

Scientific Writing

- "In science, the credit goes to the man who convinces the world, not to the man to whom the idea first occurs."
--Sir William Osler

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- "Writing is an art. But when it is writing to inform it comes close to being a science as well."
- --Robert Gunning, *The Technique of Clear Writing*

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- Lecture One: Introduction
- What makes good writing?
- What does it take to be a good writer?

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■ What makes good writing?

- 1. Good writing communicates an idea clearly and effectively.
 - 2. Good writing is elegant and stylish.

Takes having something to say and clear thinking.

Takes time, revision, and a good editor!

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- What makes a good writer?
 - Inborn talent?
 - Years of English and humanities classes?
 - An artistic nature?
 - The influence of alcohol and drugs?
 - Divine inspiration?

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What makes a good writer (outside of poets, maybe):

- Having something to say.
- Logical and clear thinking.
- A few simple, learnable rules of style (the tools we'll learn in this class).

Take home message: Clear, effective writing can be learned!

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How much can you improve your writing in one short quarter?

- A lot!
- In addition to taking this class, other things you can do to become a better writer:
 - Read, pay attention, and imitate.
 - Let go of “academic” writing habits (deprogramming step!)
 - Talk about your research before trying to write about it.
 - Develop a thesaurus habit. Search for the right word rather than settling for any old word.
 - Respect your audience—try not to bore them!
 - Stop waiting for “inspiration.”
 - Accept that writing is hard for everyone.
 - Revise. Nobody gets it perfect on the first try.
 - Learn how to cut ruthlessly. Never become too attached to your words.
 - Find a good editor!

Scientific Writing Reading list

**Read, pay attention, and imitate.

My favorite sources of good writing...

- *The New Yorker*
- *The New York Times*
 - *How many read the NY Times Tuesday Science section?*
- *Nature*
- *Science*

- Expect to see examples from these sources throughout this course!

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- Clear writing starts with clear thinking.

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Before you start writing, ask:

“What am I trying to say?”

- When you finish writing, ask:

“Have I said it?”

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Once you know what you're trying to say,
then pay attention to your words!

Today's lesson: Strip your sentences to just
the words that *tell*.

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- [The Elements of Style](http://www.bartleby.com/141/), **William Strunk Jr.**
(available online at:
<http://www.bartleby.com/141/>):
- “Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should have no unnecessary lines and a machine no unnecessary parts. This requires not that the writer make all his sentences short, or that he avoid all detail and treat his subjects only in outline, but that every word tell.”

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- “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

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- Famous Example:

- “Such preparations shall be made as will completely obscure all Federal buildings and non-Federal buildings occupied by the Federal government during an air raid for any period of time from visibility by reason of internal or external illumination.”
- (from a government blackout order in 1942)

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- FDR's response:
 - “Tell them that in the buildings where they have to keep the work going to put something across the windows.”

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- Example 2:

- “Objective consideration of contemporary phenomena compels the conclusion that success or failure in competitive activities exhibits no tendency to be commensurate with innate capacity, but that a considerable element of the unpredictable must invariably be taken into account.”

(example by George Orwell; quoted in Sin and Syntax)

Another example: A sentence 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 ascorbate radical production exceeding its recycling back to ascorbate.”

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Today's introduction to writing well:

Words:

- 1. Reduce dead weight words and phrases
- 2. Cut, cut, cut; learn to part with your words
- 3. Be specific

Sentences:

- 4. Follow: subject + verb + object (SVO)
- 5. Use strong verbs and avoid turning verbs into nouns
- 6. Eliminate negatives; use positive constructions instead

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Words

- 1. Reduce dead weight words and phrases
 - Get rid of jargon and repetition

“*Verbose* is not a synonym for *literary*.” --(Sin
and Syntax)

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Examples:

“I would like to assert that the author should be considered to be a buffoon.”



“The author is a buffoon.”

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Examples:

“The expected prevalence of mental retardation, based on the assumption of a normal distribution of intelligence in the population, is stated to be theoretically about 2.5%.”

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Scientific Writing

Examples:

“The expected prevalence of mental retardation, based on the assumption of a normal distribution of intelligence in the population, is stated to be theoretically about 2.5%.



“The expected prevalence of mental retardation, if intelligence is normally distributed, is 2.5%.”

