

APPENDIX 2

THE MECHANICS OF RESEARCH

re•search *n* 1: to search or investigate a problem thoroughly. 2: studious inquiry or examination; *esp*: investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws.

This appendix covers:

- Getting started: planning your research schedule
- Defining the research problem and stating the research question.
- Reviewing the related literature.
- Research citations, quotations, and paraphrases
- Research methodology: qualitative and quantitative methods

Research is a structured and systematic way to create knowledge. Research searches for facts with a purpose in mind. Kuhn said research is like solving a puzzle: you have to follow specific rules, and the challenge of putting the puzzle together to get a complete picture is what usually motivates the researcher.¹ This appendix provides a summary of research issues Air Force members may encounter either during their assignments or during their professional military education. It also provides samples of citation formats used in research papers, including endnotes, footnotes, and textnotes.

GETTING STARTED: PLANNING YOUR RESEARCH SCHEDULE

“Don’t put off for tomorrow what you can do today, because if you enjoy it today you can do it again tomorrow.”

– James A. Michener

At first research may seem like a tedious and complex process. Actually though, some researchers find that once they begin to pursue a research question they are interested in, they really begin to enjoy the process. Do not let the idea of writing a huge paper keep you from getting started. As Henry Ford said “Nothing is particularly hard if you divide it into small jobs.”

Here are some tips on getting yourself going:

- Don’t wait to get started until you can set aside two or three entire days to do your research. This is one task you want to do in a few sittings and not all at once. If you keep waiting for the “perfect” time to get started, you may never get anything done at all.
- Create an overall plan for what you want to accomplish and when you want to have each step done. For example, here is a proposed research process broken down into manageable chunks:

Task	Desired Date	Actual Date
Topic selected		
Research question written		
Methodology selected		
Sources and data gathered		
Sources read and data analyzed		
Outline created		
Expand outline to draft all topic sentences		
First draft written		
Second draft written		
Final draft written to include front matter (abstract, preface) and back matter (endnotes, bibliography)		
Seek publication if appropriate		

Back up your milestones from whatever due dates you are given to allow for a little “slop” time and then reward yourself for any deadlines you meet. (Bribery does work—even if you are bribing yourself.)

- Not all tasks associated with research need to be done in the quiet of a library with an 8-hour stretch of time. Break your research-related tasks down into chunks and work them in when and where you can. For example, you don’t necessarily need to devote an entire day to reading articles. Instead you can carry a few with you to read when you get stuck waiting somewhere.

- If your research involves a survey or an experiment that requires the collection of data involving people, be sure that you get proper approval before you get started. This can take up a bit of time, so the earlier you do this the better.

“If you want to make an easy job seem mighty hard, just keep putting off doing it.”

– Olin Miller

SELECTING A RESEARCHABLE PROBLEM

Research starts with the selection of the problem. This can be harder than it sounds because not every problem may be researchable. For some problems it can be impossible to collect the data to support it. On the other hand, it's easy to become lost in data that is easy to collect and lose sight of the original question. Carr listed three laws to help define researchable problems:

1. The problem should be clearly formulated in a single sentence of 25 words or less. (Otherwise you could find yourself working with no direction and go off onto irrelevant tangents.)
2. You should be able to collect useful empirical data with observable and accessible criteria. Wherever possible that data should be numerical.
3. You should be able to directly, or indirectly, observe the events you plan to collect data about.²

These three simple rules should be followed as closely as possible whenever a problem is selected.

Another challenge in defining a problem is making it “not too big and not too small.” Barzun and Graff discussed how your subject should, “when clearly presented in a prescribed amount of space, leave no questions unanswered within the presentation, even though many questions could be asked outside it.”³ Though this can be difficult, following these rules will prevent serious problems later on in the research process. Ideally, the problem you select to research will be one that you are interested in. The longer the research paper you will be writing, the more important this is. If you are writing a 5-page paper you can usually slog through almost any topic, but if this is your doctorate dissertation it better be something you feel passionate enough about to attack daily for a year or more.

What is NOT an appropriate research question?

1. A ruse for achieving self-enlightenment.
2. Problems where the sole purpose is comparing two sets of data.
3. Problems seeking correlation between two sets of data merely to show a relationship between them.
4. Problems with a “yes” or “no” answer.

SOURCE: Leedy's *Practical Research*, pp 47-48.

STATING THE RESEARCH QUESTION

Once the problem has been decided, the next step is to articulate it concisely and clearly in a research question.

1. **Name your topic:** I am studying ...
2. **Imply your question:** Because I want to find out/show you who/how/why ...

3. **State the rationale** for the question and the project: In order to understand/explain how/why/what ...

Once you have your focus narrowed, and you know just what you want to study, it is time to begin the hunt for what others have written on the same, or similar, subjects.

REVIEWING AND CITING THE RELATED LITERATURE

“Read the best books first, or you may not have a chance to read them at all.”

