Science articles can be condensed, full of jargon, and have certain expectations of the background knowledge of the reader. You should expect that some articles will be slow and difficult to read; however, you will find that articles follow certain formats that can help guide your understanding.

Here are some tips to help you tackle a science paper.

**Give yourself a few days to read an article over twice.** This will give you time to fill in any gaps you have in background information necessary to understand the article.

**TIP**

Don't be afraid to ask a fellow student, your TA, or a professor for help when you don't understand something.

*Sharing knowledge is the foundation of scholarship.*

**USING BASIC SOURCES**

As someone new to a field, you will want to find sources for basic information to explain basic concepts and fill in gaps in your knowledge. Choose only well-known, peer-reviewed, and carefully edited sources.

Don't read everything you find. Look for trustworthy sources.

Here are some guidelines to save you time.

**The Personal Website**

A personal website is no more reliable than a guy standing on a street corner handing out homemade flyers. The information is unreliable.

**Wikipedia**

The trouble with Wiki is that it varies in quality across articles. It can be as good as an encyclopaedia, but it can also be as bad as a personal website. You just don't know.

Some Wikipedia articles are sabotaged (e.g., at one point Tony Blair's entry had to be
corrected 25 times in one day), but most mistakes come down to a lack of peer-review before publication. For example, a Wiki writer misinterpreted his main source article on the history of the English language. This misreading gave Wiki readers information that was exactly the opposite of thinking in the field. The error was corrected only when another writer took the time to re-do the research and contact Wiki about the mistake.

GOOD PLACES TO START

When new to a topic, turn first to your lab manual, your TAs, and your professors as sources for basic information. They may have handouts, they may point you in the direction of a reliable source, or they may be able to answer your question with a quick chat.

Encyclopaedias

Encyclopaedias are a good start. They will give you some understanding of a topic and may even fill in gaps you didn't know you had, but they will not give you all the information needed at a university level.

Internet

If you do use the Internet to get basic information, stick to big websites and well-known organizations (e.g., Smithsonian, BBC, ROM).

TAKING NOTES WHILE READING

“Reading” in university means “reading and writing” or “comprehending, evaluating, and forming an opinion.”

TIP

Record all reference information (including volume, issue, and page numbers) every time you look at a source. It is annoying and time-consuming to find it later.

1. Never read without a notebook at hand to jot down things you think about as you read.
2. Avoid highlighting—it is not the best way to figure out a paper. Instead, write notes in your notebook or in the margins of the paper summarizing the main point(s) of that section and questions you have about it.
3. Take short, single sentence notes. These are jumping off points to think about
Think a lot, write a little.

Writing short notes teaches you to paraphrase and helps you to incorporate the ideas of what you are reading.

Example

Note: p. 3156 Smith writes about *Canis lupus* but shouldn't he think about other species as well?

Note: p. 3157 Main point: *Canis lupus* is decimating the mole population in North Dakota.

PASS 1: READING FOR UNDERSTANDING

Do not read the paper from start to finish. Here are some tips at what to look at first so that you can understand the main goals and main findings of the paper.

READ THE TITLE AND THE ABSTRACT

This will tell you what the question was, how it was answered, and the results of the study.

You may not be clear about the methods or results after reading the abstract—that's okay. But if you are having trouble understanding the topic or the jargon, take some time to visit your basic sources and fill in your gaps.

READ THE END OF THE INTRODUCTION

This is where most authors will write out their hypotheses, their questions, and include a brief description of their methods.

You should now have a clear idea of the main question(s) of the article. Write this down in your notes.
This is where background information about the topic can be found. This background information establishes why the question under discussion is interesting.

At this point, if you aren't clear on the main question or if you find the background information confusing, get some help and advice from a fellow student, TA, or a professor.

The main results are usually summarized at the beginning of the Discussion section.

You should now have a clear idea of what the main results were. Write this down in your notes.

Identify and write down in your notes

- the general protocol
- the independent variable(s) (the treatment)
- the dependent variable (the response)

You may be faced with statistics or complex analysis. Don't worry. For most courses, you don't need to understand the details.

You should now have a clear idea of how the main question was answered. Write this down in your notes.

Do the figures and tables show any significant or interesting results?

Read the entire Discussion to understand the explanation of what the results mean.
PASS 2: READING TO FORM AN OPINION

READ THE INTRODUCTION AGAIN

You now have some background understanding of the topic. Do you find the question posed interesting or important?

Examples

Notes: The question is interesting but not important given that they mention other researchers who've done the same experiment and had the same results.

Notes: The question is important – I've never thought of it. Recheck the lit review and the reference section to see if others have done this same experiment.

Notes: The question looks good. I can't tell from the reference list if it's been done before. And why has no one else done this experiment before? Is there a reason?

Notes: The experiment seems to follow logically from what was already known in the field.

READ THE METHODS AGAIN

Look at how well the study was designed to answer the question posed.

- Was the question answered?
- Were confounding variables controlled for? Can I think of any that weren't?
- Was the control appropriate?
- Were the sampling methods appropriate? Would I have done it differently?

READ AND COMPARE THE RESULTS AND DISCUSSION

Look at how honestly and clearly the results are considered.

- Is the interpretation of the results convincing?
- Is the writing trying to overemphasize or minimize an issue?
- Are other explanations for the results considered?
- Could I design a different experiment that might address some of these issues?