

# Writing Tips and Traps: How to Compete for a Reader's Time (and Grant Money)

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# Writing Tips

*“It is an old observation that the best writers sometimes disregard the rules of rhetoric. When they do so, however, the reader will usually find in the sentence some compensating merit, attained at the cost of the violation.”*

-- William Strunk, Jr., *The Elements of Style* (1918)

# Tightening Text

Wordy text demands more time and energy than your reader may be prepared to invest.

Economy of expression rewards your reader and keeps him or her reading.

Brevity demands *your* time and energy.

*"I have written you a long letter because I did not have time to write a short one."*

- Blaise Pascal

# Let's Do the Tighten Up

Avoid the verb “to be” in all its forms: is, was, are, am, will be, have been, etc.

In many problems, one wants to track an interface propagating with complex physics through a medium. In several of these calculations, a great deal of resolution **is** often required. For example, to accurately compute turbulent combustion processes, the amount of resolution required **is** infeasible for many practical uses. Tracking the full set of kinetics and chemistry **is** impractical if one wants to embed this problem into more complex problems, such as in boilers, furnaces, or internal combustion engines. An attractive alternative **is** to use highly resolved specialized calculations to build models that can capture the correct multi-scale physics inside a far larger calculation.

My research **is** in developing adaptive mesh, high order level set methods, to track moving interfaces in combustion fluid flow solvers, in

order to design such models. Level set methods **are** powerful techniques that implicitly track moving interfaces as the zero level set of a function, which is evolved by solving an initial value problem. The main advantage of using this Eulerian framework **is** that the interface location is precisely calculated even when sharp corners develop, which **is** critical when the behavior depends on its geometry. In order to properly capture the chemistry of a system, the behavior of the interface must be carefully coupled with the flow solvers. In particular, we need to understand the mathematics of how to match chemistry inside the flame front to a macro-model across the flame front. This will require multi-scale analysis, homogenization theory, and an understanding of the interaction of the flame geometry with transport of curvature and species. While a few specialized adaptive versions have been built, my goal **is** to provide a complete methodology to solve a host of fluid problems, including simulation of boilers and combustion furnaces, mantle convection, and type Ia supernovae flames.

## Instead, use clauses to replace “is.”

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# Remove unnecessary words

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# How Are We Doing?

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## Further refinements: More targets?

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For example, **to compute** turbulent combustion processes, **infeasible for practical uses**, the amount of resolution required . . . . **Impractical when embedding this problem into more complex problems**, such as in boilers, furnaces, or internal combustion engines, tracking the full set of kinetics and chemistry . . . . An attractive alternative, using highly resolved specialized calculations to **build models that can** capture the **correct** multi-scale physics inside a far larger calculation . . . .

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297 words → 207 Length reduced by 30%

Calculations to track an interface propagating with complex physics, for example, turbulent combustion processes through a medium, often require resolutions infeasible for practical uses, for example, tracking the full set of kinetics and chemistry in boilers, furnaces, or internal combustion engines. An attractive alternative uses highly resolved specialized calculations to capture the correct multi-scale physics inside a far larger calculation.

My research develops adaptive mesh, high-order level set methods to track moving interfaces in combustion fluid flow solvers. Level set methods implicitly track moving interfaces as the zero level set of a function, evolved by solving an initial value problem. The interface location is calculated precisely, even when sharp corners develop: the main advantage of using this Eulerian framework, and critical when the behavior depends on its geometry. To capture the chemistry inside the flame front, interface behavior must be coupled with the flow solvers. Matching the internal chemistry to a macro-model across the flame front will require multi-scale analysis, homogenization theory, and an understanding of the interaction of flame geometry with transport of curvature and species. Although specialized adaptive versions have been built, my goal -- a complete methodology to solve fluid problems -- would simulate boilers, combustion furnaces, mantle convection, and type Ia supernovae flames.

# Target words for tightening:

- “Existing” – Most things exist. With the possible exception of loans or agreements, have a good reason to mention this unremarkable quality.
- “I think that,” “We believe,” “It is our opinion that” – These words often are unneeded, I think.
- “Obviously,” “clearly” – If accurate, these words (and perhaps entire sentences they introduce) may go without saying.

- “Robust” – Substitute “swell,” “grand,” “strong,” or “remarkable.” Then delete.
- “Not only ... but also” – Often a simple “and” will do.
- “Furthermore,” “Also” – As sentence openers, these are tacitly assumed.
- “Represents,” “constitutes” – often used as fancy substitutes for “is.” See above.



- “Utilize” – “use” is shorter.
- “Indeed” – same category as “forsooth,” “verily,” “really,” “honestly,” and “truly.” Unless you have been lying and want to indicate a contrast, these are conversational fill words.
- “Totally” and “completely” – Like totally extraneous filler.