– Henry David Thoreau

Read All About It!

Quotations
Paraphrases
Copyright
Footnote
Endnote
Bibliography
Formatting

Once you have your research question solidified, start your literature review as soon as possible. One reason to search the related literature right away is to make sure that someone else hasn't already researched the same topic. Keep in mind that if someone has already done the study you would like to do, you can still check their conclusions to see if they have recommended an area of further research. Also, check the date of their study. If it was quite some time ago, replicating their study with a few new twists just might expose some interesting conclusions.

There are several other reasons to conduct a thorough literature review:

- It will increase your confidence in your topic....
- It can provide you with new ideas and approaches....
- It can inform you about other researchers whom you may wish to contact....
- It can show you how others have handled methodological and design issues....
- It can reveal sources of data....
- It can introduce you to measurement tools other researchers have developed....
- It can reveal methods of dealing with problem situations....
- It can help you interpret and make sense of your findings....⁴

One major way to save time is to **record all your source data properly from the start**. There are several ways to gather your data as you review the related literature. You can use old-fashioned pen, ink, and note cards. You could take a laptop along and type your notes right in. Or you can purchase or photocopy everything. Note cards are convenient in that you can arrange your thoughts in order as you get ready to write. You can also do the same thing with computer notes by printing out your notes, cutting them into strips and then arranging them as you see fit. Just make sure that each line, or paragraph, has a source and page number before you start to cut up your notes pages. One big benefit of typing your notes on a computer is that you can copy and paste quotes right from your notes to your paper. If you can afford it, purchasing or photocopying your sources can be useful. This is especially true if you plan to do further research on the same topic. Being able to refer back to the original source for more information can be very helpful.

No matter how you capture your source data, be sure to include the details of where you got them. This is especially important if you are using sources from several different libraries and need to track one back down again. Another important thing to remember if you are typing or writing notes is to distinguish clearly between what is a direct quote, what is a paraphrase, and what are your own words and thoughts. If you don't indicate the difference now, while you initially type them in, you will forget and then run the risk of plagiarism.⁵

Read The Original

Wherever possible, you should try to read original works instead of someone's interpretation of another work. One rule is that if three others have cited the same source, you should probably hunt it down and read the original work yourself.

SOURCE: Paul D. Leedy & Jeanne Ellis Ormrod, *Practical Research; Planning and Design* (Upper Saddle River, NJ: Merrill Prentice Hall, 2001), 76.

“Our two greatest problems are gravity and paperwork. We can lick gravity, but sometimes the paperwork is overwhelming.”

– Dr. Wernher von Braun

CITATIONS

In the staff environment, we frequently reuse previously prepared data to save time and avoid “reinventing the wheel,” but we rarely need to cite the source of such data. In the academic world, however, reusing another's work without giving that person credit and deliberately trying to pass it off as your own, is *plagiarism* and can get you into a heap of trouble.

When and where do you document sources? The rule is simple: **If the ideas and information in what you've written are not “common knowledge” or do not represent your own work, you must document where and from whom the “borrowed” ideas and information came.** As a writer, when you quote an authority word for word, paraphrase someone's thoughts or use someone's ideas, model, diagram, research results, etc., you need to do so at that point in the text. This is referred to as *citation*. Citation refers to one of several types of systems writers use to document their sources. The signals for citation may be footnotes, in-line notes or endnotes. Whatever the system, the purpose is to flag material for which the writer is indebted and to identify the source. The sum of all citations in a paper, together with the bibliography, is the documentation system of the paper. Citation, if done properly, fulfills a writer's responsibility for maintaining academic integrity. So, to keep yourself out of a literary (and perhaps legal) jam—give credit where credit is due and cite those sources!

Each community has its own standards for citations. This section relies very heavily on the *Air University Style Guide for Writers and Editors*, which can be accessed at <http://www.maxwell.af.mil/au/aul/aupress/>.

QUOTATIONS

A quotation (also called a direct quotation) occurs when a writer is indebted to a source not only for the source's ideas or facts but also for the wording of those ideas. When you are using a portion of a source word-for-word you must indicate so by using either quotation marks or a block quote. For shorter quotations, keep them in the text and simply enclose the words you are using from another source in double quotation marks (see the example below). Different style-guides have different criteria for how long a quote needs to be before you pull it out of the text and create a "block quotation." According to the *Air University Style Guide for Writers and Editors*, you should use a block quotation, "for passages easily set apart from the text, 10 or more typed lines, or exceeding one paragraph. Indent from both sides and single-space. Do not use quotation marks to enclose the block quotation, and do not indent its paragraphs. Use double quotation marks to enclose a direct quotation within a block quotation. Skip a line between paragraphs. The block quotation should reflect the paragraphing of the original."⁶ (That was also an example of an in-text quotation.) If you are using quite a bit from a copyrighted work, you need to get written permission from the copyright holder. The *Air University Style Guide* also offers the following advice on direct quotations: (note that the quote below is an example of the block quote format)

Plagiarism—HOW TO AVOID IT

- Be aware of where your eyes are when you type and/or write: source or your page?
- Realize when you rely heavily on a source: re-writing what you see?
- Compare your work with sources: same words/phrases as in source?
- Take good notes, note page references: check your work later

SOURCE: Booth, Colomb & Williams, *The Craft of Research*, 170.

