Reading Scientific Papers

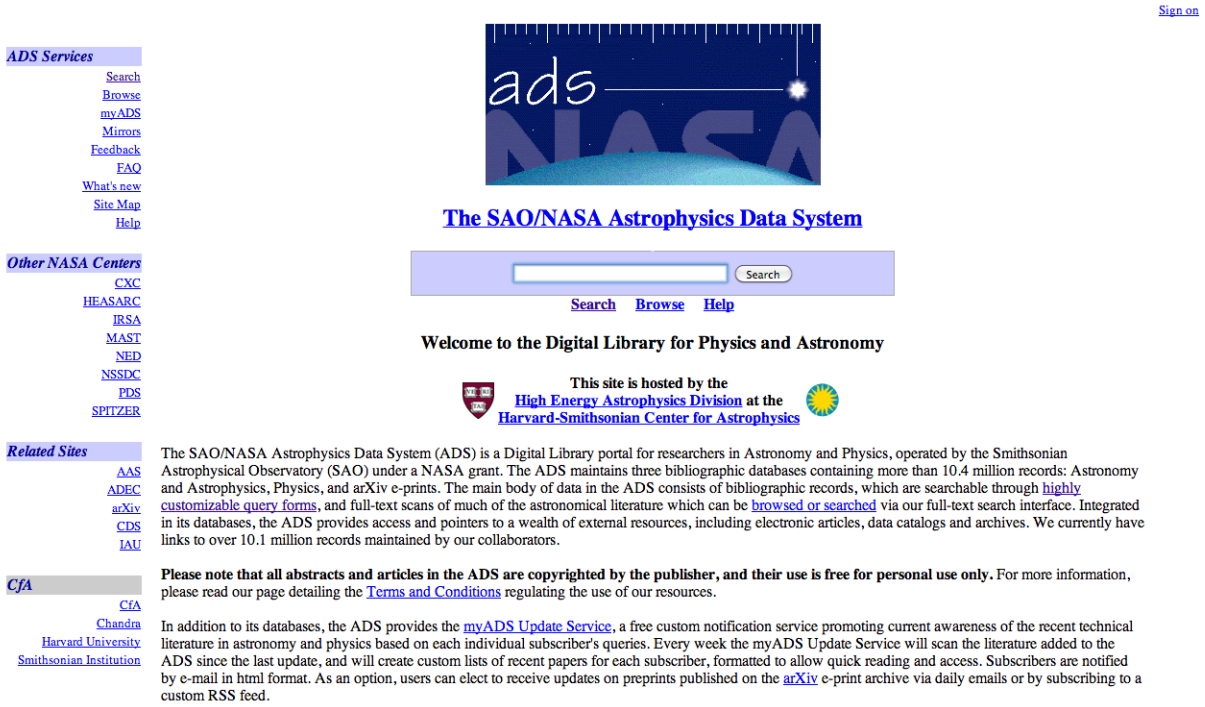
In 8 easy steps!

Before we start....

- Realize that everything I tell you is only a SUGGESTION
- Use this as a guide, but feel free to try your own thing

The tool of the trade: SAO/NASA Astrophysics Data System (ADS)

- http://www.adsabs.harvard.edu/
- Go to Search>Astronomy and Astrophysics
- You can search for different authors, title keywords, abstract keywords, etc
- **Pro Tip**: putting a "^" before an author's name tells the system to look for papers where that person is the FIRST author



