

공학도를 위한 Technical Writing

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Technical Writing에 관한 오해

- 선천적인 능력이다
 -) 선천적 20% + 후천적 80%
 - Cf. 한국어 글 쓰기를 누가 잘하는가?
- 미국인보다 잘하기 어렵다
 -) 미국인보다 잘할 수 있다!
 - Cf. 한국어 작문을 따로 공부했나?
- 실력을 늘이는데 몇 년이 필요하다
 -) 단기간에 실력을 늘일 수 있다
 -) 단 체계적인 노력이 필요하다

Technical Writing의 3가지 요소

1. Grammar
 - professional/scholarly etiquette
 2. Writing vocabulary
 - efficiency
 3. Critical thinking
 - effectiveness
 - the very essence of writing
 - not about your command of English
- + 영어답게 글 쓰기
- readability

A Must-Have for Writing: English-English Dictionary

One is good, but may not be enough.
Two are better and recommended.
Three and more are even better.

Grammar

professional/scholarly etiquette

문법

- 필요 능력
 - 문법에 맞게 문장을 작성할 수 있어야 함
 - 문장이 문법에 맞는지 판별할 수 있어야 함
- 문법책 공부 필수
 - 기본 문법 습득 필요
 - 어려운 문법은 불필요
 - 수능 영어 공부하지 말자!
- Etiquette
 - 문법이 틀려서 창피당하지 말자!



Writing Vocabulary

efficiency

Efficiency ^[1/2]

- The execution time of algorithm A is smaller than that of algorithm B.
- Algorithm A runs faster than algorithm B.
- Algorithm A outperforms algorithm B.
- The benefit of implementing ... is much larger than its disadvantage in speed.
- The benefit of implementing ... far outweighs its disadvantage in speed.

Efficiency ^[2/2]

- The most important part of the problem is ...
- The technology is not mature enough that it can be ready for commercial deployment.
- They have two more players than we have.
- occur at the same time
- The crux of the problem is ...
- The technology is nowhere near ready for commercial deployment.
- We are outnumbered by two.
- coincide

Writing Vocabulary의 중요성

- 간결한 문장
 - 문장이 읽기 쉽다
- 정확한 뜻 전달
 - 단어 자체의 힘을 최대한으로 활용

) 고급 영작의 첫 단계

Passive vs Active

- Passive vocabulary
 - 뜻을 알고 이해할 수 있음
 - 독해에 필요
- Active vocabulary
 - 언제든지 직접 구사할 수 있음
 - 작문에 필요
- Passive ≠ Active
 - Active vocabulary를 의식적으로 외워야 함

Writing Dictionary를 만들자

- 자신만의 writing vocabulary를 정리
- Active vocabulary에 들어올 때까지 반복해서 공부
- 실제 작문시 적절한 표현이 있는지 복습

