



Criteria of Scientific Writing (3)

(学术写作规范 (3))

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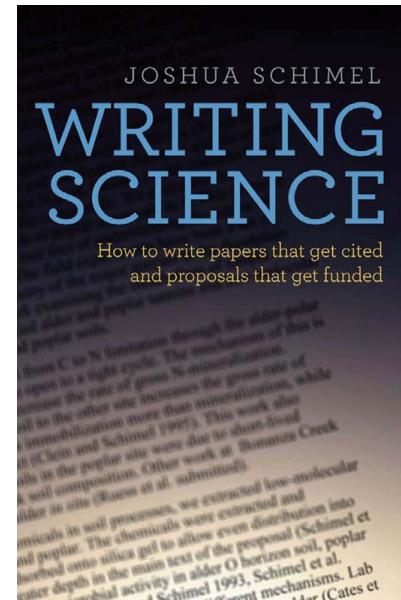
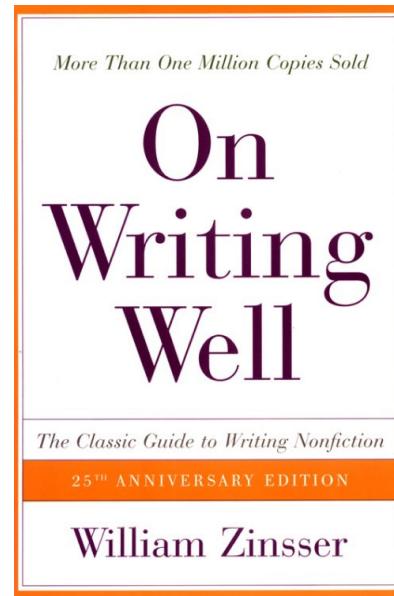
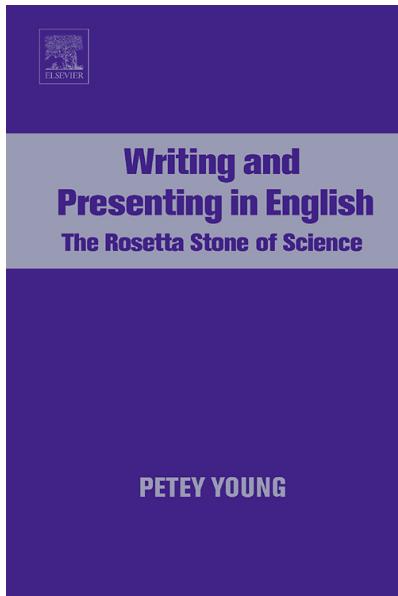
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Introduction

- Introduce trends & habits of scientific writing in **English**.
- Useful reading materials



- Stanford University: **Write in the Sciences**
 - <https://online.stanford.edu/courses/som-y0010-writing-sciences>

Attitudes to Scientific Writing

- Professional
 - Writing is a skill and can be learned.
 - ChatGPT?
- Social
 - You are writing for readers.
- Cooperative
 - Resort to supervisor or trustable peers/colleagues.



Responsibility!

Stay in awe!



Problems Cause Paper Rejection

- The scope of the manuscript is too broad; this material should be divided into 2~3 papers and resubmitted.
- The claim of this manuscript goes beyond the given data.
- The manuscript is too lengthy, includes unnecessary details such as an overly long review of history, or redundancy.
- The authors have failed to give appropriate credit to others.

May be one of the root causes



Outline

1. Eliminate Unnecessary Language
2. Use Active Voice
3. Emphasizing Meaning with Intensifiers
4. Avoid Clichés
5. Transitions
6. Verb Tenses
7. A Few Grammar Tips
8. Punctuations
9. Paragraphs



1. Eliminate Unnecessary Language

- English is a redundant language
 - Repetition is a language trap easy to fall into, because of rich synonyms and endless varieties of syntactical structures.
 - Writers can easily convince themselves that they are not repeating but merely emphasizing points.

Self-efficacy is reflects the extent to which a person feels capable of performing a behavior and is the focus of social cognitive theory in which individuals learn by observing the behavior of other individuals.



Self-efficacy is reflects how much a person feels capable of doing a behavior. This is the focus of social cognitive theory whereby individuals learn by watching the behavior of other individuals.



