Research Methodology in Networking

S cnrs

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Class 11

Writing - Part 2/2

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Structure (example for 12 pages)

- Title
- Abstract
- Introduction
- Related work
- The problem
- My idea
- The details
- Conclusion and further work

From: S. Peyton-Jones, "How to write a good research paper"
https://www.microsoft.com/en-us/research/academic-program/write-great-research-paper

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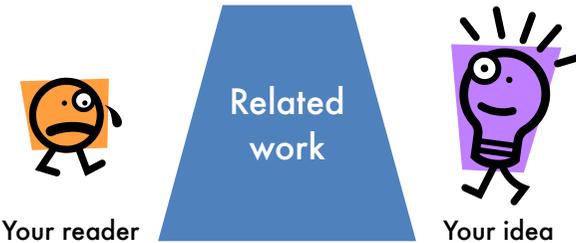
Refresh from class 3

- Abstract
- Introduction

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Structure (example for 12 pages)

- Title
- Abstract
- Introduction
- ~~Related work~~
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No related work yet!

Your reader   Related work   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; so your (carefully trimmed) description of various technical tradeoffs is absolutely incomprehensible

- Problem 2: describing alternative approaches gets between the reader and your idea

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(Un)Related Work Section

- Section 2, or Penultimate Section?

  - Placing early pushes the "meat" of the paper later, but can prevent the reader from discounting your technique

- Handwavy rule

  - Generally better to put towards the end, but...

  - If the topic of the paper appears similar to others, have an "unrelated work" section after the intro

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Presenting the idea

3. The idea
Consider a bifircuated semi-lattice D, over a hyper-modulated signature S. Suppose p_i is an element of D. Then we know for every such p_i there is an epi-modulus j, such that $p_j < p_i$.

- Sounds impressive...but

- Sends readers to sleep

- In a paper you MUST provide the details, but FIRST convey the idea

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Presenting the idea

- Explain it as if you were speaking to someone using a whiteboard

- Conveying the intuition is primary, not secondary

- Once your reader has the intuition, she can follow the details (but not vice versa)

- Even if she skips the details, she still takes away something valuable

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Putting the reader first

- **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.

The payload of your paper

Introduce the problem, and your idea, using **EXAMPLES**
and only then present the general case

Using examples

2 Background

To set the scene for this paper, we begin with a brief overview of the *Scrap your boilerplate* approach to generic programming. Suppose that we want to write a function that computes the size of an arbitrary data structure. The basic algorithm is "for each node, add the sizes of the children, and add 1 for the node itself". Here is the entire code for gsize:

```
gsize :: Data a => a -> Int
gsize t = 1 + sum (gmapQ gsize t)
```

The type for gsize says that it works over any type a, provided a is a *data* type — that is, that it is an instance of the class Data[1] The definition of gsize refers to the operation gmapQ, which is a method of the Data class:

```
class Typeable a => Data a where
    ...other methods of class Data...
    gmapQ :: (forall b. Data b => b -> r) -> a -> [r]
```

Example right away

The details: evidence

- Your introduction makes claims

- The body of the paper provides evidence to support each claim

- Check each claim in the introduction, identify the evidence, and forward-reference it from the claim

- Evidence can be: analysis and comparison, theorems, measurements, case studies

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State the results carefully

- Clearly state assumptions

- Experiment/simulation description

  - Enough info to nearly recreate experiment

- Simulation/measurements:

  - Statistical properties of your results (e.g., confidence intervals)

- Are results presented representative?

  - Or just a corner case that makes the point you want to make

Don't overstate/understate your results

- Overstatement mistake:

  - "We show that X is prevalent in the Internet"

  - "We show that X is better than Y"

    when only actually shown for one/small/limited cases

- Understatement mistake: fail to consider broader implications of your work

  - If your result is small, interest will be small

  - "rock the world"

Evaluation Section

- **Context:** Clearly state assumptions

  - In what context do your results hold?

  - How general are they?

- **Recipe:** Clearly describe the setup

  - Machines, data, scripts, topologies, etc.

  - You must make this clear!

  - Rule of thumb: The reader should be able to recreate the experiment and results from the description in the paper

Evaluation Section

- Many people will skim

  - Corollary: Make it skimmable!

- Evaluation signposts

  - Table summarizing key results (and where to find them in the paper)

  - Declarative subsection headings (trick: finding as subsection heading)

  - Readable graphs

  - Captions that summarize the key finding (implication: each graph should have one main point)

  - Big fonts!

