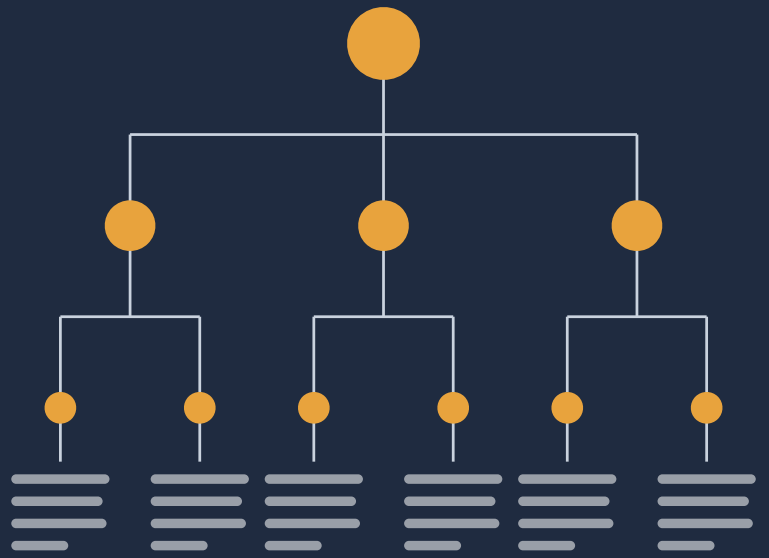
How I Write Papers

Outline first. Sentences last.



Adapted from “How I write papers,” thoughtforms.life

WHY OUTLINE FIRST

Two ways to write a draft

Linear

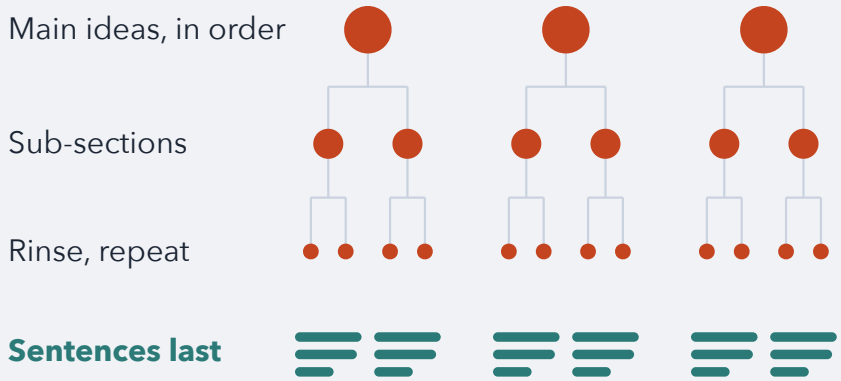
Start at the beginning, write to the end, then edit



Works for some remarkable people. Not for me.

Top-down (breadth-first)

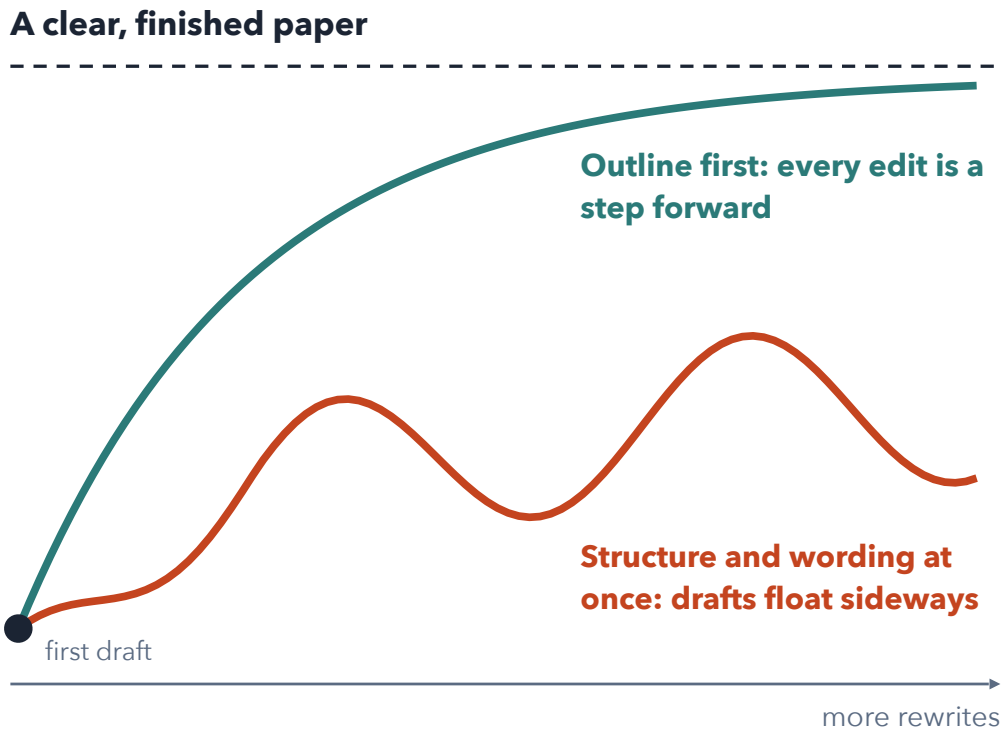
Settle each level of the outline before going deeper