1. Eliminate Unnecessary Language

- Several common flaws in rejected papers
 - **Repetition:** Directly repeat the same words.
 - **Redundancy:** Indirect repetition through alternate phrases or synonyms.
 - **Non-closely related contents:** Related work, lengthy introduction, etc.
- Suggestions to eliminate repetition & redundancy
 - ⌚ **Make a point once and only once within the paper body.**
 - ⌚ **Think after writing a sentence/paragraph/draft**
 - What do I want to convey in the sentence/paragraph/draft?
 - What happens if I remove the sentence/paragraph/draft?
 - Is there any ambiguity for readers?



1. Eliminate Unnecessary Language

- Example

ABSTRACT

Persistent packet loss in the cloud-scale overlay network severely compromises tenant experiences. Cloud providers are keen to automatically and quickly determine the root cause of such problems. However, existing work is either designed for the physical network or insufficient to present the concrete reason of packet loss. In this paper, we propose to record and analyze the on-site forwarding

INTRODUCTION

giving the location information.

Unfortunately, a series of existing tools and systems such as [1, 7, 24, 26] either lack a comprehensive extension of their application scenarios from the physical network to the cloud-scale overlay network or provide no way to access a deep diagnosis for the root cause. Thus, to troubleshoot the problematic production traffic, the operations engineers of our cloud system first determine the set of



1. Eliminate Unnecessary Language

- Example

7 RELATED WORK

Active network monitoring methods: Active probing, such as Pingmesh, ATPG and Cisco IPSLA [6, 8, 25], entails injecting and tracing test probes in the network to measure connectivity. These methods can easily get latency data and pinpoint the culprit nodes. However, they may not be appropriate for VTrace since the probing traffic and the production traffic may travel along different paths, which prevents reflecting the on-site forwarding conditions.

Passive network monitoring methods: Contrast with active probing, passive solutions like VeriFlow [10], [16] and [19] implemented quality-of-experience measurement techniques without



Repeated Vocabulary

💀 Repetition of the same **non-science** vocabulary, especially verbs (动词), makes your manuscript dull – latex will remind you.

- ✌ Replace some repeated **non-science** words with alternate words that mean the same and often are more accurate.
- A thesaurus (词库) is a dangerous source for finding an alternate word (but useful for a new writer).
 - Your only reliable information is in latest articles.
 - Establish your own spreadsheets (电子表格) which collect words from articles and are kept updated.
 - Examples: (此外) In addition; Additionally; Besides.
 - If no other choices, repetition is OK.
- How?



Unnecessary Explanation/Description

☠ Additional information on explanation/description is an important form of unnecessary language.

☠ Overuse of prepositional phrases (介词短语)

- Write “in our laboratory”, when where the work has taken place is obvious to the reader;
- Watch for extraneous information in prepositional phrases such as: “by the researcher”, “during the research”, “in the table”, “in this group”.

✌ Avoid

- More background or history than the journal to which you plan to send normally prints.
- Too many details about what was done – or even worse, details about unsuccessful work.



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2. Use Active Voice

Table 3.1 Examples of Indirect or Unnecessary Language from Unpublished Papers

Indirect language	Direct, clear language
It will be the end of the year before we can expect results to be ready.	We expect results by the end of the year.
It was discovered in our laboratories that sulfur dichloride reacts with . . .	We discovered sulfur dichloride reacts with . . .
It is vital to recognize the importance of the variance among lengths of multiple bonds.	Recognizing variance in the length of multiple bonds is vital.



2. Use Active Voice

- Active voice (主动语态): Subject verb object
 - Emphasize author responsibility.
 - Improve readability.
 - Reduce ambiguity.
- Passive voice (被动语态): Object verb subject
 - Use passive voice if you want to emphasize a point.

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- Passive voice (被动语态): Object verb subject
 - Use passive voice if you want to emphasize a point.
- Contemporary writing in science has become more and more **direct**.
- Journals esteem active voice and direct statements. Conference?
 - ✍ Passive structures are easy, familiar structures to use, and they will probably aid your ability to compose freely, so use them **in your early drafts**.
 - ✍ Change passive voice into active voice **when suitable in your revised/final manuscript** so that the content is more quickly available to the reader. (Just a suggestion)



2. Use Active Voice

- Contributions in Introduction

multiple of the scheduling period. In this paper, we make further investigation and the contributions are given as follows:

- (1) We consider detecting discontinuous replay attacks in CPSs and scheduling watermark signals to reduce the control cost. To the best of our knowledge, it is the first work that designs a periodic scheduling strategy for the i.i.d. Gaussian watermark against discontinuous replay attacks.
- (2) We formulate a one-time attack duration model for discontinuous replay attacks inspired by the Stuxnet worm and design a detector that periodically schedules the i.i.d. Gaussian watermark signal. In this paper, we consider that the attacker's replay delay is arbitrary, which is more general than the special case in Fang et al. (2017).

