Reading Scientific Literature

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Some Tips…

• It’s painful at first…consistent practice will help.
  • We all felt a bit lost in the beginning, don’t take it personally!
  • The learning curve is steep. Acknowledge this fact and put in the effort.
  • Developing techniques will make this task easier!

  ❖ The worst way to approach this task is to treat it like the reading of a textbook—reading from title to literature cited, digesting every word along the way without any reflection or criticism.
  • It’s helpful to create some new habits
    • Peruse a paper source at a common time of day
    • There are phone/tablet apps for paper access too!

Some Tips…

• Older papers are often less condensed and more accessible to readers.
  • Reading older papers can be kinder to the ego.

• Publication summary sources are useful
  • News articles
  • Astrobites

• Take notes! Write out points in your own words.
  • Utilize the 3-pass method
What is the 3-Pass Method?

- **Useful approach outlined by scholars at the University of Waterloo**

  For many years I have used a simple ‘three-pass’ approach to prevent me from drowning in the details of a paper before getting a bird’s-eye view. It allows me to estimate the amount of time required to review a set of papers. Moreover, I can adjust the depth of paper evaluation depending on my needs and how much time I have. This paper describes the approach and its use in doing a literature survey.

Method Outline

- **Pass 1: Quick scan! (5-10 minutes for experienced reader)**
  1. Read title, abstract, and introduction
  2. Read section and subsection headings (ignore all else)
  3. Glance at the math
  4. Read conclusions
  5. Glance over references
  6. Answer the following:
     - Category: What type of paper is this?
     - Measurement? Analysis? Theoretical model?
     - Context: What other papers is this related to?
     - Correctness: Do the assumptions appear to be valid?
     - Contributions: What are the main contributions?
     - Clarity: Is this paper well written?

Method Outline

- After Pass 1, you may choose not to go to any further if...
  - This is often an adequate stopping point for papers that are outside your research field.
  - Most readers do stop here.
  - If a reader cannot get the gist of the paper after this first pass, he/she is unlikely to read further.

Method Outline

- **Pass 2: Read with greater care, but ignore proofs**
  (1 hour for an *experienced* reader)
  1. Note down terms you don’t understand or questions you have
  2. Look carefully at figures, diagrams, and illustrations. Pay special attention to graphs.
  3. Mark relevant unread references for further reading
  4. This is a great way to learn more about paper background
Method Outline

• Still don’t understand the paper?
  1. Return to the paper later after reviewing some background material or going over questions with peer/mentor.
  2. Persevere and go on to 3rd Pass.

Pass 3: Full understanding of work, which is typically necessary for a peer referee
• You should SKIP THIS!

How to Read a Scientific Article

• Review the hand-out written by Mary Purugganan and Jan Hewitt
  1. Skim the article and identify its structure
  2. Distinguish main points
  3. Generate questions and be aware of your understanding
  4. Draw Inferences
  5. Take Notes
    • Use the template provided

How do I find relevant papers in my field of interest?

• First off, it’s good to have a broad base, so don’t be hesitant to read things in other subfields or disciplines.

• Trace popular articles to their original sources.
  • “A group of scientists recently published their findings on…”

• Ask a prof or postdoc, where do you peruse literature in your field? There are various degrees of specialization.
  • Google Scholar
  • Nature
  • Arxiv/Astroph
How do I keep track of all this stuff?

- Mendeley and Papers for Mac are useful platforms for organizing your papers by author, keywords, etc.

Want more?

- [https://www.youtube.com/watch?v=8QaPstHybjY](https://www.youtube.com/watch?v=8QaPstHybjY)