

# Technical Writing and Speaking in English

## Class 3: Sustaining Energy.<sup>1</sup>

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<sup>1</sup>This course is based on the book The Craft of Scientific Writing, Michael Alley.

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Put another way, the longer your document is, the more important that sustaining the writing's energy becomes.

# Sustaining Energy: How?

We can sustain energy in our writing by:

- selecting strong verbs and concrete nouns;
- making the writing concise.

# Select energetic verbs

Verbs provide energy in sentences. When your verbs are energetic, the writing moves.

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In this paragraph, no energy emanates from any of the three verbs: is presented, are discussed, and is revealed.

- the verbs occur at the end;
- the verbs are bloated;
- the verbs are passive.

## Avoid having verbs occur at the ends of sentences.

In English, you can think of a verb as the engine for the sentence. Put another way, the verb is what injects energy into the sentence.

What do you think about the following excerpt?

In this study, the care given by a hospital and the medical outcomes of patients are compared. The effects of exogenous factors, such as the types of illnesses, are accounted for. Also, the opinions of both patients and physicians on the quality of health care are considered.



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- made the decision
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The verb *is* acts as an equal sign, thereby serving a sentence that defines or equates: "*A positron is a positively charged electron produced in the beta decay of neutron-deficient nuclides.*"

What do you think about the next excerpt?

The human immune system is responsible not only for the identification of foreign molecules, but also for actions leading to their immobilization, neutralization, and destruction.

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In this example, the revision consisted of simply removing three words: *there*, *are*, and *who*. In other cases, you will also have to insert a verb such as *exist* or *occur*.



# Select the natural voice

Two main features distinguish the action of a verb: tense and voice.

- Tense refers to when the action occurs: past, present, or future;
- Voice, on the other hand, refers to the perspective for the action: who or what performed the action.

# Select the natural voice

Two main features distinguish the action of a verb: tense and voice. Voice strongly affects the energy of the writing. Verbs can be either:

- **active voice**: the subject performs the action
- **passive voice**: the subject is acted upon

For example:

- The satellite was struck by orbital debris.
- Orbital debris struck the satellite.

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# Select the natural voice

Is all passive voice wrong? Certainly not. Although the active voice is stronger than the passive voice, occasions arise in which the passive voice is more natural:

For example:

On the second day of our wildebeest study, the herd migrated to the river. There, a calf wandered just a few yards from the herd and was attacked by painted dogs.

- the first two verbs (migrated and wandered) are active
- the third verb (was attacked) is passive

Using the passive voice in the third case is appropriate, because the passive voice keeps the focus on the subject of the study (wildebeests).

# Select the natural voice

Which form is more natural? Most often, an active verb is more natural.

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Now, imagine listening to a baseball game in which the radio announcers speak in an unnatural passive voice:



The ball is pitched by Gibson. The bat is swung by Clemente. The ball is hit by Clemente. The outfield is covered by Brock. The fence is climbed by Brock.

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Clemente digs in. Gibson comes set, delivers. Clemente swings. He drives the ball to deep left field. Brock races back, way back. He climbs the wall. That ball is gone.

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How to move from the passive voice to the active voice? One strategy is **to allow objects to act**.

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How to move from the passive voice to the active voice? One strategy is **to allow objects to act**. But, be careful.

How does the following sentence can be rewritten?

The voltage was shown on the oscilloscope.

- The oscilloscope **calculated** the voltage .?
- The oscilloscope **displayed** the voltage .?
- The oscilloscope **measured** the voltage .?

# Select the natural voice

In general, the active voice occurs in scientific documents as following:

- This paper *presents* ...
- Figure 1 *shows* ...
- The test setup *included* ...
- Experiments *yielded* results ...
- The results *indicate* that ...

# Select the natural voice

A second strategy for transforming passive voice to active voice is to use the first person (I or we).

It saves us from examples such as:

- In this paper, the authors assumed that all collisions were elastic ...
- It was determined that ...
- It was decided that ...
- It was attributed to ...

In cases where we make an **assumption** or **decision**, the first person is not only natural but **expected**.

# Select the natural voice

Consider an example in which the writers should have used the first person, but did not:



In that an effort to identify a specific control circuit responsible for the failure of the gear box was unsuccessful, it was determined appropriate to resurvey the collector field for torque tube damage.