Sentences only after the whole structure is settled.

WHY OUTLINE FIRST

Why drafts drift instead of converging



Writing and structuring at the same time

- Detailed writing paints you into a corner that forces a large-scale restructuring
- Pieces shift, and get rewritten again and again
- Writing becomes dreaded, and is put off until the last minute
- The result may still not be logical, clear, or on message

The cure: *separate* deciding what to say from deciding how to say it.

THE CORE IDEA

Separate creative work from mechanical work



PHASE 1 · CREATIVE

Decide what to say

- The story you will tell
- What's in, and what waits for later
- The order of ideas, and how they relate
- The journey you'll take the reader on

No sentences yet.





PHASE 2 · MECHANICAL

Then fill it in

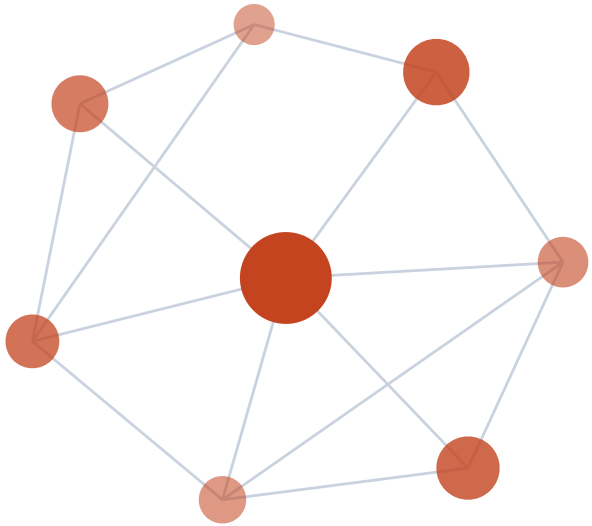
- Sentences around each bottom-level point
- Wording
- Numbers, statistics, figure callouts
- No big decisions left: turn the crank

Only after Phase 1 is finished.

Don't make executive decisions and wrestle with wording in the same piece of text, or at the same time.

PHASE 1 · CREATIVE

Phase 1: turn a mind-map into an outline



A mind-map: everything connects to everything

- **1 The puzzle**
  - 1.1 What's known
  - 1.2 The gap
- **2 The approach**
  - 2.1 The system
  - 2.2 Key experiment
    - Controls
- **3 The answer**
  - 3.1 What it implies

An outline: one ordered path through the web

The rules

- No sentences yet
- No wording until the bottom layer is in place
- Decide what's in, and what waits for later
- Work out how each idea relates to the others

The fun part: playing with ideas, with no worry yet about how to say anything.

PHASE 2 · MECHANICAL

Phase 2: just turn the crank



Each bottom rung becomes a paragraph

Once the outline is complete

- No deep decisions remain
- Put sentences and numbers around each bottom-level point
- Trust the outline (or edit it, if needed), and keep filling in

What could be simpler than filling in an existing structure?

PRIMARY DATA PAPERS

Write in a different order than it's read

HOW IT'S READ

1	6	3	2	5	4	4
Abstract	Introduction	Results	Figures	Discussion	Methods	Acknowledgments

The number on each part is when it gets written.