- adversely affects the performance
- on the ground that ...
- under-utilize
- The speedup peaks when ... / hits the bottom (?)
- suggest vs hint at the fact that
- perform comparably with ... / perform on par with ...
- works done in ... can be profitably adopted in ...
- ... branches on the value of a location vs. ... branches depending on the value of a location
- spend the majority of its time
- appear unusual by contemporary standards
- Recent years have seen burgeoning interest in the use of ...
- Examples of when these lemmas are used can be found in ...
- exclude from the count ...

```
gla@pl:~/latex-pl$
gla@pl:~/latex-pl$ ls
README          cs321.tex      icde09.tex     icfp07.tex     jar12.tex      jfp11.tex      popl13.tex     thesis05.tex
acta10.tex      cs433.tex      icde11.tex     icfp08.tex     jfp09.tex      lics12.tex     purify         tldi03.tex
aplas06.tex     ic10.tex       icdt09.tex     ijcar12.tex    jfp11.log      pods10.tex     sigmod10.tex  top1as08.tex
gla@pl:~/latex-pl$ grep outweigh *
icde09.tex:the communication cost far outweighs the benefit of parallel dominance tests.
icde09.tex:and its communication cost is likely to outweigh the benefit of parallel computing.
icde09.tex:can outweigh the gain from an increase in the number of cores.
icde11.tex:far outweighs the reduction in the number of dominance tests.
thesis05.tex:can outweigh its disadvantage in speed
thesis05.tex:can outweigh its disadvantage in speed.
tldi03.tex:far outweighs this inevitable disadvantage
top1as08.tex:can outweigh its disadvantage in speed.
top1as08.tex:can outweigh its disadvantage in speed.
gla@pl:~/latex-pl$ grep coincide *
cs321.tex:which coincides with \makebox{\textcd{'a set}} under the definition of \makebox{\textcd{'a set}}.
cs433.tex:coincides with the direction in which the proof construction should proceed.
cs433.tex:it is no coincidence that we use $\lambda$-abstractions and $\lambda$-applications
jar12.tex:Fortunately the two type systems coincide in their typing capabilities
lics12.tex:the syntactic provability of a sequent coincides with its semantic unsatisfiability,
lics12.tex:$\TSante{\Wdown{W_1}{W_2}}$ coincides with $\TSformula{\Wdown{W_1}{W_2}}$
lics12.tex:and $\TSante{\Wup{W_1}{W_2}}$ coincides with $\TSformula{\Wup{W_1}{W_2}}$
popl13.tex:the syntactic provability of a sequent coincides with its semantic unsatisfiability,
popl13.tex:$\TSante{\Wdown{W_1}{W_2}}$ coincides with $\TSformula{\Wdown{W_1}{W_2}}$
popl13.tex:and $\TSante{\Wup{W_1}{W_2}}$ coincides with $\TSformula{\Wup{W_1}{W_2}}$
thesis05.tex:coincides with the notion of world in the ``possible world interpretation.''
thesis05.tex:coincides with $m$
tldi03.tex:which coincides with the intuition behind the modal connective $\square$.
top1as08.tex:coincides with the operational description of
gla@pl:~/latex-pl$
```

영어답게 글 쓰기 = 우리말처럼 쓰지 않기

readability



중요 원칙

동사의 비중이 크다

주어의 비중이 ~~작다~~

중요 원칙

형용사의 비중이 ~~작다~~
부사의 비중이 크다

추상 명사를 주어/목적어로 ~~쓰지 말자~~

- 무분별한 개발은 자연 파괴를 낳는다
무분별하게 개발하면 자연이 파괴된다
- 보호를 요청했다
보호해 달라고 요청했다
- His careful examination brought about the patient's speedy recovery.
- The introduction of labor-saving technology has cost many people their jobs.

추상 명사를 주어/목적어로 ~~쓰지 말자~~

- 과학에서 향후 25년은 전염병이 사라지는 것을 보게 될 것이다
과학의 힘으로 향후 25년내에 전염병이 사라질 것이다
- The next 25 years in science will see the elimination of infectious disease.

대신 동사를 쓰자

- 1581년 신생국은 스페인으로부터 독립을 선언했다
1581년 새 나라는 스페인에서 독립한다고 선언했다
- In 1581, the new state declared its independence from Spain.

가능하면 형용사 대신 부사를 ~~쓰자~~

- 그것들의 자세한 비교는 차이점을 드러낼 것이다
그것들을 자세히 비교하면 차이점이 드러날 것이다
- 아버지의 갑작스러운 죽음으로 학교를 그만두었다
아버지가 갑자기 돌아가시는 바람에 학교를 그만두었다
- A careful comparison of them will show you the difference
If you compare them carefully, you will see the difference
- His father's sudden death forced him to give up school
Because his father died suddenly, he had to give up school

대명사는 ~~빼거나~~ 명사로 바꾸어라

- 그들은 죽은 다음에 어떤 대접을 받을지는 몰라도 하느님에게 영혼을 맡길 수 있다고 확신했다.
- They expresses their confidence that they could entrust their souls to God for whatever arrangements He might make for them for their deaths.

수동태 대신 ~~능동태~~

- 맥주는 보리로 만들어진다
맥주는 보리로 만든다
(주어를 쓸 필요가 없으므로 능동태)
- 신이 진흙을 빚어서 아담을 만든 것으로 이야기된다
신이 진흙을 빚어서 아담을 만들었다고 말한다
- Beer is made from barley.
(주어가 드러나지 않게 하기 위해서 수동태)
- God is said to have fashioned Adam from the clay of the earth.

