

GRS CS 687 Computer Science Initiation  
Guest Lecture on

## A Manual for Writers in Computer Science

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Disclaimer: English is my second language. My formal education in writing ended with an "A+ Abitur" in German in 1986.

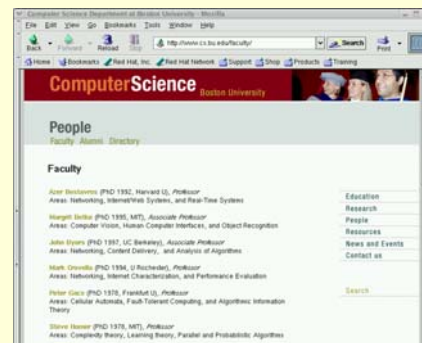
## Taking Care of Your Writing-- Why bother?

- Improve your **publications** and your chances for your papers to be accepted at key conferences and published by high-impact journals
- Improve your **CV** and chances to be hired and promoted
- Improve your **website** and chances to be hired, receive funding, initiate research collaborations, etc.
- Improve your **emails** and their impact.

## Does your website look like this?



## Look at Examples of Professional Websites and CVs



## Writing Grant Proposals

- Try to be involved in the grant writing process as early as possible.
- Ask your mentors for successful examples!

## CS Papers

- Different styles in different areas of CS
- Ask your advisor not just for examples of technically strong papers, but also of **well-written papers** in your area
  - Read books & papers about writing
  - **Learn** from advisor's edits of your paper
  - Create yourself a "**to-remember-list**" to improve YOUR writing

## Writing Mentors

Concise

Clear

Attention to details

Attention to readership

Attention to referencing

Concise

## Starting to Write a Paper

**Top-down Approach:**

- Start with the "big picture," a first draft of the **abstract** (maybe not even in sentence form, it will probably change).
- Don't start a paper by "wordsmithing" the **introduction**.
- Can you **visualize** the concept/algorithm/result in a high-level diagram or flow chart?
- Think about **high-level structure** of paper

## Starting to Write a Paper

**Bottom-up Approach:**

- **Theory results:** Work out your notations & definitions, then theorems and/or algorithms, then proof sketches, only then connect & motivate.
- **Experimental results:** Prepare a draft of your figures and tables first, then explain your method.

## Typical High-level Structure of a CS Paper

- Title
- Abstract
- Introduction
- Method
- Results
- Discussion
- Conclusions
- References

## Typical High-level Structure of a CS Paper

- Title
- **Abstract**
- **Introduction**
- Method
- Results
- Discussion
- **Conclusions**
- References

Common Mistake

Don't cut and paste sentences from the abstract into the introduction or conclusions

## Typical High-level Structure of a CS Paper

- Title
- Abstract
- Introduction
- Method
- **Results**
- **Discussion**
- Conclusions
- References

Common Mistake

Don't discuss results in the results section (just present them).

## Placing the Related Work

- Title
- Abstract
- Introduction and Related Work
- Method
- Results
- Discussion
- Conclusions
- References

## Placing the Related Work

- Title
- Abstract
- Introduction
- Method
- Results
- Discussion of Your and the Related Work Advantage?
- Conclusions
- References

## Title of Sections?

- Abstract
- Introduction
- Method (and Materials)
- Results
- Discussion
- Conclusions
- References

## Title of Sections?

- Abstract
- Introduction
- Methods and
- Results
- Discussion
- Conclusions
- References



## Plan Paragraph Structure

- Sketch out / visualize the structure using "topic sentences"
- Carefully plan the paragraph order
  - Pseudo-code first or explanation of algorithm first?
  - Do you really want to present your least important result first? *Common Mistake*
- Enforce coherence - a "red thread" through your paper

## Plan Paragraph Structure

*Common Mistake*

Don't use terms, variables, algorithms, etc. before you've defined them.  
This also applies to abbreviations.

## Paragraphs

### Common Mistake

Don't start your paragraphs with these adverbs:

- Moreover, ...
- Thus, ...
- In this manner...
- Therefore...

## Visual Information: A picture is Worth a Thousand Words

- Attend Prof. Wayne Snyder's lecture on visualizing information  
Read E. Tufte's books
- Make your line, flow, bar & pie charts, graphs, histograms, ..., **self-explanatory** and use **concise captions**
- Don't forget axes **labels & units**
- Use **legible** font throughout the figure
- **Semantics** of boxes, arrows, fonts, etc.
- **Aesthetics**

## Pay Attention to Grammar

- **Not:** "To achieve the desired quality of service, an extra processor is added ..."
- "To achieve the desired quality of service, we add an extra processor ..."
- In general:
  - **Not:** "To do task 1..., passive voice task 2"
  - Instead: "To do task 1, subject does task 2"  
The subject does **both** tasks !