HOW I WRITE IT

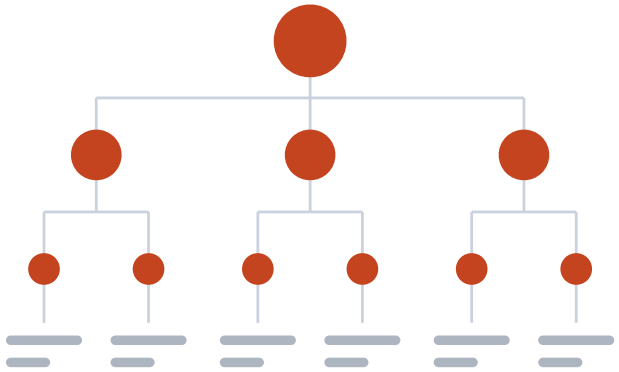
1. **Story, outline & Abstract**
2. **Figures (titles first)**
3. **Results**
4. **Methods & Acknowledgments**
5. **Discussion**
6. **Introduction**

DATA PAPERS · STEP 1 OF 6

Decide the story, then write the Abstract

First, the story

- Decide on the story
- Outline how you'll tell it
- Decide what's included, and what isn't



Then the Abstract

PROBLEM What problem was addressed?

APPROACH How was it addressed?

FINDINGS What was found?

About 250 words. Its shape is an hourglass (more on shapes later).

DATA PAPERS · STEP 2 OF 6

Figure titles are the bones of the paper



FIGURE 1

The regeneration assay *(schematic)*

FIGURE 2

Treatment A **blocks** regeneration

FIGURE 3

Treatment A **acts by silencing** gene X

FIGURE 4

Restoring gene X **rescues** regeneration

Hypothetical example. Read in order, the titles alone tell the story.

- Each figure is one major Result; the titles are the bones of the paper
- Each figure holds just the graphics needed to convince the reader of its title claim

Title = a claim, with a verb

✗ Gene X levels after treatment A

✓ Treatment A silences gene X

Checkpoint: share the figure titles with your PI or collaborators before filling in the content.

DATA PAPERS · STEP 3 OF 6

Every Results subsection follows one formula

1 · QUESTION & APPROACH

In order to determine **X**, we took approach **Y**.

↓

2 · EVIDENCE

We performed experiments **Z**, which showed that **Q** (Figure **N**; statistics).

↓

3 · CONCLUSION

Therefore, we conclude that **W**.

Subsection titles = figure titles

FIGURE 3

Treatment A silences gene X

↕

RESULTS, SUBSECTION 3

Treatment A silences gene X

- Same outline level as the figures, though not always one figure each
- Designed to be easy to fill in without getting stuck

DATA PAPERS · STEP 4 OF 6

Methods and Acknowledgments

Methods

- Every technique you used
- Enough detail for others to repeat the work

Flag whatever was tricky: anything likely to trip others up or keep them from getting the same results as you.



