

# PROCEDURE FOR RESEARCHING AND WRITING A THESIS IN PHYSICAL ANTHROPOLOGY

**NOTE THAT IF YOU ARE NOT DOING A THESIS IN PHYSICAL ANTHROPOLOGY THESE GUIDELINES MAY NEED TO BE MODIFIED. ASK YOUR ACADEMIC ADVISOR.**

One of the core requirements of most graduate programs is some form of research project. Our program at UM is no exception. When a graduate research project is written up, the resulting document is called a thesis or dissertation. Usually, the term dissertation is reserved for a specific type of thesis prepared while earning the Ph.D. degree.

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## STEPS IN A GRADUATE RESEARCH PROJECT

1. Choose a project.
  2. Write a proposal for your project.
  3. Choose a thesis committee. There is a form for doing this that has to be filed at the graduate school. Submit your proposal to the committee members.
  4. Do your research.
  5. Write up your thesis and present a draft to your committee members. Make any changes or additions that your committee requires and resubmit it. Repeat this step as often as necessary. When your committee decides you are ready to defend your draft, work with them to set up a time and place for your thesis defense. File your defendable draft at the graduate school, along with the proper form.
  6. Defend your thesis. When you pass, file the proper form at the graduate school. Make a final draft of your thesis, make sure that it's in the format required by the graduate school. Make an abstract, title page, etc. Submit the required number of copies of your final draft (along with the proper form and fees) to the graduate school.
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## CHOOSING A RESEARCH PROJECT

Although you should consult with your faculty advisor and potential thesis committee members, the task of choosing a research project is your responsibility. Your advisor will not choose a project for you.

Your project should be on a topic that is interesting to you, and which your committee members know something about.

As part of your research you must do something original, either gather new data, analyze existing data in a new way, or apply some new principle. In other words, a research project is not a term paper - you can't simply do a summary of existing knowledge from the library. In some way or another you must generate new knowledge.

The most important factor in choosing a thesis project is whether it is "doable". By "doable" we mean whether or not you can actually do it in a reasonable amount of time. Plan to spend about one semester doing your research, and about one semester writing and defending your thesis.

There are many things that affect whether or not a thesis project is doable. A doable project is usually one that is narrowly focused on a single testable hypothesis. In order for a project to be doable, appropriate collections, specimens, populations, archives, or similar sources of data must be available. In order to be doable, methods must

exist for gathering and analyzing appropriate data in order to generate some result and draw some conclusion.

Unfortunately, we do not have many physical anthropology data sources available at UM, which means that many students will have to travel to other universities or museums in search of data. Resources available at UM include the following:

1. The Mansfield Library: Data sets of many types, from many places in the world can be found at the library or through interlibrary loan. Historical archives are available.
2. The Forensic Collection: about 65 specimens of various ages, sexes, races, and degrees of completeness. We do not have any identifiable Native American remains.
3. The Boas data set. This is a set of anthropometric data on over 16,000 Native Americans collected in the 1800's by people hired by Fraz Boas. It consists of age, sex, blood quantum, tribal affiliation, some genealogical information, six cranial measurements, and six postcranial measurements.
4. Several hospitals and clinics exist in the Missoula area.

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## WRITING A RESEARCH PROPOSAL

The proposal (or research design) is a formal part of the process of doing research in anthropology. Its purpose is to communicate your research interests and plans to anybody who needs to know about them. You will certainly have to communicate your research plans to your thesis committee. In many cases, you may need permissions from department heads, campus committees, potential collaborators, curators of museums holding specimens you may want to use, and other potential advisors also need to know what your plans are. As a general rule you should present your proposed research in the best light possible, but stop short of exaggeration. Do not hide or disguise weak sections of your project, because someone may be able to offer suggestions for making it stronger.

What a research proposal usually ends up being is a brief, preliminary version of what will eventually become the introduction and materials/methods sections of the finished thesis. You should try to keep the length under 5 pages if possible. Your goal is to address any questions the reader might have in as concise a manner as possible.

Individual faculty members will have preferences as to the format of your proposal. In physical anthropology, there is a fairly standard format with the following sections.

