

Reviews in Quantitative Biology

Writing a review



Purpose of a review

- “[To] carefully identify and **synthesize** relevant literature to **evaluate** a specific research question, substantive domain, theoretical approach, or methodology and thereby provide readers with a **state-of-the-art understanding** of the research topic.”

Purpose of a review

- Synthesize current state of knowledge
- Identify inconsistencies in results
- Evaluate methodology
- “Develop conceptual frameworks to reconcile and extend past research”
- Resolve definition ambiguities
- Identify gaps in knowledge
- Point to future research directions

**Not every review paper does ALL of these things*

Standards of a review

- Enough past research in the domain exists to make having a review paper worthwhile
- Review must be well done
 - Good coverage of literature (collection, breadth, depth)
 - Compelling writing style
- Review must offer significant new insights
 - Not a “book report” that describes past research!

Difference between research article and review article

	Research article	Review article
Viewpoint	Presents the viewpoint of the author	Critiques the viewpoint of other authors on a particular topic
Content	New content	Assessing already published content
Length	Depends on the word limit provided by the journal you submit to	Tends to be shorter than a research article, but will still need to adhere to words limit

Purpose of a review

- “A literature review ...is generally considered a **secondary source** since it may analyze and discuss the method and conclusions in previously published studies.”

https://en.wikipedia.org/wiki/Literature_review

https://en.wikipedia.org/wiki/Review_article

The writing process

Find/read relevant papers

Organize ideas, structure narrative

Write first draft

Edit and revise



**Find/read
relevant papers**



Finding papers

- Google Scholar
- Pubmed
- [How to access the literature for free](#)

The screenshot shows the Google Scholar interface with the search term 'gene duplication'. The search results are displayed in a list format. On the left side, there are filters for 'Articles' (showing about 203,000 results in 0.07 seconds), 'Any time' (with options for 'Since 2022', 'Since 2021', 'Since 2018', and 'Custom range...'), 'Sort by relevance' (with 'Sort by date' as an option), 'Any type', 'Review articles', and 'Create alert'.

The search results list the following articles:

- [HTML] Evolution by gene duplication: an update** [HTML] sciencedirect.com
J Zhang - Trends in ecology & evolution, 2003 - Elsevier [Paperpile] [Share]
... **gene duplication** play in the evolution of genomes and organisms? Detailed molecular characterization of individual **gene** ... Changes of **gene** expression after **gene duplication** appear to ...
☆ Save 📄 Cite Cited by 2277 Related articles All 13 versions Import into BibTeX
- [HTML] Gene duplication as a major force in evolution** [HTML] springer.com
S Magadum, U Banerjee, P Murugan, D Gangapur... - Journal of genetics, 2013 - Springer [Paperpile] [Share]
... **Gene duplication** is an important mechanism for acquiring new ... new **gene** functions have evolved through **gene duplication** and ... **Gene duplication** can result from unequal crossing over, ...
☆ Save 📄 Cite Cited by 336 Related articles All 15 versions Import into BibTeX
- Gene duplication: past, present and future**
PWH Holland - Seminars in cell & developmental biology, 1999 - Elsevier [Paperpile]
... **Gene duplication** is of ... **gene** duplications and for widespread **gene duplication** in vertebrate evolution. I also outline the major unresolved questions in the study of **gene duplication**, and ...
☆ Save 📄 Cite Cited by 207 Related articles All 4 versions Import into BibTeX
- Evolution of gene duplication in plants** [HTML] oup.com
N Panchy, M Lehti-Shiu, SH Shiu - Plant physiology, 2016 - academic.oup.com [Paperpile] [Share]
... **gene duplication**, including **gene duplication** mechanisms, the potential fates of duplicate genes, models explaining duplicate **gene** ... , and the evolutionary impact of **gene duplication**. ...
☆ Save 📄 Cite Cited by 760 Related articles All 6 versions Import into BibTeX

