Scientific English M2 Marine Physics

Lecture

Introduction

• Brief history of Science and scientific writing

Scientific writing

- Structure and content of a paper
- Writing and revision papers
- Writing reports, proposal, etc ...

Effective Scientific writing

• How to write more effectively

The peer-review process

• What? And How?

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Activities

- Read and discuss scientific articles
- Write a short article Due date: Dec. 5th
- Review articles
 Due date: Dec. 12th

Material available at: http://ocean.fsu.edu/~qjamet/share/Scientific_English/

Scientific English Tentative paper instructions

Text requirements for your paper:

- 6 publication units (1 PU = 500 words or 1 figure or table)
- Using a standard structure:
 - Abstract
 - Introduction
 - Methods
 - Results
 - Conclusion

References:

- http://www.nature.com/scitable/topicpage/effectivewriting-13815989
- https://cgi.duke.edu/web/sciwriting/index.php
- https://www.coursera.org/learn/sciwrite

What makes good writing?

- Communicate an idea **clearly** and **effectively**.
- Good writing is beautiful, elegant and stylish
- Takes having something to say and clear thinking
- Takes times, revision, and a lot of practice

A few examples (of what not to do)

Example (bad,) – from section II.A of A. Vieira's paper:

• As it is widely known, nowadays, mankind problems keep on being, as it was in ancient years, to find new energy sources that may attend to its needs. Traditional fuels, besides being pollutant, are limited in their reserves. In this context, natural gas may be seen as one of the most promising forms of energy (pompous and verbose)

A few examples (of what not to do)

Example (bad, then better)

– from section II.A of A. Vieira's paper:

- As it is widely known, nowadays, mankind problems keep on being, as it was in ancient years, to find new energy sources that may attend to its needs. Traditional fuels, besides being pollutant, are limited in their reserves. In this context, natural gas may be seen as one of the most promising forms of energy (pompous and verbose)
- Given its available reserves, its low price and small amount of pollution, natural gas is nowadays one of the main energy sources that can be considered as an alternative to oil (clear and accurate)

A few examples (of what not to do)

An example from *Photochemistry* and *Photobiology*:

These findings imply that the rates of ascorbate radical production and its recycling via dehydroascorbate reductase to replenish the ascorbate pool are equivalent at the lower irradiance, but not equivalent at higher irradiance with the rate of an ascorbate radical production exceeding its recycling back to ascorbate.

A few examples (of what not to do)

Something common to the two examples:

some nice spunky verbs are turned into clunky nouns = nominalization

This is incredibly common in academic writing, but it makes the writing hard to read ; because:

- Verbs drives sentences
- Nouns slow them down

A few examples (of what not to do)

Another example from *Photochemistry* and *Photobiology*:

These findings imply that the rates of ascorbate radical **production** and its **recycling** via dehydroascorbate reductase to replenish the ascorbate pool are equivalent at the lower irradiance, but not equivalent at higher irradiance with the rate of an ascorbate radical **production** exceeding its **recycling** back to ascorbate.

These findings imply that at lower radiation ascorbate radicals are produced and recycled at the same rate, but at higher radiation they are produced faster than they can be recycled back to ascorbate.

I. Subjects and Actions

II.Cohesion, Coherence and Emphasis

III.Concision and Simplicity

IV.A few grammar tips

V.Writing and self-revising (summary)

Sentences usually communicate 2 main pieces of information:

- **who** is the sentence about?
- what did they do?

You can **help readers find this information** using cues in your sentence structure.

For example, **characters** in your sentences are most likely to be interpreted correctly when placed in the grammatical **subject**.

Similarly, your intended action is best placed in the sentence's verb.

You can use these structural decisions **to minimize the amount** of energy your readers require to understand your writing.

Principles

- Put action in verbs (#1)
- Put character in subjects (#2)
- Keep subjects near verbs
- Place the main idea in the main clause (#4)

Principles #1: Put action in verbs

Verbs are *action words*: they describe motion, like to *explore*, to *examine*, or to *observe*.

Verbs can be turned into nouns, which changes the word from an *action* to a *thing*. For example, the verb *to analyze* can be changed into its noun form *analysis*.

A noun that is formed from a verb is called a *nominalization*. Nominalizations are nouns that contain a hidden action.