1. Identification section. Not labelled as a separate section, the identification section usually forms the heading at the beginning of your proposal. Information included in the identification section is:
  - A. Your name.
  - B. Your title and institutional address. Most of you can give yourselves the title "Graduate Student" and your institutional address as Department of Anthropology, University of Montana, Missoula, MT 59812.
  - C. A title for the project. This title should be descriptive of what you are going to be doing. An informative title might be something like: "Dental Wear at the Pocket Road Site (CA-Sac-42)". An uninformative and unacceptable title would be something like: "Research in Biological Anthropology".
  - D. The date.
2. Introduction section. Often labelled "Introduction". This section should include the following information:
  - A. A statement of what research question you are investigating. Tell what it is that you are hoping to demonstrate with the data you collect for this project. It is good if you can state your research questions in terms of hypotheses to be tested, and best if you can provide null hypotheses that you will try to reject. If you don't know what hypotheses are, you should take a statistics course immediately.
  - B. An explanation of why your research questions are important. What will the consequences be for our understanding of human beings? What new light can you shed on some controversial issue? Where does your research fit within the overall scheme of your subdiscipline? These and similar questions may be appropriate ones to answer depending on the nature of your project. The purpose of this is to help

someone who may not be familiar with your field to understand why this research needs to be done (and perhaps why they should cooperate with you in doing it). Try to frame these explanations in simple language if possible - pretend you are trying to explain your research to your high school biology teacher.

- C. A brief statement of why your background qualifies you to do research on this topic. Have you done similar research before? Have you had training in the techniques you will be using? How long have you been interested in these research questions?
3. Materials and methods section. Often labelled "Materials and Methods". In this section you explain how you plan to answer your research questions and test your hypotheses. The following information should be included:
    - A. Materials that will be used. What specimens, archive, people, etc. will you need to examine in order to answer your research question? Where are these data sources located? From which collections or facilities will you need permissions to examine materials they may have? These and/or other questions about the nature of any materials you will use should be addressed.
    - B. Methods for gathering data. How will your data be gathered? What measurements will you need to take? What instruments will you use to gather your data? How will your data be recorded? Will the data you gather constitute a representative random sample? These and/or other questions about the manner in which you will collect your data should be addressed.
    - C. Methods for analyzing data. How will your data be analyzed? What statistical techniques will you use to test your hypotheses? Are these statistical techniques appropriate for the type of data you will collect? These and/or other questions about how the data will be analyzed should be addressed.
  4. Implications section. Often labelled "Implications of this Research Project". In this section you should briefly discuss the conclusions you would draw if you were able to reject your null hypotheses or if you failed to reject your null hypotheses. The purpose of this section is to convince the reader that your research will actually generate some conclusions in the end.
  5. Bibliography. Often labelled "References Cited". You should include complete references for each citation in the body of your research design. In addition, many research proposals contain a section labelled "Other References", which contains references not cited in the body of the research design, but which the researcher has read and thinks are important. The purpose of the "Other References" section is to demonstrate to the reader that you have done a substantial amount of preliminary research. An "Other References" section is not legitimate in the thesis itself- only in a proposal. The number of references in your bibliography will vary, but the more is better.
  6. Budget section. Often labelled "Budget". If you are applying to a funding agency, such as NSF, NIH, or the Leakey Foundation, they will want to know how much money you need and what you will spend it on. In this case you should include a budget, itemized in as detailed a manner as possible.
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## **A SAMPLE PROPOSAL**

The following document is a project research design that I put together in 1984 for a project that I never did pursue. I pulled it out of a file and spruced it up for you to use as an example.

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### **RESEARCH PROPOSAL VISUAL DETERMINATION OF SEX FROM THE HUMAN SCAPULA**

**Randall R. Skelton, Ph.D.**  
**Associate professor**  
**Department of Anthropology**

**University of Montana**  
**Missoula, MT 59812**  
**September 23, 1993**

## **Introduction**

The goal of this project is to test a method for visual determination of sex from the human scapula discovered by Skelton (1978). A large sample of scapulas of known sex will be scored using the Skelton method and the accuracy of the method will be evaluated. The working hypothesis is that the Skelton method is able to identify the correct sex of scapulas with a rate of success that is significantly higher than chance alone. This hypothesis may be accepted if we can reject the null hypothesis that accuracy of the Skelton method is equal to the accuracy expected by chance alone.

