

Scientific writing

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Why do scientists write?



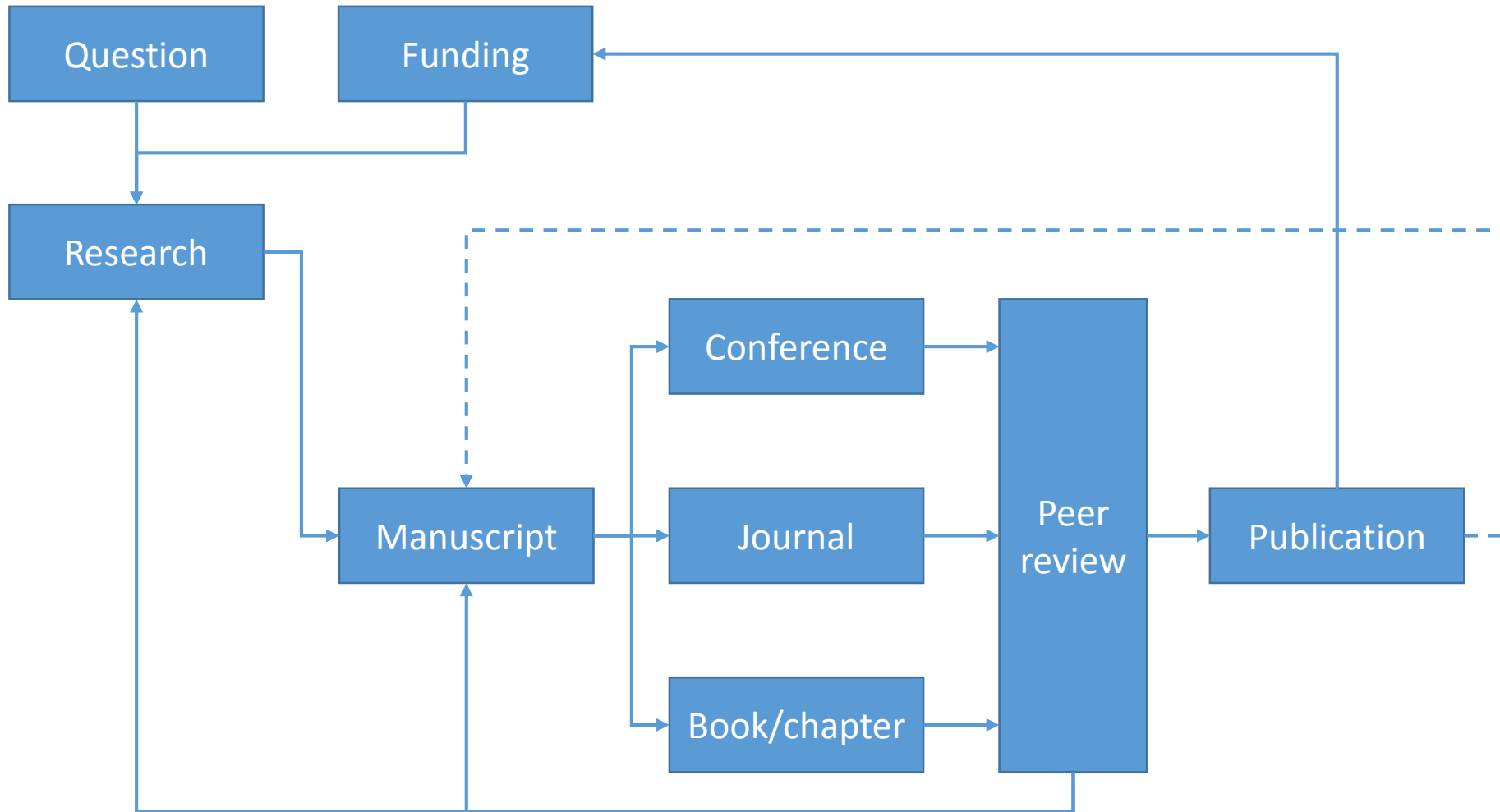
*If I have seen further
it is by standing on
the shoulders of giants.*

