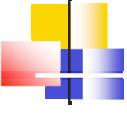


# How to write a great research paper

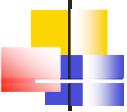
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## Structure

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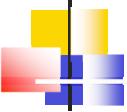
- Abstract (250 words)
- **Introduction** (2 pages)
  - The problem / hypothesis / motivation
  - My ideas
- Methods (2-3 pages)
- Results (1-2 pages)
- Discussion (5 pages)
  - Conclusions and further work (0.5 pages)



## The introduction (2 page)

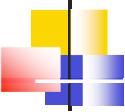
- **Describe the problem**
- **State your contributions**

...and that is all



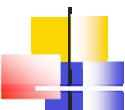
## The introduction (2 pp)

- **Describe the problem**
  - Why is this interesting? Who else thinks so? What other related work is there -- on collections, on your group?
- **State your contributions**
  - What are you trying to do about it?



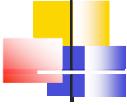
## Introduction: state the aims

- Write the list of aims first
- **The aims drive the paper:** the paper substantiates the (**falsifiable**) claims you make
- Reader thinks “gosh, if they can really deliver this, that’s be exciting; I’d better read on”



## Introduction: Everything in scientific writing should be refutable

NO!	YES!
We describe the collection. It is really cool.	We give the context and systematic update of an understudied collection. The unexpected features of the material studied are...
We study its contents	We examine the faunal coverage to genus level, and compare local specimen records to the historical distribution of species.



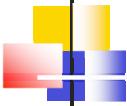
## No “rest of this paper is...”

- **Not:**

“The rest of this paper is structured as follows. Section 2 introduces the problem. Section 3 ... Finally, Section 8 concludes”.

- Instead, **use forward references from the narrative in the introduction.**

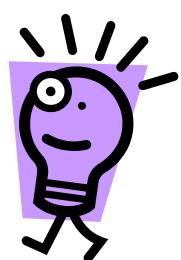
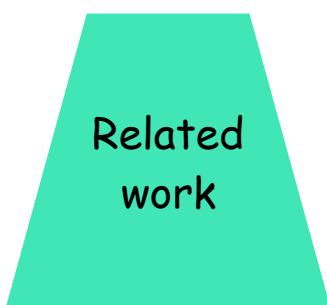
The introduction (including the contributions) should survey the whole paper, and therefore forward reference every important part.



## introduction

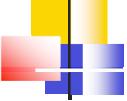


Your reader



Your idea

We adopt the notion of transaction from Brown [1], as modified for distributed systems by White [2], using the four-phase interpolation algorithm of Green [3]. Our work differs from White in our advanced revocation protocol, which deals with the case of priority inversion as described by Yellow [4].



## No related work yet

- **Problem 1:** the reader knows nothing about the problem yet
- **Problem 2:** describing alternative approaches and studies gets between the reader and your results
- **The Discussion should be the longest section and include most of this**

I feel stupid

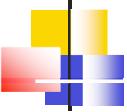


I feel tired



## Structure

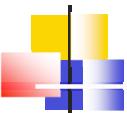
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## Methods

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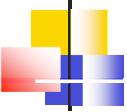
- **Include everything**
- **Remember** you want it to be replicable, so write as if you were explaining to someone else how to repeat your work
- This is not the “boring” section
- This is where you get to brag about how much you have done



## Publishing vs. student work

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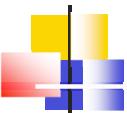
- **Published work is a little different -**
- **Do not** recapitulate your personal journey of discovery. This route may be soaked with your blood, but that is not interesting to the reader.
- Instead, choose the most direct route to the idea.



## Structure

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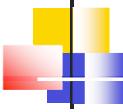
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## Results

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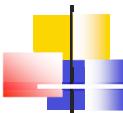
- Look at your methods section
- For every paragraph in the methods, write 1-2 paragraphs of results to say what you got!
- Re-check - did you leave anything out?  
Add it to both **results** and **methods**



## Results

---

- For every **paragraph** in the methods, write 1-2 **paragraphs** of results to say what you got!
  - This means, write it out
  - **DO NOT USE BULLET POINTS**



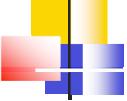
## Results: illustrate!

---

- All of your figures and tables should go in the Results
- Explain / summarise each figure or table in the text. If it isn't explained it can't be included

... the collection included a total of 199 specimens, which cover the majority of the species in the family (Table 1).

