also warned that some forensic science information posted on the Web is wrong (in some cases deliberately so). The following posting from the Web illustrates this problem:

"1994's Most Bizarre Suicide" - from Fortean Times #79

At the 1994 annual awards dinner given by the American Association for Forensic Science, AAFS President Don Harper Mills astounded his audience in San Diego with the legal complications of a bizarre death.

Here is the story:

"On 23 March 1994, the medical examiner viewed the body of Ronald Opus and concluded that he died from a shotgun wound of the head. The decedent had jumped from the top of a ten-storey building intending to commit suicide (he left a note indicating his despondency). As he fell past the ninth floor, his life was interrupted by a shotgun blast through a window, which killed him instantly. Neither the shooter nor the decedent was aware that a safety net had been erected at the eighth floor level to protect some window washers and that Opus would not have been able to complete his suicide anyway because of this."

Revised 8/19/99
"Ordinarily," Dr. Mills continued, "a person who sets out to commit suicide ultimately succeeds, even though the mechanism might not be what he intended. That Opus was shot on the way to certain death nine stories below probably would not have changed his mode of death from suicide to homicide. But the fact that his suicidal intent would not have been successful caused the medical examiner to feel that he had homicide on his hands.

"The room on the ninth floor whence the shotgun blast emanated was occupied by an elderly man and his wife. They were arguing and he was threatening her with the shotgun. He was so upset that, when he pulled the trigger, he completely missed his wife and the pellets went through the window striking Opus.

"When one intends to kill subject A but kills subject B in the attempt, one is guilty of the murder of subject B. When confronted with this charge, the old man and his wife were both adamant that neither knew that the shotgun was loaded. The old man said it was his long-standing habit to threaten his wife with the unloaded shotgun. He had no intention to murder her - therefore, the killing of Opus appeared to be an accident. That is, the gun had been accidentally loaded.

"The continuing investigation turned up a witness who saw the old couple's son loading the shotgun approximately six weeks prior to the fatal incident. It transpired that the old lady had cut off her son's financial support and the son, knowing the propensity of his father to use the shotgun threateningly, loaded the gun with the expectation that his father would shoot his mother. The case now becomes one of murder on the part of the son for the death of Ronald Opus."

There was an exquisite twist.

"Further investigation revealed that the son [Ronald Opus] had become increasingly despondent over the failure of his attempt to engineer his mother's murder. This led him to jump off the ten-story building on March 23, only to be killed by a shotgun blast through a ninth storey window.

"The medical examiner closed the case as a suicide."

Virtually every statement in the above account that can be easily checked is false. The 1994 American Academy of Forensic Sciences meeting was in San Antonio, not San Diego. Don Harper Mills was not president in 1994 and there was no awards dinner. The story reads very much like a bar examination question. The alleged victim’s last name is the same as that of a character in the comic strip *Bloom County*. This tale was used as a basis for an episode of the television police drama *Homicide: Life on the Streets*.

CRITICAL EVALUATION OF SOURCES

The critical evaluation of sources is an important skill for any forensic scientist or any other user of scientific information to acquire. The student should keep in mind that just because a statement appears in print it is not necessarily true. A knowledge base is necessary for a thorough critique of published research. However, even non-specialists can detect poor scientific work, if they apply some simple rules of thumb. First of all, the student should be immediately suspicious of research papers that fail to present the raw data from which conclusions are drawn. Another serious omission unfortunately far too common is the omission of sufficient procedural de-
tails to permit another researcher to replicate the research. The student can also look for evidence of poor experimental design, such as the following:

a.) failure to perform replicate analyses;
b.) failure to use randomized blind studies (particularly important if the authors are testing an analytical method that relies on subjective impressions);c.) failure to reasonably approximate real-life conditions;d.) pre-selection of samples or test subjects in ways such that bias results;e.) failure to use controls; and
f.) discrepancies between number of data points and number of samples and controls.

Some other things that should put the student on guard are evidence of faulty reasoning (circular logic, special pleading, question-begging and the like), indications of prejudice (personal, ethnic, racial or gender-based), indications of interest (such as financial) and the use of propaganda techniques (e.g. appeals to emotion).