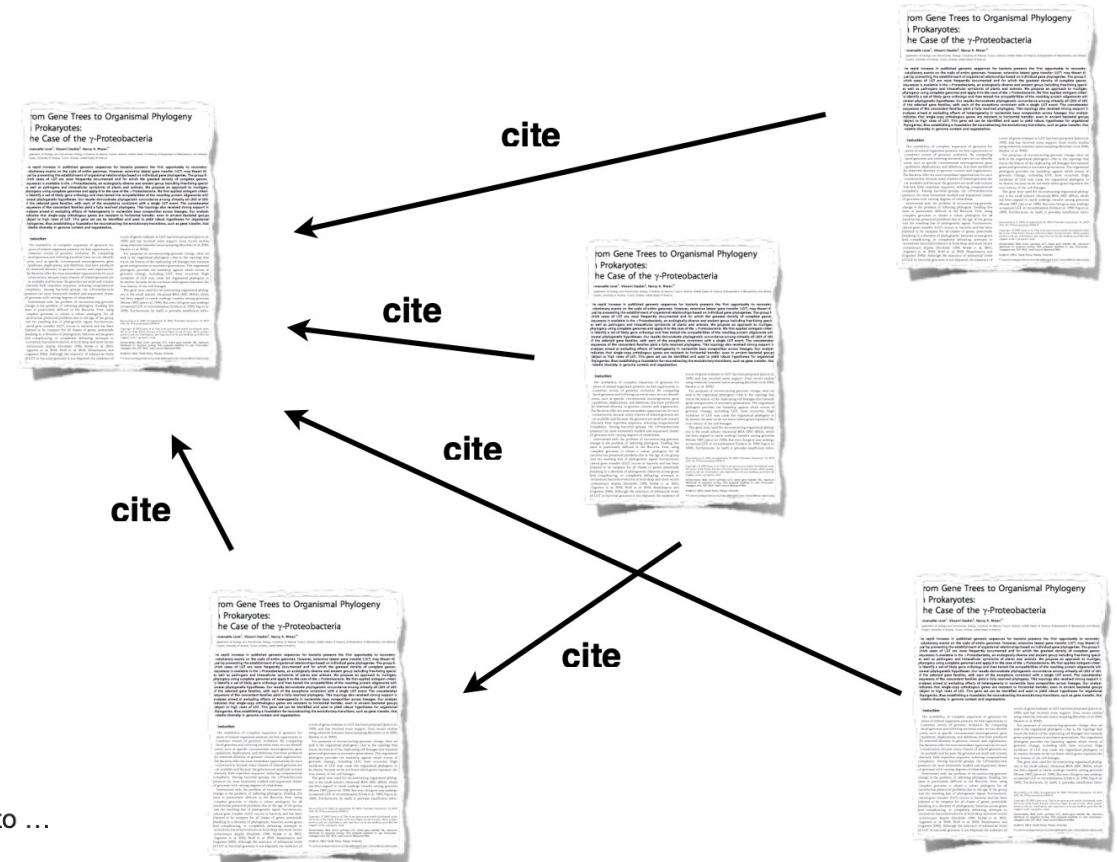


Shiny new
research
topic



Paper hopping

- Find original idea or result, evidence, influential papers
- Find dependent work, follow-up, criticism, falsification
- Google scholar cited by, related articles



[HTML] [Evolution by gene duplication: an update](#)

[J Zhang](#) - Trends in ecology & evolution, 2003 - Elsevier  

... **gene duplication** play in the evolution of genomes and organisms? Detailed molecular characterization of individual **gene** ... Changes of **gene** expression after **gene duplication** appear to ...

☆ Save  Cite [Cited by 2277](#) [Related articles](#) [All 13 versions](#) [Import into BibTeX](#)

AI tool: Research Rabbit

- <https://researchrabbitapp.com/home>

The screenshot displays the Research Rabbit app interface, which is designed for discovering research papers. The interface is divided into several sections:

- Left Panel:** A sidebar with navigation options such as "New Collection", "New Category", and "Connect to Zotero". Below this is a list of collections, including "ancestral genomes" (40 items), "synteny" (1 item), "protein function" (1 item), "machine learning" (33 items), "bioinformatics tools" (4 items), "gene gains" (1 item), "gene loss" (1 item), "Biodiversity bioinformatics" (3 items), "Genome quality" (1 item), and "Comparative genomics of birds" (36 items). There is also a "Shared with Me" section showing "No collections".
- Filter Panel:** A "Filter" section with a "Custom" filter type. It includes checkboxes for "Abstracts" (unchecked) and "Comments" (checked). Below this, there are several paper cards with titles like "Ancestral reconstruction of protein interaction networks", "Reconstruction of hundreds of reference ancestral genomes across the eukaryotic kingdom", and "Ancestral Genomes: a resource for reconstructed ancestral genes and genomes across the tree of life". The selected paper is highlighted with a blue border.
- Selected Paper Panel:** A central panel titled "1 selected paper" showing the details of the selected paper: "Ancestral Genomes: a resource for reconstructed ancestral genes and genomes across the tree of life" by Xiaosong Huang and Paul D. Thomas, published in Nucleic Acids Research in 2019. The abstract text is visible, starting with "A growing number of whole genome sequencing projects, in combination with development of phylogenetic methods for reconstructing gene evolution, have provided us with a window into genomes that existed millions, and even billions, of years ago." There is a PDF icon and a "Download" button.
- Right Panel:** A panel titled "Similar Work" with a "Filter" section and a "Relevance" dropdown. It lists several similar papers, including "Fast and sensitive protein alignment using DIAMOND", "Distinguishing Homologous From Analogous Proteins", "OrthoFinder: solving fundamental biases in whole genome comparisons dramatically improves orthogroup inference accuracy", and "Assigning protein functions by comparative genome analysis protein phylogenetic profiles". There are also buttons for "Remove from", "Add to Other Collection", "EXPLORE PAPERS", "EXPLORE PEOPLE", "EXPLORE OTHER CONTENT", and "EXPORT PAPERS".
- Connections Panel:** A panel on the far right titled "Connections between" showing a network graph of related papers and authors. It includes a "Graph Type" dropdown set to "Network" and a "Filter these items" input field. There are also buttons for "Help", "Survey", "Follow", and "Donate".

How to read a paper?

- **Identify (possibly record) key points:**
 - Hypothesis? Approach? Findings? Significance?
- **Order:**
 - Start with **Title** and **Abstract**
 - Then, read **Introduction**
 - **Figures** and **Tables** (captions are often self-contained)
 - **If it's not relevant, stop reading!**



Dr. Lisa Munro @llmunro · Sep 27

Making a "how to skim an academic article" guide for students because I spent years assuming that everyone was reading every word.

801

11.5K

150.2K



**Some papers you skim, some important papers you read in depth*

Citation managers



No-fuss reference management for the web

Manage your research library right in your browser.

- Save time with a smart, intuitive interface
- Access your PDFs from anywhere
- Add citations and bibliographies to Google Docs

New: Paperpile for [iOS](#), [Android](#), [Word](#)

[Start Paperpile](#)