Principles of Effective Writing

Examples:

“To control infection with *Mycobacterium tuberculosis* (M. tb), a robust cell-mediated immune response is necessary, and deficiency in this response predisposes an individual towards active TB.”



“Deficiency in T-cell-mediated immune response predisposes an individual to active TB.”

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Examples:

“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.~~” ^{and}

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

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Examples:

is associated with

~~“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.”~~
fitness.

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

Or just:

“Increased athletic activity is associated with improved cardiovascular health.”

Or, use verbs:

Increased athletic activity reduces cardiovascular risk and improves cardiovascular performance.

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

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**Very, really, quite, basically,
generally**

These words seldom add anything useful. Try the sentence without them and see if it improves.

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Watch out for the verb “to be”

Often “there are” is extra weight.

- There are many students who like writing.
 - Many students like writing.

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Dead weight phrases

- in the event that
- in the nature of
- it has been estimated that
- it seems that
- the point I am trying to make
- what I mean to say is
- it may be argued that

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Dead weight phrases

- for the most part
- for the purpose of
- in a manner of speaking
- in a very real sense
- in my opinion
- in the case of
- in the final analysis

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Clunky phrase

Equivalent

- All three of the the three
- Fewer in number fewer
- Give rise to cause
- In all cases always
- In a position to can
- In close proximity to near
- In order to to

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Beware of clunky words that sneak in:

Beware of

Use instead

- Assistance help
- Utilize use
- Numerous many
- Facilitate ease
- Individual man or woman
- Remainder rest
- Initial first
- Implement do
- Sufficient enough

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Beware of

- Attempt
- Referred to as
- With the possible exception of
- Due to the fact that
- He totally lacked the ability to
- Until such time as
- For the purpose of

Use instead

try
called
except
because
he couldn't
until
for

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Beware of

- Investigate study
- Optimum best
- Indicate show
- Initiate start
- Currently now
- Facilitate help
- Endeavor try
- Ascertain find out

Use instead

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<u>Wordy</u>	<u>To the point</u>
at 3 am in the morning	3 am
absolutely spectacular	spectacular
a person who is honest	an honest person
a total of 14 birds	14 birds
autobiography of her life	biography
circle around	circle
due to the proximity	proximity
completely unanimous	unanimous
in agreement / consensus of opinion	consensus
cooperate together	cooperate
each and every	each
the result	result
there is a man who	he

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Wordy

in spite of the fact that

in the event that

new innovations

one and the same

period of four days

personally, I think/feel

personal opinion

refer back

repeat again

revert back

shorter/longer in length

en previously found

Pointed

although

if

innovations

the same

four days

I think/feel

opinion

refer

repeat

revert

shorter/longer

had been found

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Wordy

small/large in size
square/round/rectangular in shape
surrounded on all sides
surrounding circumstances
the future to come
there is no doubt but that
usual/habitual custom
unexpected surprise

Pointed

small/large
square/round/rectangular
surrounded
circumstances
the future
no doubt
custom
surprise

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Constantly be on the lookout for extraneous words that crop up like weeds....

Ask yourself, is this word or phrase necessary?

What happens if I take it out?

Most of the time, you'll find you don't need it!

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- 2. Cut, cut, cut; learn to part with your words

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DON'T BE AFRAID TO CUT

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- 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

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- Parting with your words...

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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.”

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- 3. Be specific

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- “Prefer the specific to the general, the definite to the vague, the concrete to the abstract.” --*Strunk and White*

- **“Some words and phrases are blobs.”**
--*Zinsser*

- Vague: A period of unfavorable weather set in.

- Specific: It rained every day for a week.

- Vague: He showed satisfaction as he took possession of his well earned reward.

- Specific: He grinned as he pocketed the coin.

(from *Strunk and White*)

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Use specific nouns and specific verbs and specific details....

Vague nouns:

Problem, situation, approach, method, reaction, component, technique, solution, challenge, difficulty

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Vague:

In proportion as the manners, customs, and amusements of a nation are cruel and barbarous, the regulations of its penal code will be severe.

Specific:

In proportion as men delight in battles, bullfights, and combats of gladiators, will they punish by hanging, burning, and the rack.

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Sentences

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

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For now, just beat the following into your head...

“Subject verb object”

“Subject verb object”

“Subject verb object”

“Subject verb object”

or just...

“Subject verb”

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The active voice vs. the passive voice.