- Isaac Newton

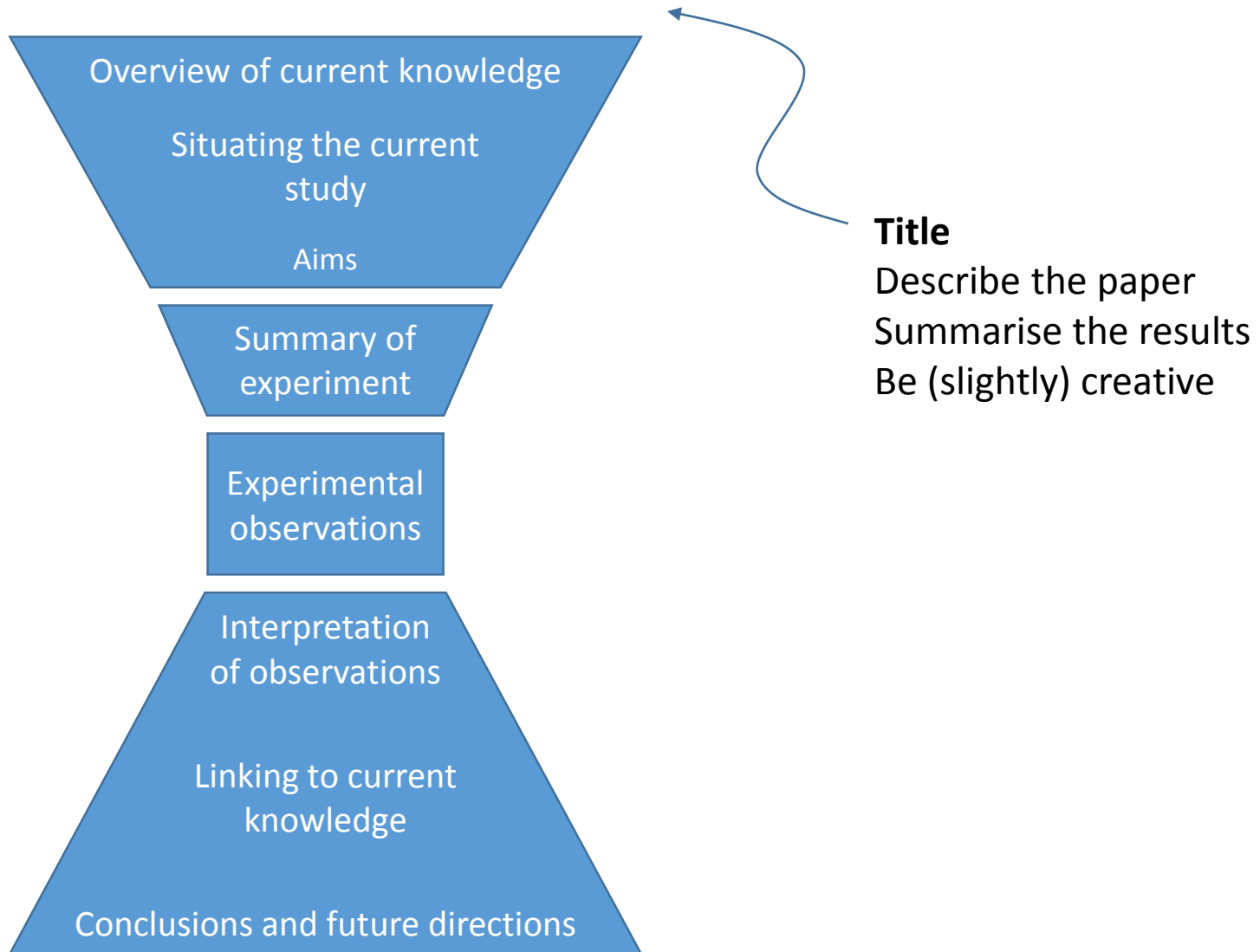
What do scientists write?

- Journal articles
- Literature reviews
- Magazine articles
- Reports
- Grant applications
- And much more

How do scientists communicate?