It will be better to use active voice when it is needed.



“There be” and “It be”

✌ Check “there be”

- There are . . .
- There is . . .
- There was . . .
- There were . . .
- There has been . . .
- There have been . . .

✌ Check “it be”

- It was . . .
- It is . . .
- It has been . . .

我很喜欢用? OK, 适度!
一直用主动语态?

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It will be the end of the year before we can expect results to be ready.	We expect results by the end of the year.
It was discovered in our laboratories that sulfur dichloride reacts with . . .	We discovered sulfur dichloride reacts with . . .
It is vital to recognize the importance of the variance among lengths of multiple bonds.	Recognizing variance in the length of multiple bonds is vital.
It is very important to realize that the aforementioned results are . . .	The results are important because . . .
If my group had been able to , we would have prepared the compound but . . .	We have not prepared the compound because . . .
There have been recent developments in NMR which allow . . .	Recent developments in NMR allow . . .
There are three molecular orbitals, namely , 1) . . . 2) . . . , 3) . . .	The three molecular orbitals are: 1) . . . , 2) . . . , 3) . . .



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3. Emphasizing Meaning with Intensifiers

- Intensifiers (强调副词), such as “really”, “actually”, “truly”, belong in narrative writing (记叙文，带有主观色彩).
 - Intensifiers are good words to use socially and are fine even in professional letters.
- ☠ Intensifiers do **not** belong in research reports
- Add an almost slippery flavor to a research report.
 - A reader who finds intensifiers in science may withdraw in suspicion.
 - Example: This system works really well! (这个系统真的好好用!)
- ✌ Scientific statements are stronger when you omit ambiguous intensifiers.



“Very”

- 💀 “Very” is another word everyone should avoid.
 - It is not ambiguous as an intensifier, but it is so common that it is basically meaningless.
- ✌ Consider using intensifiers that are more effective at adding emphasis, such as “extremely”, “highly”, “strongly”, “surprisingly”.
- ✍ But, use all intensifiers infrequently or they will lose their power and sound unscientific.



More Specific and Objective

- ✌ Replace words such as “a lot” and “many” with more **specific** meaningful words (e.g., xx Gbps/Tbps level throughput).
- ✌ Improve the impact of your words by omitting those that are judgmental, such as “good” or “nice”.
 - Try to avoid words that praise instead of explain: Good science explains not praises.
- ✌ Exclamation marks (感叹号) are certainly **not** in scientific writing.

Hey, My Malware Knows Physics!
Attacking PLCs with Physical Model Aware Rootkit

Who's in Control of Your Control System?
Device Fingerprinting for Cyber-Physical Systems



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4. Avoid Clichés

- ☠ Clichés (陈词滥调) are over-used idioms (成语或习语) and using them is **not** respected in English.
- ☠ Clichés are considerably less effective than the simple direct words for which they stand. (简单、有效即可，高中英语足以应对)
- ☠ Clichés, in a language as dynamic and changing as English, quickly become so dated that reading them distracts people or, worse, invites them to laugh.
- ✌ Don't use them.

Table 3.2 Examples of Inappropriate Clichés and Unnecessary Words from Unpublished Papers

Inappropriate	Appropriate
Attempting to do this was like trying to put a square peg in a round hole . . .	Attempting this was difficult because . . .



4. Avoid Clichés

Table 3.2 Examples of Inappropriate Clichés and Unnecessary Words from Unpublished Papers

Inappropriate	Appropriate
Attempting to do this was like <u>trying to put a square peg in a round hole</u> . . .	Attempting this was difficult because . . .
In high hopes we studied the spectrometer printout and found . . .	Results of the spectrometer reading indicate . . .
Darwin's tried and true method of . . .	Darwin's method of . . .
We believe that sooner or later these results will . . .	We believe that these results will . . .
We are pleased to be able to report that the structure . . .	The structure is . . .
The findings of the results of the study show . . . that the end product has indicated . . .	The end product indicates . . .
The product is black as coal . . .	The product is an intense black color.
This result is the cherry on top .	This result adds to the evidence that . . .
This result is beyond our wildest dreams .	This result encourages us that . . .



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5. Transitions

- Transitional (过渡性的) words and phrases are valuable within and between sentences.
- ✖ However overuse of any of them will weaken your final draft.