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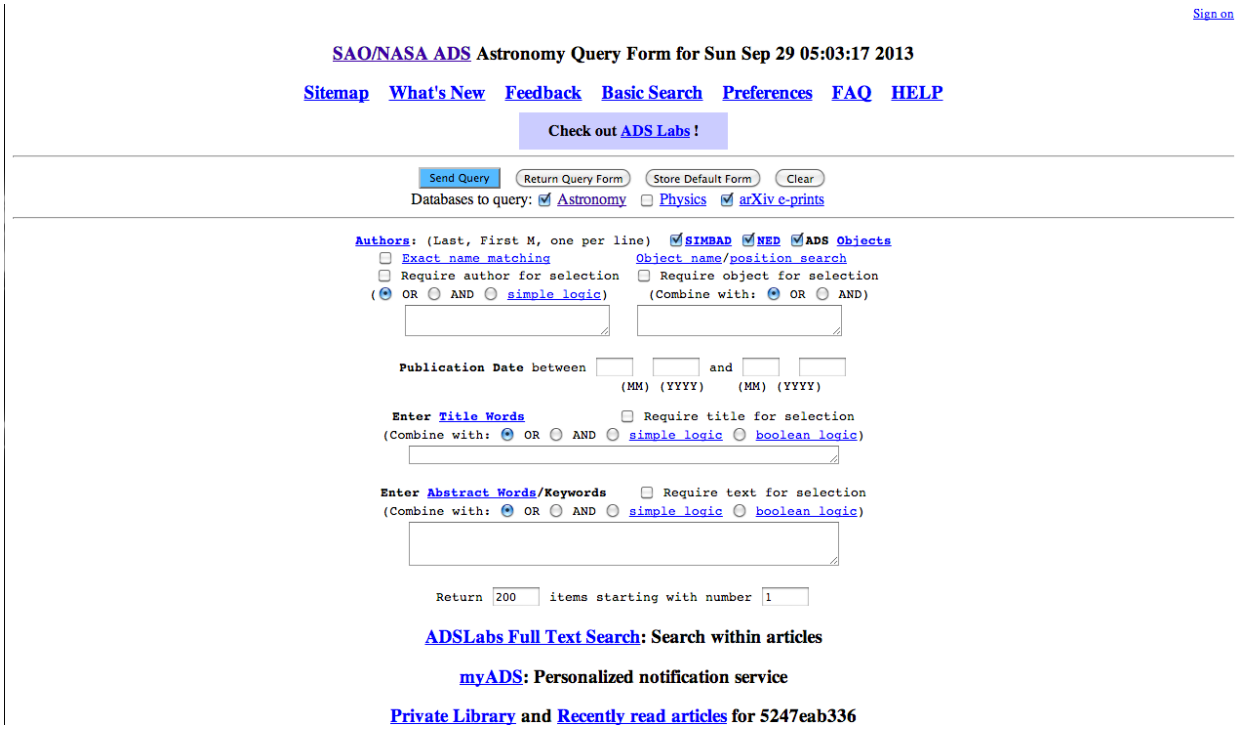


General Suggestions

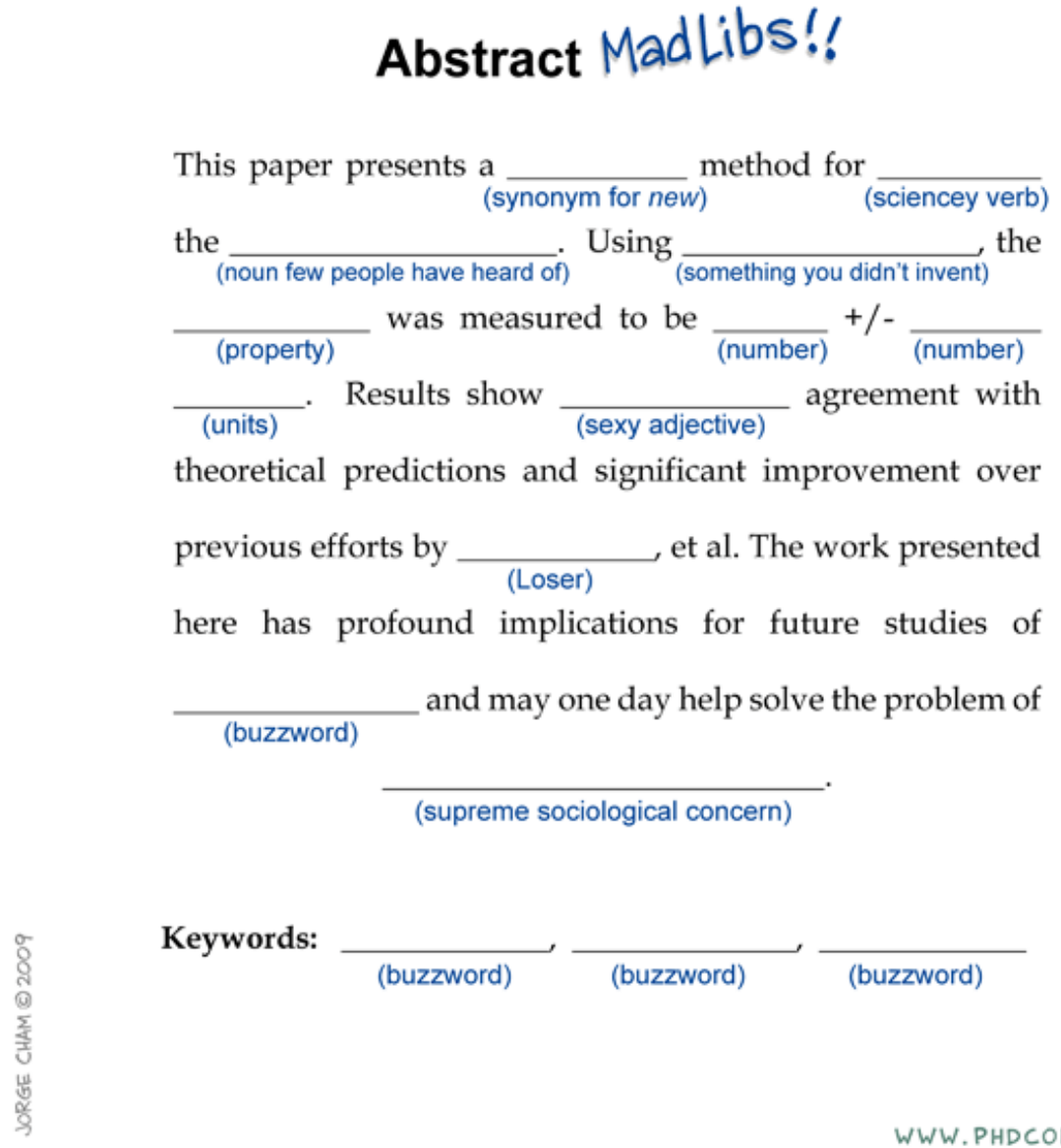
- Take notes and/or annotate
- Note of any words you don't know and **look them up**
- Be mindful of the meaning of words you think you know. For example, "significant" and "non-significant" have a very specific statistical meaning.
- Don't be afraid to use google/wikipedia as you go
- Make notes of important references as you go along so that you can look them up later.