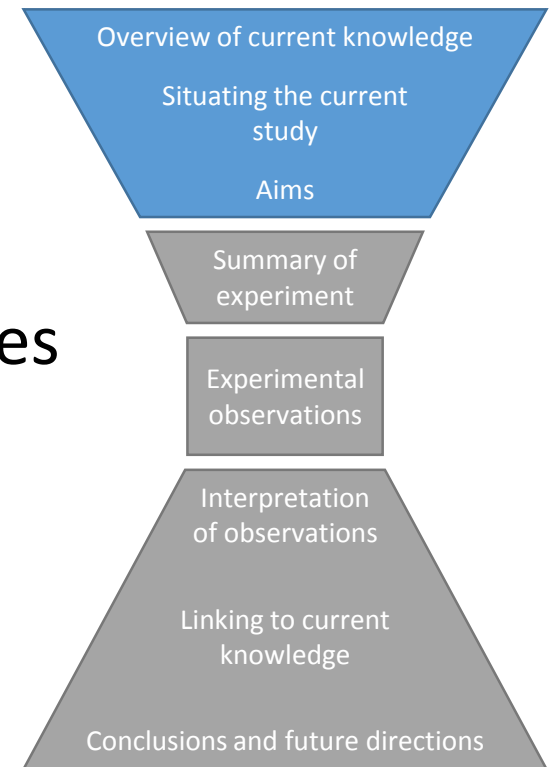


How do scientists write a paper?



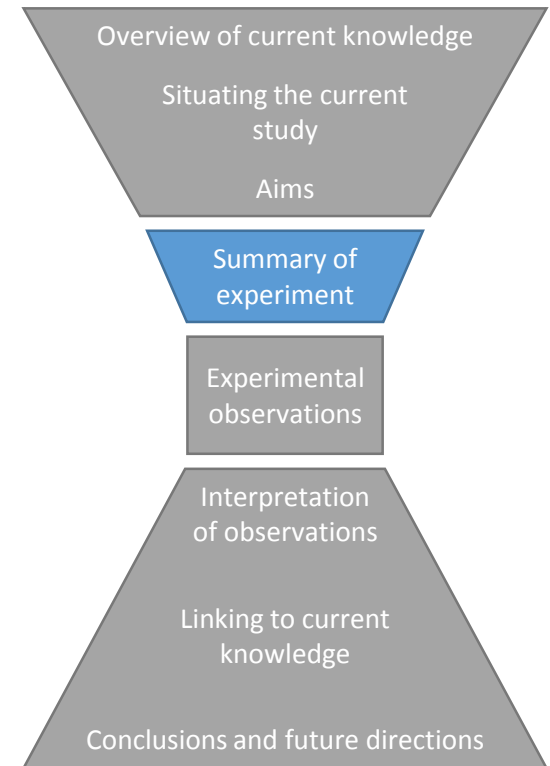
Structure of a paper: Introduction

- Mini literature review
 - Overview of current knowledge
 - What is the significance?
- Identify gaps in understanding
 - Be realistic
- Overview of how your research addresses these gaps
 - Methodology (not methods!)
 - Aims/hypotheses



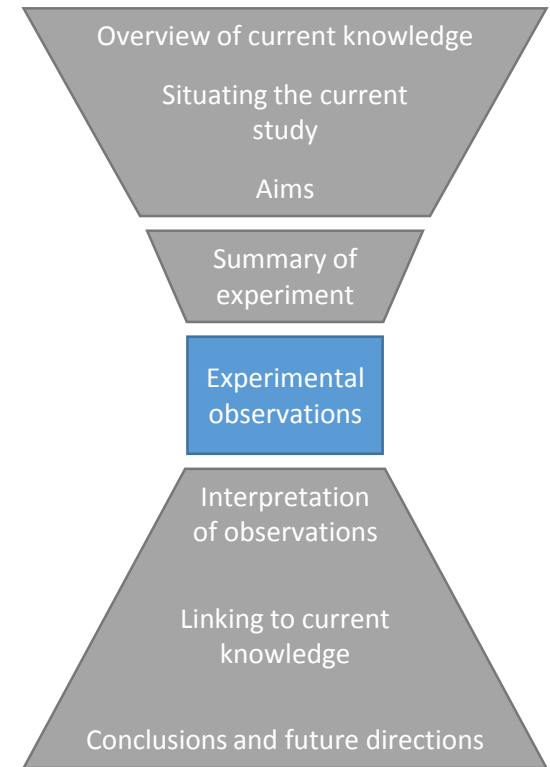
Structure of a paper: Materials & Methods

