

Log of Comments on Writing

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Last update: Sept 1, 2021

This is an informal log file of the common writing mistakes committed by my students. I found that these mistakes were committed repeatedly by students and that I was repeating the same comments again and again like a grumbling old man. Meanwhile, students graduate and new students join the group. The merry-go-round of the circus continues. This log file is an exercise of the “principle of reuse” and it will be updated from time to time. Many comments contain my personal biases and stylistic preferences, and they are not definitive on what is right and what is wrong. Most comments, however, are “objective”. Also, many comments apply to authors from China, since most of my students are from China.

- 1) Some reviewers do not like people to use “et al.” when referring to past work. The reason is that in many papers, the first author may not be the main contributor. I usually try to avoid that by mentioning the work rather than the authors’ names to avoid offending people inadvertently. If there are fewer than four authors, I may also list all the authors’ names. If you do use the authors’ names, it is customary to refer only to the last names without the initials. Also, please google on the right way to spell “et al.” including the use of the italic font. You need to learn fine details like this so that I do not need to debug these minor things for you in the future.
- 2) When you read others’ technical papers, please pay attention to their presentation style and learn from them – except those written by authors from China. As a novice writer, please try not to use “words” that you do not see others use in technical papers. This is a surefire way to make your writing sound non-English. An example is the use of the term “keystone work”. This comes across as sounding very strange to me. I checked google and could not find instances in which this term was used. Why distract your reader with non-customary usage? Why not the simple “related work”? In technical writing, the simplest and the most straightforward way to bring across the idea is always the best. It is not like we are trying to win a literature prize with inventiveness in writing. We should focus on technical innovations, not writing innovations. When in doubt, google to see if a phrase is commonly used. When in doubt, google the term you want to use and see if you can find its usage in the English-speaking world.
- 3) Learn how to use “hyphen” to make your writing clearer. For example, “channel-coded PNC” is clearer than “channel coded PNC”. Here “channel-coded” forms an adjective and channel-coded PNC is PNC that is channel-coded. The meaning of “channel coded PNC” is vague. You could mean, for example, some sort of an encrypted PNC system that has been channelized. The main point is that the use of hyphen makes many things less ambiguous. Google to find out other examples of the proper use of “hyphen”. “Point-to-point systems”, not “point to point systems”.

- 4) As a novice writer, try to avoid the use of “which”. Search your whole paper for the word “which”. For each case, ask yourself whether you can change the sentence or break it into smaller sentences without the use of “which”. Usually, those sentences will be better off without the use of “which”. The use of “which” is a major source of weakness for many Chinese authors when writing technical papers. You should use “which” only after you have acquired many years of experience writing in English and reading English articles. It is a dangerous weapon that should not be handled by inexperienced writers. Almost all my students from China like to use the word “which”, and with no exception, that bomb often explodes in their hands. The use of “which” is often a lazy way to piece things together or to create long sentences. An example of getting rid of “which” to create a more forceful sentence:

The channel-estimation errors cause an increase in BER, which leads to decreased throughput.

Revised to

The channel-estimation errors cause an increase in BER, leading to decreased throughput.

Specifically, the pattern here is that for a sentence like “ ..., which {verb}”, you can often get rid of “which” and replace the verb with its “-ing form”.

- 5) For Chinese, two most difficult words to handle are “a” and “the”. Google to learn the proper use. When reading others’ papers (non-Chinese again), pay careful attention to when they use “the” (“a”), when they do not. It may take you at least two to three years, and writing at least 10 papers, before you learn how to use them properly.
- 6) Suppose you are a TA for a computer programming course. How would you feel if your students make elementary mistakes in their computer programs and ask you to help debug each and every line of their codes? Instead of debugging their programs for them every time (and in the process feeling very frustrated that you have to do so), a better strategy is for them to learn how to write good programs; to debug their programs themselves many times before asking you to take a look; to write programs that can be understood by others easily rather than writing spaghetti code. Many of you are currently like those students and I am like that poor TA, having to spend much time debugging others’ programs each day. I do not mind debugging non-trivial bugs – my own writings often have presentation bugs as well as technical bugs. Debugging trivial bugs, on the other hand, is not very fulfilling to me.
- 7) The use of "which" to string together many important points is not a good practice. For example,

The system is overheated and expanded, which causes it to explode eventually.

This is a poorly written sentence. The explosion is a big deal and is not some sort of a side

comment. A better way to write it is

The system is overheated and expanded. The uncontrolled expansion causes the system to explode.

The first sentence sounds almost like

The system is overheated and expanded. By the way, this causes it to explode eventually.

Whenever you use "which" to add to something. What follows "which" plays a secondary role. Your intention is for the reader not to pay too much attention to what follows "which". Unless you know how to differentiate the subtle nuances, my advice is to avoid the use of "which" to string together sentences. Hopefully, one day, after you become an experienced writer, "which" will be safe for you to handle.

- 8) A common mistake by Chinese students: “Denote by” not “denote as”. Don’t say the transmitted symbol is denoted as x . Either say x denotes the transmitted symbol, or the transmitted symbol is denoted by x .
- 9) Another common mistake I often see in email correspondence: “Can I meet with you recently?”. “Recent” means something that happened in the “near past”, not “near future”. So, if you request to meet someone in the near future, the above sentence is wrong. With today’s technology, I have no way to grant a request to meet with you in the recent past. Maybe one day in the future, we can travel back to today, but not for the time being.
- 10) Use of “;” for contrast. Compare the following two sentences:
 - (i) Scheme A is fast but not optimal; scheme B, on the other hand, is slow but optimal.
 - (ii) Scheme A is fast but not optimal, and scheme B is slow but optimal.Both are right. (i) is preferred.