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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

- Be generous to the competition. "In his inspiring paper Foogle shows that blabla [Foo98]. We develop his foundation in the following ways…"

- Acknowledge weaknesses in your approach

Structure (example for 12 pages)

- Title

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- The problem

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- The details

- Related work

- **Conclusion and further work**

Structure

- Title

- Abstract (a few sentences)

- Introduction (1 page)

- The problem (1 page)

- My idea (2 pages)

- The details (5 pages)

- Related work (1-2 pages)

- **Conclusion and further work (0.5 page)**

Conclusion section

- Keep it crisp

- Remember how reviewers and readers skim papers (intro, abstract, conclusion)

- Two elements

  - Very concise summary (one paragraph); remember, readers by now should have context

  - "Elevation" (one paragraph to one page, depending on the paper)

    - What are the takeaways? General lessons or applications?

    - Broader implications?

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Specific aspects

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Some discussion on practical aspects

- Titles

- References

- Figures and tables

- Visual structure

- Sizing

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Style and composition

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Style and composition

- Often referred to as "flow"

  - How sentences flow together to form paragraphs

  - How paragraphs flow together to form sections

  - How sections flow together to form a paper

- The most important aspect of writing a paper

Organizing paper flow

- Plan first, write later

- Write top-down

  - Step 1: Outline sections

  - Step 2: Within a section, outline paragraphs

  - For each paragraph, write topic sentences

Writing a Section, Top-Down Style

- Make a bulleted list of points to include

- Cluster the points into related topics/points

- For each cluster, write a topic sentence

- Organize your topic sentences

- Make subsections if necessary

- Fill in paragraph details (top down!)

- Add paragraph headings

Style Points

- Motivation

  - Everything that a paper includes should be accompanied with an explanation for why it is necessary/interesting useful

- Balance

  - Topics of equal relevance should be addressed with equal weight/length

Writing a Paragraph

- A paragraph is group of **logically related** sentences

- Start with a sentence that describes the logical relationship ("thread")

- Keep continuity

  - Keep a common verb tense

  - Don't string together loosely related sentences

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Signposting

- The reader must have a clear view of how the paper/story will proceed

- Allow for *top-down* reading

- **Signposts**: How is the paper (or section) organized?

  - Outline at end of the introduction

  - Preamble to each section

  - Declarative subsection titles

  - Paragraph headings

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Landscaping

- Your goal: efficient information transfer

  - Forcing the reader to "block" or "context switch" by taking a break, falling asleep, or, worse—skimming over important points—defeats the purpose

- Consecutive pages of dense text: ouch!

  - Tables

  - Figures

  - Whitespace

  - Signposts

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The process of writing

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The process

- Start early. Very early.

  - Hastily-written papers get rejected.

  - Papers are like wine: they need time to mature

- Collaborate

- Use SVN to support collaboration

From: S. Peyton-Jones, "How to write a good research paper"
http://research.microsoft.com/en-us/um/people/simonpj/Papers/giving-a-talk/giving-a-talk.htm

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The process

- Prepare first, then write

  - Take time to crystallize your thoughts

  - Clear thoughts lead to clear writing

  - Much more difficult to revise muddled text...often you will start over!

- Shut off all distractions

  - Writing takes focused, clear thinking

  - Context switches and interrupts are particularly damaging

From: N. Feamster, A. Gray, "Communicating Ideas: Writing"
http://www.gtnoise.net/classes/cs7001/fall_2008/syllabus.html#Schedule

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The writing process: Growth

- Practice whenever possible

  - Write a lot, multiple times per day if possible

  - Email, notes, blogs, publications

- Find a style that you like and try to emulate it

- Experiment

From: N. Feamster, A. Gray, "Communicating Ideas: Writing"
http://www.gtnoise.net/classes/cs7001/fall_2008/syllabus.html#Schedule

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Editing: Reading

- Read aloud

  - Helps identify clunky, awkward, and repetitive passages

- Read in reverse

  - Helps bypass your brain's tendency to fill in gaps, mistakes, etc.

From: N. Feamster, A. Gray, "Communicating Ideas: Writing"
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Editing: Cutting

- Watch out for fancy words and cut them

- Toss out redundancy

- Each sentence, word, phrase, section, graph, etc. must be justified!

- Sleep on it…

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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 ("I got lost here" is much more important than "Jarva is mis-spelt")

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Getting expert help

- A good plan: when you think you are done, send the draft to the competition saying "could you help me ensure that I describe your work fairly?".

- Often they will respond with helpful critique (they are interested in the area)

- They are likely to be your referees anyway, so getting their comments or criticism up front is Jolly Good.