‘형용사 + 명사’를 ~~‘주어 + 서술어’~~

- 그는 성격이 밝아서 남과 잘 어울린다
- 공간이 비좁다 보니 집을 다닥다닥 붙여서 지었다
- 그는 이가 안 좋다

- He has a cheerful character and fits in well with others.
- The houses had to be built closely together due to limited space.
- He has bad teeth.

뒤집기 – 뒤집으면 자연스럽다

- 영어 번역에서 중요한 기법
 - Please memorize this dialogue before you come back.
 - 오기 전에 이 대화를 외우세요
이 대화를 외워서 오세요
- 영작에서 기억해 둘 만한 기법
 - 영어: “A lead to B”
 - 원인을 먼저 제시, 결과는 나중에
 - 우리말: “B가 일어난 것은 A 때문이다”
 - ‘결과를 나중에, 원인은 나중에’가 안정적

Critical Thinking

effectiveness

Paragraph = Unit of Composition

Multicore processors are going mainstream [1]. As a response to the problem of excessive power consumption and the lack of new optimization techniques, the industry has adopted a new strategy for boosting processor performance by integrating multiple cores into a single processor instead of increasing clock frequency. In upcoming years, we will see processors with eight, sixteen, or more cores, but not with much higher clock frequency.

Well-structured Paragraphs

- Topic sentence
 - introduce the main idea of the paragraph.
 - two components:
 1. general topic
 2. what kinds of things will be said about the topic
- *"A car has several moving parts."*
- Body
 - support, prove, or explain the statement made in the topic sentence.
- Concluding sentence
 - summarizes what has been said.

Example

A paragraph has three major parts. The topic sentence introduces the main idea. The body supports, proves, or explains the topic sentence. The concluding sentence summarizes the paragraph. These are the major parts of a paragraph.

Good/Bad Topic Sentence

- Bad
 - Uninteresting fact
 - Too specific statement
- Good
 - No immediately evident, but provokes curiosity.
 - Uninteresting facts are immediately evident and seldom provoke curiosity.
 - Can be justified, proven, or explained.
 - If it is too specific, nothing more needs to be stated.

Examples

"Everyone will eventually die." vs

"All humans pass through different stages from birth to death."

"The Old Man and the Sea is a novel written by Ernest Hemingway." vs

"The Old man and the Sea deals with several interesting ideas."

"Learning English is difficult." vs

"Learning English is difficult for several reasons."

Styles of Paragraphs (1)

- Descriptive details

"The young woman was pretty."

- Classification

"There are several varieties of beans."

- Telling function of parts

"The machine is divided into three sections/parts/components."

"An automobile consists of many parts."

- Explaining process

"We have to follow several steps in baking a cake."

Styles of Paragraphs (2)

- Comparing and contrasting
 - "Plants and animals are alike in several ways."*
 - "There are several differences between men and women."*
- Using examples
 - "Sometimes it pays to be honest."*
 - "John has always been a difficult child."*
- Using reasons
 - "I like string beans for several reasons."*
 - "A college education is important for success in life."*
- ...

) topic sentence가 잘 정해지면 **body**를 채우기 쉬움

Concluding Sentence

- May be unnecessary depending on the style of the body
 - descriptive details

"The young woman was pretty. ...(body)"

) perhaps unnecessary
 - examples

*"There are several varieties of beans. ...(body) **These are ...(concluding sentence).**"*
 - reasons

*"A college education is important for success in life. ...(body)... **Hence ...(concluding sentence).**"*

Critical thinking에서
왜 paragraph & topic sentence를
강조하는가?

Critical Thinking

- 처음 50% ($\frac{1}{4}$ lead your writing)
 - Section을 여러 paragraph로 나누고
각 paragraph의 topic sentence와 structure를 결정
 - 1st 'why':
"Why do all these topic sentences connect well to each other?"
- 나머지 50% ($\frac{1}{4}$ manage your writing)
 - 각 paragraph를 topic sentence에 맞춰 individual sentence로 채우는 것.
 - 2nd 'why':
"Why do all these sentences in the body make sense?"