- Past-tense recount of experiment
 - Not a recipe or a protocol
- Level of detail
 - Sufficient for a trained scientist to repeat your experiment
 - Avoid excessive detail
 - ❌ A P20 was used to transfer 20 μL of FM4-64 to tube 1 which contained 10 mg of centrifuged CHO cells.
 - ✅ CHO cells were incubated with FM4-64 (2 $\mu\text{L}/\text{mg}$ cells).
 - Include necessary detail
- Do not present results



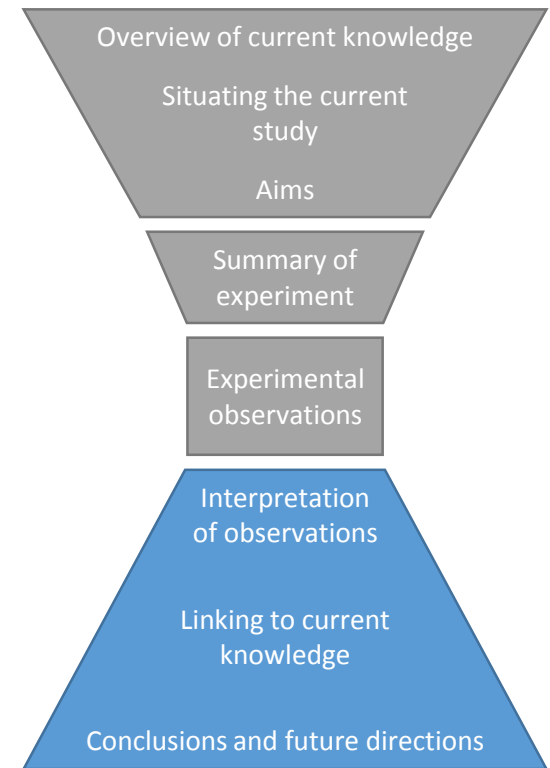
Structure of a paper: Results

- Describe your findings and observations
- Use figures and tables to support
 - Use wisely (or, according to the marking criteria)
 - Present clearly
 - Be careful when manipulating data
 - Informative legend
- Do not discuss or interpret



Structure of a paper: Discussion

- Interpret your results
 - Relate to research aims/hypotheses
 - Unexpected results? That's science!
- Integrate with existing literature
 - Research findings
 - Compare
 - Contrast
 - Explain
 - Methodological limitations
- Suggest future research questions arising from your findings
- Conclude

