Writing Research Papers

Gerontechnology II
Spring 2011
I used to hate writing assignments, but now I enjoy them.

I realized that the purpose of writing is to inflate weak ideas, obscure poor reasoning, and inhibit clarity.

With a little practice, writing can be an intimidating and impenetrable fog! Want to see my book report?

"The dynamics of interbeing and monological imperatives in Dick and Jane: a study in psychic transrelational gender modes."

Academia, here I come!
Why Write a Research Paper?

- Fame and fortune
- Betterment of society
- Dissemination of knowledge
- Graduate
- Publish or perish
- Get feedback
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Communicate ideas!
How to Write a Research Paper

- ResearchPaperDom.com
- AcademicWritingHelp.com
- TermPaperWriter.org
- $20–30/page
- Why not?
How to Write a Research Paper

- One model
  - Do lots of research
  - Write it all up at the end

- Another model
  - Do lots of research
  - Write it up as you go

- Yet another model
  - Write the paper first
  - Do research to fill in the gaps

- Get feedback
Imposter Syndrome

- My research is worthless
- My contribution is insignificant
- Everybody else is smarter than me
Imposter Syndrome

- My research is worthless
- My contribution is insignificant
- Everybody else is smarter than me
- Most researchers secretly feel this way
- The rest are imposters
Components of a Good Paper

- What is the problem
- Why is the problem important
- What is my approach to the problem
- Why should you believe my approach solves the problem
- What else has been done to solve the problem
- Why is my approach better than others
Structure of a Good Paper

- Title
- Authors and affiliations
- Abstract
- Introduction
- Approach
- Experiments and Discussion
- Related Work
- Conclusions and Future Work
- Acknowledgements
- References
5–10 words
Informative, not flashy
Use keywords that people in the field will recognize
Abstract

- Purpose
  - Allow the reader to determine if the paper is useful to them

- 100–200 words

- Content
  - Problem statement (1 sentence)
  - Problem importance (1 sentence)
  - Approach (1–2 sentences)
  - Main results (1–2 sentences)
  - Major contributions (1 sentence)
Introduction

- Describe the problem
  - Examples are good
- Motivate the problem
  - Statistics are good
- Briefly describe your solution
- Describe your contributions
  - Be precise
  - Don’t oversell
Related Work: Where

- At the beginning
  - Puts your work in context
  - Satisfies “But this has been done” questions
  - But delays the good stuff

- At the end
  - Get to the good stuff quicker
  - Gives the reader a better understanding of your approach before comparison to others
  - Begs the “But this has been done” question
  - Obligatory

- At the end, but also along the way
Related Work: What

- Seminal work in the field
  - Reviewers?
- Work addressing similar problems
  - How your approach is different and better
- Work using similar approaches
  - How your approach solves a novel problem
- Don’t belittle related work
  - Your standing on the shoulders
- Acknowledge weaknesses of your approach
Approach

- Intuitively define problem
- Give an example
- Precisely define problem

- Intuitively describe your approach
- Give an example
- Precisely define your approach

Theorem 1. For all papers $p$ such that $\text{good}(p) > T$ and $n = \text{variables used in } p$, $n < 20$. 
Experiments and Discussion

- Purpose is to support the claims of the paper
  - Not just wow them with Excel charts
- Precisely describe methodology
  - Experiments should be reproducible
- Discuss each result
  - Why is it here; how does it support your claims
Figures, tables, eye candy

- Picture worth 500 words
  - If less, picture not worth it
- Purpose of pictures is to increase understanding
  - Not wow the reader, or take up space
- Tables are good for qualitative information, not quantitative
  - Use a chart

![Figure 1. Overview of approach.](Image)

### Table 5

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP per capita</th>
<th>Scientific papers</th>
<th>Patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>15,502</td>
<td>17,945</td>
<td>0.065</td>
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<tr>
<td>Japan</td>
<td>10,380</td>
<td>11,915</td>
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<td>UK</td>
<td>10,047</td>
<td>12,724</td>
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<td>14,555</td>
<td>16,362</td>
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<td>11,079</td>
<td>13,291</td>
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<tr>
<td>Brazil</td>
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<tr>
<td>India</td>
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<td>1,282</td>
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<td>Mexico</td>
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<td>0.131</td>
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<tr>
<td>Korea</td>
<td>3,212</td>
<td>7,251</td>
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<tr>
<td>Taiwan</td>
<td>4,593</td>
<td>8,063</td>
<td>0.067</td>
</tr>
</tbody>
</table>

Conclusions and Future Work

Conclusions
- Summarize main contributions
- Summarize your evidence to support them

Future work
- What would you do next
- What should the field do next

Feel good sentence
- “...and someday elderly will never have to leave their homes.”
Acknowledgements

- People who contributed to the research, but didn’t contribute to the writing
- Reviewers
- Grant support
References

- Follow an accepted style (e.g., APA)
  - Usually prescribed by editors
- Be consistent
Effectively communicates a good idea
- Look at award-winning papers
- Citation count

**PROTEIN MEASUREMENT WITH THE FOLIN PHENOL REAGENT**

*By Oliver H. Lowry, Nira J. Rosebrough, A. Lewis Farr, and Rose J. Randall*

(From the Department of Pharmacology, Washington University School of Medicine, St. Louis, Missouri)

(Received for publication, May 28, 1951)

Since 1922 when Wu proposed the use of the Folin phenol reagent for the measurement of proteins (1), a number of modified analytical procedures utilizing this reagent have been reported for the determination of proteins in serum (2–6), in antigen-antibody precipitates (7–9), and in insulin (10).

Although the reagent would seem to be recommended by its great sensitivity and the simplicity of procedure possible with its use, it has not...
Where to Publish

- Best conferences and journals in your field
  - Impact factor
  - Less than 25% acceptance rate
- Workshops
  - Preliminary work
  - Get feedback
- Workshops → Conferences → Journals
Resources Online

- Guide for Writing Research Papers
  - www.ccc.commnet.edu/apa
- Writing Research Papers
  - www.ruf.rice.edu/~bioslabs/tools/report/reportform.html
- Writing Technical Articles
  - www.cs.columbia.edu/~hgs/etc/writing-style.html
- Research Skills
  - research.microsoft.com/en-us/um/people/simonpj/papers/giving-a-talk/giving-a-talk.htm
- Advice on Research and Writing
  - www-2.cs.cmu.edu/afs/cs.cmu.edu/user/mleone/web/how-to.html
- Publish or Perish (www.harzing.com/pop.htm)
Resources in Print


I think we've got enough information now, don't you?

All we have is one "fact" you made up.

That's plenty. By the time we add an introduction, a few illustrations, and a conclusion, it will look like a graduate thesis.