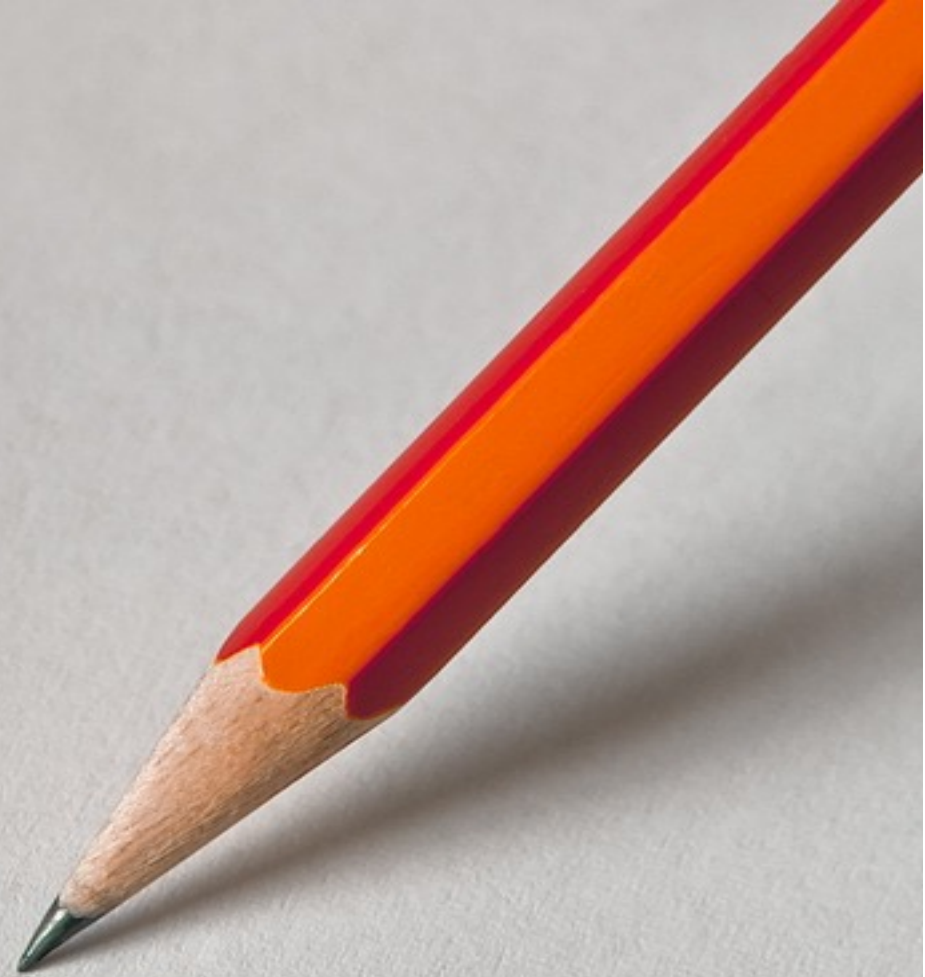
30 day free trial



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zotero

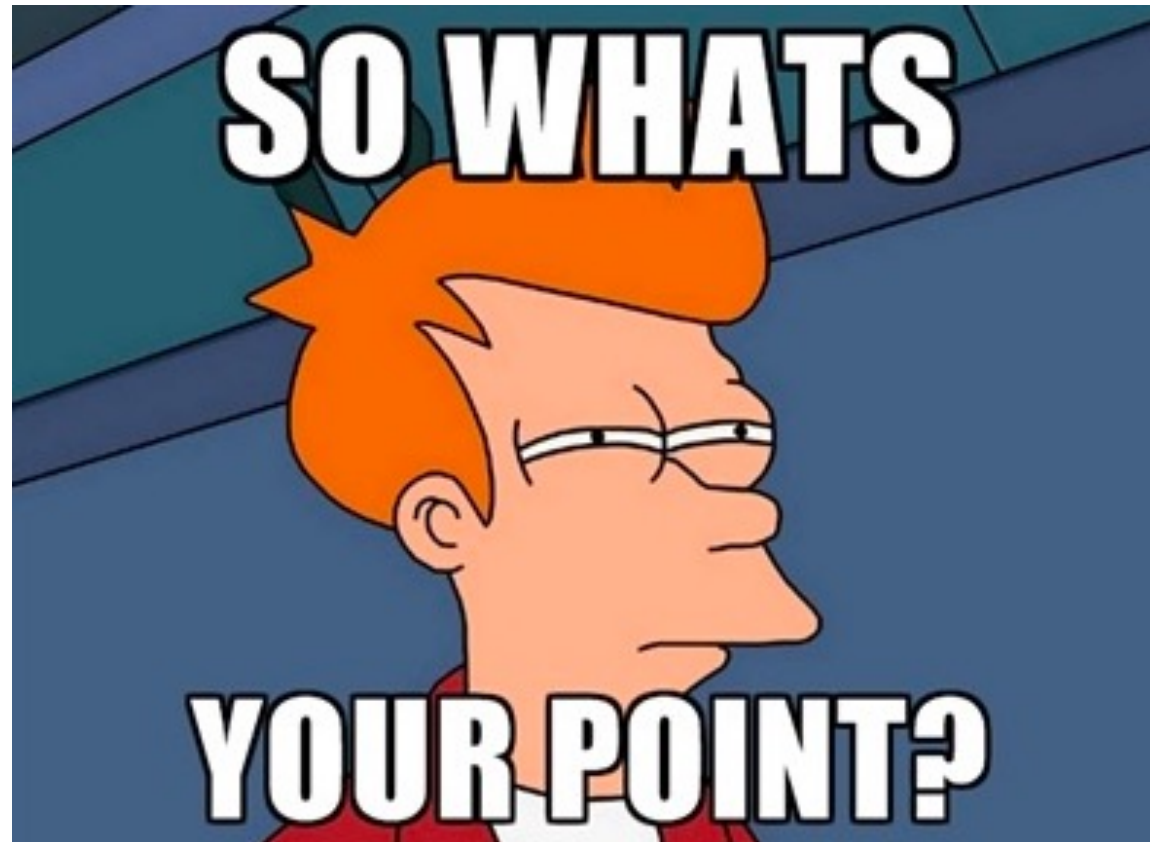
**Organize ideas,
structure
narrative**



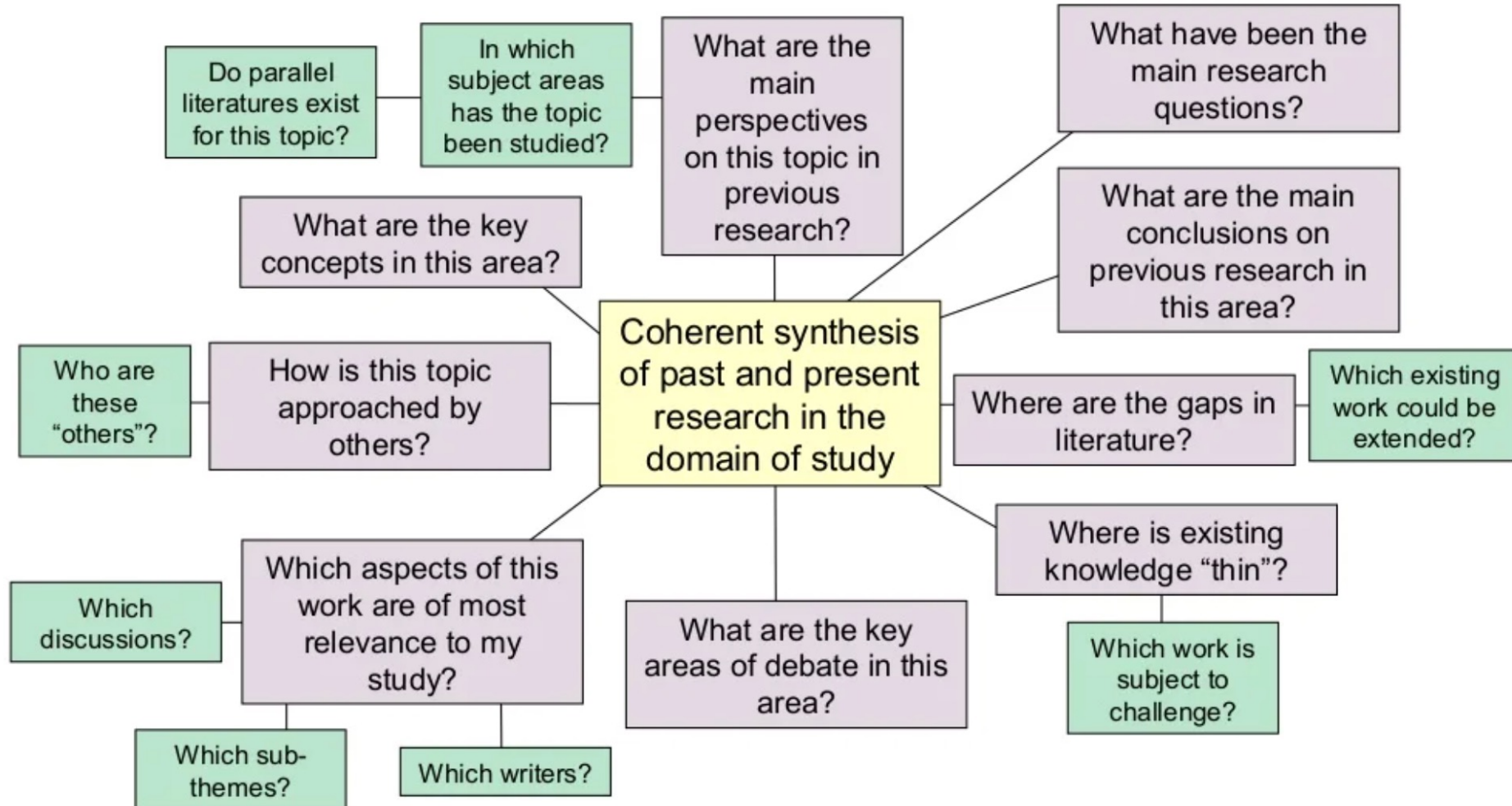
Key Questions

- What is the hypothesis/problem/question?
- Why is it interesting?
- What answers are provided by current literature? How did they do it? Implications?
- Which studies are particularly interesting and why?
- What is unsatisfactory about current literature? What remains unanswered?

