

Last quarter we realized that many of you needed more guidance writing a research paper. Many student papers read as if the student read a number of references and then sat down in front of the computer and began typing, pausing every once in a while to lift an idea or direct quote from one of the references and put it into the paper. Papers written in this manner are rarely well-thought-out, engaging, or easy to read. Much of the process of producing a research paper is not in the actual writing, but rather in the reading and rereading of your sources, allowing the ideas to ferment in your brain for a while before attempting to organize them into a cohesive and compelling paper. Even experienced writers can lose sight of what they are trying to say once they start writing, so it is usually important to have a clear thesis and structure before you begin writing. This process requires time...unstructured time to muse and reflect after reading the references. Therefore, it is highly unlikely that you can produce a high-quality paper in a couple of days.

We will cover the topics outlined below during lectures and workshops. This handout emphasizes some of the most important points. These topics are organized roughly in the sequence you might encounter them during the quarter. **PLEASE NOTE THE SCHEDULE ON THE LAST PAGE**, which outlines when various “benchmarks” are due.

Choosing a topic

- Pick a topic that has some relationship to forests, that can be phrased as a question, and that is large enough that you can't answer it from a single source. Also make sure that you care about the topic sufficiently so that you don't utterly bore yourself before quarter's end.
- This can be very easy or extremely time-consuming. After identifying several potential topics, you should do a little prospecting in the literature to determine how “rich” the topic is—whether there a number of different views and how much is known. Choose a topic that is not “cut-and-dried”, one with a number of different positions and with depth.
- If your question is too broad, consider narrowing it by focusing on a particular region or time period.
- One reliable method of identifying a topic is to identify a species or group of organisms, and an ecological or evolutionary process, and to ask how the one impacts the other. For instance: “How do terrestrial rodents effect the rate of nutrient cycling in neotropical forests?” If this proved too broad, you could modify the question by restricting your research to neotropical cloud forests. Or only look at the role of mice, rather than all rodents. Or only the cycling of Nitrogen. You get the picture.

Researching your topic

- The purpose of these papers is to explore a particular issue or situation. Unlike many papers you may have written in the past, you are not taking a particular position and supporting it. Your job is to present all the different views surrounding an issue.
- Expect the literature to be divided. If all the references you can find support the same interpretation of the issue, then the topic you've chosen is too narrow. Your job is to find and summarize all the different perspectives, identifying the places where they agree and where they disagree.
- Often, the information you need is not readily available. You will need to dig deeply to uncover peer-reviewed articles that explore various aspects of the issue(s) you have chosen. Look at your notes and the handout from the library research workshop last quarter.

References

References are the foundation of any research paper. They are used to build and support all statements that you make. Any claim or statement you write that is not entirely your own should be supported by quality references (see below). It is the use of references that distinguishes a research paper from an opinion paper. The quality and number of references that you use are what give weight to your paper and make it convincing.

Quality of references

There is a wide range of resources available out there from Internet web pages (generally low-quality) to peer-reviewed journals (highest quality). You should focus on getting the highest quality references possible for your paper. Anything without an author should be considered suspect and should cause you to dig deeper. Web pages are especially suspect. Anybody can put a page on the Web with anything on it. Many of the organizations putting information on the Web have a particular bias or viewpoint. This can be useful when gathering opinions, but not when trying to put together an unbiased collection of facts with which to construct arguments. The Web can be a useful resource to find government documents and to get an idea of the types of information available.

Peer-reviewed journals are the highest quality information source. Other researchers in the field have reviewed such papers, essentially signing off on their scientific validity. This means that the bs factor is significantly lower and that the information has been subjected to critical scrutiny.

Quantity of references

How many references do you need to support a particular statement? It depends on the importance of the statement to the point you are developing. In general, the more important the point, the more references should be used to support it. Having only a single reference may mean that the statement is weak and/or out of the main stream of critical thought on that topic; on the other hand, it may mean that it is a new argument, based on new data.

