Scientific English

M2 Marine Physics

Jonathan Gula
jonathan.gula@univ-brest.fr
Quentin Jamet
quentin.jamet@shom.fr

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?

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

Scientific English

How to write more effectively

References:

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

Scientific English

How to write more effectively

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

Scientific English

How to write more effectively

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)*

-

Scientific English

How to write more effectively

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)*

Scientific English

How to write more effectively

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.

Scientific English

How to write more effectively

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

Scientific English

How to write more effectively

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.

Scientific English

How to write more effectively

I. **Subjects and Actions**

II. **Cohesion, Coherence and Emphasis**

III. **Concision and Simplicity**

IV. **A few grammar tips**

V. **Writing and self-revising** (summary)

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

Principles

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

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and 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

Scientific English

I. Subject and Action

Principles #1: Put action in verbs

Examples of nominalization:

Action	Nominalization
to regulate	regulation
to analyze	analysis
to occur	occurrence
to understand	understanding
to investigate	investigation
to delineate	delineation
to perform	performance

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

Principles #1: Put action in verbs

Example:

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

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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

Scientific English

I. Subject and Action

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?

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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).

Scientific English

I. Subject and Action

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

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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?

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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**.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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)

Scientific English

I. Subject and Action

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).

Scientific English

I. Subject and Action

Additional examples

The ABC database has been subject to different improvements, modifications, and extensions in structure and content over the years by the curators.

Scientific English

I. Subject and Action

Additional examples

The ABC database has been subject to different improvements, modifications, and extensions in structure and content over the years by the curators.

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

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

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

Scientific English

I. Subject and Action

Additional examples

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

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

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.

Scientific English

I. Subject and Action

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).

Scientific English

I. Subject and Action

Additional examples

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

Scientific English

I. Subject and Action

Additional examples

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

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

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.

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.

Scientific English

I. Subject and Action

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.

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.

Scientific English

I. Subject and Action

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.

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.

Scientific English

I. Subject and Action

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.

Scientific English

I. Subject and Action

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.