Write Good Papers

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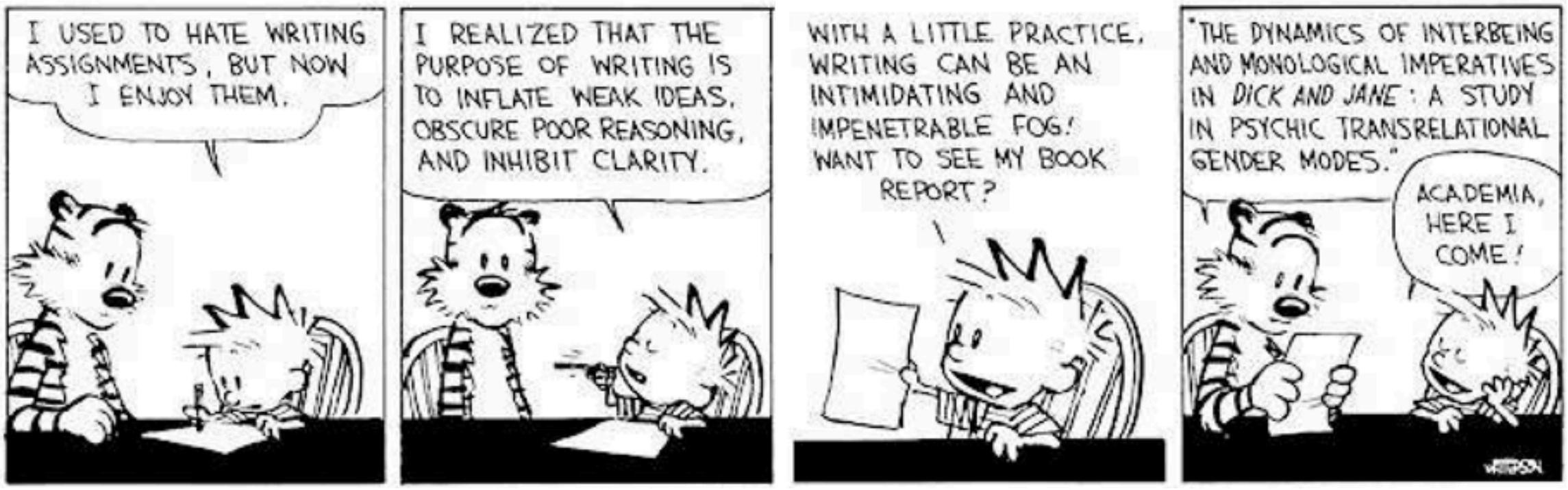

If you remember nothing else

- Writing matters
- Everyone who can think can write
- Organize your ideas
  - What are your ideas BTW?
  - Hierarchy
- Think about your readers
- Edit & iterate

Writing is critical

- For your career
  - academia and industry
- For your impact
- For the intellectual quality of your research
  - It forces you to better understand what you're doing
    - and often leads to new project ideas
- In general, communication is critical
  - much of what follows applies to talks

Writing in academia

- **Papers**
- Fundraising
- Letters of recommendation
- Textbook
- Psets, quizes
- Task force reports
- Project reports
- Call for paper
- Job descriptions
- Research & Teaching statements
- Misc. Emails
- Degree proposals

Writing in industry

- Project proposal
- Project specification
- Technical documentation
- Progress report
- Technical papers
- Cajoling subcontractors
- Fundraising (VC, government)
- Feedback & evaluations (e.g. code review)
- Patents
- Job descriptions
- Issue tickets and bug reports
- Protocols for collaborators/partners
- Design history
- Testing and verification plans and reports
- Contracts
- Business plan
- Meeting minutes
- Email (esp. for remote collaborations)
- Technical online forums (internal or external)
- Conference/Meeting reports
- Many people emphasized the variability in audience and how important it was to be clear to non-experts

Impact

- e.g., some of my algorithms are in Photoshop
- But they didn't use my code
- They used my articles
  - And actually they screwed some of it up because it wasn't well described

Badly written papers

- Get rejected
- Have low impact
- Get unfair comparisons because people can’t reproduce them