The determination of sex from the skeleton is an important concern for osteologists and forensic anthropologists who base their analyses on data obtained from examination of skeletal material. The pelvis is thought to be the best part of the skeleton from which to determine sex, and the skull the second best (Bass, 1971), but in many cases the skull and/or the pelvis are missing from a skeleton and the ability to determine sex from an alternative anatomical region would be useful. The ability to determine sex from the scapula may also be useful in situations where the sex determined from the pelvis or skull is uncertain. In 1978 I undertook a study of metrical and visual methods for sex determination of the scapula (Skelton, 1978). I am, therefore, familiar with the existing methods of sex determination for this bone and with the bone's anatomy. During the 1978 study I proposed a set of visual criteria which seemed to be useful for determining sex, and subsequent informal observations have convinced me that this method is worth pursuing further. I have an earned doctorate in physical anthropology and have worked as a staff osteologist or consulting osteologist on several archaeological projects during the past twelve years.

## **Materials and Methods**

I plan to test the Skelton method for visual determination of sex from the scapula using a sample of at least 50 male and 50 female scapulas. A suitable skeletal collection is housed at the Lowie Museum of Anthropology, University of California, Berkeley. Permission to use the skeletal collection will have to be obtained from Frank Norrick, Curator of the museum. The following information will be recorded for each scapula:

1. Specimen identification number.
2. Sex as determined from the pelvis using the method of Phenice (1969).
3. The angle that the axis of scapular breadth makes with the axis of maximum scapular length. This angle should approach 90 degrees in females, but be closer to 60 degrees in males. [Note: I should have included a diagram or illustration of this and the following characteristics. I didn't, in order to save space. Do include illustrations in your proposal].
4. Sub-glenoid concavity. The axillary border of the scapula should be concave in females, but straight in males.
5. Relationship between the tip of the coracoid process and the superior angle. When the scapula is placed in anatomical position the tip of the coracoid process should be inferior to the superior angle in females, but superior to the superior angle in males.
6. Shape of the glenoid fossa in cross section. The glenoid fossa should be deep when viewed in cross section in females, but shallow in males.

The condition of the scapula for characteristics 3 through 6 above will be recorded as hypermasculine (2), masculine (1), ambiguous (0), feminine (-1), and hyperfeminine (-2). A contingency table will then be constructed for each characteristic that compares sex and score for that characteristic. These contingency tables will have the form shown in figure 1. For each characteristic, a chi-square test will reveal whether there is a non-random distribution of scores by sex. An overall score will be obtained for each specimen by adding the scores for each of the 4 characteristics that are shown to have a non-random distribution by sex from the chi-square test. If the overall score is greater than zero, then the specimen will be diagnosed as male. If the overall score is less than zero, then the specimen will be diagnosed as female. These diagnoses will be compared to the known sex of the specimen and each diagnosis will be recorded as correct or incorrect. The null hypothesis that the frequency of correct diagnoses is equal to 50% will be

tested.

Data collection should take one week at the Lowie Museum of Anthropology, University of California, Berkeley, CA.

### Implications of this Research

If the Skelton method for visual sex determination from the scapula is more accurate than expected by chance, then this method would be a useful addition to list of sex determination methods available to an osteologist. If the method is no more accurate than chance, then the human scapula can be considered uninformative for sex using visual methods.

### References Cited

Bass, William M., 1971. Human Osteology: A Laboratory and Field Manual of the Human Skeleton. Missouri Archaeological Society, Columbia, MO.

Skelton, Randall R., 1978. Sexing the scapula: Various methods. Paper prepared in satisfaction of the "Substantive Research Paper Requirement" for the M.A. degree in Anthropology, University of California, Davis.

Phenice, T. W., 1969. A newly developed visual method of sexing the Os Pubis. American Journal of Physical Anthropology 30: 297-302.

### Other References

Bainbridge, Douglass. and Santiago Genoves Tarazaga, 1956. A study of sex differences in the scapula. Journal of the Royal Anthropological Institute of Great Britain and Northern Ireland 86:109-134. Hrdlicka, Ales, 1942a, The scapula: Visual observations. American Journal of Physical Anthropology 29:73-94.

Hrdlicka, Ales, 1942b, The adult scapula: Additional observations and measurements. American Journal of Physical Anthropology 29:262-415.

Stewart, T. D., 1954. Sex determination of the skeleton by guess and by measurement. American Journal of Physical Anthropology 12:385-392.

