


Write!
(as if your career depends on it)

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Write *for* your audience (the reader)

Some Simple Principles of Audience Design:

1. Omit needless words
2. Write text that *could* be spoken aloud
3. Write to be read
4. Organize top-down; use topic sentences (*global coherence*)
5. Pay attention to information flow (*local coherence*)
6. Beware of jargon; choose just the right word

Concluding advice for clear and lively scientific writing
Time allowing: more examples from GRFP applications

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Omit needless words

"The **main** purpose of any scientific article is to convey in the fewest **number of** words the ideas, procedures, and conclusions of an investigator **to the scientific community**. Whether **or not** this **admirable** aim is accomplished depends **to a large extent** on how skillful the author is in **assembling the words of** the **English** language."

(Gaafar, 1981, "Use, misuse and abuse of language in scientific writing", used as a bad example by Gregory, 1992)

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Omit needless words

"The purpose of any scientific article is to convey in the fewest words the ideas, procedures, and conclusions of an investigator. Whether this aim is accomplished depends on how skillful the author is in the language."

(Gaafar, 1981, "Use, misuse and abuse of language in scientific writing", used as a bad example by Gregory, 1992)

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On writing as you speak


(well, not exactly - just don't write anything that you would feel ridiculous saying out loud!)

Remember that text is different from speech.

"The following methodology was utilized."
 "The following method was used."
 "This is what I did."

(From William Deresiewicz, "You talking to me?"
The New York Times Book Review, Sunday, January 9, 2005, p. 27)

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A corollary to writing as you speak:
 Do not refer to yourself in the third person, or as the "royal we."


With no guidance, scientists may copy what they see, leading to atrocities like this:

'The author is of the opinion that it is appropriate to write scientific papers in the third person.'

This is ridiculous. *I* am the author, not a third person.

(Adapted from Gregory, 1992, p. 12)

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Do put yourself into the picture
 (especially for fellowships or CAREER proposals)

It's ok to use the pronoun "I"

Make it clear which good ideas are yours!
 Do not expect reviewers to know the literature well enough to make this inference on their own.

Hedge if necessary: *"To my knowledge, this is the first time this hypothesis has been tested."*

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Write to be read

From an actual article, quoted in Gregory, 1992:

"All of these measurements have wide ranges of values in both control (Doniach & Shiner, 1957; Butterworth & Perez-Santiago, 1958; Rubin et al., 1960a, 1960b Shiner & Doniach, 1960; Chacko, Job, Johnson, and Baker, 1961; Cameron et al., 1962; Jos, 1963; Yardley, Bayless, Norton, & Hendrix, 1962; Astaldi, Conrad, Ratto, & Costa, 1965; Madanagopalan et al., 1965; Swanson & Thomassen, 1965; Stewart, Pollock, Hoffbrand, mollin, & Booth, 1967; Pollock, Nagle, Jeejeebhoy, & Coghill, 1970) and coeliac (Rubin et al., 1960a; Shiner and Doniach, 1960; Chacko et al., 1961; Cameron et al., 1962; Jos, 1962; Yardley et al, 1962; Bolt, Parrish, French, & Pollard, 1964; Madanagopalan et al, 1965; Stewart et al., 1967; Hamilton, Lynch, and Reilly, 1969, Pollock et al, 1970) mucosae and the difference between the means are small."

<followed by 5 more citations>

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Write to be read

From an actual article, quoted in Gregory, 1992:

"All of these measurements have wide ranges of values in both control and coeliac mucosae, and the difference between the means are small."

9



Long sentences aren't the problem


The problem: Find the subject and the verb!

Recently, however, immunoprecipitation experiments with antibodies to purified, rotenone-sensitive NADH-ubiquinone oxido-reductase [hereafter referred to as respiratory chain NADH dehydrogenase or Complex I] from bovine heart, as well as enzyme fractionation studies, have indicated that six human URF's (that is, URF1, URF2, URF3, URF4, URF4L, and URF5, hereafter referred to as ND1, ND2, ND3, ND4, ND4L, and ND5) encode subunits of Complex I. This is a large complex that also contains many subunits synthesized in the cytoplasm.