Writing is Easy & Hard

- Good writing is not just for English Majors
- Good writing doesn't have much to do with being a native speaker
- Good writing is not about elegance
- Good writing does not come in a single session

Writing

- High-level
  - what ideas?
  - organization of ideas
- Low level [Rob's talk]
  - The actual prose
  - some local organization of ideas
  - I will not talk about it but there are lots of great resources

Big principles

1. **Organize paper & ideas hierarchically**
   - Don't just describe, motivate, organize, justify
   - Be redundant. Big ideas should be repeated
   - Be selective. Small ideas get swept under the rug
2. **Think about your readers and what they know**
3. **Be redundant**
   - repeat ideas
   - combine rigor+intuition
4. **Iterate, edit**
   - Get feedback
   - Prioritize clarity over style

1/ Understand your ideas

- Which ones are important?
  - that you spent time on them is NOT a good criterion
- Which ones are new?
- How do they relate to one another?
- Organize into a hierarchy of ideas
- Again, writing is not literature, it's about understanding and ortganizing your ideas

Honesty & expectations

- Do not lie
- Discuss limitations
- Make sure readers have the right expectations
  - as early as title

Paper structure

- Abstract
- Intro
- Related work
  - but some people like it at the end. Depends it it helps or confuses
  - Can include required background
- Overview
- Technical sections
- Results & discussion
- Conclusions

2/ Understand readers

- Contextualization!
  - You have context that they don't have
- That background do they have?
- They don't read sequentially
  - they sometimes want to check a particular point many months later.
- Some like math, some like intuition

Context story

- Denny's teddy bear is usually in the closet
- Anantha has hidden it under the bed
- Where will Denny first look for his teddy bear?

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- **Small children think he'll look under the bed**
  - They don't understand that Denny doesn't know what they know
- **If Denny is the audience of your paper, don't assume he knows the bear is under the bed!**

Understand readers

- Just because you know what you mean doesn't mean people know what you mean

3/ Redundancy

- Repeat the important ideas multiple times
  - maybe refining them and relating them to current discussions
- Rigorous + intuition

- Just because it's in the paper doesn't mean
  - it's at the right place
  - it's clear
  - it's repeated enough

4/ Edit!

- The beautiful part of writing is that you don't have to get it right the first time, unlike, say, a brain surgeon.

  – Robert Cormier

- Good Writing is Bad Writing That Was Rewritten

  – Marc Raiberts

Edit

- Corollary: writing takes time, start early
- Be critical
- Think about alternatives
- Get external feedback

  - not just co-authors

Getting started

- Avoid writer's block:
  - The first draft doesn't need to be perfect
    - And actually it won't
  - remember: it's all about editing
- Outline
  - sections, subsections
  - a couple of bullets per section
  - central equations, pseudocode
- Figures
- I advise against writing sentences too early.

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Introduction and abstract

- Motivation
  - need or opportunity
- Context
- First overview of your contributions, focusing on big ideas and silver bullets
- Consequences & benefits
- Possibly summary of contributions (what ideas are new)
  - can be useful when you only modified some parts of a bigger technique

Overview

- **Forget what you thought an overview was**
  - I hate "In section we introduce blah, in section 2....)
- **The overview should give people a high-level understanding of the elements of yoru work and how they fit together. It's a roadmap of teh technique, not a roadmap of the paper.**
  - Although hopefully there is some correlation between the overview and the paper organization
  - It is often helped by an overview figure

Related work

- Focus on how they inform, motivate and differ from your work
- Can provide a self-contained introduction to the field
- Sometime also add a tutorial on required background that is uncommon in the field
- Be generous. Don’t piss off people.

Results

- Your results should support your claims
- Be critical
- again, get external feedback

Future work: Don’t

- Why would you discuss your future research?
- Only useful as a discussion of current limitations.

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Resources about high-level writing

- http://people.csail.mit.edu/fredo/student.html
- http://people.csail.mit.edu/fredo/FredoBadWriting.pdf
- http://www.americanscientist.org/issues/pub/the-science-of-scientific-writing/1
- http://www.dgp.toronto.edu/~hertzman/advice/writing-technical-papers.pdf
- http://www.cs.ubc.ca/~tmm/talks/sfu07/papers.nopause.pdf
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