1. You may change single quotation marks to double quotation marks and vice versa, if necessary.
2. You may change the initial letter to a capital or lowercase letter.
3. You may omit the final period or change it to a comma, and you may omit punctuation marks where you insert ellipsis points.
4. You should usually omit original note-reference marks in a short quotation from a scholarly work. You may insert note references of your own within quotations.
5. You may correct an obvious typographical error in a passage quoted from a modern source, but you should usually preserve idiosyncratic spellings in a passage from an older work or manuscript source unless doing so would impair clarity. You should inform the reader of any such alterations, usually in a note.⁷

It is good to set the stage for every quote you use and then provide closure after each quote by showing how it relates back to the main point of your paper. Quotes just hanging there, without any stage setting or closure, can make your paper sound choppy and disjointed. What you want is a product that flows seamlessly between what the experts say (quotes) and the conclusions and creative recommendations you can draw from what they say.

PARAPHRASE

Paraphrase is a restatement of a text, passage, or work, giving the meaning in another form. It is not simply changing a couple of words or putting them in a different order. A paraphrase falls into a gray area between summary and quotation. Where a summary uses only the source's content, but not its words, a paraphrase uses the source's content stated in words and sentence structure that are similar to—but not exactly like—the source's. If you do paraphrase, always cite the source (and the appropriate page numbers).

There is no simple answer to the problem of deciding how many words you may use from a source before you are required to show you are quoting. A complete sentence taken from the source would certainly have to be treated as a quotation. But even a single word might have to be quoted, especially if it is a new technical word introduced or developed by the source. The *Air University Style Guide* says, "Ideally, you should introduce your paraphrase so that the reader has no question at all about where your own commentary ends and where your paraphrase begins."⁸

All in all, you need to make sure your research report consists of much more than just a string of quotes and paraphrases from other sources. It would be very inappropriate for example to put a citation mark next to a chapter heading to indicate that everything in an entire chapter of your research paper came from another source. (Yes, someone has tried to do that!) If you have that much from a single source, and if it really is key to understanding your research, then you can put it word-for-word in an appendix and cite the source there. Remember that research is not just a compilation and regurgitation of others' thoughts—your own thoughts need to be evident too.

COPYRIGHTS!

What is a copyright? A copyright is the exclusive legal right granted under Title 17, US Code, to the author of an original published or unpublished work (literary, dramatic, musical, artistic, and certain other intellectual works) to copy and send copies (paper or electronic), to make derivative works, and to perform or display certain types of works publicly.

Research papers, or any other written material produced as part of your official government duties, are not subject to copyright protection, and are the property of the United States Government.

What are your rights and limitations? Ownership of the copyright is distinct from ownership of the material object (book, periodical, photograph, record, video or audio recording, music, etc.) in which the work is included. The owner is the boss—the head honcho who allows (or not) the work to be performed or displayed publicly. Be careful to not trespass on someone else's property or step on anyone's toes. However, there are exceptions that allow the use of the owner's work without requesting permission or obtaining a license. Find your organization's expert to keep you out of hot water ... or jail!

Can you make changes? You will not get your hand slapped for making *minor* style changes. But the changes, individually or cumulatively, should not significantly change the context or its meaning. Minor changes are only allowed to let you fit the work smoothly into the syntax and typography style of the product.

HOW TO CITE YOUR SOURCES

Footnotes, textnotes and endnotes are three common citation methods used to indicate where you got your information. For more extensive coverage of these and other methods, consult the style manuals such as *The Air University Style Guide*, *The Chicago Manual of Style*, or *The American Psychological Association Style Guide*. There are certainly plenty of style guides to choose from, but the *Air University Style Guide for Writers and Editors* is not only free from Air University Press, it is also available on-line.¹ Whatever style you choose within a particular document, be consistent.

1 FOOTNOTES

With today's computers, using footnotes is much easier than it used to be with a typewriter. If you are using footnotes, each footnote should appear on the same page you refer to it. Sometimes you might want to include more than just source data in the footnote. Keep in mind that a page containing more footnote material than text not only is unpleasant to the eye, but also may discourage all but the most determined reader.