Google to learn the effective use of ";". Instead of a long sentence, sometimes it is better to break it into many short sentences separated by ";".
- 11) “Less” versus “Fewer”. Google to find out the proper usage. For example, fewer bit errors, not less bit errors, if you mean bit errors as something that are countable.
- 12) “Less” versus “Lesser”. I have also seen people using the word “lesser” when “less” will do. To me, “lesser” comes across as grammatically incorrect when used in most situations in technical writing, but people do use them. I don’t think it is a good word to use in technical

papers. “Lesser” is often used in a “qualitative sense” while “less” is used in a quantitative sense.

Some usage examples in the following:

He is a lesser researcher than Paul.

Would you think lesser of me if I did that?

The BER of system A is less than the BER of system B.

As can be seen from Fig. 1, the degradation of system A is less than that of system B.

For technical writings, we often focus on quantitative comparisons to be precise, thus “less” is often the correct word to use. “Lesser” is kind of loose and is often used in a rhetorical sense. Google “less versus lesser” and you will see lots of discussions on the subtle differences between them.

By the way, this comment is not aiming at my Chinese students. They do not usually use the word “lesser”.

13) Use of pronouns. When you use pronouns like “it”, often confusion can arise as to what is being referred to by “it”. When in doubt, do not use pronouns. An example of confusion is as follows.

The color of the apparatus turns green when it is heated. It is not appropriate.

The use of "it" in the first sentence above is not ambiguous, as it clearly refers to the "apparatus" as being heated. The use of "it" in the second sentence takes more time to interpret and is a potential source of ambiguity. It is not immediately clear whether the green color is not appropriate or heating the apparatus is not appropriate. If you mean the former, you should write "The green color is not appropriate".

Another example:

The computer code should be modified so that it can count the size and number of packets actually received in this period and print it out.

The first “it” refers to the computer code and no ambiguity arises. It is not clear what the second “it” refers to. There are three possibilities, the second “it” can still refer to the computer code. However, it appears not, since the sentence then means the computer code must print itself out. It can also mean the size of packets, or the number of packets. Most likely the sentence is intended to mean

The computer code should be modified so that it can count the size and number of packets actually received in this period and print out the size and number for validation purposes.

The lesson is that one should be alert to ambiguities caused by pronouns.

- 14) If you just have a very simple figure that is very easy to understand, say "Fig. xx shows ... ". If the figure is more complex and illustrates a subtle idea, you can say "Fig xx depicts ... ".

The use of "depict" for something simple sounds pompous.

"depict" is close to "illustrate the idea of ... with pictures".

For example, if you replace "The above shows the balance sheet of my bank account", by "The above depicts the balance sheet of my bank account", that will sound very strange unless the balance sheet does not just show numbers, but pictures, bar charts, etc. to show more than just the balances of the account. In that case, that cannot be just a balance sheet; it must be more than that.

You will learn to differentiate this kind of subtleties only if you read more English articles (not just technical articles).

There is a subtle difference between "illustrate" and "show". "Illustrate" implies you are showing things indirectly. What is shown is a concept and an abstraction. You "shine light" on something so that it can be seen.

"Show" means you just show things the way they are.

For example, you illustrate a principle with an example. You show that something is correct.

- 15) When you say "The difference of scheme A is ... ", you need to clearly establish with what scheme you are comparing scheme A with first.

When you say "Scheme A is more complex than normal schemes", you should clearly establish beforehand what is meant by "normal schemes". The definition of "normal" needs to be clearly specified first.

When you say "The algorithm is better", you need to explain "better with respect to what". Beware of the use of comparative terms without first stating the benchmark against which you are using the terms for. In general, when you use the word "better" for comparison purposes, you need to be clear on which algorithm/system you are comparing your algorithm/system

with. If the other system is not mentioned in the sentence before, chances are there is a problem in your sentence. This applies not just in English writing, it applies to Chinese writing as well.

- 16) Normal means something that is not abnormal. Or it means a majority of something that has a certain characteristic.

When you say, "Normally, the algorithm terminates within five iterations", it is not a precise sentence. It is better to say "The algorithm terminates within five iterations in 25 out of 30 runs". "A majority of " is better than "normal" for technical writing. When you use the word "normal", you should be ready to answer the question "What is abnormal then?". If you cannot answer that question, don't use the word "normal".

- 17) Run a spelling check on your paper before you give it to me each time. It is distracting for me to have to correct your simple typos.

Example: "field" is mistyped as "filed".

I would rather you correct this type of typos for me than I for you. I have to read papers from all the group members; you have to read only your papers. This kind of menial job should be done by you, not me.

- 18) Just like short sentences, short paragraphs with each paragraph focusing on one point are easier to read. Google to learn how you should divide your content into paragraphs.

- 19) For easy reading, it is advisable not to have a sentence like the following.

This is the end of a sentence. $x(t)$ is positive.

You should have some fill-in English word to separate $x(t)$ and the period before it. This is because the period “.” can be interpreted as a multiplication in math. When you have a math notation at the beginning of a sentence, introduce fill-in words so that the sentence does not begin with a math notation. For example,

This is the end of a sentence. Furthermore, $x(t)$ is positive.

or

This is the end of a sentence. The variable $x(t)$ is positive.

It is okay to say

..., where $x(t)$ is positive

because $x(t)$ is in the middle of a sentence.

For references, I also insert the word Ref. or Refs. if they are at the beginning of a sentence. For example,

This is the end of a sentence. Ref [1] showed that

Meanwhile, the following is okay

The authors in [1] showed that.

20) Use $1/R$ for inline math notation and $\frac{1}{R}$ for displayed math notation on a separate line.

