

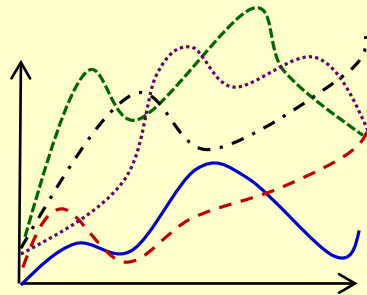
# Some (Random) Thoughts on Writing

- Buy a copy of *Strunk & White* and read it (and re-read it).
  - ◆ Their philosophy: “avoid needless words,” “less is more,” “keep it simple,” etc.
  - ◆ Think about how to apply these principles to technical CS writing.
    - To proofs?
      - Which is better:
        - $x_1 + x_2$
        - $x + y$
      - Which is better:
        - $a + b$
        - $\Xi + \chi$
      - Which is better:
        - $1 + 1$
        - $n + 1$
      - Which is better:
        - $O + 2$
        - $N + 2$

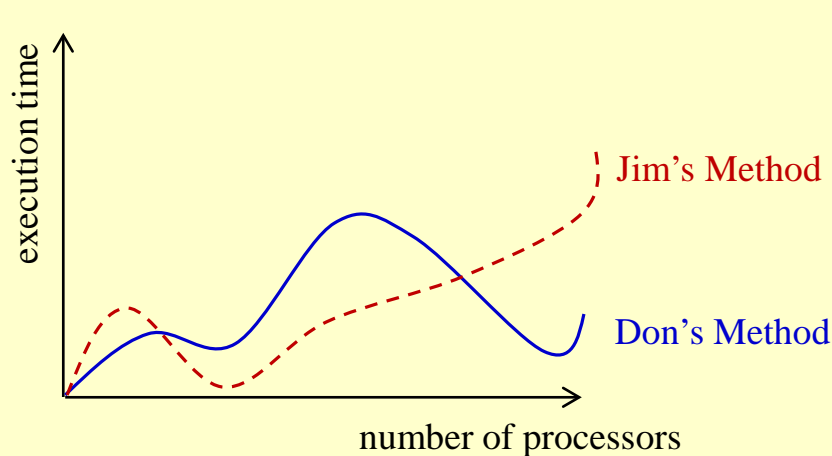
Dijkstra: “Avoid the Greek alphabet like the plague.”

# Applying Strunk and White (Cont'd)

- To performance experiments?
  - Which is better:
    -



A good source of the do's and don't's of graphs.



# The World Before Strunk & White

## ■ Beginning of Thomas Wolfe's (famous UNC author) *Look Homeward Angel*:

This is one sentence!

A destiny that leads the English to the Dutch is strange enough; but one that leads from Epsom into Pennsylvania, and thence into the hills that shut in Altamont over the proud coral cry of the cock, and the soft stone smile of an angel, is touched by that dark miracle of chance which makes new magic in a dusty world.

## ■ Use short, punchy sentences!

Each of us is all the sums he has not counted: subtract us into nakedness and night again, and you shall see begin in Crete four thousand years ago the love that ended yesterday in Texas.

The seed of our destruction will blossom in the desert, the alexin of our cure grows by a mountain rock, and our lives are haunted by a Georgia slattern, because a London cut-purse went unhung. Each moment is the fruit of forty thousand years. The minute-winning days, like flies, buzz home to death, and every moment is a window on all time.

This is a moment:

An Englishman named Gilbert Gaunt, which he later changed to Gant (a concession probably to Yankee phonetics), having come to Baltimore from Bristol in 1837 on a sailing vessel, soon let the profits of a public house which he had purchased roll down his improvident gullet. ....

# How To Write a Document

(For me, it's a three step process)

## 1. Begin by creating an outline.

- ◆ Like your high school English teacher taught you.
  - It works!
- ◆ I like to take outlines down to the paragraph level.
- ◆ An outline doesn't have to be a work of art.

## 2. Create rough text.

- ◆ I think this is the hardest part.
- ◆ This is where I have to really figure out what I want to say.
  - Ex: My outline might say “discuss related work on blah.”  
Roughing this into text may take a lot of Googling.

# How To Write a Document (Cont'd)

## 3. Make it beautiful.

- ◆ To me, this is the enjoyable part.
- ◆ This is an artistic exercise.

■ BTW, it's OK if the final product deviates from your original outline. The outline just gives you a starting point.

# Outlines

- Fortunately for us, we're not producing the next great work of fiction. Most of what we write is pretty formulaic.
- My standard outline for an intro:
  - Para 1: Set the stage.
  - Para 2: “Unfortunately,...” Point out something that is “broken”.
  - Para 3: Focus of this paper: fix the broken thing.
  - Several paras on prior work to provide context for explaining my contributions (with a para label “Prior work”).
  - Several paras explaining my contributions (with a para label “Contributions”).
  - A para on the paper's organization.

# My Principles for Good Writing

■ For me, good writing is about having

◆ **good content**

- You need something interesting to say.