Principles #1: Put action in verbs

Examples of nominalization:

Action

to regulate to analyze to occur to understand to investigate to delineate to perform

Principles #1: Put action in verbs

Examples of nominalization:

Action

to regulate to analyze to occur to understand to investigate to delineate to perform

Nominalization

regulation analysis occurrence understanding investigation delineation performance

Principles #1: Put action in verbs

There is nothing inherently wrong with nominalizations, but many scientific writers misuse them by using abstract nouns to convey Action.

This creates a disconnect between *structure* and *meaning* — the intended action is no longer found in the verb. **Most readers expect the main action of a clause to be found in a verb**.

This is because verbs inherently convey action, and nouns do not. If you fail to put your intended action in a verb, your reader must work to determine where the action is.

Principles #1: Put action in verbs

Example:

Sentence	Action
We performed an analysis on the data	nominalization
We analyzed the data	Verb

Principles #1: Put action in verbs

Example:

Sentence	Action
We performed an analysis on the data	nominalization
We analyzed the data	Verb

In the first example, the verb is *to perform*, but the intended action is *to analyze* (and has nothing to do with *performance*). A reader of the first example has to consider this possibility (if subconsciously), while the reader of the second clearly understands the action.

This is a trivial example, but the point is more important in complex sentences.

Principles #1: Put action in verbs

Example:

Instead of	write
Perform an analysis of	Analyse
Make an examination of	examine
Present a comparison of	compare
Be in agreement	agree
Produce an improvement in	improve

Principles #1: Put action in verbs

Scientific writing regularly disguises the main actions in nouns, costing reader energy.

Improve your writing by restructuring your sentences to capture actions in verbs.

Revision technique:

Go through your manuscript and underline all nominalizations. Take a closer look at these words to see if they should be changed to verbs.

Or, it may be easier to do the opposite: Go through the manuscript and underline all the verbs. For each verb, ask yourself this question: Does this verb capture the action in the sentence?

Principles #1: Put action in verbs

Nominalizations are sometimes useful; for example, when they *summarize the action of the previous sentence*. In such a case, a nominalization is a good way to form a backwards link to something already familiar to the reader.

Example:

We analyzed the data. This **analysis** demonstrated the need for additional experiments.

Principles #2: Put characters in subjects

The character is the actor (the entity performing the action).

Readers expect the main character in a clause to be found in the subject.

The grammatical subject of the sentence should be the answer to the question: *What is this sentence about?*

This principle goes hand-in-hand with the actions/verbs principle.

Principles #2: Put characters in subjects

Example:



The **movement in the liquid medium** of the bacteria was accomplished by microflagella.

The **bacteria** move themselves in the liquid medium with microflagella.

In the first sentence, the grammatical subject is an abstract noun (movement), which is really describing the action of the main character.

The second example is clearer because the intended actor (what's the sentence about?) is the same as the grammatical subject (bacteria).

Principles #2: Put characters in subjects

Science writing often has the problem of *subject shifting* — when subjects change erratically throughout a paragraph.

Often, writers intend to discuss a particular topic for several sentences (the *topic* doesn't change), but change the grammatical subjects.

Writing is easier to follow when the string of subjects in a paragraph reflects the topics. You can fulfill reader expectations by maintaining a *logical flow* of grammatical subjects in a paragraph:

- Maintain a common subject throughout a one-topic paragraph
- Shift the subject appropriately according to the story

Principles #2: Put characters in subjects

Example:

To understand human evolution, genomes from related primates are necessary. For example, identification of features common among primates or unique to humans will require several primate genomes. Fortunately, scientists can now do such genome-wide exploration; in the past 5 years, the community has released several nonhuman primate genome sequences.

Principles #2: Put characters in subjects

Example:



To understand human evolution, **genomes from related primates** are necessary. For example, **identification of features** common among primates or unique to humans will require several primate genomes. Fortunately, **scientists** can now do such genome-wide exploration; in the past 5 years, **the community** has released several nonhuman primate genome sequences.

In this example, the grammatical subjects shift, while the topic of the paragraph (genomes) stays the same:

genomes from related primates...identification of features...scientists...the community

Principles #2: Put characters in subjects

Example:



To understand human evolution, **genomes from related primates** are necessary. For example, **identification of features** common among primates or unique to humans will require several primate genomes. Fortunately, **scientists** can now do such genome-wide exploration; in the past 5 years, **the community** has released several nonhuman primate genome sequences.



To understand human evolution, **genomes from related primates** are necessary. For example, several **primate genomes** are needed to identify features common to primates or unique to humans. Fortunately, such **genome-wide exploration** is now a reality; in the past 5 years, **genome sequences** of several nonhuman primates have been released.