# The “from . . . to . . .” trap

- Sentences using this structure often end up causing trouble. “The typical country store has everything from overalls to baby chicks, from soda pop to fly paper, from pickled pigs feet to canning jars.”
- Where are we going with this? The list is incomplete, so why did it stop? Then again, we can’t list everything in the store. We are trapped in arbitrariness.

IF there are defined boundaries – e.g., of scale (“from quarks to galactic clusters”), time (“from dawn to midnight”), sequence (“A to Z”), or development (“from cradle to grave”) – the writer can achieve meaningful closure.

Otherwise, heading down the “from . . . to . . .” path leads to trouble in nearly every kind of writing, from reports to essays, to articles, to grant applications, to ransom notes, to . . . . you name it.

# A more general principle: Don't open a "can of worms"

- Since you can't explain the entire history of your topic, how much background should you include?
- Three questions: How much do your readers *\*want\** to know? How much *\*should\** they want to know? How much do they *\*need\** to understand you?
- Only the answer to question #3 should concern you.

# How smart is my reader?

Who are you writing for? As you write, keep before you a mental picture of the reader: the reason you write.

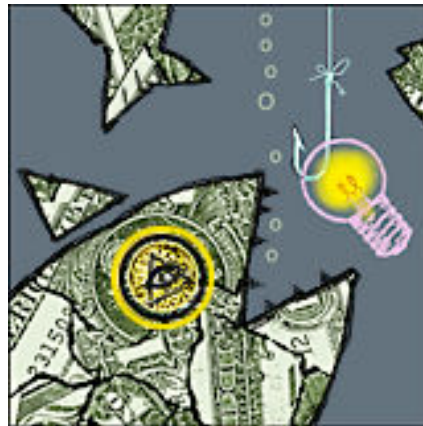
Your reader may be ignorant of your topic and possibly your field of specialization, but should be presumed intelligent and generally educated.

Unfortunately, specialists often begin with a patronizingly elementary lead sentence or two, “Tensors are important in physics and engineering.”

Then drag the unsuspecting reader into an impenetrable thicket: “In the field of diffusion tensor imaging, for instance, a tensor quantity that expresses the differential permeability of organs to water in varying directions is used to produce scans of the brain; in this technique tensors are in effect made visible.” (Wikipedia, “Tensor”)

# Idea Teleportation

Rely on your reader's mental models as storehouses of thousands of words at your disposal. Examples and analogies unlock those storehouses.



# Example Example

A concrete example helps explain the difference between weight and mass:

“The hinges holding up the heavy door of a bank safe make it ‘weightless,’ but the inertia of its mass requires force to move the door.”



Use analogies and comparisons to tap your reader's (existing) mental models to abbreviate explanation.

- “Flying a helicopter is like driving a car with a manual transmission, except with three clutches instead of just one.”
- “Teaching people how to write is like teaching people to swim: without a tangible context, instruction is abstraction.”

## More analogies

- “Your car’s suspension is a lot like a pogo stick, without the stick.”
- “DNA can be compared to a chemical zipper, with each open half-zipper acting like a mold to cast its opposing half-zipper in RNA. RNA strands then float off to become molds for the original DNA half-zipper, or zipper pieces.”

≠

Analogies by definition are imperfect copies; a source of both strength and weakness. A poor or stretched analogy can confuse.

“Chess is just like checkers, except that the pieces, with the possible exception of pawns when capturing, move completely differently.”

Did that help?

Make sure your audience gets the reference:

- “A burrito is exactly like a crepe Suzette except without the Grande Marnier, and using a flour tortilla plus refried beans.”
- “A maglev train is propelled just like an electric motor, except the stator is laid out flat and the rotor (the train) moves forward instead of rotating.”

If you can identify an analog of your idea in the reader's mind, he or she becomes your ally in comprehension of the unfamiliar. "Prison inmates use cigarettes like money."

# Exercise:

Can anyone offer an analogy or simile to explain a Blackberry?



(Nuts and Bolts)

## Quotation marks

- Commas and periods go inside quotation marks.
- Colons, semicolons, question marks and exclamation points go outside, unless part of the original quote:
- Instead of “true blue,” do consumers now want “genuine green”?
- The particles get their name from Joyce’s “Three quarks for Muster Mark!”
- Proceed normally unless the label is marked “radioactive,” “flammable,” or “biohazard.”

# That vs. Which

Use “that” for restrictive clauses:

- “This is the car that I bought yesterday.”

“That” introduces crucial identifying information that restricts which car we are talking about.

Use “which” for nonrestrictive clauses:

- “This car, which I bought yesterday, is very economical.”