*27 words!
3 hyphenated compound words!
lots of jargon!
-> and a jargon-filled complement clause packed w/ acronyms!*

(See this example and rewrites in Gopen & Swan, 1990)

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**Working memory is limited!
Help your reader chunk information.**


Don't front-load your sentences too heavily... Instead, split up lengthy preambles into bite-sized chunks.

From a colleague's email to a program officer, asking for advice:

"Although our investigation is at the level of physiological effects on individual coral organisms, since the focus is on reproduction and thus directly links to survival of the population and the reef habitat, and since we are looking at large scale climate effects (temperature and to a lesser extent interactive impacts of widespread hormonally active anthropogenic chemicals) the proposal has population and even ecosystem relevance. For this reason, we are also curious as to whether Biological Oceanography might be appropriate as a second reader of the proposal. We look forward to your comments.

EXERCISE: How would you split this up and rewrite it?

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**Working memory is limited!
Help your reader chunk information.**

Give appropriate weight to important points.

BEFORE


"The underlying neural correlates of these epigenetic processes are unknown and motivate this proposal."

AFTER

"The underlying neural correlates of these epigenetic processes are unknown. Discovering these correlates what motivates this proposal."

Don't just string important, distinct sentences together with "and". Breaking this into 2 sentences gives each the importance it deserves.

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Manage your reader's attention


Good writing has direction and momentum.
Note that these two sentences are headed in different directions.

"Lanie, who now walks with the help of braces, had polio as a child."
 "Lanie, who had polio as a child, now walks with the help of braces."

(Diana Hacker: "Do not subordinate major ideas")

Short sentence grab attention, especially after a long sentence.
 "People like to talk." *(in an NSF proposal opening)*

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Provide cues about where your paragraph is going.

BEFORE:

Large earthquakes along a given fault segment do not occur at random intervals because it takes time to accumulate the strain energy for the rupture. The rates at which tectonic plates move and accumulate strain at their boundaries are approximately uniform. Therefore, in first approximation, one may expect that large ruptures of the same fault segment will occur at approximately constant time intervals. If subsequent main shocks have different amounts of slip across the fault, then the recurrence time may vary, and the basic idea of periodic mainshocks must be modified. For great plate boundary ruptures the length and slip often vary by a factor of 2. Along the southern segment of the San Andreas fault the recurrence interval is 145 years with variations of several decades. The smaller the standard deviation of the average recurrence interval, the more specific could be the long term prediction of a future mainshock.

(Example from Gopen & Swan, 1990)

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Provide cues about where your paragraph is going.

AFTER:

Large earthquakes along a given fault segment do not occur at random intervals because it takes time to accumulate the strain energy for the rupture. The rates at which tectonic plates move and accumulate strain at their boundaries are roughly uniform. Therefore, nearly constant time intervals (at first approximation) would be expected between large ruptures of the same fault segment. However, the intervals at which earthquakes occur may vary; the basic idea of periodic mainshocks needs to be modified if subsequent mainshocks have different amounts of slip across the fault. In fact, the length and slip of great plate boundary ruptures often vary by a factor of 2. For example, the recurrence period along the southern segment of the San Andreas fault is 145 years with variations of several decades. The smaller the standard deviation of the average recurrence interval, the more specific a long-term prediction about a future mainshock can be.

(Example adapted from Gopen & Swan, 1990)


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Make your writing coherent

- Global coherence (the overall logic and organization of your proposal or paper)
- Local coherence (the ordering or flow of information, within and across sentences)


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Global coherence: Organize your proposal or paper top down, not bottom up

- Foreshadow and recap
- Use topic sentences that reflect each paragraph's "job"
- Provide cues about where the paragraph is going


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Local coherence:
Pay attention to information flow and packaging

- Prefer verbs to nouns
- Keep track of given and new information
- Use parallel structure
- Don't be afraid to use pronouns or ellipsis
- Maintain consistent perspective within a sentence: temporal, syntactic, lexical
(don't change perspective without a good reason – this is costly to the reader)

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Given and new information

The given/new "contract" (in English)
(Clark & Haviland, 1977)

- The known or presupposed or backward-linking information (AKA, the topic) goes at the beginning ("**Topic position**")
- The important point or new, forward-looking information (or punchline) goes at the end ("**Stress position**")

(See also Gopen & Swan, 1990)

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The all-important end of the sentence

Before:
"Understanding the specificity of X in the Y pathway can increase our knowledge of the mechanisms involved in choosing to label certain proteins for destruction among a variety of eukaryotic organisms."

