

# Common Technical Writing Issues

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<http://www.cs.illinois.edu/homes/taoxie/>

<http://www.cs.illinois.edu/homes/taoxie/publications/writeissues.pdf>

<http://www.cs.illinois.edu/homes/taoxie/advice/>

# Important goal

- Don't make readers a hard time in reading your papers
  - Your technical content is already hard enough

# Top-Down Writing Style

- Hand hold readers on walking through your draft in a top-down way
  - Tell readers the structure on what you are going to say
- See my blog post on “Advice to Students on Mastering Communication Skills”
  - <http://asegrp.blogspot.com/2009/11/advice-to-students-on-mastering.html>
- “The Minto Pyramid Principle”
  - <http://www.barbaraminto.com/textbook.html>

# Avoid ambiguous words

- “since” → “because”
  - Bad: components may become coupled since the adaptation introduces dependency.
- “while” → “although”, “whereas”
- “method” → “technique”, “approach”
- “function” → “functionality”
- “if” → “whether”
- “test” a question/hypothesis → “answer” or “validate”
- others?

# Avoid strong words

- “always” → “often”
  - Bad: Coupling is **always** regarded as a **fatal** factor for reducing maintainability

# Avoid informal or offensive words

- Avoid “obviously”, “clearly”, “apparently”
- Avoid “very”?
- “Though” → “Although”
- “above” → “preceding”
- “very well” → “satisfactorily” “sufficiently”
- “enough” → “sufficient”
- “as far as we know” → “within our knowledge”
- “means” → “indicates” “represents”

# Avoid complicated words

- “utilize” → “use”

# Explicitly write out things

- Don't let readers guess
- I just got a pet and gave her a name. This is cute.
  - This pet is cute?
  - This name is cute?
  - This get acquirement process is cute?
  - This naming process is cute?
- Check your writing to see whether there is “This is” “It is” “They are” “This does”... and fill in a noun after “this” or “that”, and replace “they”.. with a noun.
- Bad: The solution in Fig. 2 is in fact a graph production. It follows the definition and presents a software transformation rule.



# Which vs. That

- Restrictive clause: that (with no preceding comma)
- Nonrestrictive clause: which (with preceding comma)
- “ABC which is the best one” → “ABC, which is the best one” or “ABC that is the best one”

# More on Which

- Don't use which to refer the whole sentence
  - Bad: We verify the applications implemented by application developers, **which** helps to discover problems in application systems.
  - Good: We verify the applications implemented by application developers; **the verification** helps to discover problems in application systems.
- Don't separate “which” and the modifying noun with some phrases
  - Bad: Spin provides extension mechanisms such as embedded C code, which greatly facilitate the transformation
  - Good: .... mechanisms (such as embedded C code), which ...

# Figure 1, Table 1, Section 1,...

- No need to add “the” before them
- The first letters need to be in upper cases
- No need to say Figure one, Table one, ...
- Can refer to multiple numbers like Figures 1-3, Tables 1 and 6; remember to use plural forms
- Alternative (uncommon, less concise) forms: the first figure, the first table
- Other words: Transaction A, Account B

# Also, And, Further

- Don't put "And" in the beginning of the sentence
  - Remove it
- Don't put "Also," in the beginning of the sentence
  - Use "In addition," or "Additionally"
  - Or put "also" in the middle of the sentence
  - Bad: Also we implemented a tool...
  - Good: We also implemented a tool

# Repetition and Consistency is Good

- Use terms/words consistently
- We conducted an experiment to do .... This evaluation does provide insights...
  - You should replace “evaluation” with “experiment”
- Bad: Section 1 introduces.... Section 2 gives ... We also give an example in Section 3. Finally, we explain .. In Section 4.
- Good: ... Section 3 gives an example. Finally Section 4 explains...

# Dangling modifiers

- Bad: After reading the original study, the paper remains unconvincing.
  - → after ....., we find that the paper .....
- Bad: The experiment was a failure, not having studied the lab manual.
  - → They failed in their experiment, not ...
- Bad: To improve his approach, the experiment was done.
  - → To improve his approach, he did the experiment.
- Bad: To capture the new semantics, Promela is extended with new primitives.
  - → To capture the new semantics, we extend Promela...