We'll see this again and again and again...

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- In passive-voice sentences, the subject is acted upon; the subject doesn't act.
- 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).

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

vs.

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



Responsible party!

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- 5. Use strong verbs and avoid turning verbs into nouns

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A sentence uses one main verb to convey its central action; without that verb the sentence would collapse.

The verb is the engine that drives the sentence.
Dull, lifeless verbs slow the sentence down.

Action verbs reflect the action they were chosen to describe, and help bring the reader into the story.

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Pick the right verb!

The WHO reports that approximately two-thirds of the world's diabetics are found in developing countries, and estimates that the number of diabetics in these countries will double in the next 25 year.



The WHO estimates that two-thirds of the world's diabetics are found in developing countries, and projects that the number of diabetics in these countries will double in the next 25 years.

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Don't kill verbs and adjectives by turning them into nouns.

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Weak verbs

Obtain estimates of

estimate

Has seen an expansion in

has expanded

Provides a methodologic emphasis

emphasizes methodology

Take an assessment of

assess

Formerly
spunky verbs
transformed
into boring
nouns

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Provide a review of

review

Offer confirmation of

confirm

Make a decision

decide

Shows a peak

peaks

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- 6. Eliminate negatives; use positive constructions instead

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- He was not often on time
 - He usually came late.
- She did not think that studying writing was a sensible use of one's time.
 - She thought studying writing was a waste of time.

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Recap:

- 1. Reduce dead weight words and phrases
- 2. Cut, cut, cut; learn to part with your words
- 3. Be specific

- 4. Follow: subject + verb + object (active voice!)
- 5. Use strong verbs and avoid turning verbs into nouns
- 6. Eliminate negatives; use positive constructions instead

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Let's dissect this sentence:

- “It should be emphasized that these proportions generally are not the result of significant increases in moderate and severe injuries, but in many instances reflect mildly injured persons not being seen at a hospital.”

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Dead weight!!

- It should be emphasized that these proportions generally are not the result of significant increases in moderate and severe injuries, but in many instances reflect mildly injured persons not being seen at a hospital.

Can we use a more informative adjective than a pronoun? What's important about "these" proportions?

More dead weight.

Ask yourself, what does the sentence lose without this qualifier?

Principles of Effective Writing



“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.”

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Top 5:

1. The word “data” is plural.

- ex: *These data are important.*

The data are important.

(v. *datum*, singular form)

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Top 5:

2. Affect v. effect

- Affect is the verb “to influence”
 - *The class affected her.*
 - As a noun, affect denotes feeling or emotion shown by facial expression or body language, as in “The soldiers seen on television had been carefully chosen for blandness of affect” (Norman Mailer).
- Effect is the noun form of this influence
 - *The class had an effect on her.*
 - As a verb, effect means to bring about or to cause, as in “*to effect a change*”

Example: recent headline...

- ~~Terrorist Plots Effect~~ the Beauty Industry

Correct:

Terrorist Plots Affect the Beauty Industry

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Top 5:

3. More than v. over

Do not use over to describe relative amounts.

- More than = greater than
- Over = physically above
- wrong: *She raised over \$500.*
- right: *She raised more than \$500.*

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Top 5:

4. Compared to v. compared with

- Compare to = to point out *similarities* between different things
- Compare with** (used more often in science) = to point out *differences* between similar things

ex: “*Shall I compare thee to a summer’s day?*”

ex: *Brain tumors are relatively rare compared with more common cancers, such as those of the lung, breast, and prostate.*

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Top 5:

5. That v. which

“That” is the restrictive (defining) pronoun

“Which” is the nonrestrictive (non-defining) pronoun

What’s the difference between these two?→

The vial that contained her DNA was lost.

The vial, which contained her DNA, was lost.

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Top 5:

That/which

that

Example: *Other disorders ~~which~~ have been found to co-occur with diabetes include heart disease and foot problems.*

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More on that/which

- Key question: Is your clause essential or non-essential?
 - THAT: The essential clause cannot be eliminated without changing the meaning of the sentence.
 - WHICH: The non-essential clause can be eliminated without altering the basic meaning of the sentence (and must be set off by commas).

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Preview to next time...

- Next time you read a newspaper, pay attention to the following:
 - 1. How many letters are in an average word?
 - 2. How many words are in an average sentence?
 - 3. How many sentences are in an average paragraph?