After:
"Understanding the specificity of X in the Y pathway can increase our knowledge of the mechanisms involved in how eukaryotic organisms label certain proteins for **destruction.**"

*End a sentence with a strong word when possible!
Don't muffle important points with empty verbal flourishes or material that is obvious.*

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Hone your writing

I felt growing anticipation as I tore through the wrapping paper on the present in my lap, hoping it would be the doll I had been asking for for months. It was not; but the microscope I found in its place was more inspiring than the doll I desired could have been.

I felt growing anticipation as I tore through the wrapping paper, hoping it would be the doll I had wanted for months. It was not; but the microscope I found in its place was more inspiring than any doll.

You can make this more vivid (and readable) by leaving out obvious details (plus you can save some space).

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Use parallel structure

"It is unfortunately the norm in this society to expect a boy to be tough, aggressive, and independent, ~~while a girl is expected~~ and to expect a girl to be soft, passive, and dependent."

(Don't change syntactic perspective in the middle of a sentence.)

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Use parallel structure

Before:

"Cook (1935) found the percentage gain in the idle hand from practice with the other hand ranges from 60 to 89%, while Siipola (1935) reported a 34% gain from bilateral transfer."

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Use parallel structure

Before:

Don't make authors the topic! "Cook (1935) found the percentage gain in the idle hand from practice with the other hand ranges from 60 to 89%, while Siipola (1935) reported a 34% gain from bilateral transfer." vs.

These two phrases essentially mean the same thing!


Do you really need this jargon?

After:

No more jargon! "Transfer of training occurs from one hand to the other. The extent of this transfer ranges from 34% (Siipola, 1935) to 89% (Cook, 1935)."

Parallel structure makes this easier to understand.

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Use parallel structure

- to highlight contrasts or similarity.
- to provide continuity across sentences, paragraphs, or sections (highlights rhetorical structure).
- to make condensing easy.

(From "Writing Tricks of the Trade" slides by Michaela Kiernan)

- to help readers identify the new information and integrate it into their mental models, using the given information.

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Use parallel structure


- to achieve impact (without distraction)

"In matters of principle, stand like a rock;
in matters of taste, swim with the current."
- Thomas Jefferson

"This novel is not to be tossed lightly aside,
but to be hurled with great force."
- Dorothy Parker

Examples from Diana Hacker's *A Writer's Reference*

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Don't be afraid of using a pronoun or ellipsis!


Pronouns and ellipses confirm continuity of ideas.

The garbage had to be taken out.
So Bill took the garbage out. -> So Bill took it out.

Nobody else would take the garbage out.
So Bill took the garbage out. -> So Bill did it.

Sometimes full phrases sound wooden—and can actually be harder to process than pronouns or ellipses!

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Don't be afraid of using a pronoun or ellipsis!

The repeated name penalty (Gordon, 1993)

Dan drives an Alfa Romeo.
Dan drives too fast.


vs.

Dan drives an Alfa Romeo.
He drives too fast.

This version is slower to read!

This version is faster; pronouns are cues to what is already in the center of attention.

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Avoid (most) little verbal flourishes

"a sufficient number of"	"enough"
"has the capability to"	"can"
"produced an inhibitory effect"	"inhibited"
"on a theoretical level"	"in theory"
"on a regular basis"	"regularly"

(Adapted from Matthews, J. R. & Matthews, R. W. (2008). *Successful Scientific Writing*. Cambridge: Cambridge University Press)

(See also Herb Clark's advice on writing)

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Jargon and what to do about it

Jargon defined: *Precise distinctions packed into efficient labels*

- Avoid jargon unless it's absolutely necessary. (*Sometimes it's necessary!*)
- Choose what you call things very carefully.
(*You aren't obligated to inherit other people's jargon!*)
- When establishing your own jargon, unpack it - introduce it in expanded form, *not* as a dense, heavy nominal phrase.
(*After that, you can switch to heavy nominalizations¹.*)
- Be consistent in your terminology! Change terms only with good reason.
(*There is no such thing as a synonym.*)
- Use (or invent) abbreviations and acronyms sparingly and only when necessary (that is, only when you'll need to use them later).