### Budget

Equipment: Digital Calipers	\$142.95
Travel: air fare: Missoula to San Francisco	\$378.32
bus fare: daily, 5 days (@\$2/day)	\$10.00
Lodging: 5 days at Motel 6 Berkeley	
(@\$32.95/day + 8.25% tax)	\$164.75
Food: 5 days at \$16 per diem	\$80.00
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TOTAL	\$776.02

## CHOOSING A THESIS COMMITTEE

Your thesis committee's job is to make sure that your thesis research is comparable to the standards for thesis research on a nationwide basis. It is also their job to make suggestions for how you can improve your thesis. Ultimately they will sit in judgement of your thesis during your defense. Obviously, your thesis committee is a very important group of people, and should be chosen carefully.

A thesis committee must consist of at least 3 University of Montana - Missoula faculty members. There may be more people on the committee, but remember that the more people on the committee, the more people you will have to satisfy.

One person is chair of the committee and that person must be a UM-Missoula Anthropology faculty member. At least one person must be from a department other than Anthropology. Additional members (beyond the basic 3) may be a non-academic professional anthropologist or someone from another university or college.

You can not officially appoint a thesis committee until you have fully passed your comprehensive exams and satisfied all conditions. However, you may work with an "unofficial" thesis committee. To formally appoint a thesis committee, you must obtain a special form for the purpose and file it at the graduate school.

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## DOING YOUR THESIS RESEARCH

Normally, your thesis research will consist of collecting some sort of data and/or analyzing it. Remember that you must generate new knowledge.

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## WRITE UP YOUR THESIS

### Thesis Format

Physical anthropologists use the standard format for an scientific paper. This format consists of 6 parts, each with a specific content. The 6 parts of a scientific paper are:

1. Introduction. In this section you introduce your research question, within an anthropological context. Your research question should be in the form of a testable hypothesis. Setting up the context of a research question normally requires a review of the literature on the subject. Here are some things to present in your introduction.
  - a. How your subject fits into anthropology in general. How it fits into your subdiscipline. How it fits into theoretical positions within your subdiscipline.
  - b. What other people have worked on the same or similar subjects, and what these people said. Controversies that exist surrounding this subject. Whether there are alternative explanations for some phenomenon that your subject addresses.
  - c. The history of ideas on the subject that your research question relates to.
2. Materials and Methods. In this section you discuss and describe all issues related to how you collected data to test your hypothesis. You should describe what specimens, collections, archives, or other data sources you used. You should describe in detail how you went about collecting your data. You should describe any equipment or instruments you used and any measurements you took. You should describe the statistical techniques and/or other methods of analysis you used.
3. Results. In this section you present the results of your analysis. This is not the section where you interpret your results. Present your results in the form of raw data, using tables and figures where appropriate. Present the results of any statistical tests you applied to your data.
4. Discussion. This is the section where you interpret your results. You should thoroughly explore all possible interpretations of your results and how you chose one interpretation over another. You should discuss any problems with your data or results. The basic principle is to try to anticipate and answer any questions a reader might have about your results. Don't try to hide results that don't agree with your interpretation - explain them instead. You should try to present your results in the best light possible, but don't exaggerate them and don't argue beyond what can be supported by your results.
5. Conclusion. In this section you relate your interpretations of your results to your original hypothesis, and draw a conclusion as to whether it is supported or not. Discuss what your results and conclusions imply for the general issues in anthropology as a whole and within your subdiscipline that you discussed in your introduction. In many cases, you will find that your research raises more questions than it answers. You should

discuss these new questions and what research should be undertaken in the future to address them.

6. **Bibliography.** In this section you should reference all published and unpublished works cited in your text. You should not include any works that were not cited in your text.

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## Citations and References

All research is based on ideas, knowledge, and data that were generated by previous researchers. Your contribution will be a small amount of additional knowledge in a very specific area. Courtesy, standard scientific practice, and ethics require that you give proper credit to the source of any fact or idea. To fail to do so is plagiarism.

A citation occurs within the text of a document and is a way of telling the reader the source of any data, facts, or ideas that are not the author's own original work. References are the entries in your bibliography. Citations point to references. The difference between a great scholar and a plagiarist is in the thoroughness with which they document the source of the ideas and facts they are using. A plagiarist seeks glory for him- or herself by neglecting to acknowledge the true source of ideas and facts, thereby making it look like he or she was the one who thought up the ideas or discovered the facts. A scholar achieves recognition for his or her ability to gather ideas and facts from a variety of sources and synthesize them with his or her own facts or data.

