How to use English in scientific writing
mainly based on
Matt Young: The technical writer’s handbook
and
Nicholas J. Higham: Handbook of writing for the mathematical sciences

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Seminar Scientific Practices

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Outline

General rules

Specific topics
Write the way you talk, then polish

Writing as highly polished speech

- Makes your writing more natural
- Polish by looking for
  - sentences that are hard to understand
  - sentences that are too long
  - word order and misplaced modifiers
  - more precise words
  - ideas that do not follow one another
One thought per sentence

Not a strict rule, just do not pack too much information into a short space

▶ Keep your writing simple: use short sentences and avoid complicated constructions
▶ Take care for linking one thought to the next
⇒ Impart information in series instead of in parallel whenever possible!

May not be elegant, but is more unambiguous and easy to understand!
Be explicit

Do not make the reader infer something (complex). Especially in proofs,

▶ emphasize the structure and key ideas

*The idea is to ... Our first goal is to ... The essential observation is that ...*

▶ indicate the nature and length of omitted parts

*An easy induction gives ... Some tedious manipulation yields ... An argument similar to the one used in X shows that ...*

▶ keep the reader informed where you are

*First, we establish that ... Our task is now to ... It remains to show that ...*
Be explicit II

Do not bury an important fact where it might be overlooked

*The single-mode, water-cooled, HCN laser beam was directed into the blazed, evacuated, infrared spectrometer*

- If something is (more) important (than others), put it in a separate sentence
- If you want to let something really stand out, give it its own paragraph!
Write for the uninformed reader

Try to write so that you address as wide an audience as possible (within the constraints of the publication)

- Generally assume that the audience is intelligent and sophisticated, but relatively uninformed
- Explain, simplify and use analogies
- Take care of material that has become trivial to you
- Be aware of jargon and technical terms (could have different meanings in ordinary language)

Of course, depends on the publication/audience you aim for
Make use of tools

Mainly: dictionaries and thesauri
  ▶ Monolingual dictionaries often provide more detail
  ▶ Use thesauri to find *the* right word (careful here!)

Some resources:
  ▶ Oxford English Dictionary
  ▶ Collins English Dictionary
  ▶ Webster’s Collegiate Dictionary/Thesaurus

A good online resource for quick check is
[www.merriam-webster.com](http://www.merriam-webster.com); it has both dictionary and thesaurus functionality
Try thinking in English

Try constructing sentences in English instead of constructing them in your own language and then translating them. To learn this,

- write your research notes in English
- annotate paper/books you read in English
- look at well-written papers of your field and study *vocabulary*, *synonyms*, *collocations* and *idioms*

Also, using a monolingual dictionary will help you learn thinking in English
Check the publications style manual and adhere to it!
Outline

General rules

Specific topics
Active versus passive voice

A subject of great controversy

- Active voice yields more natural writing
- Passive voice puts emphasis on the object of interest

Passive

A numerical example is now given to illustrate the above result.

Active

We give a numerical example to illustrate this result.

or even better

The following numerical example illustrates the above result.
Active versus passive voice II

- Generally, prefer active over passive voice
- Passive phrases can often be removed by rewriting the sentence
- But, passive voice may be good to
  - add variety
  - emphasize certain parts of a sentence
What to call yourself

There is nothing wrong with using the first person!

Avoid

▶ constructions using “the author” (too formal, stilted)
▶ passive constructions if referring to your own work (unclear, clumsy)
▶ constructions with “One . . .” (vague)

“We” may be used in the sense of “the reader and I” as in We saw earlier that . . .
Word order

*The first words of a sentence are usually regarded as the most important.*

⇒ here, “the first words of a sentence” is emphasized rather than “the reader”. Choose word order to reflect the desired emphasis!

Also, be careful with placement of adverbs like *only*:

- Only we can see the stars
- We only can see the stars
- We can see only the stars
Consistency and false elegance

Be consistent with

- terms, i.e., do not use “Cholesky factorization” and “Cholesky decomposition” in the same work
- alternative spelling, i.e., do not use both “orthogonalize” and “orthogonalise”. If you use “orthogonalize” also use “optimize”, and so on
- items in a list, i.e., all sentences, all participles, all nouns

Do not try to avoid repetition, if it introduces ambiguity or is unnecessary:

*We calculated the mean and standard deviation; the average was 1.7.*
Wordiness

Try to avoid being wordy, i.e. using words or phrases that do not add to the content.

- *actually, very, really*
  ⇒ often better to omit

- *For reasons of simplicity ...*
  ⇒ For simplicity ...

- *It would seem reasonable to achieve repeatability with this process.*
  ⇒ The process will probably be repeatable.
Dangling participle

- A participle must modify something in the sentence
- When a participle begins the sentence, it must modify the subject of the sentence

If a participle does not modify anything or the wrong subject, it is “dangling”.

Hard to understand, so let us look at some examples . . .
Dangling participle II

*Substituting* (2) *into* (1), *the integral becomes* 3.

The integral does not make any substitutions . . .
Correct versions:

*Substituting* (2) *into* (1), *we find that the integral becomes* 3. *When* (2) *is substituted to* (1), *the integral becomes* 3.

Also, take care of ambiguity:

*A bug was found in the program using random data.*

What does “using random data” modify? The bug? The finding? The program?
Punctuation

Wide topic, here some specialities:

- In a list the final comma before *and/or* is optional, but sometimes needed to avoid ambiguity:
  \[\text{A dictionary is used to check spelling, shades of meaning, and usage}\]

- *If we use iterative refinement solutions are computed to higher accuracy.*
  \[\Rightarrow\text{ At first distracting without a comma after refinement}\]

- Use a semicolon (;) only where you could also use a full stop (.)

- Use exclamation marks with care!

The main function of punctuation is to make perfectly clear the construction of written words.\(^1\)

\[^1\text{G. V. Carey: Mind the stop: A brief guide to punctuation with a note on proof-correction}\]
Hyphenation

- Hyphenate compound modifiers if appearing before a noun
  
  *host-specific parasite*

- Trend to not hyphenate words with *multi, pre, post, non, pseudo*, and *semi*, unless a proper noun is modified
  
  *nonsingular*, but *non-Euclidean*

- Only hyphenate before a noun
  
  *This is an ill-posed problem*, but *This problem is ill posed*

- Hyphenate to remove ambiguity
  
  *A popular science writer*
Numbers in sentences

- Spell out (small) numbers when used as adjectives:  
  *The three lemmas.*

- Do not spell out numbers when used as names of numbers:
  *Average age was 37.*
  *This follows from Theorem 3.*
  *A factor of 3.*

- Separate numbers with many digits by spaces rather than commas:
  *123 456 and 7.891 23*
Conclusion

- Generally, it’s much about style and personal taste
- But, there are many things that are worth checking consciously

The books, on which this presentation is based, are worth reading:
- Higham is well structured and concise (and also covers other topics)
- Young provides much detail and is fun to read!