# How to read papers

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# Question

- You have 5 minutes to examine a 10 page paper/article.  What do you do.
- Can we use AI?- Yes!

# Levels of Reading Articles

A. **Relevance:** Is the article relevant to my work?
B. **Meaning:** What does the article say?
C. **Background Understanding:** What can I learn about the topic in general?
D. **Validity:** Are the results and conclusions believable?
E. **Application:** How can I use the methods to design new experiments? How can I use the results to formulate new hypotheses?

# Skimming for Relevance

(Is this relevant for my work?)

Examine the Title for Keywords & Ideas

↓ Potentially Useful?

Read the Abstract

↓

**Will the Article:**

1. Stimulate new ideas?
2. Clarify state of the art?
3. Contain useful methods?
4. Clarify a question or phenomenon?

↓

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# Skimming for Meaning

## (What does the article say?)

1. Read the Abstract
2. Read the last paragraph of the Introduction.  What did the authors set out to do?
3. Read the conclusions.
4. Look over the results (graphs and tables).
5. Look at parts of the Results section related to graphs and tables.
6. Look through the discussion section for interesting points.
7. Look through the methods section to clarify general questions you may have on the experiments.
8. Read the complete article, if it may be relevant.

# Reading to Enhance Understanding

(What can I learn from this work?)

A. Focus is on the **Introduction** & **Discussion**

B. Procedure is:

   a. Scan the Abstract.
   b. Scan the Conclusions.
   c. Scan the Introduction.
   d. Skim the results.
   e. Scan the Discussion sections.
   f. Refer back to results and methods as needed to understand the discussion.

**(Scan – a careful reading of that section).**

# Evaluating for Validity

(especially if you are the reviewer)

1. Skim the article for meaning.
2. Read the complete article.
3. Re-read the article from a critical viewpoint.
4. Read articles from the reference section.

- The features you should look for in each section are described in the following slides.
- One or two problems might not negate the validity of the work.

# Evaluating Introduction for Validity

1. Is the provided background information accurate to your knowledge?
2. Are appropriate references provided for major concepts?
3. Do the authors' statements agree with your understanding of those references with which you are familiar?
4. Have the authors cited all of the references that are required to make their point?
5. Is the background appropriate to the overall purpose of the work undertaken?
6. Is the purpose of the work clear and unambiguous?
7. Are you convinced that there was a need for this work?
8. Is the general approach of the authors clear?

# Evaluating Methods for Validity

1. Are standard methods used, where appropriate?
2. Are the methods that were adopted from others properly referenced?
3. To your knowledge, do the authors describe adopted methods correctly?
4. Where appropriate, are calibration methods described?
5. Are positive controls described, ensuring proper implementation of the methods?
6. Are negative controls provided for comparison?
7. Are statistical analysis methods properly described?
8. Are correct units used for measurements (e.g. molarity of a reagent)?
9. Are all methods plausible, to the extent that you can evaluate them?

# Evaluating Results for Validity

1. Are needed calibrations adequately presented?
2. Are all plots properly labeled, including axes, units of measurement, legends for different curves?
3. Do all results generally agree with what is physically possible (e.g., mass & energy are conserved).
4. Is the range of data presented within the boundaries of the experimental protocol (e.g. length is not given in μm when it was measured with a ruler).
5. Are conversions correct (e.g. if measurements are made with a force transducer, but presented in terms of pressure, what area was used?).
6. Are curve fitting methods and data models appropriate?
7. Do p-values appear to be plausible, given the scatter in the data and the number of measurements made?

# Scispace- Dr. DeCoster Library


**Conclusions from the paper:**

- The green synthesis of metal-organic biohybrids (MOBs) with nanoscale features was successfully achieved using physiological and room temperature conditions. Different nanomaterials, including copper-based elongated structures (CuHARS), silver-based nanoparticles (AgCysNPs), and cobalt particles (CoMOBs), were synthesized using the naturally occurring amino acid dimer cystine as the biological component and various metals. [1]
- The self-assembly of CuHARS was found to be self-limiting, allowing for easy termination of the reaction by cooling the reaction vessel. The incorporation of sulfur from cystine or cysteine was observed in the self-assembled CuHARS. [2]
- The co-synthesis of MOBs containing copper, silver, and cobalt in the same vessel was demonstrated, and the size and shape of the materials could be distinguished using light polarization and digital microscopy. The green synthesis methods used in this study provided a smaller energy footprint for nanomaterials production. Modest temperatures in the range of 37°C to room temperature were sufficient to selectively produce different types of nanomaterials. [3]

Write a feedback 11:57 AM

3 Sources

# Strategies for keeping track of journal articles

- Maintain a database of all articles (electronic)
- Printouts of PDF files *may help you* (why?)
- Add key words to the articles entry in your database (*why?*)
- Most electronic databases allow you to add notes, either on the PDF itself (Adobe) or in a separate field.
- Some current tools:
- Papers -researchGate -Endnote
- Zotero -bibtex -Mendeley

# Identifying Gaps

A. Begin with a general idea or question

I would like to invent a method to target cancer-destroying beads to tumors

B. Ask yourself what questions this idea raises?

1. Is tumor vasculature different from normal vasculature?
2. Are there antibodies I can use?
3. How do I seal in the toxin until the tumor is reached?
4. How do I trigger the toxin to be released?
5. Will the toxin pass through the vascular barrier?
6. What happens to the dead tissue?

# Example: Platelets/Hemodynamics

Q: Where might fluid mechanics be important?

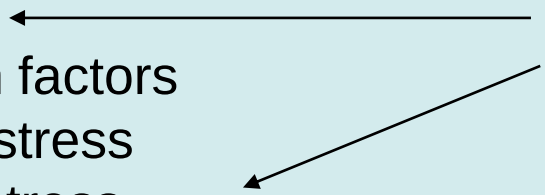
A: Blood flow
B: Cerebral spinal fluid
C: Respiration
D: Micturation

Q: What applications (in blood flow) have been examined?

1. Atherosclerosis: (diagnosis/pathogenesis)
2. Artificial devices: (thrombus formation, cell damage)

Q: What causes thrombus formation?

1. Platelets
2. Coagulation factors
3. High shear stress
4. Low shear stress
5. Injury



Connection?

# Example: Platelets/Hemodynamics

Q: How do platelets relate to shear stress?

1. Direct activation by shear stress
2. Endothelial denudation
3. Von Willebrand factor ← Interesting
4. Recirculation
5. Chemical transport
6. Enhanced diffusion

# Example: Platelets/Hemodynamics

Q: How does von Willebrand factor work?

1. Adsorption of protein onto collagen
2. Opening up of the protein
3. Possible activating mechanism

Q: How readily does vWf absorb?

Q: What stress is required to open the protein?

Q: How does activation occur?

# Experiments: Platelets/Hemodynamics

Q: Quantify vWf absorbtion

Q: Examine structure of vWf

Q: Generate hypothesis on vWf-mediated activation. Isolate activation from adhesion. (would need to know more about activation pathways).

# From General to Focused Literature Review