21) Node A sends a DATA frame to node B. Node B then replies with an ACK. BTW, for native English speakers, when pronouncing “ACK”, they don’t say “A-C-K” in three syllables, they just say “ACK” the way they say “Act” except that the “t” sound at the end is replaced by the “k” sound. All my students from China say “A-C-K” rather than just “ACK”. Not sure why.

For abbreviations, if they can be easily pronounced as if they are words, they are pronounced like proper words. Native speakers usually find the quickest or the laziest way to pronounce something. Besides “ACK”, there are also other examples.

For the “sync” in “TCP sync”, it would be awkward to say “TCP S-Y-N-C”. You don’t pronounce “sync” letter by letter. That is the hard way. The lazy way preferred by native speakers is just the one-syllable “sync”.

“OPEC” is pronounced as two syllables rather than “O-P-E-C”.

Too bad “PNC” cannot be pronounced as a word; thus, we have to resort to “P-N-C” in three syllables. Some people use “P-L-N-C”. I personally do not like that because I prefer abbreviations to be as simple as possible as long as they don’t cause confusion.

22) “We let the node to send five packets” should be “We let the node send five packets”.

23) We conduct extensive simulations to test our theory. In detail, we run the simulations five times and then collect the...

Replace “In detail” by “Specifically”.

For brevity and better effect. Say

Specifically, ...

or

In particular, ...

Learn to use "Specifically" and "In particular", and your technical writing will have better transitions when you go from general "big picture" statement to detailed elaboration.

In technical writing, we often first write a sentence that gives the broad idea and the main essence, followed by another sentence for elaboration. To connect the second sentence with the first sentence, and to let the reader know that the second sentence elaborates on the first sentence, you use “in particular” or “specifically” or “that is” to start the second sentence.

As far as the use of “in detail” is concerned, it often comes at the end of a sentence, not the beginning. For example,

Let me describe the experimental setup in detail.

24) When you use a noun as an adjective, the common practice is to use the singular rather than plural form (there are exceptions occasionally due to common practice). For example, a 64-point FFT; not a 64-points FFT.

25) Students from China have a habit to overuse the word “propose”. Next time you see this word in your writing, ask yourself whether this word is necessary, or whether the writing will be better with a different word:

“Our proposed scheme” or “the proposed scheme” can simply be replaced by “our scheme”.

“We propose” is less forceful than “We put forth”.

Generally, “propose” is a pretty lame word. It implies you are asking the reader for “approval”. You propose something for consideration, such as when you write a research proposal. If you already have enough objective evidence showing that your scheme is good (e.g., when you write a journal paper with comprehensive proofs and results), you should not need approval anymore if you are confident enough. In fact, it is others that need to show you why you are wrong by refuting your evidence. Hence, you “put forth” or “present” your idea, and challenge the reader to see if he/she can find faults with it.

An ultimate oxymoron, to me, is the combined use of “propose” and “novel” (see my comment on “novel” later), such as

We propose a novel scheme for object recognition.

You are basically asking the reader to approve of a scheme you claim to be new, clever, and original. You are being humble and tentative, but also excessively confident, in the same sentence.

26) “Besides” is a lame word to use in technical writing. Use “In addition”, “Furthermore”, “Importantly”, etc. What follows “Besides” is something done on the side. It is not the main focus of the work. So, unless you are talking about a side effect or side investigation, do not use “Besides”. For example,

In this paper, we investigate A and B. Besides, we also investigate C.

In this case, C is not a core part of the work. “Besides” is similar to “By the way”. So, the above sentence reads like

In this paper, we investigate A and B. By the way, we also investigate C.

I have found that the use of “Besides” like above to be very common among Chinese writers.

27) Use of plural: “User A and B” should be written as “users A and B”.

28) In English, “more than one” is treated as singular. For example, “More than one item is missing”, not “More than one items are missing” or “More than one item are missing”.

29) To add to confusion, “all but one” and “all except one” are plural. For example, “All but one item are missing”, not “All but one item is missing” or “All but one items are missing”.

30) To further add to confusion, “zero” is plural. For example, Cookie Monster in Sesame Street says, “There are zero cookies left for me,” not “There is zero cookies left for me”. You say, “Zero experiments are successful,” not “Zero experiment is successful”. If you search the web, you will find many discussions and debates on the topic. It appears that the following is the definitive answer to counting cookies in English:

2 cookies

1.5 cookies

1 cookie

0.5 cookies

0 cookies

-0.5 cookies

-1 cookies

-1.5 cookies

It is all very coccoo. For a race that enjoys counting, its people can't count in a logical way in their language.

31) Excessive use of "denote". Oftentimes, you can replace "denote" with "is". For example,

where v denotes the speed

sounds awkward. The simpler form

where v is the speed.

sounds crispier and more direct.

Also, students tend to confuse "denote" with "define". There is a difference. For example, speed is "defined by"

d/t , where d is the distance traveled and t is the time expended in traveling the distance.

not "denoted by".

The simpler "is" can be used for "denote" or "define". You use the grandiose "define" or "denote" if you want to emphasize something that the reader should take note of. So, use them only sparingly. Otherwise, the emphasis will be gone.

32) The wrong use of "the" when you describe a process or an action. For example,

Running is a good exercise

not

The running is a good exercise

unless you mean a particular running event or a particular style of running. Similarly,

Decoding is performed after that,

Not

the decoding is performed after that

unless you mean a very special form of decoding (such as that proposed by you in the current work) is performed after that.

“Action”, “State”, etc. are uncountable. That is, you do not say “a running” or “a decoding”. So, you do not always need a “the” when you do not have an “a”. For countable nouns, you usually need to have a “the” if you do not have an “a” when the singular form is used. For example,

A dog in the family will be good for the kids.