Most computer programs have an option where you can choose to insert a footnote and it takes care of all the formatting for you, to include keeping the numbering straight—even if you move text around while editing. In Word, you can jump back and forth between the text and the citation by double-clicking on the footnote number. You simply can't beat having the computer do all the work for you, but if you do have to put footnotes in manually, they should be underneath a flush left, five-eighth inch line, that has at least one space above. Also, use an 8-point font size. Single-space within each footnote and also between each footnote. Footnotes look just like endnotes (described next), except they are at the bottom of each page—just like the one below.

2 ENDNOTES

For an example of endnotes, check out the end of this chapter. The *Air University Style Guide for Writers and Editors* has other examples for a wide variety of sources.

Endnotes can be placed at the end of each chapter, or at the very end of the manuscript. Endnote numbers may run consecutively from beginning to end of the manuscript, or they may begin again with each new chapter. The typed format for endnotes included at the very end of the manuscript differs slightly in that chapter numbers could be included too.

The computer can set up your endnote formatting in the same way it does footnotes. In Word, when you select "Insert" and "Footnote," a menu pops up where you can choose between footnotes and endnotes. You can also specify where you want the endnotes to go, at the end of the section or the entire document. If your endnotes aren't going where you want them to go,

¹ Marvin Bassett, ed., *Air University Style Guide* (Maxwell AFB AL: Air University Press, 2001), 11. Web site <http://www.au.af.mil/au/awc/awcgate/style/styleguide.pdf>

you may need to insert (or remove) a section break. For example, sometimes they will appear after your bibliography, which is incorrect. In this case, put a section break before the bibliography. If you are creating endnotes manually, start on the page where you want your endnotes to appear and center the word “**Notes**” 1 inch from the top of the page or double-spaced below any text on the same page. Triple-space between the heading and the first text entry. Number each entry and arrange in numbered sequence as superscript numbers in text. Single-space within each entry as well as between entries. Indent each numbered entry one-half inch from left margin with subsequent lines flush left. When including chapter numbers, center “Chapter #” on the third line below “**Notes**” and begin the list two line spaces underneath.

3 TEXTNOTES

Textnoting is a means of identifying a source parenthetically at the appropriate point within the text. This method can be accomplished two ways. One way is to show the source within the text. For example:

Samuel Huntington, in his book *The Soldier and the State*, observed, “The outstanding aspect of civil-military relations in the decade after World War II was the heightened and persistent peacetime tension between military imperatives and American liberal society.”

Another way is to provide only the source name and page number in the text and prepare a bibliography page containing the complete source identification. When the bibliography contains more than one entry by the same author, include the date in your textnote to ensure the reader refers to the proper source.

The definition of analysis (Motes: 23-31) used is ...

The definition of analysis (Motes, 1997: 23-31) ...

Remember your audience when you are deciding which citation format to use. If you are writing for a school assignment, your school probably has a specific way they want you to cite your sources. If you are writing to seek publication, check with your target publications for their preferred style and format before you get started. If you are really serious about publishing widely, there are computer programs available which will convert your document from one style guide to another which may be worth the investment.

BIBLIOGRAPHY

A bibliography is an accurate list of all sources used to prepare your research manuscript. This means there could be sources in your bibliography that do not appear in your endnotes, footnotes, or textnotes. On the other hand, everything you have cited in your notes should definitely be in the bibliography. One way to prepare your bibliography is to copy all your endnotes and/or footnotes into the bibliography section once you are done writing your paper, and then put them in alphabetical order. However, you still aren’t done. Take a close look at the differences in some style guides between the endnote and/or footnote format and the bibliography format. For example, these are the differences for citing the same source according to the *AU Style Guide*:

Bibliography:

Leedy, Paul D. *Practical Research*. New York, N.Y.: Macmillan Publishing Co., 1989.

Footnote and/or Endnote:

Paul D. Leedy, *Practical Research* (New York, N.Y.: Macmillan Publishing Co., 1989), 112.

That is just enough difference to drive you crazy, huh? One time-saver is to cite your sources in the correct format from the very start of your literature review. The last thing you want to do after spending lots of time on the text of your paper, is to have to go back to hunt down information that would have been really easy to collect the first time you looked at the data. This means you shouldn't just photocopy articles and stash them away hoping all of the information you want will be on the photocopied page. Make sure the volume number, journal title, page numbers, author, etc., are all captured somehow. Usually you need to look at the very front of some journals to find the volume number. This can be very easy to overlook, so if you have a comprehensive and structured process to capture all the pertinent details on each and every source you use, you will save yourself lots of trouble as you tie up the loose ends of your research.

GUIDE TO TYPING A BIBLIOGRAPHY

An example of the bibliography format is at the end of this book. Hopefully you will be building your entire research report off of a research paper template that lays everything out for you. In the event you are building all of this manually, here are some ideas to get you started.