**Distill the answers into
your synthesis**



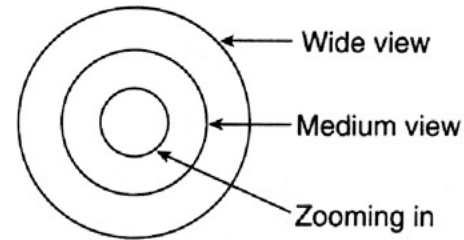
More questions



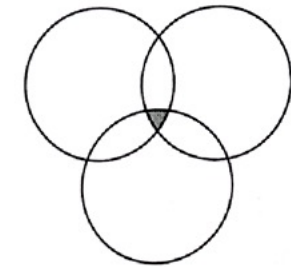
Typical structures

- Chronological
- Conceptual (e.g. pro/contra)
- Experimental/
methodological
- Centered on implications

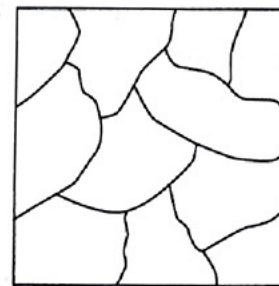
But: remember your point!



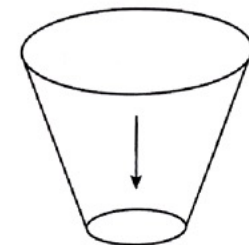
(a) Zooming



(b) Finding intersections



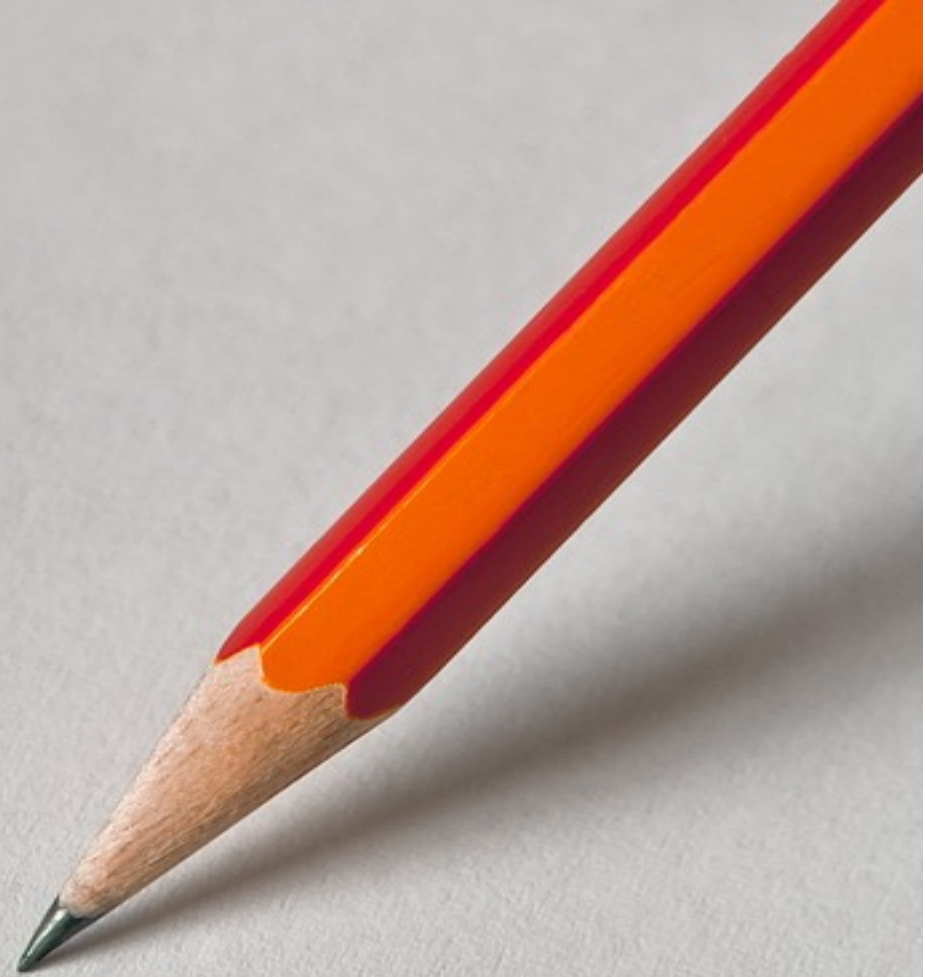
(c) Patch working



(d) Funelling

Ridley, "The Literature Review",

Write first draft



Know your reader

- What can the reader be assumed to know?
 - Read the journal editorial policy
 - Read similar articles published there
 - Err on side of caution, but avoid condescending or educational tone
- For this course, assume that your reader is a Masters student in Biology
- But keep a formal tone

The Title

- Signals the field and scope
- Includes your main point
- Gets readers interested

The Abstract

- Introduces field in 1-2 sentence(s)
- Motivates your review
- Announces important points (reformulates subheadings and main point)
- Includes relevant keywords (for indexing)

The Introduction

- Set the context from general to specific
 - Show that the research area is important/interesting/relevant.
- Establish a niche
 - Show need for your work (the review)
- Occupy the niche
 - Announce your main point
 - Indicate structure of article

The Main Body

- Use subheadings for each section
 - One sentence summary/conclusion
 - Helps non-linear reading
- If appropriate, use figures and/or tables
 - Review figures are often schema/cartoons
 - Use captions to make them self-descriptive

The Conclusion

- Specific -> general
 - Mini summary
 - Broader implications, future directions

Drafting

- Make an **outline**
- Every claim needs to be back by some evidence (in reviews, typically a reference)
 - Either report the findings only
 - Or paraphrase their approach and findings
 - Or use quotations (do not distort context)
- Best way to start writing is to start writing

Beware of plagiarism!

- If you include exact wording, use quotation marks and reference
- If you paraphrase, use a reference only

**Edit and
revise**



Improve flow

- Start each paragraph with a topic sentence
 - It signals paragraph content to the reader
- Improve cohesion
 - Connect sentences through conjunctions, parallel structures, repeated keywords, pronouns, “old-new” pattern, etc.