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In that an effort to identify a specific control circuit responsible for the failure of the gear box was unsuccessful, it was determined appropriate to resurvey the collector field for torque tube damage.

They shirked responsibility both for not finding what caused the gear box failure and for authorizing another survey of the field.



Because we could not locate the control circuit responsible for the gear box failure, we surveyed the collector field again for damage to the torque tubes.

# Select the natural voice

When using the first person, how do you keep the emphasis on the work and not the person(s) doing the work?

- reserve the use of the first person for those occasions in which your role in the work is important: for instance, when you assumed, measured, or decided.
- avoid placing the first person (either I or we) as the beginning word of a sentence because that position receives heavy emphasis.

For example:

To test this process, we performed experiments in flow tubes.

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Look yet again at the example that began this section:



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A new process for eliminating nitrogen oxides from diesel exhaust engines is presented. Flow tube experiments to test this process are discussed. The percentage decrease in nitrogen oxide emissions is revealed.



This paper presents a new process for eliminating nitrogen oxides from diesel exhaust engines. To test this process, we performed experiments in flow tubes. These experiments revealed a 99 percent decrease in nitrogen oxide emissions.

## Rely on concrete nouns

While verbs infuse sentences with energy, **nouns provide stepping stones to allow readers to stay on course.** When your nouns are vague, the audience has difficulty in navigating the sentence:



The existing nature of Mount St. Helens' volcanic ash spewage was handled through the applied use of computer modeling capabilities.

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The nouns in this example—nature are weak: spewage, use, and capabilities.



With supercomputers, we modeled how much ash spewed from Mount St. Helens.

Notice that the nouns and pronoun in this revision provide stepping stones for readers to navigate the sentence: supercomputers, we, ash, and Mount St. Helens

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In general, reducing the number of abstract nouns will strengthen your writing. Here is a short list of abstract nouns that often bad into scientific writing:

- ability
- approach
- capability
- concept
- environment
- factor
- nature
- parameter



# Rely on concrete nouns

We should anchor the abstract noun with a concrete definition or example:

This study considered three methods for detecting plastic explosives in airline baggage: ion mobility spectrometry, x-ray backscatter, and thermal neutron activation. To evaluate these three methods, we used four criteria: cost of the method, effectiveness of the method at identifying a plastic explosive, speed of the method at processing baggage, and ease of use for the method.

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Because the writer grounded the abstract nouns *methods* and *criteria* with concrete examples, the writer made these abstract nouns concrete for the remainder of the document.

# Be concise

Being concise not only sustains the energy but also clarifies the meaning. Some ways to achieve conciseness in scientific writing are:

- eliminate redundancies;
- eliminate writing zeroes;
- reduce phrases to simplest forms.

# Eliminate redundancies

Being concise not only sustains the energy but also clarifies the meaning.

- already existing
- alternative choices
- at the present time
- basic fundamentals
- completely eliminate
- continue to remain
- currently being
- currently underway
- empty space
- had done previously
- introduced a new
- mix together
- never before
- none at all
- now at this time
- period of time
- private industry
- separate entities
- start out
- still persists

# Eliminate writing zeroes

A second way to become concise is to eliminate writing zeroes, which are empty phrases that provide no information to your readers.

What do you think about the following excerpt?

It is interesting to note that more than 90 incidents of satellite fragmentations have produced more than 36,000 kilograms of space debris.

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# Eliminate writing zeroes

Sometimes, writing zeroes raise undesirable questions. Consider the following example:

The requirements to be met for the detection system of plastic explosives include a detection rate of at least 95 percent and a false alarm rate of less than 5 percent.

The writing zero “to be met” is dangerously superfluous. It implies that requirements exist which will not be met.

# Eliminate writing zeroes

Some common writing zeroes are

- as a matter of fact
- I might add that
- it is noteworthy that
- it is significant that
- it should be pointed out that
- the course of
- the fact that
- the presence of



# Eliminate writing zeroes

Consider the following example:

What do you think?

Vibration measurements made in the course of the rocket's flight test program were complicated by the presence of intense high-frequency excitation of the vehicle shell structure during the re-entry phase of the flight. (33 words)

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Vibration measurements made during the missile's flight test were complicated by intense high-frequency excitation of the vehicle shell during re-entry. (20 words)