¹ Psycholinguistic jargon, lol

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Jargon and what to do about it

Unpack jargon the first time you use it.


"When people try to integrate schema-inconsistent information..."

"When people try to integrate information that is inconsistent with the schemas they hold..."

After that, readers will be ready for the jargon phrase *schema-inconsistent information*.

(Example from H. H. Clark)

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Jargon and what to do about it


"The bovine was postoperatively traumatized by a defective electrified fencing enclosure, necessitating euthanatization."

"Positionize the slide carefully to visualize the quite unique spatial configurations with a high degree of accuracy."

"It is the author's opinion that it is not an unjustifiable assumption that this chemotherapeutic agent has the capability of significantly ameliorating and attenuating the symptomology of the disease process."

(Adapted from Matthews & Matthews, 2008)

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Jargon and what to do about it


"After the operation, the cow ran into a defective electric fence and had to be killed."

"Position the slide carefully to see the unique shape clearly."

"I predict that the drug will relieve and curtail disease symptoms."

(Adapted from Matthews & Matthews, 2008)

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Every difference makes a difference! (Dwight Bolinger)

Define your jargon in expanded form before you use it, and don't change terms unless you're making a contrast.


Digitalis increases the contractility of the mammalian heart. This change in inotropic state is the result of changes in calcium flux through the muscle cell membrane.

Digitalis increases the contractility of the mammalian heart. This increased contractility is the result of changes in calcium flux through the muscle cell membrane.

Digitalis increases the degree to which the mammalian heart can contract. This increased contractility is the result of changes in calcium flux through the muscle cell membrane.

(Examples from Michaela Kiernan's slides, "Writing Tricks of the Trade")

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Remember: There is no "perfect" version!

"The purpose of any scientific article is to convey in the fewest words the ideas, procedures, and conclusions of an investigator. Whether this aim is accomplished depends on how skillful the author is in the language."


(Gregory, 1992)

"The purpose of any scientific article is to convey the investigator's ideas, procedures, and conclusions in the fewest words. Whether this purpose is achieved depends on the investigator's skill in the language."

Watch your given/
new structure!

Use the same word
to mean the same
thing!

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Choose the right word or phrase

William Safire on metaphors or "word pictures":

"...when somebody 'leaves under a cloud'—that's been used so often that it lost its punch," Safire said. "But when you say someone 'leaves in a hail of dead cats,' all of a sudden, that'll wake somebody up."

(From "Political Columnist William Safire Dies At 79" by David Folkenflik, 9/27/09)


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Choose the right word or phrase

- Some words are high-impact. *Use these for emphasis, but do so judiciously.* (Don't wear out your reader.)
- Limit your use of intensifiers (e.g., "very", "extremely"), as they can dilute the impact of the words around them.
- Use adjectives sparingly (for the same reason).
- Limit your use of rhetorical questions. (Don't use any that you don't end up answering or at least addressing.)

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Choose the right word or phrase


Do not confuse affect and effect (these are often misused!)

Noun	Verb
"It it had that <u>effect</u> , it would negatively <u>affect</u> me." -> Correct!	
"It it had that <u>affect</u> , it would negatively <u>effect</u> me." -> Wrong!	
(feeling)	(cause)

"This is likely to affect the results." -> to change or influence
 "This would be likely to effect the results." -> to bring about

"He was without affect" – he showed no emotion
 "He was without effects" – his experiment didn't work out!
 (or perhaps he didn't have any personal possessions)

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Choose the right word or phrase

Avoid malapropisms, such as:

"We need an energy bill that encourages conservation." (GWB)
 (consumption)


"We cannot let terrorists and rogue nations hold this nation hostage." (GWB)
 (hostile)

"Republicans understand the importance of bonding between a mother and child." (DQ)
 (bondage)

"...computationally intensive datasets" (my anonymous colleague)
 (intense)

"...identify optimal solutions" (ditto)
 (optimum)

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Avoid inadvertent puns

"To my delight I was funded to work full time for eight weeks. My mentor had other projects and responsibilities that summer, so I was given considerable freedom in planning field and lab work. I became completely absorbed by the lake and I wanted to understand everything about it, both past and present."