WRITING STYLE

All term papers will be written in standard English. Each five grammatical, spelling or typographical errors will result in the lowering of the maximum term paper grade one letter grade. Ten such errors will result in the immediate rejection of the paper; in such a case, the student will receive an F for the submitted work. Many students have in the past expressed dismay at this particular aspect of the Department's term paper policy. However, the student should realize that forensic science is a field that relies heavily on written communication. Its practitioners often must prepare laboratory reports that may ultimately be admitted as evidence in court. In such circumstances, mistakes can have a serious impact on the judicial process. Mistakes can also have a serious impact on the careers of the writers of the reports. The writer of a laboratory report who refers throughout to "secreators" (to take an actual example) is either too careless or too ignorant to be taken seriously as an expert in the field of serology.

There are a number of useful guides to proper writing style. That of Strunk and White [5] is one of the most generally useful. Menzel et al. [6] and Day [7] have written guides specifically for the writers of technical papers. Most wordprocessor programs have both spell checking and grammar checking capabilities: Use them. Proofread and correct your work. If you have a doubt about the clarity of your writing have a friend read the paper.

LITERATURE CITATIONS

There are a number of ways of citing the scientific literature. The instructor may require that the student use one of the methods below, or the student may be allowed to choose one of these methods.

a.) Harvard system (name and year system):
... according to the work of Smith and Jones (1950) ...."


In this system the references are listed alphabetically. If Smith and Jones wrote two articles in 1950 which are cited, the first is Smith and Jones (1950a) and the second is Smith and Jones (1950b). If this reference were to a chapter in a book it would be cited as follows:


Books are cited as follows:


b.) Alphabet-number system:

text page: "... according to Smith and Jones (25)...."

reference page:


In this system the references are listed alphabetically and numbered consecutively.

c.) Citation order system:

The text pages would appear as in b.) above (assuming that the article by Smith and Jones were the twenty-fifth reference cited). The references would be numbered in the order in which they were cited.

d.) ASTM system (used by the Journal of Forensic Sciences prior to 1995):

This handout is an example of this style.

e.) The system currently used by the Journal of Forensic Sciences.

Revised 8/19/99
The system is described in detail below:

References

Number references consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by Arabic numerals in parentheses. References cited only in tables or in legends to figures should be numbered in accordance with a sequence established by the first identification in the text of the particular table or figure.

Use the style of the examples below, which are based on slight modifications on the formats used by the U.S. National Library of Medicine in Index Medicus. The titles of journals should be abbreviated according to the style used in Index Medicus. Consult List of Journals Indexed in Index Medicus, published annually as a separate publication by the library and as a list in the January issue of Index Medicus.

Try to avoid using abstracts as references; "unpublished observations" and "personal communications" may not be used as references, although references to written, not oral, communications may be inserted (in parentheses) in the text. Include in the references papers accepted but not yet published; designate the journal and add "In press." Information from manuscripts submitted but not yet accepted should be cited in the text as "unpublished observations" (in parentheses). The references must be verified by the author(s) against the original documents. Examples of correct forms of references are given below.

Articles in Journals

1) Standard journal article (List all authors, but if the number exceeds six, give six followed by et al.)


As an option, if a journal carries continuous pagination throughout a volume, the month and issue number may be omitted.


2) Organization as author


3) No author given


4) Article not in English


Revised 8/19/99
5) Volume with supplement


6) Issue with supplement


7) Volume with part


8) Issue with part


9) Issue with no volume


10) No issue or volume


11) Pagination in Roman numerals


12) Type of article indicated as needed


13) Article containing retraction


14) Article retracted


15) Article containing comment

Revised 8/19/99

16) Article commented on


17) Article with published erratum


Books and Other Monographs

18) Personal author(s)