“Smoothers”

- “Smoothers” (顺序过渡语) are transitional words or phrases that smooth the way between sentences in which the logic flows in an expected direction.
- A **judicious** use of optional transitions smoothes readers' ability to follow along as your writing moves from idea to idea.
- ✖ However, overuse of smoothers will weaken your writing and distract your readers.



“Smoothers”

- furthermore
- in addition
- first, second, third, etc. (archaic: firstly, secondly, thirdly etc.)
- finally
- lastly
- moreover
- incidentally
- in fact
- in truth
- as a matter of fact
- for example
- such as
- next
- then

Transitions that Continue
an Expected Flow of Logic



“Contradictors”

- “Contradictors” (转折过渡语) are transitions that are usually required when a sentence or paragraph contradicts the on-going logic of the previous idea.

- but
- however
- instead
- nevertheless
- despite
- surprisingly
- in spite of
- in contrast
- for comparison

Transitions that **Change** to
an Expected Flow of Logic



“Explainers”

- “Explainers” (因果过渡语) are transitions used to show cause and effect.
- They are sometimes optional and often occur in the middle of sentences.

- because
- as a result
- therefore
- in general
- consequently
- as predicted
- in conclusion
- since
- as
- for
- finally

Transitions that Indicates
Cause and Effect



Guidelines and Notes

employed. When the covariance of the watermark signal is large, it could produce good detection performance. However, it may also lead to severe fluctuations in pressure, which will in turn cause the heater to consume more energy to stabilize the pressure. As a result, a large control cost is induced. Here, we consider that the system operator is willing to sacrifice acceptable detection performance to reduce the control cost. In this paper, one simple but effective periodic watermarking strategy: $\theta = \{\theta^0, \theta^1, \dots, \theta^{p-1}\}$ and $\theta^k = 0$ or 1 for $k \in \{0, p - 1\}$, which is to be described in detail in Section 4, is considered to reduce the control cost. As the analytical detection performance is hard to



Guidelines and Notes

✍ Guidelines for editing transitions

- If a current reputable journal article written by a native English speaker uses the term, it is probably a good choice.
 - The only role of transition words or phrases is to clarify the meaning to readers.
 - Using transitions more than 10~12 times on a full page of text is apt to interfere with, not help, the readers' comprehension.
 - In early drafts, they are an aid to you because they tend to tighten up and guide your thinking.
- ✌ However, in the final draft, you need to check carefully to see:
- How many you have used; and
 - Whether or not you have used them in places where the meaning requires them.



Guidelines and Notes

💀 Out-of-date transitions

- “as was mentioned earlier”, “the aforementioned”, “the authors would like to say”, “in order to”, etc.
 - In current thinking, these old-fashioned phrases mildly insult the reader and interfere with comprehension.
- 👉 They should be rarely used.

可以用，需适度！



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6. Verb Tenses

- The final and most tedious edit is to examine each verb tense (动词时态) in the paper for **consistency**.
- This should be done after all other revisions and edits have been made.
- While you are conducting this final tense check, do not let yourself pause to consider anything else.
- Present tense (现在时)
 - Simple present tense (一般现在时)
 - Present progressive tense (现在进行时)
 - Present perfect tense (现在完成时)
- Past tense (过去时)
 - Simple past tense (一般过去时)
 - Past progressive tense (过去进行时)
 - Past perfect tense (过去完成时)



Simple Present Tense

- The most common tense in scientific writing today is the **simple present tense** (一般现在时).
- All results, **whether done today or years ago**, are referred to in the simple present tense.
 - This implies that the finding is an all-time truth, which would occur again where the experiment repeated.
 - In contrast, using the past tense for a research result may imply the finding is no longer true.

✌ Make the **simple present tense** your friend.



Present Progressive Tense

- Foreign speakers of English tend to use the present progressive tense (现在进行时) far more than native speakers of English.
- ☠ Present progressive tenses are fine in conversation, narrative writing, and letters, but they are **seldom** found in professional or scientific writing.
- ✌ Reserve the present progressive tense for those highly unusual times when you **must** emphasize the event is in progress right now.



Present Perfect Tense

- The present perfect tense (现在完成时) can be correct and quite elegant in scientific writing.
- However, the present perfect tenses are **seldom** required, and they do require more language knowledge than the simpler tenses.

Inappropriate Tense	Tense Preferred in Science
Sodium is reacting with water.	Sodium reacts with water
Sodium reacted with water	Sodium reacts with water
The results are showing that . . .	The results show that . . .
Results showed that . . .	Results show that . . .
Our group has been proposing that . . .	We propose that . . .
Some researchers are arguing that . . .	Some researchers argue that . . .