◆ **good flow**

- Ideas need to be presented in the right order.
- Complexity needs to be exposed at a rate that's not too fast.
- Sections 1,...,N should set up Section N+1.
- In a section, Paragraph N (along with prior paragraphs) should set up Paragraph N+1.
- In a paragraph, Sentence N should follow from the previous sentences.

# Principles (Cont'd)

## ◆ good pattern matching

- This is bad:
  - “We present a new scheduling framework for supporting real-time tasks. Using this scheduling environment, it is possible to meet a wider range of timing constraints.”
- This is bad:

$$x = y + 15$$

...2 pages elapse...

$$z = x + 5$$

...2 more pages elapse...

“From our prior assertions, we can see that  $z = y + 20$ .”

- Properly label expressions and important conclusions and refer to the labels! Don't make readers hunt for them!



# Principles (Cont'd)

## ◆ good vocabulary

- Don't come across sounding like a high school kid!
  - Also avoid that “high school kid start to a paper”: “Computers are changing the world today...”.
- You learned those SAT words for a reason! Use them!
  - At least, the ones that aren't too esoteric (BTW, that's an SAT word).
  - An online thesaurus can be very helpful here.
- Which is better:
  - Prior work on memory allocation has had a lot of impact.
  - Prior work on memory allocation has had significant impact.
- Which is better:
  - Our algorithm exhibits overheads that are about the same as those of the naïve algorithm.
  - Our algorithm exhibits overheads commensurate with those of the naïve algorithm.

# Some (Random) General Advice

- If you have to write a 10-page paper...
  - ◆ It's a bad idea to come to work thinking, "I have to write a 10-page paper!"
  - ◆ It's a better idea to come to work thinking, "I need to write two good pages."
    - Not as overwhelming.
    - Do it five times and you're done!
- To see if what you've written is "smooth," read it out loud.
  - ◆ Better yet: Listen to someone else read it out loud.

# Advice (Cont'd)

- Lazy writing makes readers work harder.
  - ◆ It's better for one person (the writer) to work hard than many (the readers).
  - ◆ Example laziness: “It's easy to see...”. Usually really means: “I was too lazy to write it down...”.
    - Variations on this: “Obviously,...”, “Clearly, ...”, etc.
  - ◆ Also lazy: not properly labeling assertions (as we discussed before).

# Advice (Cont'd)

- Too many people fall into the trap of weaseling out of a writing problem by inventing unneeded notation, vocabulary, definitions, etc.
  - ◆ This is “anti-Strunk & White”!
  - ◆ You should use exactly the amount of notation, vocabulary, definitions, etc., to do the job and no more!
    - You should think hard about these choices and not just casually invent notation, etc., as you go.
  - ◆ **Advice:** Create a notation table (even if you don't put it in the paper) so you can holistically see the choices you've made and make sure symbols haven't been overloaded. Overloaded notation is a major writing sin.

# Advice (Cont'd)

## ■ Be Honest!

- ◆ Don't “cherry pick” results to strengthen your argument.
- ◆ In discussing experiments, differentiate between conclusions drawn about your “experimental world” and conjectures about the “real world.”

## ■ Personal pet peeve: Figure out the difference between “which” and “that” and use them properly.

# Advice (Cont'd)

## ■ Attention to detail matters.

### ◆ Two examples:

- Have consistency in your bibliography.
- Exquisite figures add; sloppy hastily-done ones detract.

## ■ Never ever EVER plagiarize.

- ◆ Did you know IEEE maintains a list of offenders?
- ◆ People on the list cannot submit to IEEE conferences.
- ◆ Have you ever heard of “self-plagiarism”? Is it OK?

# Advice (Cont'd)

■ Know your audience.

■ **Ex:** The following are very different:

- A computer vision paper written for a computer vision conference.
- A computer vision article written for *Communications of the ACM*.
- An article on the wonders of computer vision written for a mainstream magazine.
- A recommendation letter for a computer vision Ph.D. student.

■ **Question:** Who's the audience for your dissertation?

# Things I Commonly Tell my Students

- You need to “Strunk and White” it.
  - ◆ Translation: You need to hone the writing to say what needs to be said and no more.
- You need to “Dan Brown” it.
  - ◆ Translation: It needs more drama/tension.
  - ◆ Ideal: Each section creates some tension that is relieved by the next section (like the chapters of a DB book).
- You need to figure out what story you want to tell with your data/experiments.
- You need to figure out **what you want to teach us.**



# Some Resources

- Alum Steve Goddard has a nice webpage with links to [writing resources](#).
- [This page](#) has some good writing tips.
- The [UNC Writing Center](#) may be helpful.
- Several of my students have benefited from their [Dissertation Boot Camp](#).
- If English isn't your mother tongue, you may find [grammarly](#) helpful. Also, consider paying an editor, which is perfectly OK (except for coursework where your writing is being evaluated) but may preclude “last-minute” paper submissions.