- ◆ Use bond paper and center “*Bibliography*” 1 inch from top edge.
- ◆ Triple space between the heading and your first entry; single-space within each entry and double space between entries.
- ◆ Begin each entry at the left margin and indent subsequent lines five spaces.
- ◆ Arrange entries alphabetically, listing author's name in reverse order (last name, first name, middle initial). When no author is named and a title is used, omit initial articles—*a*, *an* and *the*—use the first major word of the title to alphabetize. If the title begins with a number, alphabetize as though the number is spelled out (76 Trombones would be alphabetized by the letter *s*).
- ◆ When you list two or more works by the same author, do not repeat the author's name. Use a line three dashes long for all entries after the first. List the works for the same author alphabetically by title.
- ◆ Items that involve a coauthor follow the works written by the first author alone.
- ◆ Set off titles of magazine articles in quotes and italicize the name of the periodical in which the article appeared. Follow with a volume number (may be the month and year) and date of issue in parentheses with page(s).
- ◆ Italicize a published report title just as a book title. Also, if there is no author, show the agency responsible for the report. Continue as you would for a book. If an organization is the author, alphabetize by organization name.
- ◆ While the *AU Style Guide* says it is not necessary to include interviews in a bibliography,⁹ it can add to the credibility of your paper. You should make sure you have the interviewee's signed consent and they have checked over their parts of your text. List an interview with the names of the interviewee and the interviewer (“author” is used for the name of the author of

the book or article in which the interview is listed), the place and date of the interview and, if possible, where it is stored.

- ◆ Even e-mails can and should be cited appropriately.¹⁰

The *Air University Style Guide* has page after page of examples, so if you are in doubt about how to cite something, be sure to check there or with another style guide.

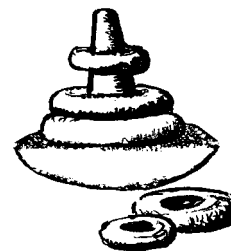
WRITING STYLE

For some reason some people think that research papers must be written at a level that is above the complexity of day-to-day writing. This is not so. Here is an example of an abstract with clear writing:

“We had some fun with a stacking rings toy and learned something about how the perceptions of adults are different from those of babies.”¹¹

Compare that abstract with this one, which has been a bit “beefed-up.”

“The stacking properties of toroids that reflect radiation in the 1.8 to 2.8 eV energy range is investigated. Preliminary results indicate that in the optimal configuration the toroids are oriented vertically with those reflecting lower energy photons having larger gravitational potential energies for toroids of equal mass. The ambiguousness of this solution is tested by experiments performed by a relatively inexperienced researcher ($t = 0.9167$ yr). These experiments indicate that alternate solutions can be found.”¹²



They both say the same thing; one just says it much more clearly than the other. Please don't think of your research report as an opportunity to throw together as many multisyllabic words as you can possibly think of. Remember, you will have to read this over a few times yourself.

FORMATTING ISSUES

One way to help your paper appear organized is through effective use of headings. In order to make sure you are consistent with your main points, the size and style of your headings and should follow what the introduction says the paper is going to cover and clearly indicate which of the issues are the most important. One of the ways to do this is to match up your outline with the appropriate heading levels.

Level One – Centered, bold, 16-font

Level Two – Centered, bold, 14-font

Level Three – Flush Left, Bold, 12-font

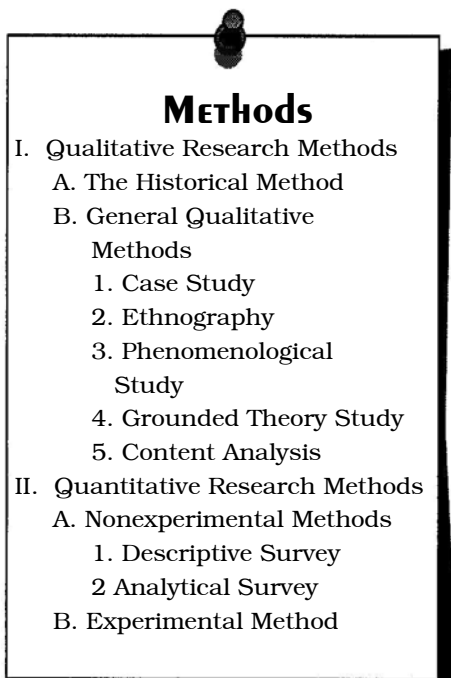
Level Four - Flush Left, Bold, 12-font. Followed immediately by text.

If possible, do not “stack headings” with one immediately following another, instead make sure some text separates your headings.¹³

Now that you know how to capture your sources, ideas, and thoughts—one last consideration is what methodology you use to collect, process and analyze your data.

INTRODUCTION TO RESEARCH METHODOLOGY

What is methodology? One good way to start is by describing what methodology is *not*. Methodology is not a running dialogue of how you did your research!! Methodology simply provides a structured way of gathering and analyzing your data.



There are as many different ways to group the research methods together as there are research methods themselves, but most of them fall into two main categories: qualitative and quantitative. Some research will even use a mix of the two so don't confine yourself to just one category. One of the major differences between these different research methods is how much control the researcher has over the situation. This section will briefly survey a few of these methods, beginning with the ones where the researcher has little control and working up to experiments where the researcher has a great deal of control.