Style

You **must** use the style guidelines from the American Psychological Association (APA) when citing outside references in your papers. We will be very picky about this in your final paper. A complete explanation of these can be found at http://owl.english.purdue.edu/handouts/research/r_apa.html. Please refer to the handout on Writing Assignment #2 from fall quarter for more specifics on citing references.

Diversity

Selective reading of sources is wholly inappropriate in a research paper. Make an effort to read the full range of viewpoints. If people continue to write books and articles about a topic, it is probably because there are unanswered questions, or different answers that authors debate with each other. When you summarize this literature for the reader, it is important to convey the doubts and disagreements, and not just the arguments you agree with.

Reading and organizing your references

So you've found a whole pile of references to read and organize into a meaningful paper. How you go about this process will be reflected in the final draft of your paper. We highly recommend the use of outlines to organize your thinking and presentation of what you've found.

Identifying the main points

Begin by reading just the abstracts of all the papers you've collected and jotting down notes as you read. Pay particular attention to key concepts and results from each paper. After reading through all the papers and rereading your notes, begin to organize the material into an outline for your paper (refer to *Outline Workshop* for additional help). At this point, just focus on the main points and topics.

Creating topic pages

Create a "topic page" for each of the main topics you've identified by putting the topic as a title on the top of a sheet of paper. Begin reading your papers in detail and sorting the information within into the topics you've identified by writing a supporting fact or statement from the paper onto the topic page. Each time you write down a note on one of your topic pages, put the reference (Author year) next to it. Create additional topic pages as needed. When you are done reading all your papers, you should have a series of topic pages with notes from all your references (neatly cited) sorted by topic.

Create an outline and revise it

After reading through all your references, you will now have a much clearer idea of how to organize your paper. Create another draft of your outline with more detail. Use headings for the main topics, subheadings for major supporting ideas within each topic, and sub-subheadings for minor supporting details for each supporting idea (Fig 1). Revise your outline several times, focusing first on the most logical presentation of the main topics, then on the order of ideas within each topic.

Once you feel that the idea flow in your outline is sufficiently robust and that it flows well, begin to add the notes from your topic pages to the appropriate places in your outline. You may find it useful to copy the entire note (or if working by hand, using a short-hand abbreviation). Once you have completed this, you have now organized your references into a logical flow and can begin the text-generation phase of writing your paper.

- ☐ Choosing a topic ☐
- ☐ Researching your topic ☐
- ☐ References ☐
 - ☐ Quality of references ☐
 - ☐ Quantity of references ☐
 - ☐ Style ☐
 - ☐ Diversity ☐
- ☐ Reading and organizing your references ☐
 - ☐ Identifying the main points ☐
 - ☐ Creating topic pages ☐
 - ☐ Create an outline and revise it ☐
- ☐ Writing ☐
 - ☐ Identifying your audience ☐
 - ☐ What do you want the reader to walk away with? ☐
 - ☐ Keeping your reader ☐
 - ☐ IBI—Interesting But Irrelevant—Staying on point ☐
 - ☐ Voice ☐
 - ☐ Excessive quotation ☐
 - ☐ Avoid "fancy" writing ☐
 - ☐ Claim-to-support ratio (C/S) ☐
 - ☐ Technical issues ☐

Fig 1. Example outline of this handout

Writing

Identifying your audience

Think about whom your audience is and how much education they will have about the issues that you are writing about. Aim your writing accordingly; explain topics and concepts that are unfamiliar to this group in plain English.

What do you want the reader to walk away with?

When your reader is done, what thoughts and concepts do you want her/him to have? Clearly identify your goals for the reader and use these to work backwards to organize and plan your paper. These will be your main points. Outline what the reader will need to learn in your paper to fully grasp your main points. These will be your supporting subtopics. Organize these in a logical fashion to build to your points.

Keeping your reader

Imagine your reader as an adult with a three-year old mind that keeps asking “Why?” and “What’s the connection?” Your job as a writer is to anticipate these questions and answer them in the context of your topic. The only time you may raise questions that are left unanswered is if they stray too far from your topic.