Principles #2: Put characters in subjects

• In the first example, the grammatical subjects shift, while the topic of the paragraph stays the same:

genomes from related primates...identification of features...scientists...the community

• In the second example, the topic and the main character stays the same:

genomes from related primates...primate genomes...genome-wide exploration...genome sequences

The second example is easier for a reader to understand because the subject (while not exactly the same words) is consistent and familiar throughout the paragraph. The second example shifts the subject twice, disconnecting it from the topic of the paragraph.

Principles #2: Put characters in subjects

Sometimes it's necessary to write paragraphs that build from one thing to the next. In this case, the subjects can shift as the topics shift. This is a common construction in scientific writing:

Technology often drives science. Among the most impressive recent technological advances is **DNA sequencing**. **More efficient sequencing** has reduced the cost of generating sequence data significantly. Cheaper data in turn enables more researchers to do data-intensive experiments, which results in **a huge amount of data** being released into the public domain. **Dealing with data** in such large quantity will require a new generation of scientists.

Subjects are shifting in an intended, logical flow. Each subject connects to the previous subject.

Principles #2: Put characters in subjects

Be aware of what your subjects are, and if they match the structure of the idea you intend to communicate.

Revision technique:

Highlight the subject of each sentence. Does the structure of your subjects match the information you intend to convey?

In other words, are the subjects of the sentences jumping from one thing to another, or do they shift only when you intend to shift the topic under discussion?

Principles #3: Keep subjects near verbs

The two primary pieces of information a reader looks for are:

- *who* is the sentence about?
- what are they doing?

When these two pieces of information are far apart, this confuses readers, because they can't piece together the whole picture without answers to these questions.

Principles #3: Keep subjects near verbs

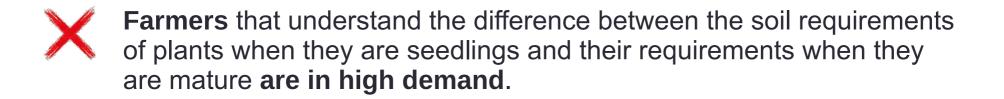
Example

Farmers that understand the difference between the soil requirements of plants when they are seedlings and their requirements when they are mature are in high demand.

Farmers are in high demand if they can understand the difference between the soil requirements of plants when they are seedlings and their requirements when they are mature.

Principles #3: Keep subjects near verbs

Example



Principles #3: Keep subjects near verbs

Example

Farmers that understand the difference between the soil requirements of plants when they are seedlings and their requirements when they are mature **are in high demand**.

Farmers are in high demand if they can understand the difference between the soil requirements of plants when they are seedlings and their requirements when they are mature.

Principles #3: Keep subjects near verbs

Example



Peanuts, shrimp, almonds, milk or anything else with lactose, and wheat or anything with gluten all represent things that people are commonly allergic to.

People are commonly allergic to things like peanuts, shrimp....

You have no idea what you're reading until the end. When you find out, you must re-read the sentence to comprehend what these things have in common.

Principles #3: Keep subjects near verbs

Make sure your sentences do not tax readers' short-term memory by obliging these readers to remember long pieces of text before knowing what to do with them.

In other words, keep together what goes together.

Revision technique:

Identify the main subject and its verb in your sentence. If they are far apart, rephrase the sentence to bring them closer together.

Principles #4: Main idea in main clause

When writing a complex sentence (a sentence that includes several clauses), place the main idea in the main clause rather than a subordinate clause. In particular, focus on the phenomenon at hand, not on the fact that you observed it.



Figure 5a shows that the translocation time t scales linearly with polymer length L.

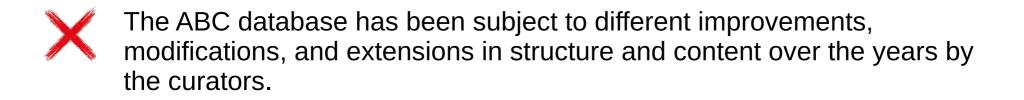
The translocation time t scales linearly with polymer length (Fig. 5a)

Principles #4: Main idea in main clause

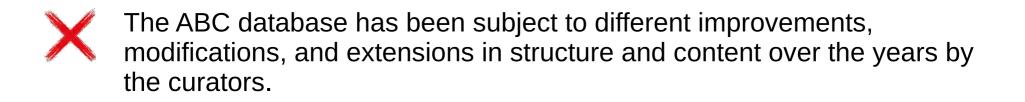
Revision technique:

Identify the main idea of your sentence. Start by stating your main idea as a single clause, then add complementary ideas in subordinate clauses (or another sentence).