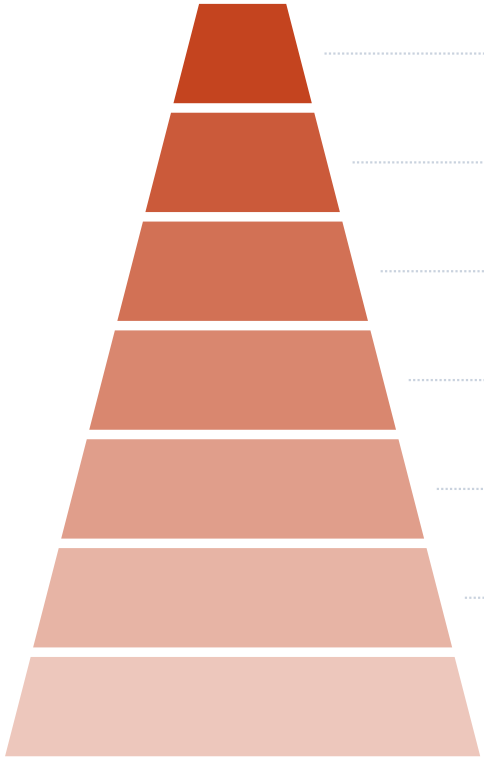
Acknowledgments

Everyone who helped

Every funding source

DATA PAPERS · STEP 5 OF 6

The Discussion widens back out



Recap the main results: cite a summary figure or model that pulls them together

Note what's interesting or puzzling, or not obvious from the raw data

Interpret: what it all means, and why it matters

Tie it to existing work: what it matches, contradicts, extends, or overturns

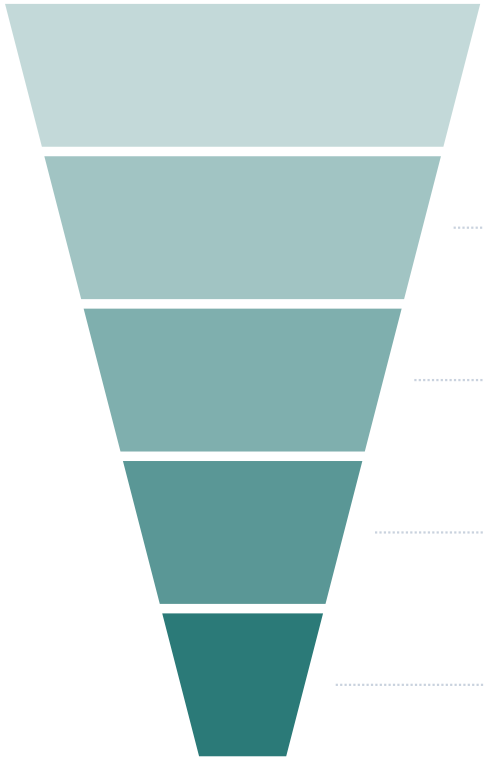
Limitations of this study: what wasn't done, what's uncertain, what's still open

Future work: what comes next, and what is now possible

Conclusion: end on a positive note that gets others excited about the field

DATA PAPERS · STEP 6 OF 6

The Introduction is written last



The field: the area of science being addressed

What is known: the structure of past work, and how to think about it

What is not known: knowledge gaps and opportunities

What you'll address: which gaps, and how

"Here, we …": a teaser of what you found, and your main claims

The hardest part. Frame the problem the way you find most useful.

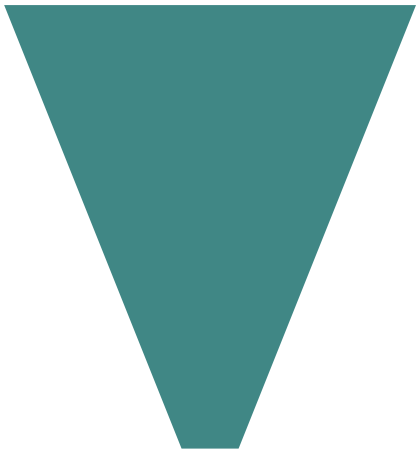
Its job: make the reader need to keep reading.

Cite generously: give plenty of references to other good work.