If you mean a particular dog, you say

The dog in the family is good for the kids.

You cannot obviate “the” in this case.

Another thing about the use of “the” is that you better make sure it is clear to the reader which particular instance/object you are talking about. For example, in

The decoding is performed after that.

If you have not described the special form of decoding you are doing before this sentence, your reader will be confused as to which decoding you are talking about. If you want to talk about your special form of decoding after this sentence, you should write

Decoding is performed after that.... For the decoding, we present an iterative algorithm that makes use of the side information ...

- 33) “Actually”. I notice that many students from China like to use the word “actually” in a redundant way. Perhaps this is a result of direct translation from Chinese to English. In English, when you use “actually”, you are trying to emphasize that something that appears like “A” is actually “B”. For example,

He looked into the darkness of the night. He saw a shadow of a dog. But it was actually a hungry cat ...

Contrast that with this sentence:

He looked into the darkness of the night. He saw a shadow. Actually, it was a hungry cat ...

The second sentence just does not sound right. Similarly, for technical writings, before you use “actually”, see if the preceding sentences actually may have guided the reader in another

direction. In the above sentence, if there is no need to dispel a wrong impression, you can just delete the word “actually”, as follows:

He looked into the darkness of the night. He saw a shadow. It was a hungry cat ...

I am not sure if this is due to the Chinese way of writing. I suspect it is not, but then a lot of Chinese students make this mistake. Before you use “其实”, don't you need to have some wrong impression to dispel in the first place?

34) On the use of “illustrate”. When do you use “Fig. 1 shows ...” and when do you use “Fig. 1 illustrates ...”? You use “show” when it is showing exactly what you want to show. You use “illustrate” when it is only illustrating the general idea of what you have in your mind. “Illustrate” is similar to the words “illuminate” or “shine light on”. You show an object; but you illuminate an object so that people can see the object clearly. There is a difference. For example, you use

Fig. 1 shows the constellation map when $\theta = \pi/4$

if Fig.1 shows this case exactly. You use

Fig. 1 illustrates the rotation of the constellation map under nonzero θ .

if Fig. 1 shows the case of $\theta = \pi/4$ (or another nonzero θ) to illustrate the fact that there is a rotation in the “nonzero θ ” case. Which sentence you want to use depends on what you want to emphasize or draw the attention of the reader to. The second sentence is better if you want the reader to focus on the rotation; the first sentence is better if that is not your intention (i.e., $\theta = \pi/4$ case is of particular interest, and not being used to illustrate a general idea).

35) “Comparing with” versus “compared with”. This is an awkward usage of English by many non-native English speakers (I notice that many professors from China do this, even for those who have undergone education in the US). I guess it is not outright wrong; just that it is not commonly used in idiomatic English.

Which of the following sentence is commonly used?

1) Comparing with device A, device B is better.

2) Compared with device A, device B is better.

Most native English speakers would use 2). It is a way of saying

Device B is better when it is compared with A.

If you have read a lot of English articles, you would probably use the form of 2) without thinking about it consciously. If you have been translating Chinese to English (and not think in English when you write in English), 1) may appear to be perfectly logical as well, because the following sentence is correct:

Running the sum from $n = 1$ to $n=10$, we obtain eqn (10).

And it would appear that 1) is similar to the above form. However, 1) is not commonly used in idiomatic English.

36) “Even if” versus “even though”... What is the difference? Consider the following two sentences:

- 1) Even if the SNR is high, the performance degradation is still unavoidable.
- 2) Even though the SNR is high, the performance degradation is unavoidable.

What is the difference between these two sentences? For 1), you have probably focused on the cases of small or medium SNR prior to this sentence and have shown that the performance degrades. By 1), you are trying to say that the degradation is independent of SNR. You may not have shown the high-SNR results yet. You are about to show it...

For 2), you need not have talked about the cases of small or medium SNR prior to this sentence. You are emphasizing the fact that the high SNR does not prevent the performance degradation from happening. The high-SNR results are already shown.

- 1) asks the reader to imagine the case of high SNR (or conjure up the mental picture for that), and then say what will happen then.
- 2) does not ask the reader to imagine. It is stating something that has happened (e.g., you have already done the simulation, and the simulation results show this...).

37) I want to share two tips with you.

1) If you find that a word in a sentence that you write does not sound quite right, and you want to see if there is a better word, check www.thesaurus.com.

2) Often the definitions of a word in www.dictionary.com do not tell you the nuances of how to use that word, i.e., how the word is commonly used. For example, suppose you encounter the word "cachet" and after checking the dictionary, you now understand its meaning, i.e., if you encounter it again in an article, you will know what it means. However, will you be able to use it properly in your own writing? To move to that level, you need to find out how that word is commonly used.

You want to see more examples. For that, you may google "cachet in a sentence", and you will find lots of examples.

On the use of "number": To avoid ambiguity, say "number of ??". For example, "number of slots", "number of users", "number of channels"; not "slot number", "user number", "channel number". For example, "student number" could mean a number used to index or identify the student. That is, it could mean "student ID". Number of students is not ambiguous, student number is. Similarly, "channel number" is quite different from "number of channels".

I see this a lot in your text as well as when you label your graph. Please take note.

38) On how to describe a system that has two properties: The following two sentences have different meanings:

- (i) Our method is useful to multiuser and multislot systems,
- (ii) Our method is useful to multiuser-multislot systems.

Sentence (i) means our method is useful to two systems: multiuser system and multislot system. Sentence (ii) means our method is useful to systems that are both multiuser and multislot at the same time. Note the use of "hyphen" here to piece multiple properties of the single type of systems together.