# Fixing long sentences

- Bad: In ABC, the Project Plan module responsible for making plan can access the Process Pattern Manager, which can choose proper process patterns from Process Pattern Base, utilize the value of estimated parameter vector in quantitative context models to assist the estimation in project plan, and build project plan skeleton based on the solution part of selected process patterns.
- Good: “, which can” → “. This manager can”

# Punctuation issues

- When listing more than three items, put “,” before “and”, “A, B and C” → “A, B, and C”
  - Similarly for “or”
- Put “,” after “e.g.” “i.e.”
- Put “,” before “respectively”



# Citations

- Don't use [1] as a part of the sentence
  - Removing [1] won't produce an incomplete sentence
  - “Tools proposed in [2]” → “Tools proposed by AAA et al. [2]”
- When mentioning others' work
  - Two authors: A and B [1] proposed ..., e.g., Xie and Notkin [1] proposed
  - More than two authors A et al. [2] proposed ..., e.g., Xie et al. [2] proposed
  - Don't use full name but only last name
    - Bad: Tao Xie et al. [1]
  - Put a space before [1]

# Citations - II

- Don't use emotional word
  - Bad: Xie et al. [1] developed an excellent tool
  - Bad: JPF [2] is a famous model checker
  - Maybe ok: JPF [2] is a well-known model checker

# Uncountable Words

- “Work” is not countable when being used to refer to research
- “Research” is also not countable
- “Software” is not countable
- Bad: several works, several researches, several softwares
- Good: several research projects, several pieces of work, several lines of research, several software programs, several software applications

# Abbreviation

- Spell out the full name and then “(ABBREVIATION)”.
- Remember to put a space before “(“
- Better to make upper cases of relevant words
  - Bad: CBSE(Component-based software engineering)
  - Good: Component-Based Software Engineering (CBSE)

# “A” or “An”?

- “A FSM” → “An FSM”
- “a XML file” → “an XML file”
- “a L and a R” → “an L and an R”

# Only

- Places of “only”
  - Bad: JPF **only** interprets Java bytecode and cannot support native code
  - Why: only “interprets” not “compile”?
  - Good: JPF interprets **only** Java bytecode and cannot support native code

# Will

- I often intend to avoid “will” but use “plan to”, “shall” or “does”
  - but proposals can be ok to have “will”
- Maybe bad: Our future work will focus on ...
- Ok: In future work, we plan to focus on...
- Maybe bad: Section 5 will describe the experiment
- Ok: Section 5 describes the experiment

# Avoid firstly, secondly, ...

- Never use “ly” after first, second, third, ... except for “finally”
- Use First, Second, Third, Finally



# Avoid passive voice

- Using passive voice makes “subject” unclear
- Bad: Given the collected operational violations, a Perl script was developed to select the first encountered test for each violated operational abstraction. Then the selected violating tests are sorted based on the number of their violated operational abstractions.

# Avoid passive voice - II

- Good: Given the collected operational violations, Jov selects the first encountered test for each violated operational abstraction. Then Jov sorts the selected violating tests based on the number of their violated operational abstractions.

# Article usage

- If a noun is countable (and singular), there must be a preceding “a”, “the”, or sth like “my”
- You can fix it by turning the singular form to the plural form
- When to use “a” or plural forms vs. “the”
- Bad: following definition defines ...
- Good: the following definition defines
- Bad: In model checker Spin
- Good: In the Spin model checker

# Otherwise

- “Otherwise” cannot connect two clauses
- “A, otherwise, B” → “A; otherwise, B”
- Similar rules for “however”, “therefore”
- It is ok to replace “;” with “.” and make first letters upper cases.

# No “can not”, avoid abbrev “n’t”

- “can not” → “cannot”
- “don’t” → “do not”

# The authors

- Better to use “We”
- Bad: The authors also extract many requirements...
- Good: We also extract many requirements
- But it may be ok to say in acknowledgment
  - Ok: the authors would like to thank ...
- Side note: in US, no “e” in acknowledgment, in UK, yes, “acknowledgement”

# Long subjects

- Bad: An example taken from middleware enabled systems demonstrates the feasibility and effectiveness of our approach
- Good: We demonstrate the feasibility and effectiveness of our approach with an example taken from middleware enabled systems

# Current vs. Existing

- Bad: the approach is implemented in current mainstream programming languages.
  - “current” → “existing”
- It may be ok to say “the current implementation of our approach” but “the existing implementation” is also ok



# Noun Stacking/Verbal

- Bad: We have proposed an approach for interoperable protocol performance **comparison**.
- Good: We have proposed an approach for comparing interoperable protocol performance.
- Bad: ... takes responsibility for **business transaction completion** and **component failure recovery**
- Good: ... for completing business transactions and recovering component failures