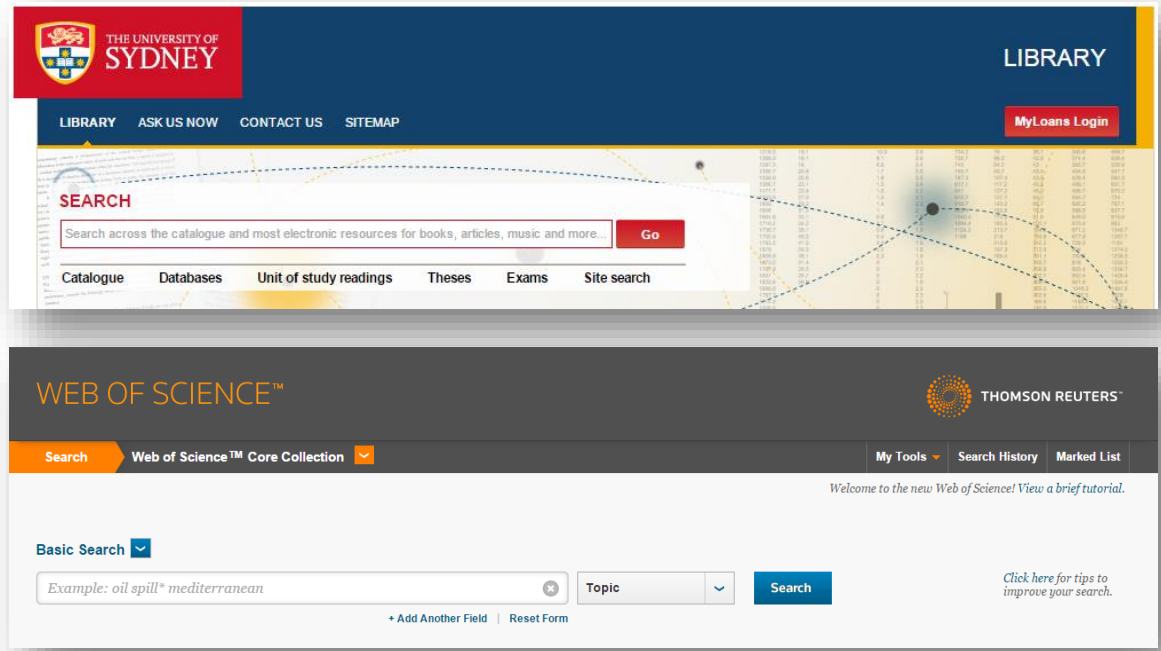


Structure of a literature review

- Different ways to structure e.g.:
 - Chronology/discoveries
 - Themes
 - Systems
 - Broad to specific
- Your perspective should shine through
 - Not 'just' a summary of the literature
 - Insightful critical analysis
- Researching a literature review
 - Annotated bibliography →
 - Mindmap →

Finding references

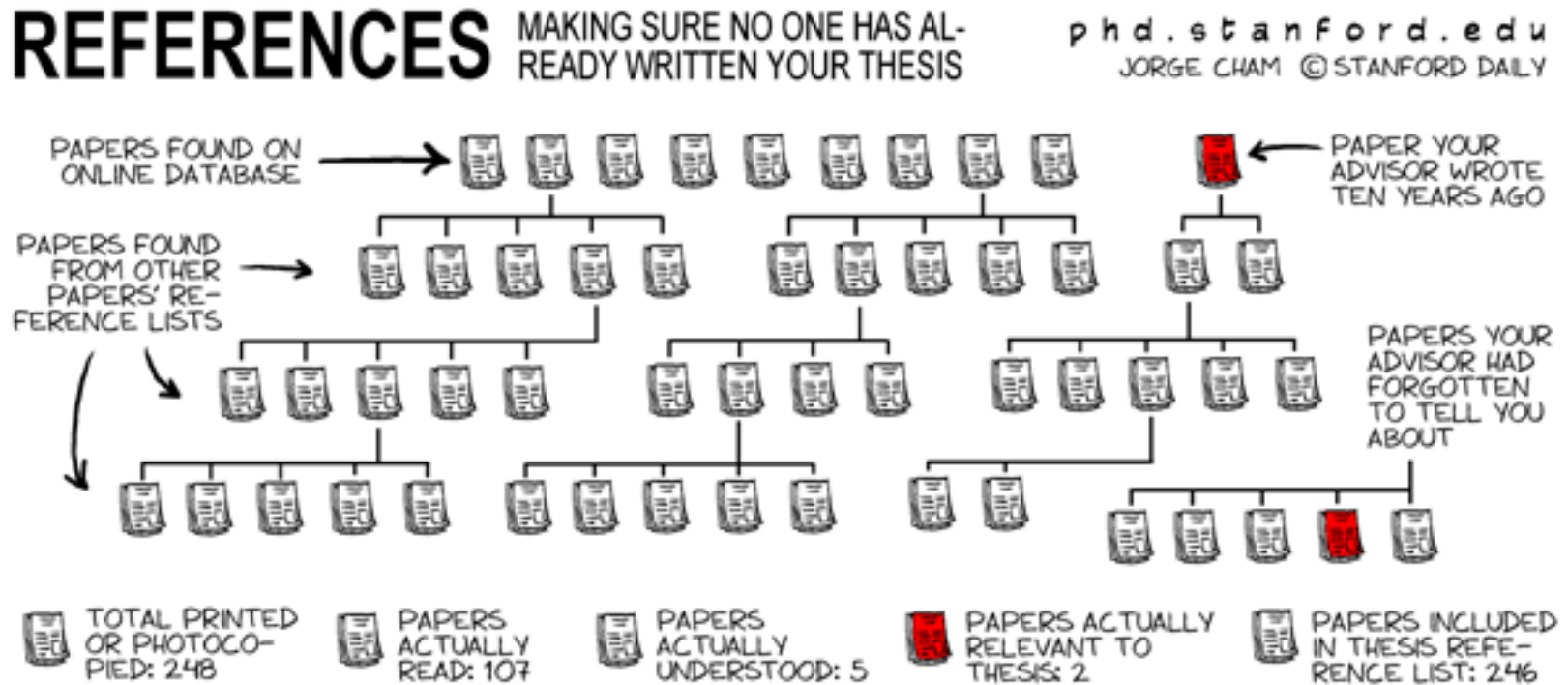
- Use databases
 - [CrossSearch](#)
 - [Google Scholar](#)
 - [Web of Science](#)



