Writing for Computer Science

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The Importance of Writing

Writing

Good writing is one of the most **important** and most **difficult** aspects of good research

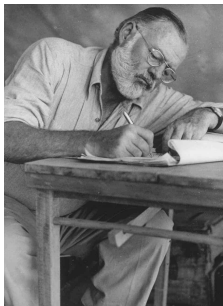Researchers spend a lot of time doing technical writing, besides writing papers:

- drafts
- research notes
- reports
- reviews
- e-mails to colleagues
- ...

In what follows we will assume the writing of a **paper**.

Writing is Hard

E. Hemingway

There is nothing to writing. All you do is sit down at a typewriter and bleed

Writing is Codifying your Thoughts

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Writing is building a language and communicating with it.
Includes structuring knowledge, determining **concepts**, establishing
notation,...

- **Concepts** (definitions) determine what you are going to **reason** about
- **Notation** determines your **technical vocabulary**
  - Leibniz $\int_a^b ..dx$
  - $O()$

Writing a Paper

Writing a paper is **simplifying**
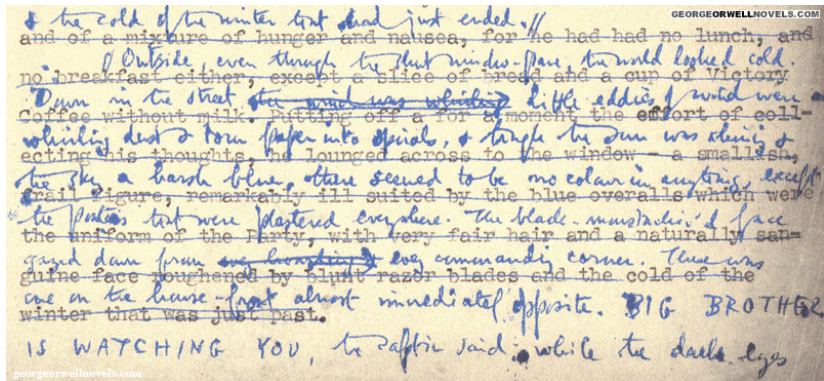
Good writing is making the hard look simple.

- Fitting months of creative thinking in a few lines (i.e, definitions, algorithms, theorems) is a final success.

Writing a Paper Means a Lot of Editing

Revision

Most of the writing time is spent in revisions

Fragment from first page of 1984's draft by George Orwell

Writing a Paper Means a Lot of Deleting

E. Hemingway

The most important object for a writer is a paper bin, not a typewriter

We are so lucky in these days because we have the *UNDO* button.

Writing a Paper Means a Lot of Deleting

Deletion

Even when you delete you are making progress

- Be ready to dislike anything you have previously written

100 years Dow Jones chart:

Writing a Paper

Inform vs Entertain

The primary objective of Scientific Writing is to **inform**, not entertain

Quote from a paper on concurrent systems:

*We have already seen, in our consideration of **what is**, that the usual simplified assumptions **lead inexorably** to a representation that is **desirable, because a solution is always desirable**; but **repugnant, because it is false**. And we have presented **what should be**, assumptions whose nature is not susceptible to easy analysis but are the only tenable alternative to **ignorance** (absence of solution). Our choice is then Hobson's choice, to make do with what material we have - viable assumptions - and to discover whether the intractable can be **teased** into a useful form.*

The reader's fixed energy allocation principle

Assumption

The reader has a fixed amount of resources (time, attention, energy,...) devoted to read a paper

Lemma

Effort used to understand the form is effort not used to understand the content

Theorem

When you write a paper you must optimize the amount of energy devoted to understand the essence of the paper.

Who are you writing for?

Prototypical reader

- Intelligent
- Experts in the field, but not on your particular research
- Busy and most probably will only skim your paper

Also write to yourself

Write to yourself

Writing is not the end of the research process, it is **integral** to it

- Vague concepts become concrete
- Complex notions become simpler
- New concepts become useful
- Written material facilitates discussion

Write to yourself

Spending time in writing your past research is a good **investment** for your future research.

Composition

Fact

An article is not a novel

- Do not keep secrets until the end
- *Spoilers* should be all over the place

Fact

An article is not a diary

- Do not get influenced on **how did you get there**
- Do not get influenced on **how much effort you put** on the different parts

Composition

1. Think of **what do you want to say**: choose what to emphasize and what to discard
2. A conference paper reports a sharp result (one idea)
3. A journal paper may group several related ideas (possibly from conference papers)

Composition

1. Write a **template**: work out a logical sequence of sections and subsections (writing the titles)
2. **Sketch each section** in 20-200 words
3. Write a first draft of the **Introduction**
4. Write a first draft of the sections containing the **contributions**
5. **Iterate** over the different sections **editing**, **deleting** and **adding**
   - During the first iterations do not worry much about style.
   - Along iterations move from the **what to say**, to the **how to say** it
   - Expect to dislike what you wrote the day before
6. Leave the **Abstract** and the **Conclusion** for the end.