예:

Writing the Introduction section
in a hypothetical paper*

*Introduction in '*A logical account of uncertain databases based on linear logic*'

Step 1: Divide it into paragraphs

- 연구 배경 소개
"uncertain databases란게 있다."
- 연구에서 다루는 문제 소개
"semantics라는 재미있는 문제가 있다."
- 본 논문에서 다루는 구체적인 문제 명시
"logical approach를 써서 semantics를 정의하는 문제를 다루겠다."
- 문제 해결에 어려운 점 설명
"maybe tuple을 처리하기 어렵다."
- 문제 해결 방법 및 결과 설명
"linear logic을 써서 문제 해결했다."
- 문제 해결의 의의
"결과를 다른 문제에도 적용할 수 있다."

개별 paragraph의 개략적 내용 결정

Step 2: Choose topic sentences

- ..., a number of approaches to formulating uncertain databases have been proposed.
- An orthogonal problem to formulating uncertain databases is to study the semantics of uncertain databases.
- This paper develops a semantics for uncertain databases based on the logical approach.
- The main difficulty in developing such a semantics is to translate a maybe tuple.
- ..., we take a radical departure from the traditional logical approach by choosing as the logical foundation not propositional logic but linear logic.
- We are not the first to use linear logic in database research.

개별 paragraph의 topic sentence 결정
연속한 paragraph 사이의 내용 flow를 확인

And then ask: "why are these topic sentences okay?"


**not from the viewpoint of an author,
but from the viewpoint of potential readers.**

) First why



Step 3: Fill in each paragraph

An orthogonal problem to formulating uncertain databases is to study the semantics of uncertain databases (*i.e.*, “what is the meaning of a given uncertain database?”). Prior work on the semantics of relational databases (without uncertainty) is categorized into the algebraic approach advocated by Imieliński and Lipski [11] and the logical approach proposed by Reiter [20]. In our context of uncertain databases, the algebraic approach maps an uncertain database to a unique set of relational databases, or possible worlds, whereas the logical approach specifies how to translate an uncertain database to logical theories. The algebraic approach is useful when analyzing the efficiency of a specific implementation of database operations, and the logical approach is useful when proving the correctness of various database operations.

- For every sentence, ask yourself:
"Why do I absolutely need this sentence?"
"Why does this sentence make sense?"
"Why can I not remove this sentence?"
not from the viewpoint of an author,
but from the viewpoint of potential readers. 
) **Second why**

Paragraph 형식 선택

- 두괄식 (strongly recommended)
 - 쓰기 쉬움
 - 읽기 쉬움
 - transition을 쓰면 효과를 증대시킴
 - Although/While/Despite/...
- 미괄식 (not recommended)
 - 쓰기 어려움
 - 읽기 어려움
- 양괄식
 - concluding sentence가 있을 경우
 - 두괄식보다 쓰기 어려움
 - 두괄식보다 효과가 더 뛰어남
- No two or more topic sentences in a single paragraph.

Two Topic Sentences? [myson '07]

The first decision, however, causes a problem when we manipulate physical quantities whose dimensions are the same but whose units are different. As an example, consider the addition of 5.0 m and 1.0 cm, which is written as the following expression in our system:

$$5.0 + 1.0$$

The above expression succeeds in type checking because the two real values have the same dimension, namely length. It evaluates, however, to 6.0, which is a wrong result. In addition, we cannot conclude whether the unit of 6.0 is meter or centimeter. In order to deal with this problem, we employ a unique unit for each dimension and convert a value with a unit to another value with the unique unit internally. If meter is a unique unit for length, then the above expression is written as follows:

$$5.0 + 0.01$$

Then it evaluates to 5.01 with unit meter, which is correct. Therefore, this solution substantiates the first decision, *i.e.*, it allows our system to focus on only dimensions. Consequently, this solution substantiates the first decision and makes our system *unit-free*.

Clear Topic Sentences [myson '07]

The first decision, however, causes a problem when we manipulate physical quantities whose dimensions are the same but whose units are different. As an example, consider a function that takes two real values with dimension length and returns their sum. Then we apply the function to a pair of 5.0 m and 1.0 cm. Without considering their units, the function returns an incorrect result, 6.0, although type checking succeeds because the two arguments have the same dimension. In addition, we cannot decide whether the unit of 6.0 is a meter or a centimeter.

Our solution is to use a representative unit for each dimension. When a value is stored, it is internally converted to another value with the representative unit for its dimension. For instance, if a meter is the representative unit of dimension length, 1.0 cm is converted to 0.01 m. Then the function in the above example returns 5.01 with the unit meter, as expected. Therefore, this solution resolves the problem and makes our system *unit-free*.