39) Whenever you use a singular noun, such as "system" without "s", chances are you need an "a" or a "the" before the noun. I notice this mistake again and again. For Chinese, we did not learn to use the plural in our mother tongue. So, having this mistake once in a few sentences is understandable. However, if this mistake keeps occurring in your writing, that indicates that you have not been double-checking your writing for this mistake.

The exception is when the noun refers to a "proper name". For example, you say "John is handsome", not "A John is handsome"¹. Nouns that describe action or process also do not need an "a" or "the". For example, "Running is a good exercise", not "A running is a good exercise".

Many of you keep writing sentences like "Fig. 4 shows the BER of PNC system". This is wrong. You either say

"Fig. 4 shows the BER of PNC" or "Fig. 4 shows the BER of the PNC system", or "Fig. 4 shows the BER of PNC systems"

When you say "BER of PNC". PNC is being used as a proper name, like "John". Personally, once things are clear, I prefer to use "PNC" rather than "The PNC system" except when I refer to a particular version of PNC.

¹ BTW, "A John" in English has a very specific meaning. The phrase could be correct if used in the right context.

- 40) Often, there is no need to say “BER performance” or “Throughput performance” unless you are trying to distinguish between many different types of performances of interest. Just say “BER” or “Throughput” will be sufficient. Also, there is no need to say “Fig. 1. Comparison of BER of System A and System B”. Just say “Fig. 1. BER of System A and System B”. The word “Comparison” is often redundant.
- 41) Try to avoid using “there exists” in the non-mathematical part of your writing. Use “there exists” only when you are stating a theorem. Sentences like “There exists a phase error causing BER degradation” should be written as “There is a phase error causing BER degradation”. Even better, try to avoid using “there”. Just say “A phase error causes BER degradation”. This is more natural for English.
- 42) This is common awkward usage in many of our writings. I believe this awkward usage of “similar to” at the beginning of a sentence began with Chinese writers and over time, even I got infected and began to write in this way in many of my papers.

"As in" is often better than "Similar to". When you say "similar to", you are comparing two things of the like-kind. For example, "Toy A is similar to toy B". You would not say "Toy A is similar to our research group meeting", even though in our research group meeting, we talk about toy B which is similar to toy A.

Consider the following sentence:

"Similar to [11], our DoF maximization process can be performed using FFT".

Certainly, it is odd to draw a similarity between a paper – in this case, paper [11] – and a process. If you want to use "similar to" here, you should say

"Similar to the DoF maximization procedure described in [11], the DoF maximization here can be performed using FFT".

This will be grammatically correct, but the phrase is much longer than just

"As in [11], our DoF maximization process can be performed using FFT".

- 43) “Different from”, “Unlike”, “Unlike in”. Sentences that start with “Different from” also cause me to stop to think and it interrupts the flow of my understanding of the sentence. Not sure why. An example is

“Different from [11], our DoF maximization process can be performed using FFT”.

Two sentences that are better, imo, are

“Unlike in [11], our DoF maximization process can be performed using FFT”.

“Unlike the technique in [11], our DoF maximization process can be performed using FFT”.

44) “A lot of” is used in an informal setting, e.g., when you talk to someone verbally. Use “much” or “many” in technical writings. For example,

“PNC has attracted much attention from the research community recently”

Not “PNC has attracted a lot of attention...”

45) Because of the limited vocab of group members, "due to" is used almost all the time. Many books on technical writing advise against the indiscriminate use of "due to". Depending on the situation, other words are often more appropriate. Some examples are

Thanks to

Caused by

Owing to

Attributed to

Because of

Try to learn the differences between them.

46) On “precision” versus “accuracy”. For example, if we talk about

“symbol-misalignment estimation accuracy”, we mean the error between the estimation and the true value.

“symbol-misalignment estimation precision”, on the other hand, may refer to the variance, and often refers to the resolution. For example, if the symbol-misalignment estimation resolution is 0.2, then it may not be very precise.

In general, you can be precise without being accurate. For example, if I say “I am the smartest person on this planet”. This statement is very precise and there is no ambiguity as to what it means. However, it may not be accurate.

See more details on the difference in <https://www.ncsu.edu/labwrite/Experimental%20Design/accuracyprecision.htm>.

47) As mentioned before, the penchant for Japanese and Chinese authors to use the word "novel" to describe their proposed system is not a good practice.

First of all, if there is no novelty, why publish the paper? Second, whether something is novel is up to the reader to judge, not for you to claim. So, this word is often redundant and conveys no information (zero entropy word if you use it to describe your own work).

"Novel" is a pompous word for "new". Using the word "novel" does not add to the novelty of your scheme.

This may be a personal bias. These days, when I see the word "novel" in a technical paper, I immediately have the impression that the author is not a creative person. At least, he is not that creative in writing and is prone to using cliches.

I googled English Chinese Translations.

“novel” translates roughly to “new and clever”. It implies originality and creativity (鲜).

Thus, when you write

"We propose a novel scheme for channel estimation"

It translates roughly to

"We propose a new and clever scheme for channel estimation"

There is much hubris in the last sentence. Since we are not Donald Trump, perhaps we should avoid sentences like that in technical writing.

48) “a” versus “an”: Goes with pronunciation, not spelling. For example,

An hour, not a hour

An ML decoder, not a ML decoder

In particular, for an acronym, if you pronounce the acronym by the letter, then be careful. In the above, the “M”, in “ML” is to be pronounced explicitly as “eM”, hence the use of “an” rather than “a”. Pay attention to the use of “a” versus “an” before an acronym. Even native English speakers make this mistake sometimes.

49) “as” versus “because”. The use of “as” to mean “because” is discouraged in technical writing, because “as” has more than just one meaning and can lead to ambiguity. For example,

The system performance degrades as the BER increases.