QUALITATIVE RESEARCH METHODS

Qualitative research tends to focus on studying things that occur in natural settings.¹⁴ Qualitative methods fall into two main categories: one is the historical method and the other is a general category which includes case studies, ethnography, phenomenological study, grounded theory study and content analysis.

THE HISTORICAL METHOD

The historical method is one of the most commonly used research methods, and it is the only one available for studying the past. It “aims to assess the meaning and to read the message of the happenings in which men and women, the events of their lives, and the life of the world around them relate meaningfully to each other.”¹⁵ Historical research is *much much* more than listing events in chronological order, or restating historical data in a new and different format. This concept can be lost on students who mistakenly view research as nothing more than a beefed-up book report. The key element in the historical method's search for meaning requires the researcher to interpret what may have appeared to be simply chance. This method pulls together both things that are commonly known by the well educated, and also any special information that may be relevant to the historical question being studied. In order to help provide stronger conclusions, primary sources should be used as much as possible to increase the validity of the data. Unfortunately, in the historical research design the researcher has absolutely no control over the collection of the data, the subjects, or even anything that happened at the time the events took place. This can make it hard to be sure all of the needed data has been found, if the data on hand is accurate, and if or how much of the data has been distorted or destroyed.

The researcher using the historical method does not need to look at history only from a time dimension, but can also look at it from the dimension of where things happened.¹⁶ By arranging historical data in different ways, such as on timelines, charts, or a map, new insights can be found to help find new meaning in the data.

Also, historical research does not restrict itself to just the study of events and people from the past. This methodology is also useful for exploring the origin, development and influence of ideas and concepts.¹⁷ This is where the power of the historical research methodology lies. The ideas and concepts explored through this methodology could have as strong an influence on their ages as the rise or fall of a nation or civilization and would be powerful lessons to pull from history to help carry us into the future.¹⁸

GENERAL QUALITATIVE METHODS

In addition to the historical method, there are several other qualitative methods.

CASE STUDY

Case studies seek to understand a person or a situation in depth.¹⁹ For example, someone could study in great detail the transition of a unit from one aircraft to another. You could do this by focusing on just one case, or make an even stronger analysis by looking at multiple cases and making comparisons between them. This is a good method to use if little is known about a situation or if you want to look at how things change over time.²⁰ Unfortunately, this method is not strong when it comes to being able to generalize the results.

ETHNOGRAPHY

Ethnographies are broader than case studies since they study entire groups in depth, particularly groups that share a common culture.²¹ For example, instead of looking at one unit transitioning from one aircraft to another, a researcher could use this method to study the entire fighter pilot community. In this method, the researcher studies the group in their natural setting over a period of months, possibly even years, “with an intent to identify cultural norms, beliefs, social structures, and other cultural patterns.”²² This method was first used in cultural anthropology, but is just as applicable in today’s organizational cultures.

PHENOMENOLOGICAL STUDY

A phenomenological study attempts to “understand people’s perceptions, perspectives, and understandings of a particular situation” by looking at several different views of the same situation to make generalizations about what that situation is like.²³ This research method depends heavily on interviews. For example, the individuals who transitioned from one aircraft to another could be interviewed to see what the change meant for them.

GROUNDING THEORY STUDY

This method is interesting in that it is the reverse of most research methods, which normally begin with a theory and test it with data. A grounded theory study begins with the data and uses the data to develop a theory, and is “typically used to examine people’s actions and interactions.”²⁴

CONTENT ANALYSIS

Content analysis takes the contents of a body of material such as books, films, transcripts, and searches for themes and patterns.²⁵ This method could be used to determine how much violence appears on TV in any given day, and describe what type of violent acts appear most frequently. This challenging task of sorting through mounds of data is now easier with computer programs that can help do this quickly. This method is being used more and more and in combination with other methods.

QUANTITATIVE RESEARCH METHODS

In quantitative research, numbers, and statistical analysis play a larger role, and the ability to generalize results is somewhat stronger than most qualitative methods. Quantitative research methods can be divided into two major categories: nonexperimental and experimental.

NONEXPERIMENTAL RESEARCH METHODS

In nonexperimental research methods, the researcher only controls the measurement of the item under study. Both the descriptive and analytical survey methods are examples of this kind of research.

THE DESCRIPTIVE SURVEY METHOD

“Survey” is used here to mean, “to look, or see over or beyond.”

The descriptive survey method uses data obtained through observation. While historical data is used to explore events of the past, survey research *looks at things as they are happening*. A descriptive survey investigates things as they are without interfering with them.