Present Perfect Tense

6. Conclusion

In this paper, we have investigated the watermark scheduling problem where the replay attacker keeps attacking only for a certain period each time. Based on the discontinuous replay attack model, we have designed a periodic watermarking strategy to decrease the control performance loss during periods of the absence of the attacker. Then, an optimal periodic strategy has been obtained to maximize the approximate detection performance P_d . Simulations on the quadruple water tank system have been carried out to demonstrate that the proposed method is able to reduce the LQG control cost while guaranteeing the



Past Tenses

- Past tenses are also commonly used in scientific writing, but only under certain circumstances.
- 👉 Within a research article, the simple past tense (一般过去时) is used to explain procedures.

5.1 Applicability of VTrace

Packet drops in the overlay network: In August 2018, a tenant reported that an ECS in his own VPC can not be accessed from the Internet. A lot of connection establishment requests were experiencing timeouts. Operations engineers suspected that there could be a persistent packet loss in the cloud network. Both the virtual and physical network teams are responsible for troubleshooting the



Past Tenses

- Past tenses are also commonly used in scientific writing, but only under certain circumstances.
 - ❖ Within a research article, the simple past tense (一般过去时) is used to explain procedures.
 - ❖ Other uses of simple past tenses are no longer common.
 - ❖ Past perfect tenses (过去完成时) can be appropriate, but the simple past tense is safer and often better.
 - ❖ Past progressive tenses (过去进行时) are rare and usually unnecessary.



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7. A Few Grammar Tips

- “Data” is plural (复数) and “datum” is singular (单数).
 - It should be “Data are”, not “data is”.
 - These data show an unusual trend.
 - The data support the conclusion.
 - The data are critical.
 - The use of “datum” in the singular form is rare.



7. A Few Grammar Tips

- “Compared to” (“比喻”) is used to compare two different things and emphasize similarities.
 - “Compared with” (“比较”) is used to compare two similar things and emphasize differences.
 - Brain tumors are relatively rare compared with more common cancers.
 - “Shall I compare thee to a summer’s day?”
- ✍ “Compared with” is often used in scientific writing.



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8. Punctuations

- Punctuations (标点) vary sentence structure.
- Comma “,”
- Colon “:”
- Dash “—”
- Parentheses “()”
- Semicolon “;”



Increasing power to
separate sentences



Semicolon

- The semicolon (分号) connects two clauses (从句).
 - A clause is a unit of grammatical organization below a sentence in rank; it contains a subject and predicate (谓语).
 - For example: “It was the best of times; it was the worst of times.”
- The semicolon is also used to separate items in lists that contain internal punctuations.
 - In 1935, fourteen series were circulating; in 1940, nine; by 1980, when the syndicate was in its final years, only four.



Parentheses

- Parentheses (括号) are used to insert an explanation.
 - ☞ If you remove the material within the parentheses, the main point of the sentence should not change.
 - ☞ Parentheses give the reader permission to skip the material.



Dash

- The dash (长划线) is used to add emphasis or to insert an abrupt definition or description.

☒ Don't overuse it.

- The drugs did more than prevent new fat accumulation. They also triggered overweight mice to shed significant amounts of fat—up to half their body weight.
- Researchers who study shipworms say these mislabeled animals—they're clams, not worms—are actually a scientific treasure.



Colon

- Colons (冒号) are used, after an independent clause, to introduce a list, quote, explanation or conclusion.
 - Washington has a simple solution to most governments it doesn't like: Isolate them, slap sanction on them, and wait for their downfall.
 - The woman suffers from lack of experience and a chronic democratic disease: Compound sentences.

☞ The lists after colons should contain at most 3 items.



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9. Paragraphs

- ✌ One paragraph (段落) focuses on one idea/point.
- ✌ Give away the punch line (重点) early, and make the last sentence memorable and emphasize the idea at the end of a paragraph.
 - The reader remembers the first sentence and the last sentence best.
 - Probably state with a topic sentence and end with a summary.
- ✌ Properly arrange the logic flow of a paragraph
 - Sequential in time
 - From general to specific
 - Logic arguments (if...then...)
- ✌ If necessary, use transition words to smooth the logic flow within a paragraph. Don't overuse them.



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10. Several tips

“Cannot”

👉 For respect, use “cannot” rather than “can’t”.