# Redundancy

- “such as/like/some examples include” + ... + “etc./and so on/...”
  - The former already implies the list is incomplete
- Bad: problems like deadlocks, livelocks or others
- Good: problems like deadlocks and livelocks
- Bad: such as CMM, CMMI, ISO 9000 etc.
- Good: such as CMM, CMMI, and ISO 9000

# As below/as follows

- Bad: The paper makes:
  - first contribution as...
  - second contribution as
- Good: The paper makes the following contributions: ...
- Good: We list the main contributions as follows/as below:
- Bad: They are described below:
- Good: They are described as below:

# Using hyphen -

- “third party libraries” → “third-party libraries”
- “interface contract mutator” → “interface-contract mutator”
- “model checking algorithms” → model-checking algorithms”
- “test generation tools” → “test-generation tools”

# Confusing words

- “stimulate” → “simulate”
- “constrains” (verb) → “constraints”
- “latter” → “later”
- “later” → “latter”
- “due to space limitation” → “due to space limit”
- “automatical” → “automatic”
- “software industry is more and more relied on third party libraries” → “software industry increasingly relies on third party libraries”

# Don't over omit “,” or “that”

- Bad: In the paper text is well written
- Good: In the paper, text is well written
- Bad: Note a void path is always executable
- Good: Note that ...

# References

- If using Bibtex, in paper titles, remember to add {} around some words that should be shown in upper cases.
  - java, jpf...
- Conference or journal references usually need to include page numbers

# Logic Flow

- Logic flow between sentences within a para
- Logic flow between paragraphs in a section
- Logic flow between sections in a paper
- Pay extreme attention to abstract and intro
  - Read on hardcopy; Read aloud as a reading group
- Sanity check on paragraph logic flow
  - Ask another person to look at your section for 1 minute
  - Then ask this person to state the relationship among paragraphs
- Use a Mind Map to organize abstract at sentence level and intro at paragraph level
  - <https://www.mindmup.com/>
  - <http://freemind.sourceforge.net/>



# Exercise

- Our solution is presented and a toolkit(named BCD) based on it is developed.
- Nowadays, the interoperable protocols play an important role in the performance of the whole application systems in the dynamic network environments.
- For example, the new version has to keep the old interface, otherwise, it may fail other softwares communicating with it.
- Obviously the above definitions are not enough because we have not defined the operational model yet.

# Writing Defect Recording Log

[Collaboration Site for NCSU ASE \(new\)](#) >

## Writing Defect Recording Log

Each student **must** categorize and record the writing defects pointed out by Dr. Xie in his marks on hardcopy of student drafts in this wiki page (you don't need to put down your writing defects detected via peer student review).

Dr. Xie will frequently double check this page against his marks on students' writing hardcopies to make sure that students do record writing defects. For a draft preparation before a deadline, due to tight timing, a student is allowed to document the defect recording log here within **\*\*2 days\*\*** after the submission deadline (based on the marks on the draft hardcopies).

Please follow the format of the first entry (as a fake entry for Tao Xie). Put your name's entry below if it is missing.

This practice is inspired by [Personal Software Process](#) (PSP)'s defect recording log. When students record their common defect types, they can keep close eyes on these common defect types to avoid them from reoccurring in their ongoing or future writing.

- Tao Xie (sample)
  - Illogical transitions between two sentences
    - 15 (05/01/09:ASE 09), 4 (04/29/09:ASE 09)

Other example defect types are listed below with the entry format as the above one by listing the defect type first, and its sub-bullet as the list of defect counts with the latest date's first "COUNT (DATE:CONFERENCE\_JOURNAL\_NAME), ...". If you don't understand some marks' defect types, please consult Dr. Xie.

- Missing definition on an unfamiliar term before use; No "the" or "a" before a singular countable noun or forgetting in turning it into a plural form; Using "this" without a noun after it; Inconsistent subject verb agreement; Dangling modifier; Overuse of passive voice; Misuse of punctuations; Simple typos; ...