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Listening to your reviewers

Treat every review like gold dust
Be (truly) grateful for criticism as well as praise

- This is really, really hard

- But it's really, really, really, really, really, really, really, important

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Listening to your reviewers

- 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.

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Usage

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Usage: Composing Individual Sentences

- Errors (spelling, grammar, etc.) or deviations in style can cause the reader to "context switch"

  - This creates a barrier for information flow

  - Your goal is to reduce or eliminate these

- Write in a style the reader expects

  - Reading previous conference proceedings can help here

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Simplify Your Usage

1. Never use a metaphor, simile, or other figure of speech which you are used to seeing in print

2. Never use a long word where a short one will do

3. If it is possible to cut a word out, always cut it out

4. Never use the passive where you can use the active

5. Never use a foreign phrase, a scientific word, or a jargon word if you can think of an everyday English equivalent

6. Break any of these rules sooner than say anything outright barbarous

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Use the active voice

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

NO	YES
It can be seen that…	We can see that…
34 tests were run	We ran 34 tests
These properties were thought desirable	We wanted to retain these properties
It might be thought that this would be a type error	You might think this would be a type error

"We" = you and the reader

"We" = the authors

"You" = the reader

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Use simple, direct language

NO	YES
The object under study was displaced horizontally	The ball moved sideways
On an annual basis	Yearly
Endeavour to ascertain	Find out
It could be considered that the speed of storage reclamation left something to be desired	The garbage collector was really slow

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Omit needless words!

- In order to => To
- The problem of optimizing => Optimizing
- The question as to whether => whether
- For optimization purposes => to optimize
- This is a module that => This module
- In a shorter running time => more quickly
- This is a subject that => this subject
- His story is a strange one => His story is strange.

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Avoiding padding

- Adding together → adding
- Totally eliminated → eliminated
- Separated out → separated
- Give a description of → describe
- "the fact that" → …
- "it is important to note" → …

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Writing bugs

- Citations as nouns

  - "In [10], the authors showed …"

  - Problem: forces the reader to context switch

  - Better: "Gray et al. previously showed … [10]."

- Beginning a sentence with "However"

  - Problem: Not a qualified word

  - Better: "Unfortunately", etc.

Writing bugs

- The naked "This"

  - Problem: "this" is a modifier

  - "Next, we sample every tenth data point. This reduces processing time."

  - Better: "Sampling every tenth data point reduces processing time."

- Passive voice

  - "A request for content is sent to the server."

  - Who/what performs the action?

  - Very important when specifying protocols, experimental setups, etc.

Which vs. That

- "Which" clauses can be removed from the sentence without changing the meaning

  - "BGP, which is the Internet's routing protocol, …"

  - They are always offset by commas

  - Better: omit "which is" entirely

- "That" clauses make the modified noun more specific and cannot be removed without changing meaning

  - "Can you send me the code that performs PCA on BGP routing updates?"

  - Not offset by commas

Other misused words

- Less vs. fewer

- Affect vs. effect

- Impact vs. influence

- May vs. can

- Further vs. farther

- Comprise vs. compose

Articles ("a", "the", etc.)

- "A" / "an"
  - Non-specific modifier
  - "I need to work on a paper." (implication: any paper)
- "The"
  - Specific modifier
  - "I need to write the paper." (implication: specific paper)
  - "I need to read the papers." (specific papers)
- Collective nouns often do not take any article
  - "Papers can provide useful background information."
  - "The papers at SIGCOMM are very interesting this year."

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Recommended reading

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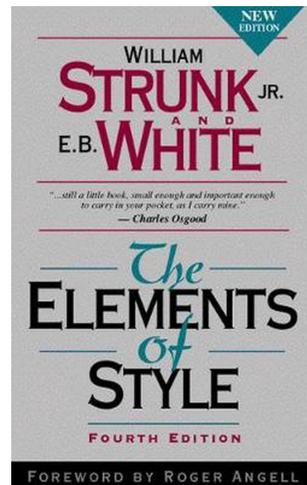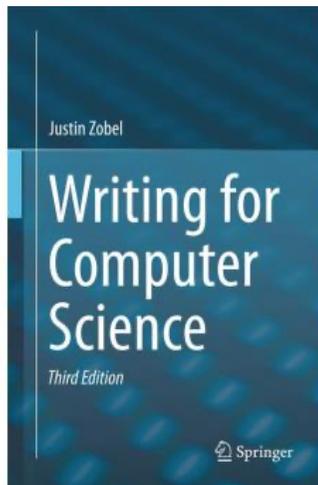
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