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ACS WEBINARS™ February 3, 2011



Fundamentals of Effective Scientific Writing – Manuscripts and Grants



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Some examples to start...

- This was the lead sentence of an article in an oncology journal:
- “Adoptive cell transfer (ACT) immunotherapy is based on the ex vivo selection of tumor-reactive lymphocytes, and their activation and numerical expression before reinfusion to the autologous tumor-bearing host.”
- Ask Yourself:
 - Is this sentence easy to understand?
 - Is this sentence enjoyable and interesting to read?

Another fun example...

- From an article in a chemistry journal:
- “These findings imply that the rates of ascorbate radical production and its recycling via dehydroascorbate reductatse to replenish the ascorbate pool are equivalent at the lower irradiance, but not equivalent at higher irradiance with the rate of ascorbate radical production exceeding its recycling back to ascorbate.”
- Is this sentence readable?
- Is it written to inform or to obscure?

After much work on my part, I translated this too...

- “These findings imply that, at low irradiation, ascorbate radicals are produced and recycled at the same rate, but at high irradiation, they are produced faster than they can be recycled back to ascorbate.”

A classic hallmark of “academic writing”: spunky verbs become clunky nouns...

- “Adoptive cell transfer (ACT) immunotherapy is based on the ex vivo selection of tumor-reactive lymphocytes, and their activation and numerical expression before reinfusion to the autologous tumor-bearing host.”
- “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 ascorbate radical production exceeding its recycling back to ascorbate.”

Fundamentals of Effective Writing

- “The secret of good writing is to strip every sentence to its cleanest components. Every word that serves no function, every long word that could be a short word, every adverb that carries the same meaning that’s already in the verb, every passive construction that leaves the reader unsure of who is doing what—these are the thousand and one adulterants that weaken the strength of a sentence. And they usually occur in proportion to the education and rank.”
- -- William Zinsser in *On Writing Well*, 1976

Principles of effective writing...

Today's lessons:

- 1. Cut unnecessary words and phrases; learn to part with your words!
- 2. Follow: subject + verb + object (*active voice*)
- 3. Write with verbs: use strong verbs, avoid turning verbs into nouns, and don't bury the main verb!

Don't be afraid to cut!

- 1. Cut unnecessary words and phrases

Cut unnecessary words

Example:

~~"This paper provides a review of the basic tenets of cancer biology study design, using as examples studies that illustrate the methodologic challenges or that demonstrate successful solutions to the difficulties inherent in biological research."~~

"This paper reviews cancer biology study design, using examples that illustrate specific challenges and solutions."

Cut unnecessary words

Example:

~~“As it is well known, increased athletic activity has been related to a profile of lower cardiovascular risk, lower blood pressure levels, and improved muscular and cardio-respiratory performance.”~~
is associated with fitness.

→

“Increased athletic activity is associated with lower cardiovascular risk, lower blood pressure, and improved fitness.”

“Increased athletic activity lowers cardiovascular risk and blood pressure, and improves fitness.” (stronger level of evidence)

Cut unnecessary words

Hunt down and cast out all unneeded words that might slow your reader.

- Dead weight words and phrases (“as it is well known”, “as it has been shown”, “it can be regarded that”)
- Empty words and phrases (“basic tenets of”, “methodologic”)
- Long words or phrases that could be short (“muscular and cardiorespiratory performance”)
- Unnecessary jargon (“muscular and cardiorespiratory performance”)
- Repetitive words or phrases (illustrate/demonstrate; challenges/difficulties)
- Adverbs (very, really, quite, basically, generally)

Long words and phrases that could be short...

Wordy version

- A majority of
- A number of
- Are of the same opinion
- Less frequently occurring
- All three of the
- Give rise to
- Due to the fact that
- Have an effect on

Crisp version

- most
- many
- agree
- rare
- the three
- cause
- because
- affect

Cut unnecessary words

- Be vigilant and ruthless
- After investing much effort to put words on a page, we often find it hard to part with them.

But fight their seductive pull...

- Try the sentence without the extra words and see how it's better—conveys the same idea with more power

Cutting extra words

Example:

“Brain injury incidence shows two peak periods in almost all reports: rates are the highest in young people and the elderly.”

More punch→

“Brain injury incidence peaks in the young and the elderly.”

Use active voice

- 2. Follow: subject + verb + *object*
(*active voice!*)

Use active voice

“Subject verb object”

“Subject verb object”

“Subject verb object”

“Subject verb object”

or just...

“Subject verb”

Use active voice

The passive voice....