- “will not” rather than “won’t”
- “have not” rather than “haven’t”
- “do not” rather than “don’t”
- “I have” rather than “I’ve”



✍ The saying “can not” is rare in academic writing.

- “Sb can not only do sth, but also do sth else.”



Punctuate Display Statements Consistently

- Academic writings include two types of mathematical environment: **Inline** and **Displayed**
- Like normal texts, displayed statements should be followed by a period (句号) at the end of a sentence.
- Commas (逗号) in normal texts and mathematical texts are different, see “,” (normal) and “,” (mathematical).

Theorem 2 (Generalized KYP): Let matrices $\Theta \in \mathbf{H}_{n+m}$, $F \in \mathbb{C}^{2n \times (n+m)}$, and $\Phi, \Psi \in \mathbf{H}_2$ be given and define Λ and $\bar{\Lambda}$ by (12) and (19), respectively. Suppose Λ represents curves on the complex plane. Denote by N_λ the null space of $\Gamma_\lambda F$ where Γ_λ is defined in (18). The following statements are equivalent.

- i) $N_\lambda^* \Theta N_\lambda < 0 \quad \forall \lambda \in \bar{\Lambda}(\Phi, \Psi)$.
- ii) There exist $P, Q \in \mathbf{H}_n$ such that $Q > 0$ and

$$F^*(\Phi \otimes P + \Psi \otimes Q)F + \Theta < 0. \quad (23)$$



More Tips about Style

💀 Do NOT start a sentence with a mathematical symbol.

- Mathematically, uppercase and lowercase symbols mean different things.
- It may conflict with the convention that sentences begin with capital letters.

✍ If necessary, begin with an explicit statement of the symbol identity.

a) The set \mathbf{M} is admissible and rank-one separable.



More Tips about Style

💀 Do NOT use a colon (冒号) where it does not belong.

✗

The main result on the solvability of linear equations is:

$$(\exists x) \ Ax = b \iff \text{rank} \begin{bmatrix} A & b \end{bmatrix} = \text{rank } A.$$

✓

The main result on the solvability of linear equations is the following:

$$(\exists x) \ Ax = b \iff \text{rank} \begin{bmatrix} A & b \end{bmatrix} = \text{rank } A.$$



More Tips about Style

- Abbreviations of Latin phrases must be punctuated correctly.
- ☞ The abbreviation “i.e.” is equivalent to “that is”.
- ☞ The abbreviation “e.g.” is equivalent to “for instance”.
- ☞ Both “i.e.” and “e.g.” are always followed by a comma.
 - “A planet (e.g., the earth) moves around a stellar (e.g., the sun)”.

to an unconstrained inequality condition with multipliers. The S -procedure is conservative in general, i.e., the latter condition implies the former, but the converse is not always true. Fradkov showed in 1973 that the S -procedure with scalar multipliers is lossless (i.e., nonconservative) if and only if a certain rank-one property holds for an associated separating hyperplane [17].



Series of Items

- ❶ In a series of items, proper conjunctive words should be inserted.
 - He opened the letter, read it(,) **and** made a note of its contents.
 - You can choose an apple, a pear(,) **or** a banana.
 - He has answered my questions(,) **as well as** given me some suggestions.
- ❷ The phrase “etc.” is equivalent to “and so on”. Thus, do NOT use “and etc.”.
 - ☛ Within a sentence, “etc.” always follow and be followed by commas. (For instance, “Apples, pears, **etc.**, are in the basket.”)
 - ☛ At the end of a sentence, “etc.” always follow a comma. (For instance, “He chose an apple, a pear, **etc.**”)



More “Data”

- Plural (复数) Singular (单数)

- | | |
|-------------|------------|
| • Data | Datum |
| • Phenomena | Phenomenon |
| • Media | Medium |
| • Maxima | Maximum |
| • Extrema | Extremum |
| • Optima | Optimum |

✌ It should be “Data are”, not “Data is”.

- These data show an unusual trend.
- The data support the conclusion.
- The data are critical.

☛ The use of “datum” in the singular form is rare.



“Regard”

- ✌ Use “regarding sth”
 - “Regarding my suggestion, who agrees or who disagrees?”
- ✌ Use “in regard to sth” or “with regard to”.
 - “In regard to my suggestion, who agrees or who disagrees?”



- ☠ Do NOT use “in regards to”



Summary

- Read latest articles when you have questions on the use of words and phrases.
- Make a point once and only once.
- Use transitions to smooth the logic flow, but don't overuse them.
- Make simple present tenses your friend.
- One paragraph = One point.

Thanks for Your Attention