- Remove unneeded/redundant words

Final checks

- Spelling: use automated spell-checker and proofread your text carefully.
- Verify one more time
 - That references are accurate and complete
 - That each claim is backed by citation
 - That your narrative is coherent
 - That the article meets editorial policy (in particular length requirements)
- Ask a colleague for feedback on the draft

Using ChatGPT



Is it ok to use?

- Yes, within reason
- Acknowledge the fact that you used ChatGPT at the end of the paper
 - “ChatGPT-4 was used to assist in writing and editing of this paper.”
- Don’t ever put something in a paper you don’t fully understand or stand by
- You ultimately assume responsibility for anything ChatGPT says
- Always fact check!

Ways to use ChatGPT to help writing

- Give it an detailed outline and ask ChatGPT to turn it into paragraphs
- Reread the paragraphs to check for accuracy and tone
- Re-prompt ChatGPT with modified instructions
- Modify/edit sentences to put it more in your words

Ways to use ChatGPT to help writing

- Write the text (paragraph form) yourself first.
- Then ask ChatGPT to help polish the text.
- The more specific the prompt the better!
 - *Please take this <outline/draft> and generate text (summarize!) It will be a section in <xxx paper/proposal>. Please thoroughly review the text for clarity, conciseness, good flow, proper grammar and punctuation, readability, appropriate sentence length, active voice usage, effective introduction and conclusion sentences, and the use of clear explanations for complex jargon. Feel free to provide specific examples or rephrasing suggestions where necessary. Your goal is to ensure that the text is clear, concise, and easily understandable by both specialists and non-specialists alike. The target output should be <n pages/words>.*

Ways to use ChatGPT to help writing

- Read your originally-written text.
- Then ask ChatGPT to help polish the text.
- For each sentence you don't like or is unclear in the original text, see how ChatGPT phrases instead.
- Take bits and pieces of the ChatGPT sentences and mix with your own if it improves the writing

Tips

- The key is to use ChatGPT to make your writing sound polished and clear, but without sounding “fake” and like ChatGPT wrote it
- Prompts should be as specific as possible and give the context of the writing
- Use of ChatGPT should be fully transparent