STRUCTURE AT A GLANCE

Three shapes to remember

Introduction

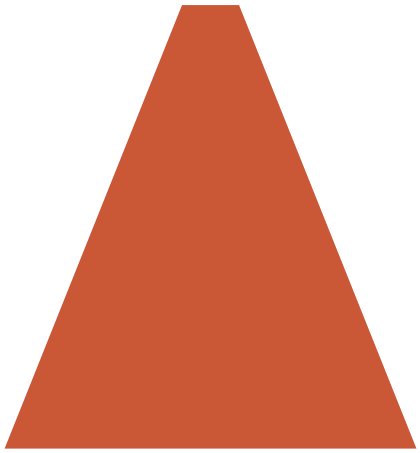


broad → specific

from the field to your question

+

Discussion

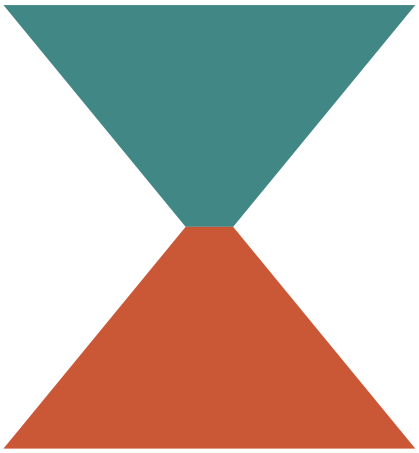


specific → broad

from your results back to the field

=

Abstract

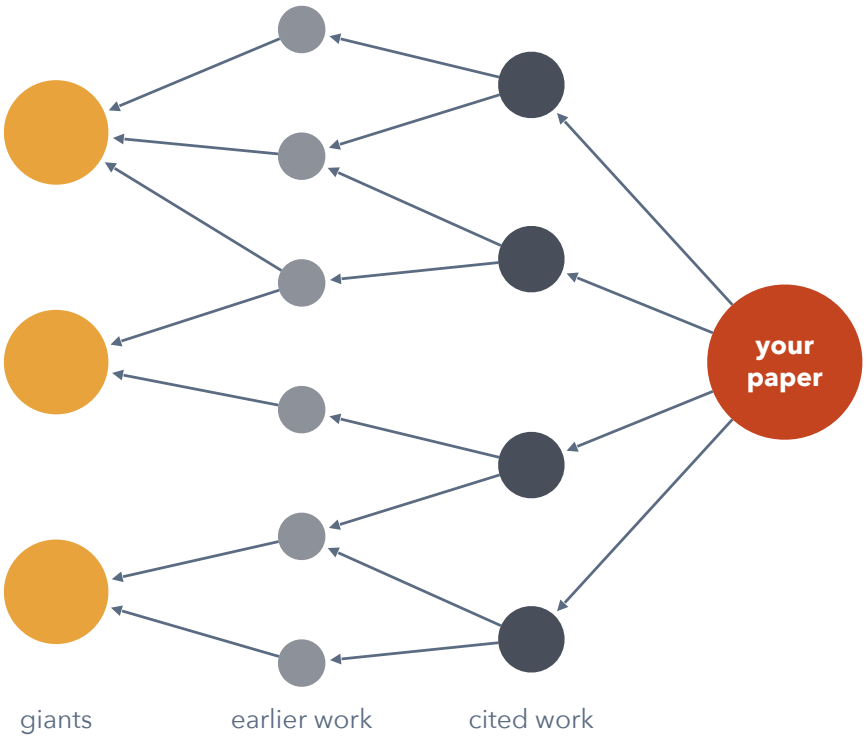


general → specific → general

all of it, in about 250 words

HABITS · REFERENCES

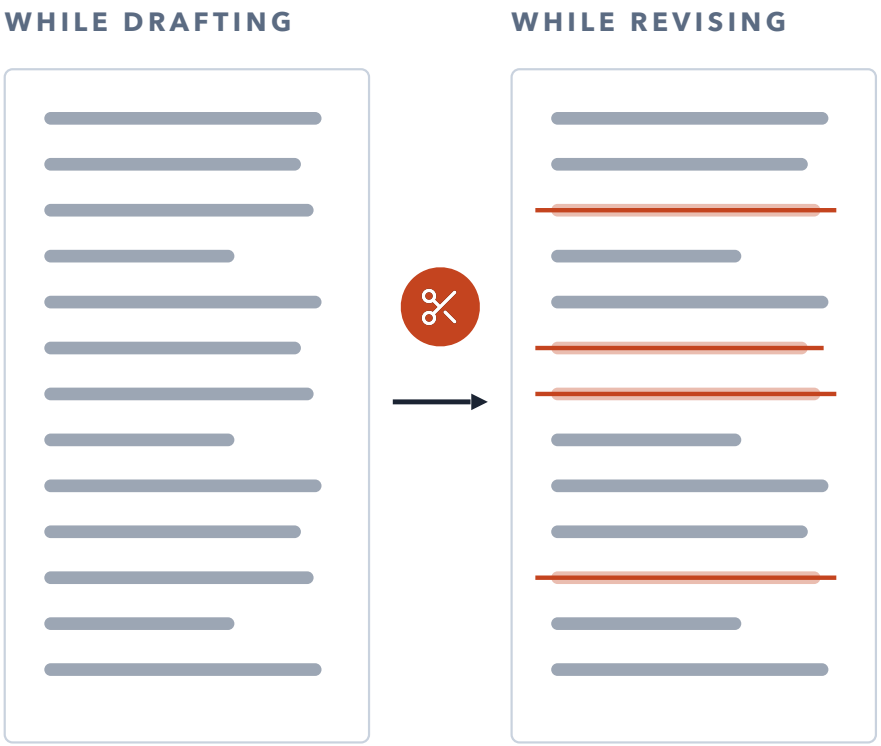
Be generous with citations



- Cite all relevant prior work, so an engaged reader can trace it all the way back to the giants whose shoulders you stood on
- If a journal limits citations (a terrible practice), make sure your preprint has every reference
- Use a reference manager. I like EndNote; my library is linked from the blog post
- Ask someone who knows the field (and/or AI) to check that you didn't miss something, or someone important