Writing Style (SSS)

elegance

Direct language #1:
Use the active voice.

Active vs. Passive

- The active voice is more direct than the passive:
I shall always remember my first visit to Boston.

VS

My first visit to Boston will be remembered by me.

- Caveat: it depends on the subject of the sentence:
The dramatists of the Restoration are little esteemed today.

VS

Modern readers have little esteem for the dramatists of the Restoration.

Use Pronouns 'We' and 'You'

- *It can be seen that ...*
- *34 tests were run*
- *There properties were thought desirable*
- *It might be thought that this would be a type error*

- We see that ...
 - We = you and the reader
- We ran 34 tests
- We wanted to retain these properties
 - We = the authors
- You might think this would be a type error
 - You = the reader

Direct language #2:

Put statements in positive form.

Positive vs. Negative

- ***not***
 - use as a means of denial, not evasion
 - Cf. constructive ***not*** vs. classical ***not***
 - $:: A \neq A$
 - We want what is, not what is not.

Examples

- *He was **not** very often on time.*
- *He did **not** think that studying Latin was a sensitive way to use one's time.*
- *Shakespeare does **not** portray Katharine as a very admirable character, **nor** does Bianca remain long in memory as an important character in Shakespeare's works.*
- *It may appear that the comparison **cannot** be conclusive*

- *He usually came late.*
- *He thought the study of Latin a waste of time.*
- *Katharine is disagreeable, Bianca insignificant.*
- *It may appear that the comparison is inconclusive,*

A Negative in Positive Form

- *not honest*
- *not important*
- *did not remember*
- *did not pay any attention to*
- *did not have much confidence in*
- *not dissimilar to*

- *dishonest*
- *unimportant*
- *forgot*
- *ignored*
- *distrusted*
- *similar to*

Direct language #3:
Use concrete/unambiguous
language.

Ambiguous vs Concrete

- *A period of unfavorable weather set in.*
- *He showed satisfaction as he took possession of his well-earned reward.*
- *In proportion as the manners, customs, and amusements of a nation are cruel and barbarous, the regulations of its penal code will be severe.*

- *It rained every day for a week.*
- *He grinned as he pocketed the coin.*
- *In proportion as men delight in battles, bullfights, and combats of gladiators, will they punish by hanging, burning, and the rack.*

Can Can be Ambiguous

- *can* means "am/is/are able", not a substitute for *may*.
 - *can* is almost always bad in technical writing.
- *We can see that the program runs faster.*
 - You are able to see (i.e., your eyes are functional), but you intentionally choose not to see?
 - *..., but unfortunately we do not have time to see.*
 - You actually learn that the program runs faster.
 - Then *can* is bad and should be removed.

Unnecessary Auxiliaries

- *Could, may, might, and can* imply real uncertainty.
 - If there is no uncertainty, drop them!

• *The applicant can make a good impression by being neat and punctual.*

• *Keats may be ranked among those romantic poets who died young.*

• *The applicant will make a good impression if he is neat and punctual.*

• *Keats was one of those romantic poets who died young.*

Direct language #4:
Use simple language

Verbose vs Simple

- *The reason he left college was that his health became impaired.*
- *It was not long before he was very sorry that he had said what he had.*
- *On an annual basis*
- *The object under study was displaced horizontally.*
- *It could be considered that the speed of a storage reclamation left something to be desired.*

- *Failing health compelled him to leave college.*
- *He soon repented his words.*
- *Yearly*
- *The ball moved sideways.*
- *The garbage collector was slow.*

Perfunctory Expressions

- *there is*
- *could be heard*

- *There were a great number of dead leaves lying on the ground.*
- *At dawn the crowing of a rooster could be heard.*

- *Dead leaves covered the ground.*
- *The cock's crow came with dawn.*

Direct language #5:
Be concise.