19) Editor(s), compiler as author


20) Organization as author and publisher


21) Chapters in a book


22) Conference proceedings


23) Conference paper


24) Scientific or technical report


Revised 8/19/99
25) Dissertation


26) Patent


Other Published Material

27) Newspaper article


28) Audiovisual


29) Computer file


30) Legal material


31) Map


32) Book of the Bible


33) Dictionary and similar references


34) Classical material


Unpublished Material

35) In press

Revised 8/19/99

Regardless of the citation system used, there are some general rules for citations. The student should cite only significant, published work. References to unpublished data, theses, interviews or personal communications should be placed in explanatory footnotes. If a number system is used, the same number is used throughout to identify a particular reference. All references are placed at the end of the paper (excepted as noted above). Finally, all information taken from the work of others must be referenced. This is especially important for any direct quotations: failure to identify the source of a direct quotation may be regarded as plagiarism and make the student subject to disciplinary action. AS A GENERAL RULE, DIRECT QUOTATIONS ARE AVOIDED IN SCIENTIFIC WRITING: THE MATERIAL IN THE QUOTATION SHOULD BE PARAPHRASED AND PRESENTED AS AN INDIRECT QUOTATION.

PHYSICAL PREPARATION OF THE PAPER

The term paper must be typed double-spaced on good quality bond paper. Correctable bond paper is not acceptable. The margins will be as follows:

1 inch from the left edge;
1 inch from the right edge;
1 inch from the bottom; and
1 inch from the top.

Note that these are the typical default settings of most word processor programs. Each page in the body of the paper (excluding title page and abstract page) is to be numbered. Each paper will have a title page, containing the title of the paper, the name of the author, the course for which the paper has been written and the date of its submission. After the title page come the following pages:

a.) table of contents;
b.) 250 word abstract of paper;
c.) body of paper; and
d.) references.

All photographs, tables, graphs or other diagrams will be placed on separate pages, appropriately numbered, in the body of the paper. Such pages do not count toward the minimum length requirements of the paper. The paper may be typed using courier, prestige, Roman, or letter gothic fonts. Avoid fancy type faces that mimic handwriting. A dot-matrix printer may also be used, but only if it gives letter-quality printing.
The student must submit a cleanly typed original of his term paper. Erasures, alterations in pencil or pen, whiting-out or over-typing will be treated as grammatical, spelling or typographical errors. The student must submit along with his paper a xeroxed copy of the first page of each article or book cited in the paper. If the student desires the return of a graded copy of his paper, he must submit a xeroxed copy of his paper: the original paper will not be returned. The instructor will not accept papers submitted in three-ring binders. Plastic ring binders are acceptable.

ANY PAPER WHICH DEVIATES FROM THESE INSTRUCTIONS WILL BE REJECTED, AND THE STUDENT WILL RECEIVE AN F FOR THE WORK.

REFERENCES


Revised 8/19/99
The selection of a research project should be made only after consultation with the instructor. The student should first carefully read the available scientific literature. After reviewing the literature on his topic, the student should then work out the details of his experimental design with the instructor. In the course of carrying out the project, the student must carefully record all experimental results in a bound notebook (available in bookstore). Basically, everything that is to be reported in the project report described below should be recorded in the notebook. He should carefully label and preserve all the specimens examined or analyzed. If photographs or video tapes are taken, these should also be labeled and carefully preserved.

Reports of the results of research projects will be submitted in the format used for the submission of manuscripts to the *Journal of Forensic Sciences*:

**Title page:**
Author(s), degrees held  
Title of project  
Author(s) institutional affiliation in footnote at bottom of page

**Abstract page:**
Approximately 250-word abstract

**Body of report:**
Introduction (no heading) (explains nature of problem addressed in project, with literature citations)

Materials and Methods (explains experimental methods employed, lists apparatus used [with manufacturers] and reagents [with suppliers])

Results (describes experimental results, may be combined with Discussion section)

Discussion (explains results in light of original hypothesis addressed by project)

Summary

References (all literature cited in body of report, uses JFS citation format)
Tables: Tables of experimental data

Figures: Page(s) with Figure Legend, followed by figures

The report should be typed double-spaced. If the report is prepared using a computer word processor, please make sure it is printed with letter-quality printing.

The following material will be submitted along with report: All experimental data (i.e. project notebook), all experimental specimens, all photographic negatives or original videotapes. I would prefer to receive a hardcopy of the project report and a word processor file (WordPerfect or Microsoft Word, if possible) on a 3 1/2" floppy disk.