It can mean the system performance degrades together with the increase of BER. That is, the system performance degrades at the same time as the BER increases.

It can also mean the system performance degrades because the BER increases.

Check your use of “as” and see if it should be replaced by “because” or a less ambiguous word.

50) On the use of “We” and “I”. At some point in time, it became fashionable to not use “We” and “I” in scientific writings, as if that would destroy the “objectivity” of a piece of work. IMO, that’s a bunch of bull. Many technical writers still advise against that, advocating the use of lame passive sentences like

It is shown that the BER decreases with the increase of SNR

rather than the more direct, less pompous sentences like

We show that the BER decreases with the increase of SNR.

The first sentence is really a lousy sentence. Who is “it” that shows? Why write in an ambiguous manner when you can be more direct, as if your reader will respect your “objectivity” for your lousy writing style.

I don’t know how this kind of pompous writing style came about. The old masters used to use “we” and “I” liberally. If it is good for Maxwell (see <http://rstl.royalsocietypublishing.org/content/155/459.full.pdf+html>), it is good for me.

51) “Advantages” versus “Merits”. When you say

My invention has the following advantages:

...

The first question that comes to mind is “compared with what”. You need to be more specific when using the word “advantages”. You need to say something like

My invention has the following advantages compared with Tesla’s invention:

...

If you do not want to compare your invention with a specific invention, you could say

My invention has the following advantages compared with many existing devices:

...

A possible sentence that is less prone to the need of comparison is

My invention has the following merits:

...

To me, “advantage” is closer to 好处, while “merit” is closer to 优点.

52) “Work” or “works”. Generally, the common practice is to say “Related Work” rather than “Related Works”. These days, these two words are both used in technical writing. In the past, the plural form “works” is used to describe pieces of works related to arts, music, etc. Technical work in a subject area typically uses “work”. Related work means the collective effort of a group of people in a subject area that is related to the current work. IMO, if you want to be absolutely correct grammatically, use “work”.

53) Putting “ends” before “means”. This was pointed out by someone else which I observe to be true among Chinese writers. Perhaps because of language, Chinese commonly put “ends” before “means”. For example,

To achieve good performance, we filter out the noise.

It is more common for English writers to say

We filter out the noise to achieve good performance.

The only exception is when, prior to that sentence, you have already talked at length on why it is so difficult to achieve the “ends” that the reader’s attention is already on the “ends”. Then you can use the “Chinese version” for emphasis.

54) “First”, “Second”, or “Firstly”, “Secondly”. If you plan to submit your paper to an IEEE (or other American) conference or journal, use “First”, “Second”. For example,

“First, we explain Scheme A. Second, we analyze its performance.”

Not

“Firstly, we explain Scheme A. Secondly, we analyze its performance.”

“Firstly”, “Secondly” are British usages.

55) “Compose”, “Consist”, “Comprise”:

Wrong: Algorithm A composes of two parts.

Corrected: Algorithm A is composed of two parts.

Awkward: Algorithm A is consisted of two parts.

Corrected: Algorithm A consists of two parts.

Awkward: Algorithm A is comprised of two parts.

Corrected: Algorithm A comprises two parts.

- 56) “Estimate” versus “Estimation” when used as nouns. You use “estimate” for a particular instance. “Estimation” typically refers to the process or action of estimating. Examples:

My estimation is that it will not rain tomorrow.

Tom and John have two different estimates for tomorrow’s temperature. Tom’s estimate is 30 degree while John’s estimate is 28 degree.

The results of our estimation are summarized in Fig. 2.

Estimation of the channel gain is difficult under Rayleigh fading.

The estimates of h_A and h_B are fed into the Tanner graph for decoding purposes.

- 57) “More and more” is colloquial. Replace it with “increasing” or other terms. Example:

PNC is attracting more and more attention.

Replaced by

PNC is attracting increasing attention.

- 58) Should you apply a colon “:” before a displayed equation? The general guideline (for IEEE, I believe) is to use a colon if, for an inline equation, you will also use a colon; do not use a colon if for an inline equation you will not use one. For example,

Substituting $x = 3$, we have $y = x+3 = 6$. (inline case)

Thus, if you want to display $y = x+3=6$, you will simply write

Substituting $x = 3$, we have

$y = x+3 = 6$.

You will not write

Substituting $x = 3$, we have:

$$y = x+3 = 6.$$

Another example.

The uncertainty in the following equation cannot be resolved: $y=x+n$. (inline case).

Therefore, for the displayed case, you will write

The uncertainty in the following equation cannot be resolved:

$$y=x+n$$

There is no difference in the use of colon for the inline case and the displayed case.

- 59) “Compute” versus “Calculate”. Many students say “calculate” when they should say “compute”. Calculation is related to arithmetic. When you deal with something that requires a computer to do or something that requires more sophisticated math than performing things such as $1+3=4$, you are likely to be computing. For example, you compute $x=\text{FFT}(y)$; you compute $x=n!$. If “compute” were equivalent to “calculate”, the discipline of “Computer Science” or “Computing Science” might have been called “Calculator Science” or “Calculating Science”.

There are also situations when both “compute” and “calculate” are not the right words. If you are “deriving” an equation, you should just should “derive” rather than “calculate” or “compute”. When you say “derive dy/dx ”, you mean deriving an expression for dy/dx (e.g., you derive the expression $dy/dx=x-1$). When you say “compute dy/dx ” or “calculate dy/dx ”, you mean plugging in specific numerical values into a previously derived expressions for dy/dx to find the numerical value of dy/dx for that particular instance (e.g., $x=1$ for a particular instance of the application of the expression of dy/dx ; then $dy/dx=x-1 = 1-1=0$).