Concise

- Concise = Short
 -) Not necessarily!
- Concise
 -) Every word counts.
 - Sentence: no unnecessary words
 - Paragraph: no unnecessary sentences

Superfluous vs Concise

- *the question as to whether*
- *used for fuel purposes*
- *he is a man who*
- *in a hasty manner*
- *the reason why is that*
- *His story is a strange one.*

- *whether (the question whether)*
- *used for fuel*
- *he*
- *hastily*
- *because*
- *His story is strange.*

No 'the fact that'

- *owing to the fact that*
- *in spite of the fact that*
- *I was unaware of the fact that*
- *the fact that he had not succeeded*
- *that fact that I had arrived*

- *since (because)*
- *though (although)*
- *I was unaware that*
- *his failure*
- *my arrival*

Unnecessary 'case' 'character' 'nature'

- *In many cases, the rooms were poorly ventilated.*
- *It has rarely been the case that any mistake has been made.*
- *It is frequently the case that ...*
- *acts of a hostile character*
- *acts of a hostile nature*

- *Many of the rooms were poorly ventilated.*
- *Few mistakes have been made.*
- *often ...*
- *hostile acts*
- *hostile acts*

Unnecessary 'who/which is/was/...'

- *His brother, who is a member of the same firm*
- *Trafalgar, which was Nelson's last battle, ...*

- *His brother, a member of the same firm*
- *Trafalgar, Nelson's last battle, ...*

Padding

- Pedantic phrases
 - *the fact that*
 - always unnecessary
 - *in general*
 - often unnecessary
 - *of course*
 - sounds patronizing or even insulting
 - Ex. *Of course the reader has observed that ...*
- Unnecessary introduction of quantities
 - *a number of* *! several*
 - *a large number of* *! many*

Note that ...

- Not padding
- But should be used to introduce something that readers can deduce for themselves
 - Ex. a consequence of a definition

You Really Need Really?

- Qualifiers *very, quite, really, ...*
 - meaningless in effect
 - Ex. *a very fast algorithm*
 - Then a fast algorithm is deficient?
) should be avoided altogether!
- *simply* is often unnecessary.

- *There is very little advantage to this approach.*
- *The standard method is simply too slow.*

- *There is little advantage to this approach.*
- *The standard method is too slow.*

Contrasting, Emphasizing

Parallelism

- Expressions similar in content are outwardly similar.

- *Formerly, science was taught by the textbook method, while now the laboratory method is employed.*
- *In SIMD, the same instructions are applied to multiple data sets, whereas in MIMD different data sets are processed with different instructions.*

- *Formerly, science was taught by the textbook method; now it is taught by the laboratory method.*
- *In SIMD, multiple data sets are processed simultaneously by the same instructions, whereas in MIMD multiple data sets are processed simultaneously by different instructions.*

Parallelism

- Applies to articles and prepositions

- *the French, the Italians, Spanish, and Portuguese*
- *in spring, summer, or in winter*
- *His speech was marked by disagreement and scorn for his opponent's position.*
- *The performance gains are the result of tuning the low-level code used for data access and improved interface design.*

- *the French, the Italians, the Spanish, and the Portuguese*
- *in spring, summer, or winter*
- *in spring, in summer, or in winter*
- *His speech was marked by disagreement with and scorn for his opponent's position.*
- *The performance gains are the result of tuning the low-level code used for data access and of improved interface design.*

Parallelism

- Correlative expressions should use the same grammatical construction.
 - *both ... and ...*
 - *not ... but ...*
 - *not only ... but also ...*
 - *either ... or ...*
 - *first ... second ... third ...*

- *It was both a long ceremony and very tedious.*
- *A time not for words but action*
- *Either you must grant his request or incur his ill will.*
- *My objections are, first, the injustice of the measure; second, that it is unconstitutional.*

- *The ceremony was both long and tedious.*
- *A time not for words but for action*
- *You must either grant his request or incur his ill will.*
- *My objections are, first, that the measure is unjust; second, that it is unconstitutional.*

Emphatic Words at the End

- Emphatic word = New element in the sentence

- *Humanity has hardly advanced in fortitude since that time, though it has advanced in many other ways.*
- *This steel is principally used for making razors, because of its hardness.*
- *A winding stream flowed through the middle of the valley.*

- *Since that time, humanity has advanced in many ways, but it has hardly advanced in fortitude.*
- *Because of its hardness, this steel is used principally for making razors.*
- *Through the middle of the valley flowed a winding stream.*
 - subject at the end

Emphatic Sentences at the End

- *I like apples the most. I like oranges. I also like grapes.*

vs

I like oranges. I also like grapes. But I like apples the most.