General Structure of Papers

- Abstract
- Introduction
- Methods
- Results
- Discussion/Conclusions

The Abstract

- Really just an advertisement
- Gives a summary of the paper: the, problem, the experiment, and the conclusion
- Used mostly as a way to decide if a paper is what you are looking for
- Avoid reading the abstract in too much detail before you read the paper itself



The Introduction

- This is where all the background info is!
- **Step One**: Identify the BIG QUESTION

  What is the problem being addressed by the entire field (or sub-field)?

- **Step Two**: Summarize the background in *five sentences or less*

  What work has already been done?

  What hasn't been done? (or what hasn't been done well enough?)

  Why is this work important?

  etc...

The Introduction

- **Step Three**: Identify the SPECIFIC QUESTION(S) being addressed

  What exactly are the authors addressing?

  How does it fit into the bigger picture question(s)?

- **Step Four**: Identify the approach being taken to answer the questions. Usually the introduction will give a brief overview of this.

Methodology

- **Step Five**: Understand as best you can the methods used by the authors to answer their questions.
- This can be very difficult. This section can have a lot of technical details.
- See if you can understand the reason behind each step the authors take in their experiment.

Results

- **Step Six**: Be able to summarize the results of the paper.
- This section is like a story that the authors are trying to tell you.
- Most of the information here should be contained in the figures
- **Step Six-point-five**: For each figure, be able to explain **1)** what they are showing, **2)** what conclusions can be drawn from them, and **3)** what they add to the authors' arguments

Results

- **Step Seven**: Ask yourself, "did the authors succeed in addressing the questions they set out to answer?"
- What conclusions would **YOU** draw and why?
- Ask yourself this **before** you read the conclusion section

Discussion/Conclusions

- **Step Eight**: Read this section. Be able to summarize what the authors conclude and why. Do the author's conclusions make sense based on the data presented?
- Try to connect each conclusion made by the authors to plots or data presented in the "results" section.
- How are these results significant to the big picture question(s)?

Done!

- Hooray! You're done reading the paper!
- **Note**: This is not as linear as it sounds. Expect a lot of flipping back and forth between sections.

What now?

- Look up those references you made note of, then see step one...
- Read it again. Knowing the story already can allow you to catch things you missed before
- Look up papers that cite the one you just read