## Stylistic Issue in CS Papers: Who Computes?

- "To achieve the desired quality of service, we add an extra processor."  
Is it really us? Or is it the network that achieves the desired quality of service?
- "The algorithm is iterative. After testing the initial assignment, we update the values according to Eq. 2."  
- Do we update? Or does the algorithm update?
- My recommendation: Only use "we" if you report your experiments or theoretical construction, e.g., "we define a graph ..." or "we tested the benchmark ..." Don't mix styles.

## Tips on Style: Stress

Compared to other languages, English enforces a relatively rigid sentence structure with the **stress on the subject in the beginning.**

### 2 Meanings:

- "The Hungarian method solves the data association problem."
- "The data association problem is solved by the Hungarian method."

**Not:** "Table 1 shows our tracking results." Common Mistake  
**Instead:** "Our tracking results are shown in Table 1."

## Parallel Structures

**Not:** Use parallel structure when you write and in speaking. [Safire, 1990]

### Instead:

Use parallel structure when you write and speak.  
Use parallel structure in writing and speaking.

**This can make a big difference!**

## Hyphenation

A hyphen turns 2 or more words into a unit that becomes a compound adjective.

"Our real-time system processes images in real time." (NOT: in real-time)

"A little-known system ..." (1 meaning)  
"A little known system ..." (2 meanings)

"She's a big-business executive" [Safire, 1990]  
"She's a big business executive"

## Common Mistakes

- Avoid noun stacking: **Not:** "rigid object motion patterns"
- Instead: "motion patterns of rigid objects"
- Avoid contractions: **Not:** "We're showing..."
- Distinguish: "Its" is a possessive pronoun, "it's" is a contraction of "it is" or "it has."
- Avoid boring beginnings: "There are...", "It is..."
- Avoid dangling participles:  
**Not:** "Considering network performance, there are several methods that ..."
- It's okay to split infinitives:  
"To boldly go where no one has gone before."

## Commas [Safire, 1990]

When a dependent clause precedes an independent clause, put a comma after the dependent clause.

Dependent clauses begin with *when, if, unless, after, like, because, provided.*

"When, in the Course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another and to assume among the Powers of the earth the separate and equal station to which the Laws of Nature and of nature's God entitles them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation."

## References to Literature

Single-author reference:

Ambivalence towards artificial intelligence was discussed by Weizenbaum (1976) and ...

or

Ambivalence towards artificial intelligence was discussed by Weizenbaum, 1976, and ...

**NOT:**

Ambivalence towards artificial intelligence was discussed in Weizenbaum, 1976, ...

*Common Mistake*

## References to Literature

Ambivalence towards artificial intelligence (Weizenbaum, 1976) was ...

or

Ambivalence towards artificial intelligence [4] was ...

**NOT:**

The ambivalence towards artificial intelligence in [4] was ...

Ambivalence towards artificial intelligence was discussed in [Weizenbaum, 1976] ...

*Common Mistake*

## References to Literature

Referencing a paper with 2 authors:

"The automata introduced by Scott and Rabin [3] ..."

Referencing a paper with 3 or more authors:

"The encryption approach by Rivest et al. [14] ..."

**Don't** list only 2 authors of a multi-author paper and **don't** switch the order of the authors:

"The encryption approach by Shamir and Rivest [14] ..."

## Placement of References

### What's the difference?

"These issues were not included in early studies of the internet but are important at present [12, 55]."

OR

"These issues were not included in early studies of the internet [12, 55] but are important at present."

Common Mistake

## List of References

"A sloppy list of references may go hand in hand with sloppy research."

- Check your spelling of foreign author names
- Watch out for upper-case to lower-case conversions by latex (use {B}ayesian, {M}arkov)
- Don't forget an author
- Don't list an incorrect year
- Make an effort to look up:
  - Journal volume and issue numbers
  - Page numbers
  - Complete name of the publication venue

## Revising or Editing Your 1<sup>st</sup> Draft

- Does your title capture the gist of the paper?
- Does the abstract describe your contribution?
- Don't fall in love with your 1<sup>st</sup> draft. Be open to changes.
- Check the paper against your personal "to-remember-list"
- Sleep over it.
- Read the paper out loud.
- Ask your friends or family to read your paper before you give it to your advisor and/or co-authors.
- Don't lose your "silver bullets" with your advisor and coauthors with a poorly written 1<sup>st</sup> draft. They may not have an attention span that survives many drafts.

## Revising & Editing Process

- What is the difference between revising and editing?
- Date & initial file names of drafts
- Working with Microsoft Word track changes
  - advantages & disadvantages