- 60) “Totally” versus “in total”. Say “There are N devices in total”, not “There are totally N devices”. “Totally” means “completely”. For example, “I am totally exhausted after running the marathon”. It does not sound quite right to say “There are completely N devices”. Thus, don’t use “totally” in this case.

- 61) “In the following”, “as follows”, and “below”. They are roughly the same and can be used interchangeably, but not all the time. For example,

“We elaborate the FFT algorithm below:” and “We elaborate the FFT algorithm in the following:” both sound right. But “we elaborate the FFT algorithm as follows:” does not come across quite right to me.

Below are some examples of WRONG usage committed by my students:

“We elaborate the FFT algorithm as below:”

“We elaborate the FFT algorithm as follow:”

“We elaborate the FFT algorithm as following:”

62) “Call” and “referred to as”. Examples of correct usage:

“We call the algorithm a turbo algorithm”

“We refer to the algorithm as a turbo algorithm”

“The algorithm is called a turbo algorithm”

“The algorithm is referred to as a turbo algorithm”.

Examples of wrong usage:

“We call the algorithm as a turbo algorithm”

“We refer to the algorithm a turbo algorithm”

“The algorithm is called as a turbo algorithm”

“The algorithm is referred as a turbo algorithm”

63) I notice that many technical writers from China like to use the word “utilize” instead of “use”. For example,

“We utilize the algorithm to compute the parameter.”

This comes across as somewhat awkward to me because I seldom see native English writers write sentences like this. It comes across as sounding unnecessarily pompous and distracting.

“Use”, to me, is the proper usage here. For example,

“We use the algorithm to compute the parameter.”

I could not quite pinpoint why I found the use of the word “utilize” in the first example above unnatural and objectionable. So, I did a web search. Take a look at the explanation of this page:

<https://grammarpartyblog.com/2012/01/17/use-versus-utilize/>

Basically, you should use the word “utilize” only when you make use of “something” in a clever and unobvious manner to achieve a purpose that is not the original purpose of that “something”. For example,

“We utilize FFT decomposition to analyze the second-order discrepancies between Newtonian Mechanic and Quantum Mechanic.”

You don’t “utilize” your sweater to keep warm. You use it to keep warm.

Reserve the word “utilize” for only the most clever part of your method. If you replace all occurrences of “use” with “utilize”, then your writing may come across as pompous in a preposterous way. By the same token, try to minimize the use of the word “leverage” when you can use the word “use”, especially in the main body of your paper. You can use “leverage” once or twice in your abstract, introduction, or conclusion to highlight the clever part of your work. Overuse of such words for straightforward things makes you sound ridiculous.

Now, I have a parting question. Do you utilize the word “utilize” or do you use the word “utilize” in a sentence? I would say many Chinese writers “negatively utilize” the word “utilize” in their sentences – i.e., they use the word “utilize” not for its original intended usage, but for usage in the wrong (negative) way.

64) Here is a commentary on using big words:
<https://socialtriggers.com/the-big-problem-with-big-words-hint-they-make-you-look-stupid/>

For non-native speakers of a language, unless they are exposed to the language by frequent use (hearing, reading, writing, and communicating in that language), they may not be able to differentiate between big words and common words.

I am not aware of a dictionary that tells you how common a word is. A dictionary that rates all words on the scale of 1 to 10 according to how common they are will be quite useful for non-native speakers.

65) “Traffic” is uncountable in English. The plural form of “traffic” is still “traffic”, not “traffics”.

66) “In constrast to”, “Contrary to”, “By constrast”, “Compared with”, “Compared to”.

You use “In contrast to”, “Contrary to”, and “By contrast”, when you want to highlight and bring out the differences of two things. They are similar to “Unlike”, For example,

In contrast to Tesla, Toyota has much higher acceleration capability.

Contrary to Tesla, Toyota has much higher acceleration capability.

By contrast, Toyota has much higher acceleration capability than Toyota.

Unlike Tesla, Toyota has much higher acceleration capability.

The above are all roughly the same. “Compared with” is more neutral. You are trying to state the outcomes of a comparison. For example,

Compared with Tesla, Toyota is equally ugly; however, Toyota has much higher acceleration capability.

“Compared to” is used when you want to state that two things are comparable on certain aspects. For example,

The ugliness of Toyota can be compared to that of Tesla.

In the above, you are saying that they are equally ugly.

67) Figure captions. Insert a “.” or “:” after “Figure X” or “Fig. x”. For example,

Figure 1 Block Diagram of FFT.

should be written as

Figure 1. Block Diagram of FFT.

or

Fig. 1. Block Diagram of FFT.

depending on the journal to which you want to submit your paper.

68) “Ever”. 曾经

Chinese speakers sometimes write something like

“I ever saw a unicorn”.

Translated to Chinese directly, this sentence seems perfectly fine. But native English speakers will omit the “ever” and just say

“I saw a unicorn”.

“I ever saw a unicorn” is an unnatural English sentence and a native English speaker who does not know Chinese may not know what your true intention is in that sentence. Phrased as a question, then it becomes a proper English sentence again. For example,

“Have you ever seen a unicorn?”

is a perfectly fine English sentence. The following shows some correct and wrong answers (language wise) to that question:

“No, I have never seen a unicorn.” (correct)

“Yes, I have seen a unicorn.” (correct)

“Yes, I have ever seen a unicorn.” (wrong)

- 69) To use past tense or present tense when you describe an experiment, work done in the past by you or others, etc?

For experiments, you only use past tense when you describe the actions that you performed in the experiment, not the system properties themselves unless the system properties have changed since the experiments were conducted. For example, you will say something like the following:

In the first experiment, I positioned an STA at a corner, and an AP at another corner, of our Lab. I installed RT Linux on both the STA and the AP. The STA and AP are low-cost devices, each costing less than \$1. I bought them at Store ABC. At Store EFG, they sell for much higher prices.