- Become a power user – [Google Scholar](#), [Web of Science](#)
 - Wildcards - *
 - Term delimiters – quotation marks and parentheses
 - Boolean operators – AND, OR, NOT
 - Advanced search operators – NEAR, NEAR/#

Finding references

- Paper chase
 - Use the references in your references



Using references

- Different parts of different references can serve different purposes for you, e.g.:
 - Introduction: get inspiration and background references etc
 - Method: find alternative methods etc
 - Results: emulate how data are presented etc
 - Discussion: more background references, inspiration for alternative arguments, validation of research directions etc
- Paraphrasing, citing, referencing
 - Be very careful about academic honesty
- Judging quality of references

Make technology work for you

- Search databases like a ninja
 - Use wildcards, delimiters, operators
- Use a reference manager
 - [EndNote](#), [Zotero](#), or [Mendeley](#)
- Organise your readings
 - Spreadsheets, mindmaps ([XMind](#), [MindMeister](#), etc)
- Back up your work
 - Set up automated backup e.g. [CrashPlan](#), [Time Machine](#)
- Submit online early
 - And check your submission for errors
- Run your own similarity check
 - [WCopyFind](#)

Common issues

- Level of detail
- Integrating and supporting with literature
- Referencing and citations
- Figures and tables
- Flow and coherence
- Scientific style and format
- Interpretation
- Reporting errors
- Overly strong wording

Methods: Excessive	1361
Awkward	1082
GOOD	959
Justify	909
Referencing error	829
Explain source	697
Scientific style	566
Grammar/spelling	525
Results: Abs vs PS	496
Results: Errors	439
Info prominent	398
Scientific format	374
Good, more	363
Strong words	319
Results: Legend	311
Structure	294
To D	292
Flow/integration	277
Wrong interpretation	251
Results: Detail	244

Final tips

- Starting
 - Start early
 - Understand the publication/writing guidelines (and rubric)
- Continuing
 - Draft iteratively
 - Be careful about getting feedback
- Finishing
 - Proofread, check references
 - Ensure your argument flows
- Remember
 - Your assessors are human, and are scientists with their own biases
 - Back up your work

Final tips

- Getting good marks for scientific writing at uni
 - Follow the assessment guidelines
 - Formatting, referencing, structure, page/word limit
 - Rubric/marking scheme
 - Be self-critical
 - Be strategic
 - Write in a scientific voice
 - Flow of argument
 - Level of technicality
 - Analyse, not just summarise
 - Your opinion matters – just back yourself up with evidence
 - Get feedback (if possible)

Final tips

Variation in Melanism and Female Preference in Proximate but Ecologically Distinct Environments

Zachary W. Culumber*†, Christian E. Bautista-Hernández*†, Scott Monks†, Lenin Arias-Rodriguez‡ & Michael Tobler§

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† Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, Pachuca, Hidalgo, Mexico

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§ Department of Zoology, Oklahoma State University, Stillwater, OK, USA

Although association preferences documented in our study theoretically could be a consequence of either mating or shoaling preferences in the different female groups investigated (should we cite the crappy Gabor paper here?), shoaling preferences are unlikely drivers of the documented patterns both because of evidence from previous research and inconsistencies with *a priori* predictions. Our methods closely followed those of published mate choice experiments in this system (Tobler et al. 2009a,b; Plath et al. 2013),

Let us know what you think

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Other resources

- Communication for scientists
 - <http://www.nature.com/scitable/ebooks/english-communication-for-scientists-14053993/contents>
- Guide to literature reviews
 - http://unimelb.libguides.com/lit_reviews
- Reading scientific literature
 - <https://journalaccess.aspb.org/ReadaSciPaper/>
 - <http://web.stanford.edu/~siegelr/readingsci.htm>