- Object-Verb-Subject or just Object-Verb
- Classic example: “Mistakes were made.”
- Passive verb = a form of the verb “to be” + the past participle of the main verb
- The main verb must be a transitive verb (that is, take an object).

Use active voice

Examples...

Passive:

My first visit to Boston will always be
remembered by me.

Object

Verb

Subject

Active:

I will always remember my first visit to Boston.

From: *Strunk and White*

Use active voice

"Cigarette ads were designed to appeal especially to children."

vs.

We designed the cigarette ads to appeal especially to children."

Responsible party!

Use active voice

Passive:

General dysfunction of the immune system has been suggested at the leukocyte level in both animal and human studies.

→

Active:

Both human and animal studies suggest that diabetics have general immune dysfunction at the leukocyte level.

Use active voice

Passive:

Increased promoter occupancy and transcriptional activation of p21 and other target genes were observed.

→

Active:

We observed increased promoter occupancy and transcriptional activation of p21 and other target genes.

Use strong verbs

- 3. Write with verbs:
- use strong verbs
- avoid turning verbs into nouns
- don't bury the main verb

Use strong verbs

Verbs make sentences go!

Compare:

“Loud music came from speakers embedded in the walls, and the entire arena moved as the hungry crowd got to its feet.”

With:

“Loud music exploded from speakers embedded in the walls, and the entire arena shook as the hungry crowd leaped to its feet.”

Latter sentence from the novel: *Bringing Down the House*, Ben Mezrich

Use strong verbs

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With:

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Latter sentence from the novel: *Bringing Down the House*, Ben Mezrich

Don't turn verbs into nouns

Don't kill verbs by turning them into nouns.

Don't turn verbs into nouns

Example:

During DNA damage, recognition of H3K4me3 by ING2 results in recruitment of Sin3/HDAC and repression of cell proliferation genes.

Don't turn verbs into nouns

Example:

During DNA damage, recognition of H3K4me3 by ING2 results in recruitment of Sin3/HDAC and repression of cell proliferation genes.

→

During DNA damage, H3K4me3 recruits ING2 and Sin3/HDAC, which together repress cell proliferation genes.

Say exactly who does what to whom!

Don't turn verbs into nouns

Weak verbs

Obtain <u>estimates</u> of	estimate
Has seen an <u>expansion</u> in	has expanded
Provides a methodologic <u>emphasis</u>	emphasizes methodology
Take an <u>assessment</u> of	assess

Formerly
spunky verbs
transformed
into boring
nouns

Don't turn verbs into nouns

Provide a <u>review</u> of	review
Offer <u>confirmation</u> of	confirm
Make a <u>decision</u>	decide
Shows a <u>peak</u>	peaks

Don't bury the main verb

Keep the subject and main verb (predicate) close together at the start of the sentence...

- Readers are waiting for the verb!

Don't bury the main verb

The case of the buried predicate...

subject

One study of 930 adults with multiple sclerosis (MS) receiving care in one of two managed care settings or in a fee-for-service setting found that only two-thirds of those needing to contact a neurologist for an MS-related problem in the prior 6 months had done so (Vickrey et al 1999).

predicate

Don't bury the main verb

The case of the buried predicate...

One study found that, of 930 adults with multiple sclerosis (MS) who were receiving care in one of two managed care settings or in a fee-for-service setting, only two-thirds of those needing to contact a neurologist for an MS-related problem in the prior six months had done so (Vickrey et al 1999).

Take-home messages

Effective scientific writing conveys an idea clearly and concisely. It should not be difficult to read.

Three key principles of effective writing:

- 1. Cut all unnecessary words and phrases.
- 2. Use the active voice (subject-verb-object).
- 3. Write with verbs.

Further resources

- **Books on writing:**
 - *On Writing Well*, William Zinsser
 - *The Elements of Style*, Strunk and White
 - *Sin and Syntax*, Constance Hale
- **Books on scientific writing:**
 - *Essentials of Writing Biomedical Research Papers*, Mimi Zeiger
 - *Successful Scientific Writing: A Step-by-Step Guide for the Biological and Medical Sciences*, Matthews and Matthews
- **Tips from journals:**
 - http://www.nature.com/authors/author_resources/how_write.html
- **Editorials:**
 - Friedman GD. Be kind to your reader. *Am J Epidemiol.* 1990 Oct;132(4):591-3.
- **Further slides on manuscript writing:**
 - www.stanford.edu/~kcobb/courses/writing

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Q&A SESSION



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Dr. Ben Swartz & Dr. Sarah Tolbert, UCLA



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Martin Lawler, Lawler & Lawler

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