As you can see, past tense and present tense are intermixed in the above paragraph, depending on what you are describing. The STA and AP are still low-cost devices as of today. Therefore you use the present tense. You installed the RT Linux some time in the past, so you use the past tense.

The use of tenses in scientific writing is tricky. Read, for example,

<https://www.internationalscienceediting.com/verb-tenses-scientific-manuscripts/>

Generally, I use past tense for actions performed by authors and use present tense to describe the interactions between machines, software or hardware that remain valid today. For example, we

typically say something like the following:

The authors of [23] proved that $A+B = C$. Their proof makes use of Einstein's theory of general relativity in an indirect manner."

In the above, the action of the authors were something in the past. However, the method in the proof remains valid today: i.e., the proof has not been overwritten by a new method. On the other hand, if the proof was found to be wrong and was replaced by a new proof, you may write something like the following:

The authors of [23] proved that $A+B = C$. Their proof made use of Einstein's theory of general relativity. After the publication of [23], a hole was found in Einstein's theory, and therefore the proof in [23] was invalidated. Subsequently, the authors of [24] provided an alternative proof for $A+B=C$ that makes use of Pythagorean Theorem. As far as we know, $A+B=C$ remains valid as of today.

70) "Next we, ... " versus "We next ...". The following is related to style than what is right or wrong.

If you are describing an algorithm with a sequence of actions to perform, then "Next, we add 1 to $x \dots$ " as you go through the sequence of actions is more natural than "We next add 1 to $x \dots$ ".

An example:

1. First, descale the fish.
2. Next, we wrap the fish in a banana leaf.
3. After that, we put the fish in an oven pre-heated to 300-degree celcius.

When you open a new paragraph and you are transitioning to talk about something new – something different from what has been talked about in the previous paragraph -- then "We next" is more natural. In other words, "We next" is a transition to something new, while "Next, we..." is not a transition to something new, but continuing to talk about the same thing. An example:

... This concludes our discussion of the FFT algorithm. (end of a paragraph here)

We next explore the performance of FFT in real applications. (beginning of a new paragraph here)

71) To use or not to use "the", again.

As related earlier, you do not use "the" when you refer to proper nouns. For example,

Gnu radio is not very powerful.

FFT is one of the more useful algorithms in signal processing.

FPGA has replaced general-purpose processors in many applications.

However, if you are talking about a specific instance (or realization) in a system (or device), you need to use “the”. For example,

The Gnu radio code in my computer does not run smoothly.

The FFT implementation in Matlab is quite efficient.

The FPGA in my USRP board is a low-quality FPGA.

72) Aim before action, or action before aim.

Do you say “To go to Shatin, I take the MTR” or “I take the MTR to go to MTR”? Both are correct, but I would say most native English speakers would use the latter phrase. The former phrase will probably be reserved for something big, such as “To go to the Moon, the country devoted tremendous amounts of resources in R&D”. Even then, the latter would also sound fine.

I notice that many Chinese writers prefer to use the former style, for big and small things (i.e., even when they are describing something small in an experiment apparatus – e.g., To reduce to noise, we use a low-pass filter (this really sounds very unnatural to me)). I am somewhat puzzled as to the reason why, because in Chinese the latter style is more common as well. Compare the following:

去沙田, 我坐地铁

我坐地铁去沙田

73) To be continued. There are many more ways to torture the soul of a professor.

74) Go to 73)

Websites Containing Useful Guides to Technical Writing

1. https://www.eleceng.adelaide.edu.au/personal/dabbott/wiki/index.php/Guide_to_technical_writing.

Three Trademarks of Writing Styles in My Group

I would like the papers from our group to have the three trademarks:

- 1) The paper should not be a pain to read
- 2) The paper should be enjoyable to read
- 3) The reader should easily recognize and appreciate your contributions

Most technical papers are a pain to read. Even fewer are enjoyable to read. Oftentimes, you do not even know what the key points are, if any, after reading the paper. Does it have to be like that? I do not think so.

In our papers, each paragraph should be written in a manner that leaves no guesswork behind. Think about it this way. If you could spend 30 minutes on a paragraph so that the reader only needs 3 minutes to comprehend it, then the 30 minutes are well spent. If the reader needs to spend more than 10 minutes on a paragraph, it becomes a pain. Say our paper reaches just 10 readers, then $30 \text{ minutes} + 10 * 3 \text{ minutes} = 60 \text{ minutes}$, while $10 * 10 \text{ minutes} = 100 \text{ minutes}$. You are already saving more than $100 - 60 = 40$ human minutes with your 30 minutes of hard work. The savings will be even more if you reach 100 readers. Add in the number of paragraphs in the paper, you begin to see the big picture.

Good novels are page-turners. You just cannot put the book down because you want to go to the next page to find out what happens next. Who says good technical papers should not aim for this goal? Develop a main theme, then a plot and a storyline around the theme. Write in a way that each paragraph flows logically from the previous paragraph, and leads naturally to the next paragraph. Think “transitions”. Each paragraph answers a question raised at the end of the previous paragraph. The answer in turn leads to a new question. The next paragraph addresses the new question and ends with yet another question.

Don't try to stuff too many things down your reader's throat. What is the single most important contribution of your paper? That should be the main theme around which your story develops. Don't count on the reader to discover for himself your great contributions. Tell him in no equivocal term what they are. Convince him with solid technical evidence and interesting story telling. Sure, good technical writing are informative and factual. But these should not be your “thinking process” when you write. Think “persuasion”. The information and facts are what you use to persuade. State a claim and provide the evidence.

Good technical papers are painful to write, but enjoyable to read.