Graduate programs reward scholars and punish plagiarists. It is ridiculously easy to distinguish between the two. Your strategy, therefore, should be to try to be as scholarly as possible. There are three principles to follow in order to appear as scholarly as possible.

1. The more sources you use the better. The longer your bibliography the better. In the course of your thesis research, you will probably accumulate a large pile of xeroxes, notes, articles, and books that you read at some point. Use as many of the articles and books you read as possible. Look each one over and think about where you could work what this author(s) said into your thesis, or where you could use what this author(s) said to reinforce a point you are trying to make in your thesis. If the author(s) disagrees with you, use them as an example of a different point of view, or set their idea up as something to be tested or refuted by your data. Recognize this principle before you start doing your background library research and apply it to every item of reading you pick up. Soon you will have an enormous bibliography, and your thesis committee will be very proud of you. You not only seem like a great scholar - you are one, because this is exactly what great scholars do.
2. Use a lot of citations. If you have a citation at the end of every sentence, so much the better. An absolutely wonderful thesis would have more citations than actual text.
3. Be thorough. Try to make sure you cover all points of view and cite them. When you trace the history of an idea, try to go back farther than anyone has ever gone before. Try to pull in references from other fields of science.

### Using Citations and References

The general rule is that anything and everything appearing in your paper has to be cited, with the following exceptions. Things that DO NOT need to be cited include the following:

1. Data or facts which you collected or generated during the course of the current research project and which are presented for the very first time in your thesis do not need to be cited.
2. Ideas that are truly original (thought of by you for the first time ever in the known history of the world) do not need to be cited. Usually this means that the ideas were generated by putting together ideas from several other authors, and are being presented in this paper for the very first time. In this case these other authors should be given credit (cited), and you should word your idea in such a manner that it is clear that you are now presenting an original idea. For example, the wording 'the facts presented in the foregoing analyses suggest that ...', alerts the reader that you are about to propose an idea that you thought of after reading some other documents.

3. Explanations or paraphrases, in your own words, of a procedure or idea in another document (which must be cited) do not need to be cited themselves. For example, 'the measurement of cranial length, as defined by Bass (1971) involves using a spreading caliper to measure the maximum distance from the point between the two brow ridges and the back of the skull ...', is an example of an explanation of something defined in a cited document.
4. Conclusions drawn from your own data do not need to be cited. Be sure to word your conclusions in such a way that the reader can recognize that these are your original ideas.
5. "General knowledge" doesn't need to be cited. There is, however, some debate over what constitutes general knowledge. Most authorities would agree that the type of information learned in public schools in grades kindergarten through 8th grade are general knowledge. Some examples are: "the world is round", "cats hunt mice", "grass is green", and "humans have 2 legs". However, the consensus is that things learned in high school and college are not general knowledge
6. When writing a document in a certain field, certain basic facts that are widely known in that field can be considered general knowledge under certain conditions. In physical anthropology you can assume that most people know facts similar to the following, which can be considered general knowledge for biological anthropologists: "the scientific name for humans is *Homo sapiens*" and "the anatomical name for the thigh bone is the femur". Even in these cases, however, your thesis can be improved by citing and referencing somebody who actually said these facts. Most of these ideas can easily be located in an introductory textbook. It takes little effort to modify the first example to "the scientific name for humans is *Homo sapiens* (Nelson and Jurmain, 1988:211)", then reference the Nelson and Jurmain text in your bibliography.

### Citation and Reference Format

The format for citations and references should be what is currently used in the primary journal for whatever branch of physical anthropology your thesis research falls into. Human Evolution theses should use the *Journal of Human Evolution* format, primatology theses should use the *American Journal of Primatology* format, and human variation theses should use the *Human Biology* format. Other types of theses can use the *American Journal of Physical Anthropology* format. Forensic theses may use the *Journal of Forensic Sciences* format. Get an issue of one of these journals and copy some articles to use for citation and referencing examples. Most of these journals publish a "Guide for Authors" at regular intervals that discusses citation and reference format.

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## DEFENDING YOUR THESIS

The last formal step in your graduate career is defending your thesis. The thesis defense is an oral presentation of your thesis research. Thesis defenses are open to the public. Following your presentation of your research, the members of your thesis committee will ask you questions about your research. Any member of the audience may ask a question upon recognition by the chair of the thesis committee. I suggest that you sit in on a someone else's thesis defense so that you know what to expect.

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