# Example Defect Recording Log

- No "the" or "a" before a singular countable noun or forgetting in turning it into a plural form
  - 3 (05/03/09:ASE 09 abstract+introduction)
- Inconsistent subject verb agreement
  - 1 (05/03/09:ASE 09 abstract+introduction)
- Miscue of punctuations
  - 1 (05/03/09:ASE 09 abstract+introduction)
- Logic gap between two sentences
  - several (05/03/09:ASE 09 abstract)
- Imprecise used terms
  - 6 (05/03/09:ASE 09 abstract+introduction)
- Mention some unrelated stuff in a certain context
  - 1 (05/03/09:ASE 09 abstract+introduction)
- Over claim things
  - 2 (05/03/09:ASE 09 abstract+introduction)
- Wrong verb (e.g., "a program using RegEx", not "a program containing RegEx")
  - 7 (05/03/09:ASE 09 abstract+introduction)
- Lack of connection word
  - 2 (05/03/09:ASE 09 abstract+introduction)

# Example Defect Recording Log

- Usage of progressive forms of a verb, i.e., verbs ending with "ing" to write observations
  - 7 (05/08/09: EMSOFT 09, Empirical Study, Conclusions)
- Usage of future tense of verb with "will". Instead use adverbial phrases to convey the same. For example, **avoid**: Our approach will take.....  
**alternative**: Our approach takes...
  - 5 (05/08/09: EMSOFT 09, Introduction, Approach)
- Lack of logical transition between paragraphs in a section
  - 4 (05/07/09: EMSOFT 09, Approach)
- No "the" or "a" before a singular countable noun
  - 24 "the", 4 "a" (05/08/09: EMSOFT 09)
- Usage of "though" in the beginning of a sentence => **avoid**: Though our approach.... **correct** : Although our approach....
  - 2 (05/07/09: EMSOFT 09), 1 (05/08/09: EMSOFT 09)
- Incorrect usage of "e.g.," . For example, **avoid**: For e.g., ... **correct**: For example.....
  - 4 (05/07/09: EMSOFT 09)
- Usage of "this" without noun
  - 2 (05/07/09: EMSOFT 09)
- Usage of "whereas" in the beginning of sentence, **avoid**: Whereas, the mock object.... **correct**: In contrast, the mock object.....
  - 2 (05/08/09: EMSOFT 09)
- Inconrrent usage of verbs. For example, **avoid**: We *executed* Pex using... **correct**: We *applied* Pex using...
  - 4 (05/08/09: EMSOFT 09, Empirical Study)
- Incorrect format of title in References. Double check the bibtex directly taken from external sources like ACM digital library. For example, **Wrong**:  
Cute: A..... engine for c ; **Correct**: CUTE: A ....engine for C
  - 7 (05/08/09: EMSOFT 09: References)

# Paper Revision

- I (advisor) always mark on hardcopies of a student's writing (not directly writing on LaTeX or Word source or on screen)
  - If I write directly, students often won't pay attention to what I changed
  - Reviewing/editing on computer screen is demonstrated to be not effective
- Whenever possible, I walk through with a student on explaining rationales of my marks
- I always don't write any paragraph for a student's writing but iterate with them with comments

# Paper Revision cont.

- I don't mark on a student's writing before the writing is commented by another peer student and the student has fixed based on the comments
  - My hourly pay is more expensive than a student's 😊
  - I don't want to spend my time on things that peer students can do
  - Any residual writing issues pointed out by me can be teachable lessons for the peer student too

# Writing as communication media

- I rely on students' formal writing to know about details on what is going on
  - Don't tell me that you need to meet with me in person to explain things not clear in your writing! Reviewers don't allocate one-on-one meetings with you when reviewing your paper!

# Common Barriers for Beginners

- Feel nothing to say (after writing several sentences for approach descriptions)
  - Tip: follow some template (see my advice on writing research papers), e.g., draw a diagram for approach overview with multiple components, and one subsection for each component...
  - Tip: use examples to illustrate the idea in the approach section
- Write too much low-level boring implementation details
  - Tip: ask whether a reader (who is not going to implement your approach) is interested



# Write Early and Along the Way

- Write abstract, intro, example, (high-level) approach, related work sections →
- Prototype the tool →
- Write (detailed) approach and implementation sections →
- Write evaluation design, subjects, ... sections (i.e., evaluation section without “results” subsection) →
- Conduct evaluation →
- Write evaluation results subsection →
- Write discussion and conclusion section

# More Tips on Advising

- <http://asegrp.blogspot.com/>

## AUTOMATED SOFTWARE ENGINEERING RESEARCH GROUP NCSU

SATURDAY, DECEMBER 27, 2008

### How not to keep your advisor up all night till last minute before the paper submission deadline?

Posted on Friday Nov 07, 2008

I recently had been through a case where a student submitted the student's draft for my review of writing two days before a submission deadline. Since I had another more urgent task during the period, the required effort for helping improve the draft to a fine shape "forced" me to stay up the whole night till early morning 5am the submission deadline.