... the number of specimen lots that showed presence of formalin in the fluid solution increased with the number tested (Figure 3).



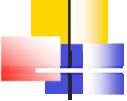
## Results: illustrate!

---

- Every table or figure needs a detailed caption **in addition to** be explained in the text of the paper.

... All work was conducted in the NMINH collections facility, a separate building off-site from the public galleries, dedicated to collections use and storage (Figure 1). ...

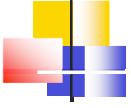
Figure 1. A generalised floor plan of the NMINH off-site collections storage building. Approximate total floor area on three levels is 2100m<sup>2</sup>.



## Structure

---

- Abstract (250 works)
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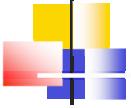
## The payload of your paper

---

Introduce the problem, and  
your idea, using

# EXAMPLES

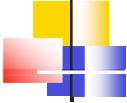
and only then present the  
general case and  
wider implications



## The details: evidence

---

- Your introduction states aims
- The body of the paper provides the roadmap to achieve the aims
- Check each aim in the introduction, identify the **evidence**, and discuss it in the discussion
- Evidence can be: analysis and comparison, case studies, similar projects in other fields

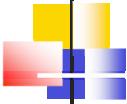


## Related work

---

### Fallacy

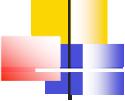
To make my work look good, I have to make other people's work look bad



## The truth: credit is not like money

Giving credit to others does not diminish the credit you get from your paper

- Warmly acknowledge people who have helped you
- Acknowledge weaknesses in your approach



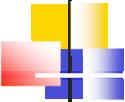
## Credit is not like money

---

Failing to give credit to others can  
kill your paper

If you imply that an idea is yours, and the reader knows it is **not**, then either

- You don't know that it's an old idea (bad)
- You do know, but are pretending it's yours (**very bad**)



## Conclusions and further work

---

- Be brief.



## The process of writing

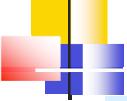
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## The process

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- Start early. Very early.
  - Hastily-written papers get bad marks, or get rejected.
  - Papers are like wine: they need time to mature
- Collaborate
  - Be **active** in contributing to work
  - Be **active** in seeking out contributions from your team members



## Getting help

---

Get your paper read by as many friendly guinea pigs as possible

- Experts are good
- Non-experts are also very good
- Each reader can only read your paper for the first time once! So use them carefully
- Explain carefully what you want from readers, and **be** a good reader!
  - ("I got lost here" is much more important than "Mamal is mis-spelt".)



## Listening to your reviewers

---

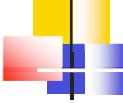
**Treat every review like gold dust**

Be (truly) grateful for criticism as well as praise

This is **really, really, really hard**

But it's

**really, really, really, really, really,  
really, really, really, really, really  
important**



## Listening to your reviewers

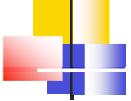
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- Read every criticism as a positive suggestion for something you could explain more clearly
- DO NOT respond "you stupid person, I meant X". Fix the paper so that X is apparent even to the stupidest reader.
- Thank them warmly. They have given up their time for you.



## Language and style

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## Basic stuff

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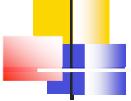
- Follow instructions!
- Submit by the deadline
- Keep to the length restrictions
  - Do not narrow the margins
  - Do not ~~use 6pt font~~
  - Supply extra evidence (e.g. species lists, catalogue) in an appendix
- Always use a spell checker



## Visual structure

---

- Give strong visual structure to your paper using
  - Standard sections and sub-sections
  - Do NOT make up your own format!
  - Do NOT use bullet points
- Follow all formatting instructions for figures and tables!



## Use the active voice

The passive voice is "respectable" but it DEADENS your paper. Avoid it at all costs.

### NO

It can be seen that...

34 tests were run

These properties were thought desirable

### YES

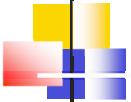
We can see that...

We ran 34 tests

We wanted to retain these properties

"We" =  
you and  
the reader

"We" =  
the  
authors



## Use simple, direct language

### NO

The object under study was displaced horizontally

On an annual basis

Endeavour to ascertain

It could be considered that the speed of storage reclamation left something to be desired

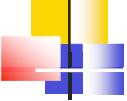
### YES

The ball moved sideways

Yearly

Find out

The garbage collector was really slow



## Summary

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If you remember nothing else:

- Identify your key idea
- Make your contributions explicit and complete
- Explain your work in a larger context (use examples)