Visualize your reader as having a short attention span and being a little lazy. If you wait too long to make a connection or answer a “Why?” you risk losing their attention. You can’t make your reader work too hard; once you lose them, your writing becomes pointless.

IBI—Interesting But Irrelevant—Staying on point

Stay focused on your subtopics and how they support/illustrate various aspects of your topic/issue. It is easy to stray from the point that you are trying to make and to include information that, while true and interesting, is irrelevant to your paper.

Voice

We all tend to have our own “voice” in our writing. However, when exploring an issue with a number of different perspectives, you often will need to “step outside” of your voice and present information in the voice of the source where you found it.

Excessive quotation

Avoid using quotations unless it is a particularly elegant phrase. Lengthy quotations often are a method of avoiding having to do any actual writing or thinking of your own. Summarize the viewpoint from a particular source in your own words, emphasizing the aspects that you’ve chosen to build your points, and then reference it.

Avoid “fancy” writing

KISS (Keep It Simple, Seriously). Use simple language. Use only words that you are familiar with. Write with a dictionary within reach and use it to check the meanings of words. Avoid adding fancy, long words just to sound academic or learned. Unless you are intimately familiar with the nuances of meaning of these words, using them inappropriately has exactly the opposite effect.

Claim-to-support ratio (C/S)

Every statement you make needs to be supported by references (unless it is your own opinion). A strong research paper has a low claim-to-support ratio, i.e. lots of evidence and analysis to justify each position it takes. There are two sides to this. You can increase the denominator (support) by adding more and higher quality references, careful reasoning, well-chosen examples, etc. This is limited by your time and access to research materials. You can also decrease the numerator by reducing number of claims you make. If you carry this too far, your paper will be narrow and dry. So strike a reasonable balance: make weakly supported claims only when there are compelling reasons (such as reader interest) to do so, and consider eliminating claims if you find little material to offer in support.

Technical issues

Page Numbers—There is no excuse for not having page numbers. Use them in all your papers. If you don’t know how to insert them, check out the Help section of your word-processing software.

Spell check—There is no excuse for not spell checking your paper.

Editing/proof reading—There is also no excuse for not reading your paper after you spell check to catch words that are spelled correctly, but aren’t the right word (e.g. form for from; to, two, too). It’s = It is. Its is the possessive form of it.

Use Headings and Subheadings—Organize and guide the reader by using headings and subheadings to identify sections of the paper.

Independent Project Timeline

Week	Task	Workshop	Work Due
1	Identify potential research topics	Mon 1/3. Topic brainstorming	Fri 1/7. Prioritized list of two or three project topics.
2	Form topic groups (faculty will assign), Pick weekly meeting time (suggest Mon 2-3 PM) Refine research topic by doing preliminary literature search	Fri 1/14. Reading and interpreting primary literature, graphs and tables.	Fri 1/14. Finalized research topic.
3	Library research, order papers, Assemble annotated bibliography (consists of a minimum of 5 peer-reviewed papers, includes citation, abstract, and short written description that outlines how each paper is related to your central question)	Fri 1/21. Peer-review of annotated bibliography.	Fri 1/21. Turn in copy of Annotated bibliography
4	Reading papers, taking notes, organizing information	Wed 1/26. Organizing and creating outlines.	
5	Peer review of outline (draft 2 or 3). Write introduction	Wed 2/2. Peer-review of Introduction/Background. Fri 2/4. Faculty meetings with topic groups	Fri 2/4. Turn in Final outline and draft of Introduction/Background.
6	Write draft of entire paper, edit and write second draft.	Fri 2/11. Global climate change symposium. Attendance required.	
7	Peer-review of draft papers on Mon outside of class. Plan presentations. Sign up for presentation slots		Wed 2/16. Submit drafts to faculty
8	Finalize papers, plan and polish presentations	Wed 2/23. Powerpoint and oral presentations (CAL).	
9	STUDENT PRESENTATIONS		Mon 2/28. Final papers due. Presentations.
10	STUDENT PRESENTATIONS		