There are three basic forms of surveys: retrospective, current, and prospective. A retrospective survey reaches back into the past to find out how things used to be. A current survey looks at things the way they are now. And a prospective survey selects a population and follows it for a period of time into the future to see what changes take place. Retrospective surveys have some problems in that the data may be incomplete or even missing. Current surveys, which are used most often, are used to determine things like current attitudes towards specific issues. Prospective surveys do the same thing, but are conducted on the population more than once. This type of long-term study is not done as often as other studies are, mainly due to time and cost constraints.

The questionnaire should be a “totally impersonal probe” which means the researcher must take several precautions when using this tool including:

1. The language must be unmistakably clear.
2. Questionnaires should be designed to fulfill a specific research objective.
3. Questionnaires succeed as their success is planned.
4. The initial letter is all-important.

SOURCE: Leedy's *Practical Research*, 1989, pp 142-146.

There are several different tools for the actual collection of the data, including questionnaires, interviews, and the differential sliding scale checklist or inventory.

When using any survey method, setting the proper population and using the appropriate, deliberate sampling procedures are essential to produce trustworthy results. Accidental sampling, such as asking questions to the first five folks who walk in each day, makes absolutely no pretense of being representative of a population and makes no attempt to control for personal bias. Quota sampling selects respondents in the same ratios as they are found in the overall population being researched. What is essential is the process of randomization that is used to choose from the overall population. This concept of randomization and the elimination of bias are the two most important elements in successful survey research.

THE ANALYTICAL SURVEY METHOD

The analytical survey method is different because it relies more on quantitative data as opposed to qualitative data. This means where the descriptive survey method relies on describing a situation through words, the analytical survey method interprets situations through numerical data. Even though many descriptive survey methods will use some numbers, the calculations are not the major form in which data exists in analytical survey research.²⁶ In the analytical survey method, the researcher is analyzing a set of data to *test a hypothesis* and to look for meanings that may be hidden within the data. Once the data is gathered, statistics play a very large role in their interpretation.

Quick Reference Sampling Table	
Total Number in Sub-Population	Number of people to be surveyed
1-5	All
6-7	5
8-9	6
10-12	7
13-16	8
17-20	9
21-30	10
31-49	11
50-99	12
100	14
200	21
500	40
1,000	75
2,000	78
5,000	80
10,000	81
SOURCE: Wilkerson & Kellogg, 1994, 14.	

<p><i>How do statistics help interpret data?</i></p> <ol style="list-style-type: none"> 1. Indicate the central point around which the data revolve. 2. Indicate how broadly the data are spread. 3. Show the relationship of one kind of data to another kind of data. 4. Provide certain techniques to test the degree to which the data conform to or depart from the expected operations of the law of chance or approximate an anticipated standard. <p>SOURCE: Leedy's <i>Practical Research</i>, p 186.</p>
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The biggest difference between the nonexperimental and experimental methods of research is survey research does not include the same highly controlled aspects of experimental research.

THE EXPERIMENTAL METHOD

There are many different subsets of the experimental method, but a common characteristic is the level of control the researcher has over both the event and the ability to collect data on the event. An experiment is a contrived event where the effect of a deliberate act is observed. One of the main purposes of experimental research is to determine cause-and-effect relationships. Unfortunately, some study results can be weakened because the artificial nature of their experiments makes the results too different from what might turn out in a natural setting.

One of the most important aspects of the experimental method is effectively planning the design of the experiment—not just how the data will be interpreted, but the entire experimental design.²⁷ One key concept involves independent and dependent variables. “A variable that the researcher manipulates is called an **independent variable**. A variable that is potentially influenced by the independent variable is called a **dependent variable**, because it is influenced by, and thus to some extent *depends on*, the independent variable.”²⁸ If we were testing a new medication to reduce headaches for example, the drug itself would be the independent variable and the headaches, which hopefully will be reduced or eliminated by the drug, would be the dependent variable—the headaches would depend on the medication.

METHODOLOGIES IN A NUTSHELL

When trying to choose between quantitative and qualitative methods, it is important to take several things into consideration—to include your interests. Table 1 gives some good guidelines of what to take into consideration.

Table 1. Research Methodology Guidelines

Use this approach if:	Quantitative	Qualitative
1. You believe that:	There is an objective reality that can be measured	There are multiple possible realities constructed by different individuals
2. Your audience is:	Familiar with/supportive of quantitative studies	Familiar with/supportive of qualitative studies
3. Your research question is:	Confirmatory, predictive	Exploratory, interpretive
4. The available literature is:	Relatively large	Limited
5. Your research focus:	Covers a lot of breadth	Involves in-depth study
6. Your time available is:	Relatively short	Relatively long
7. Your ability/desire to work with people is:	Medium to low	High
8. Your desire for structure is:	High	Low
9. You have skills in the area(s) of:	Deductive reasoning and statistics	Inductive reasoning and attention to detail
10. Your writing skills are strong in the area of:	Technical, scientific writing	Literary, narrative writing

SOURCE: Leedy, Paul D, and Jeanne Ellis Ormrod, *Practical Research: Planning and Design* (Upper Saddle River, NJ: Merrill Prentice Hall, 2001), 112.