Additional examples



Additional examples



The curators have improved the structure and content of the ABC database.

Additional examples



Mapping of open chromatin regions, post-translational histone modifications and DNA methylation across a whole genome is now feasible, and new non-coding RNAs can be sensitively identified via RNA sequencing.

Additional examples



Mapping of open chromatin regions, post-translational histone modifications and DNA methylation across a whole genome is now feasible, and new non-coding RNAs can be sensitively identified via RNA sequencing.

 \checkmark

It is now feasible to map open chromatin regions, posttranslational histone modifications and DNA methylation across a whole genome, and to sensitively identify new non-coding RNAs via RNA sequencing.

Additional examples



We first plotted on figures 15 and 16 the mean anomalies of Freshwater Content at two different depths : 100m and 2000m. At first sight, at 100m, the six plots seem very consistent with each others.

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We first plotted on figures 15 and 16 the mean anomalies of Freshwater Content at two different depths : 100m and 2000m. At first sight, at 100m, the six plots seem very consistent with each others.

The mean anomalies of Freshwater Content at 100 m and 2000 m are consistent between datasets (Figs. 15 and 16).

Additional examples



Significant positive correlations were evident between the substitution rate and a nucleosome score from resting human Tcells.

Additional examples



Significant positive correlations were evident between the substitution rate and a nucleosome score from resting human Tcells.

In resting human T-cells, the substitution rate correlated with a nucleosome score.

Additional examples



The possibility that some termini have a base composition different from that of DNA simply because they are the nearest neighbors of termini specifically recognized by the enzymes can be checked by comparing the experimental results with those expected from the nearest neighbor data.

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If we compare the experimental results with those expected from the nearest neighbor data, we can **check** the **possibility** that some termini have a base composition different from that of DNA simply because they are the nearest neighbors of termini specifically recognized by the enzymes.

Additional examples



This implies that it may be the presence of the ridge-flank canyons on the western flank of the Mid-Atlantic Ridge in the South Atlantic, and not just processes associated with random topographic variance or roughness (Polzin et al. 1997; Jayne and St. Laurent 2001), that is responsible for the high rates of mixing observed there.



This implies that the observed high rates of mixing may be explained by the presence of ridge-flank canyons on the western flank of the Mid-Atlantic Ridge in the South Atlantic, and not just by processes associated with random topographic variance or roughness (Polzin et al. 1997; Jayne and St. Laurent 2001).

Additional examples



The estimated mean free path in these systems was I>2.5 m, which establishes that the samples studied were well within the quasi-ballistic regime

Additional examples



The estimated mean free path in these systems was I>2.5 m, which establishes that the samples studied were well within the quasi-ballistic regime

With a mean free path estimated at I>2.5 m, the samples studied were well within the quasi-ballistic regime.

Additional examples



However, in clear contrast to the observations at lower excitation, no oscillations of the diffraction signal occurred. Instead, it was observed that after reaching the maximum the diffraction signal decreased monotonically and reached a quasistationary level of 40% in approximately 10 ps.

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However, in clear contrast to the observations at lower excitation, no oscillations of the diffraction signal occurred. Instead, it was observed that after reaching the maximum the diffraction signal decreased monotonically and reached a quasistationary level of 40% in approximately 10 ps.

 \checkmark

In clear contrast to what it did at lower excitation, the diffraction signal did not oscillate: after reaching the maximum, it decreased monotonically and reached a quasi-stationary level of 40% in approximately 10 ps.

Additional examples



The fear expressed by some teachers that students would not learn statistics well if they were permitted to use canned computer programs **has not been realized** in our experience. **A careful monitoring** of achievement levels before and after the introduction of computers in the teaching of our course **revealed** no appreciable change in students performances.

 \checkmark

Many teachers feared that the use of canned computer programs would prevent students from learning statistics. We monitored student achievement levels before and after the introduction of computers in our course and found no detriments in performance.

Additional examples



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Additional examples



Review of each center's progress in recruitment **is important** to ensure that the cost involved in maintaining each center's participation is worthwhile

We should review each center's recruitment progress to make sure its continued participation is cost effective.

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