“Which” flags non-restrictive, parenthetical information; usually set off by commas.

*Examples from: Prentice-Hall Handbook for Writers, 7<sup>th</sup> Ed. (1978)*



# That and which

- The cat that I want has soft fur and a good attitude.
- The cat, which I want, has its own ideas about things.
- The cat that I want has not been born.

Make sure clauses modify  
(and typically, follow closely)  
the appropriate word:

- “The study will use samples prepared by undergraduate students, each weighing 50 grams.”
- “The sheriff stood wiping his neck on the courthouse steps.”

An actual story:

## **Man overboard refused help before shooting**

*Associated Press 7/22/2008*

“Police said Hirschfield apparently jumped off the boat voluntarily but did not know why.”

# Unclear referents

Unclear referents may involve pronouns, e.g., “he,” “she,” “it,” or “that,” “them,” etc. Take care in using “this,” “these,” etc. in a new sentence; their referent may be unclear.

Pronouns with unclear referents. The entire final paragraph of Strunk's 1918 Introduction to *The Elements of Style*:

“It is an old observation that the best writers sometimes disregard the rules of rhetoric. When they do so, however, the reader will usually find in the sentence some compensating merit, attained at the cost of the violation. Unless **he** is certain of doing as well, **he** will probably do best to follow the rules. After **he** has learned, by their guidance, to write plain English adequate for everyday uses, let **him** look, for the secrets of style, to the study of the masters of literature.”

“This” or “these” in a later sentence require the reader to remember and/or sort out the referent.

“Earthlike planets have been discovered orbiting nearby stars. **These** now number in the hundreds.”

Better: Use “this/these” to point back as amplifiers for new information:

“Earthlike planets have been discovered orbiting nearby stars. These rocky worlds, most too hot or too cold for liquid water, now number in the hundreds.”

# Space savers:

Semicolon “;” = “and” or “but”

Colon “:” = “is”

Legends

E.g., on a list of names with institutions, use  
“\*” “\*\*” etc. in the list, with a legend.

\* West Campus, University of Antarctica

\*\* Morbius Laboratory, Krell Science Annex,  
Forbidden Planet

# Quantify, quantify, quantify

Words such as “Many” “Very” “Etc.” reveal gaps in knowledge. Plug the gap or rephrase.

*“‘Many’ is a word that only leaves you guessing; guessing ‘bout a thing you really ought to know.”*

-- Led Zeppelin

*“Substitute ‘damn’ every time you’re inclined to write ‘very’; your editor will delete it and the writing will be just as it should be.”*

-- Mark Twain



# Myth America

“A note about ending a sentence with a preposition. Some believe there's something wrong with that. It's a myth. One can find sentences ending with preps in the lines of some of the finest writers in history: Chaucer, Swift, Kipling, Shakespeare and so on. ‘We are such stuff as dreams are made on’ -- Try rephrasing that line from *The Tempest*. See what inelegant glob results. This canard about no-prepositions-at-the-end belongs in the same dustbin as ‘Thou shalt not split an infinitive.’ So the next time people fault you for ending a sentence with a preposition, ask them: ‘What are you talking about?’”

-- Anu Garg A.Word.A.Day, Nov. 3, 2008

# Currently vs. Presently

- “Currently” = now
- “Presently” = soon

“Currently the Chair of chemistry, John presently will be Dean of the School.”

# While and Although

- “While” = during the time that, at the same time that
- While Rome burned, Nero fiddled.
- “While” may be used as conceding a fact, as with “although,” but it’s not always clear: “While I was working nights, I made time to go surfing.”

You surf at night?

# While vs. Although

“Although” = even though; in spite of the fact that

“While the sun is out, most owls rest, although some do hunt.”

“While the clock was ticking, he ignored it.”

vs.

“Although the clock was ticking, he ignored it.”

# Sit, set; lie, lay

Intransitive verbs don't require an object,  
(e.g., sit down, lie down)

Transitive verbs do (e.g., set down the  
book, lay down the blanket)

Most people get sit and set right; many get  
lie and lay wrong.

# Less vs. Fewer

Tip: If you can count the noun, use “fewer”

- Wrong: “Less people; fewer traffic.”
- Right: “Less flour; fewer pizzas.”
- Exercise: “This recording needs less cowbell!”
- “Over” vs. “More than” = similar
- “With temperatures over 120, more than 100 fainted.”

# Rules are boring.

Master them and then flout convention. It takes writing confidence to ruthlessly split an infinitive, or sneak in a preposition to end a sentence with.

Learn the blues; then rock and roll. Integrate the standard licks into your writing repertoire and then extemporize.