TWITTER UPDATES

has an ESEC/FSE 2009 paper on method sequence generation based on code mining 2 days ago

@xushengxiao Good for you! Hope you become a CCI expert soon 29 days ago

ISSTA 2009 paper on "Time-Aware Test-Case Prioritization using Integer Linear Programming" is available: <http://bit.ly/e3JdP> 33 days ago

# Use LaTeX

- <http://web.engr.illinois.edu/~taoxie/publications/writingtools.html>
- Sometimes when you have to use Word, you may consider to use Endnote
- Use style-check for checking RegEx against your paper latex sources
  - <http://web.engr.illinois.edu/~taoxie/publications/writingtools.html#stylecheck>
  - Turn your common writing issues to RegEx

# Excellent Online Dictionary

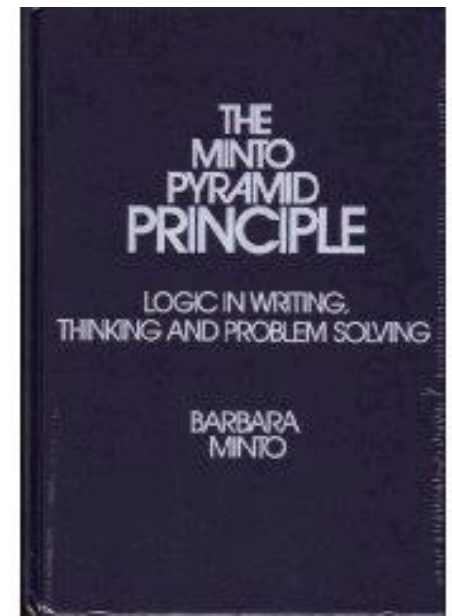
- <http://www.oup.com/elt/catalogue/teachersites/oald7/>
- Has good sample sentences
- Indicates whether a noun is countable or uncountable

# Book Recommendations

- Strunk, W., Elements of Style by Strunk : easy to read, useful to read (free online)
  - <http://www.bartleby.com/141/index.html>
- Style: Ten Lessons in Clarity and Grace: not a book for easy reading, but it can be very helpful in improving writing style
  - [http://www.amazon.com/Style-Lessons-Clarity-Grace-9th/dp/0321479351/ref=ntt\\_at\\_ep\\_dpi\\_1](http://www.amazon.com/Style-Lessons-Clarity-Grace-9th/dp/0321479351/ref=ntt_at_ep_dpi_1)
  - A basic version “Style: The Basics of Clarity and Grace” [http://www.amazon.com/Style-Basics-Clarity-Grace-3rd/dp/0205605354/ref=pd\\_sim\\_b\\_2](http://www.amazon.com/Style-Basics-Clarity-Grace-3rd/dp/0205605354/ref=pd_sim_b_2)

# Book Recommendations cont

- The Pyramid Principle: Logic in Writing and Thinking (pricy but seems to be easy to read)
  - <http://www.amazon.com/gp/product/0273617109/002-0480640-8802440?v=glance&n=283155>
  - There is a cheaper Chinese edition
  - It talks about how to have good logic in writing



# More Resources

- <http://spoke.compose.cs.cmu.edu/ser04/course-info.htm>
- <http://www.cs.cmu.edu/~Compose/shaw-icse03.pdf>
- <http://www1.cs.columbia.edu/~kaiser/relatedwork.htm>
- <http://www.cs.washington.edu/homes/mernst/advice/write-technical-paper.html>
- [http://www-bsac.eecs.berkeley.edu/~muller/jmems.web/sds\\_editorial\\_june\\_2003.pdf](http://www-bsac.eecs.berkeley.edu/~muller/jmems.web/sds_editorial_june_2003.pdf)
- <http://www.cs.berkeley.edu/%7Epatrsn/talks/writingtips.html>
- <http://web.engr.illinois.edu/~taoxie/advice.htm#writing>
- <http://web.engr.illinois.edu/~taoxie/adviceonresearch.html>
- <http://web.engr.illinois.edu/~taoxie/seconferences.htm>
- <http://web.engr.illinois.edu/~taoxie/publications/writingtools.html>