HABITS · LENGTH

Write it all, then cut mercilessly



While drafting

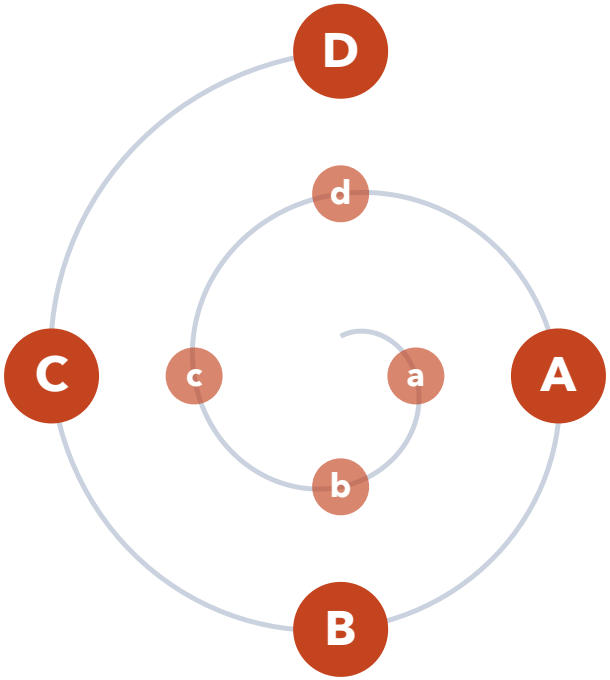
Ignore word counts: thinking about cutting while writing inhibits the creative process. Say everything you want to say (if the outline is sound).

While revising, ask of every paragraph

- Is it serving the mission: taking the reader where you want them to go?
- What work is it doing for the main theme?
- What effect will it have on the reader?

Then cut mercilessly.
(Preprints have no length limit.)

For interlocking ideas, use a spiral



The problem: parts A, B, C and D each need the others to make sense, like an interlocking puzzle. Which goes first?

- First, a short, simple statement of every part
- Then launch into each one in full
- Readers reach A having already met b, c and d
- Several circles of increasing size work too: each pass gives just enough to keep moving

READING ORDER



SUMMARY

The method on one page

Outline top-down
Finish each level before going deeper

Decide, then write
Keep creative and mechanical work apart

Figure titles first
Claims with verbs; check them with your PI

One Results formula
Question → evidence → conclusion

Introduction last
From the field down to "Here, we …"

Cite generously
Let readers trace every idea back

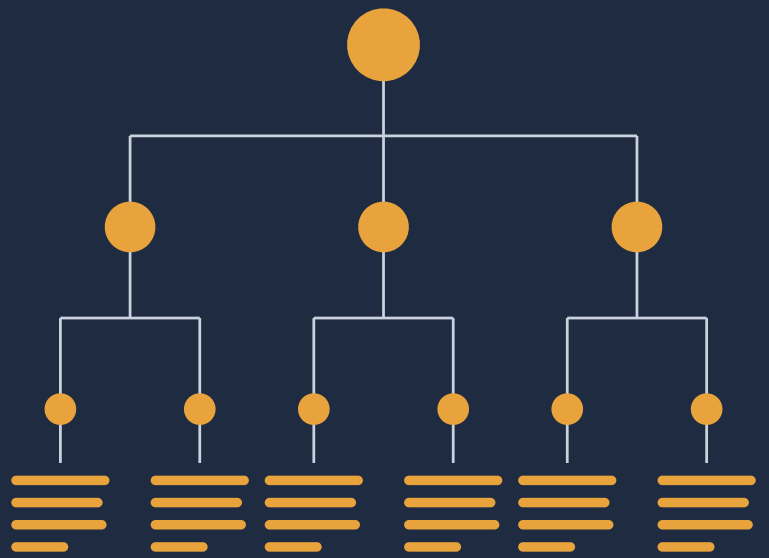
Write long, cut later
Ask what each paragraph is doing

Spiral tangled ideas
a, b, c, d, then A, B, C, D

None of this is written in stone

If you have a process that works well for you, use it.

There are many ways to do lovely papers.



The full post: thoughtforms.life/how-i-write-papers