*“The Blues had a baby and they named it Rock and Roll.”*

-- Muddy Waters

# Writer's Block

We don't speak of "doing the dishes block." Start. The Muses can't descend until you do. Writing doesn't have to start out good, but it does have to start out.

If you really can't write, there is usually another problem. It could be the project concept ("The Fascinating History of Lint")

or just a bad start. You didn't start a sentence with the structure "from \_\_\_\_\_ to \_\_\_\_\_," did you? Bogged down in the introduction? Write the main argument or conclusion and come back.



# Writer's Block

It may be an audience issue. Are you writing for a particular person you dislike? Write it for someone else.

Identify the problem, and start.

*“Do or do not. There is no try.”*

- Yoda

# Golden Word Syndrome

After all that work, my writing must be a masterpiece. You wouldn't touch up the Mona Lisa or take a rock hammer to the Pieta (although a disturbed geologist did in 1972).

Think again. Good writing is good editing.

# Embrace criticism

Even the best editing stings and burns like Bactine on a sidewalk-scraped knee.

If you can find a good editor, listen and learn, and count your lucky stars.

If you can't find a good editor, find a friend with a mean streak.

# To invigorate your writing

- Identify a word at random, say “parsimonious,” or an item from Word a Day. Work it into your writing. Hint: it’s not the word that’s important.
- Use the “dream method.” Do your research, prepare your mind for writing, and then go to sleep, with the intention of writing when you awake. This works.

# To invigorate your writing

- Put a picture related to your topic in front of you as you write. This helps for technical subjects.
- If you are writing for a fee or for a grant, put some money in front of you.
- Take out words.
- Take out some more words.

# To invigorate your writing

Value clarity and economy of expression in writing as you do precision in thought.

Remember that you inherit a complex, powerful and beautiful language, a flame that gutters in the wind and burns only as brightly as the latest generation of writers and readers.

Be a keeper of the flame.

# Find the Words

The ability to write is not a gift. Although some writers are gifted, writing is a craft and an art that demands practice and persistence.

Some never find the words. I hope you find the words. A professor once wrote on my paper, “Your writing improves with every page.” Yours does, too.

## Find the Words

*“In the year of America's birth, in the coldest of months, a small band of patriots huddled by dying campfires on the shores of an icy river. The capital was abandoned. The enemy was advancing. The snow was stained with blood. At a moment when the outcome of our revolution was most in doubt, the father of our nation ordered these words be read to the people: ‘Let it be told to the future world...that in the depth of winter, when nothing but hope and virtue could survive...that the city and the country, alarmed at one common danger, came forth to meet [it].’”*

*-President Barack Obama, Inauguration Speech*



# Thanks for Listening



# Sources for Writers

- SCIENTIFIC WRITING

Day/Gastel, *How to Write and Publish a Scientific Paper* (Greenwood Press)

*Now in its 6th ed., considered by many scientists to be the definitive nuts & bolts guide to writing, organizing and submitting a scientific paper.*

## SCIENCE WRITING/COMMUNICATING RESEARCH

Montgomery, *The Chicago Guide to Communicating Science* (Chicago)

*Starts with basic principals of good writing and moves on to the nuts and bolts of scientific writing. A good, all-purpose guide for anyone who writes up science. (My scientist friend found this the most useful suggestion.)*

Blum/Knudson, *A Field Guide to Science Writing* (Norton)

*A compendium of essays covering a wide range of science writing but aimed for professional writers and journalists.*

Hancock, *Ideas into Words: Mastering the Craft of Science Writing* (Johns Hopkins)

*On the more creative aspects of communicating science, also primarily for people who get paid to write about science.*

## GENERAL

Strunk & White, *The Elements of Style*.

*A classic. And its execution follows its own advice -- it's a joy to read. It's been in print since it emerged, though you can find a copy at any good used book store. (Original is online at <http://www.bartleby.com/141/>)*

GENERAL (cont.)

Bremner, Words on Words: A Dictionary for Writers and Others Who Care About Words (Amazon has new and used copies, starting at \$1.25 <http://www.amazon.com/Words-John-B-Bremner/dp/0231044933> )

*John Bremner was a larger-than-life figure from down under who left the priesthood and ended up in the Midwest, a copy editing guru at the University of Kansas j-school. <http://www.journalism.ku.edu/school/bremner.shtml> This is his bible.*

Prentice-Hall Handbook for Writers 7<sup>th</sup> Edition 1978 (ISBN: 0136957676)  
Leggett, Glenn/Mead, C. David/Charvat, William

*Solid, reliable reference. Use ISBN number to find 7<sup>th</sup> edition, or get an older edition. The most recent edition, the 12<sup>th</sup>, is not as useful and has many more words.*