College students spend entire semesters studying the intricacies of the various research methods and this appendix has only briefly touched on a few of them. For more details, one good reference is Leedy & Ormrod’s *Practical Research: Planning and Design*.

SUMMARY

The most important concept to take away from this appendix is that research must consist of more than just gathering information and spewing it back out again in a slightly different format. Research begins with the formulation of an appropriate research question. The research question, the data, and your interests influence the research methodology. In shorter research papers you may not be required to specifically state the methodology you used. However, it should be apparent from reading your paper that you aren't just presenting information, but are also drawing some new meaning from the information and actually contributing to the body of knowledge.

The real fun in life comes from total creative absorption in a task and not the external rewards for doing it.

– Michael Leboeuf

Notes

- ¹ Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, IL: The University of Chicago Press, 1970), 38.
- ² J. J. Carr, *The Art of Science: A Practical Guide to Experiments, Observations and Handling Data* (San Diego, CA: HighText Publications, 1992), 85-87.
- ³ Jacques Barzun and Henry F. Graff, *The Modern Researcher* (New York: Harcourt, Brace and World, 1985), 19.
- ⁴ Paul D. Leedy and Jeanne Ellis Ormrod, *Practical Research; Planning and Design* (Upper Saddle River, NJ: Merrill Prentice Hall, 2001), 70.
- ⁵ Marcia Watkins, *The Walden University Survival Guide* (NY: Love From the Sea Publishers, 1997), 56.
- ⁶ Marvin Bassett, ed., *Air University Style Guide*, (Maxwell AFB, AL: Air University Press, 2001), 11.
- ⁷ Bassett, 27.
- ⁸ Bassett, 72.
- ⁹ Bassett, 131.
- ¹⁰ Goodfellow, Major Gerald V., "Citing an email." E-mail to Marcia Watkins. 1 April 2003.
- ¹¹ HCarolineH, HEricH, and HEmilyH, "How to Write a Clear Research Report," on-line, Internet, 8 October 2002, available from <http://www.radix.net/%7Eforfax/air/clearrep.html>.
- ¹² HE. Robert SchulmanH, HC. Virginia CoxH, and HE. Anne SchulmanH, "How to Write a Scientific Research Report," on-line, Internet, 8 October 2002, available from <http://www.radix.net/%7Eforfax/air/scireport.html>.
- ¹³ Bassett, 86.
- ¹⁴ Leedy & Ormrod, 147.
- ¹⁵ Paul D. Leedy, *Practical Research; Planning and Design* (New York: MacMillan, 1989), 125.
- ¹⁶ Leedy, 128.
- ¹⁷ Leedy, 133-134.
- ¹⁸ Leedy, 134.
- ¹⁹ Leedy & Ormrod, 149.
- ²⁰ Leedy & Ormrod, 149.
- ²¹ Leedy & Ormrod, 151.
- ²² Leedy & Ormrod, 151.
- ²³ Leedy & Ormrod, 153.
- ²⁴ Leedy & Ormrod, 154.
- ²⁵ Leedy & Ormrod, 155.
- ²⁶ Leedy, 141.
- ²⁷ Leedy & Ormrod, 230.
- ²⁸ Leedy & Ormrod, 233.

Let's face it—English is a crazy language

There is no egg in eggplant nor ham in hamburger; neither apple nor pine in pineapple.

Sweetmeats are candies while sweetbreads, which aren't sweet, are meat.

We take English for granted. But if we explore its paradoxes, we find that quicksand can work slowly, boxing rings are square and a guinea pig is neither from Guinea nor is it a pig.

And why is it that writers write but fingers don't fing, grocers don't groce and hammers don't ham?

If the plural of tooth is teeth, why isn't the plural of booth beeth?

One goose, 2 geese. So one moose, 2 meese? One index, 2 indices?

Doesn't it seem crazy that you can make amends but not one amend?

If you have a bunch of odds and ends and get rid of all but one of them, what do you call it?

If teachers taught, why didn't preachers praught?

If a vegetarian eats vegetables, what does a humanitarian eat?

Sometimes I think all the English speakers should be committed to an asylum for the verbally insane.

In what language do people recite at a play and play at a recital?

Ship by truck and send cargo by ship?

Have noses that run and feet that smell?

How can a slim chance and a fat chance be the same, while a wise man and a wise guy are opposites?

You have to marvel at the unique lunacy of a language in which your house can burn up as it burns down, in which you fill in a form by filling it out and in which an alarm goes off by going on.

English was invented by people, not computers, and it reflects the creativity of the human race (which, of course, isn't a race at all).

That is why, when the stars are out, they are visible, but when the lights are out, they are invisible.

Enuff? Gud!