Re-word this!!


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Avoid ambiguous or *garden-path sentences
 *(ambiguous sentences that can be misread and then need to be re-read)

"This is a good way to keep people engaged in criminal activities off the streets."
 "Teacher observations are very helpful in programming."

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Avoid ambiguous or *garden-path sentences
 *(ambiguous sentences that can be misread and then have to be re-read)

"These disorders all involve dysfunction in affect or impulsivity **and** candidate gene polymorphisms, i.e., genes that vary in their molecular structure, have been identified that confer individual differences in affect or impulsivity."

"These disorders all involve dysfunction in **affect or impulsivity**. Candidate gene polymorphisms (i.e., genes that vary in their molecular structure) have been identified that confer individual differences in **affect or impulsivity**."

"These disorders all involve dysfunction in affect or impulsivity. Individual differences in affect or impulsivity may be associated with gene polymorphisms (i.e., genes that vary in their molecular structure)."

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Restrictive vs. non-restrictive modifiers

"Americans who are patriotic revere the flag." (Not all... restrictive)
 "Americans, who are patriotic, revere the flag." (All... non-restrictive)

That is restrictive; **which** is not (and should be preceded by a comma).
 "This trend is due to gender stereotypes **that** claim that boys are tough, while girls are fragile."
 "This trend is due to gender stereotypes, **which** claim that boys are tough, while girls are fragile."

*These sentences mean very different things.
 When in doubt, use that rather than which.*


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Only and scope

<i>Only Pat is sad because the Prime Minister is ill.</i>	(no one else is the least bit sorry)
<i>Only, Pat is sad because the Prime Minister is ill.</i>	(here, <i>only</i> is used as a conjunction, like <i>but</i> or <i>except that</i> .)
<i>Pat is only sad because the Prime Minister is ill.</i>	(Pat is feeling no other emotion)
<i>Pat is sad only because the Prime Minister is ill.</i>	(for no other reason)
<i>Pat is sad because only the Prime Minister is ill.</i>	(and not the whole of Parliament)
<i>Pat is sad because the only Prime Minister is ill.</i>	(the one and only Prime Minister. Would Pat would be happier about the illness if there were more Prime Ministers?)
<i>Pat is sad because the Prime Minister is only ill.</i>	(as opposed to dead)


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If English isn't your first language...

- Develop your own awareness of how your first language can lead to issues in your second language.
- Common problems for L2 speakers:
 - Determiners: a vs. the
 - Prepositions are difficult (not rule-based, but wildly idiomatic)
 - "Put it ~~to~~ the table" "Put it on the table."
 - "Go ~~to~~ home" "Go home"
 - "I'm ~~by/in~~ home" "I'm at home"

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If English IS your first language, consider...

Everyone has writing issues! Discover what yours are. Here are some common ones:

- "Lasers ~~only~~ destroy the target, leaving the surrounding healthy tissue intact." (only → ^{only})
- "Upon entering the doctor's office, a skeleton caught my attention." (Upon → [?])
- "~~Less~~ people get funded on their first try than on their second." (Less → ^{Fewer})
- "It's true that a bear will defend ~~its~~ cub." (its → ^{its})
- "He must ~~of~~ arrived earlier." (of → ^{have})

(First 2 examples are from Diana Hacker's book)


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Beware of editing mishaps

- Be sure to check your given-new structure after rearranging sentences or paragraphs.
 - Read the relevant text straight through with a fresh eye (don't intro something as new if it's already mentioned).
 - Make sure you don't repeat material you don't mean to
- Avoid *fractal writing! **(my term)*
 - Resist the impulse to start decorating your prose with extra phrases or unnecessary adjectives.
 - Don't ruin the lovely linear flow you may have achieved.
 - Fractal writing introduces redundancy. It wears your reader out and makes them start skimming; they will miss important points.
- Check for missing words due to cut-and-paste errors.


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Strategic writing for proposals and papers

- Say what you're *not* doing (provide disclaimers).
- Acknowledge what is risky and highlight what is innovative.
- Try to do the reviewers' job for them.
- Be strategic in your citations.
- Try reading your prose out loud.
- Ask others to read your proposal!
 - "After 20 years of grant writing, I can still produce wordy, unfocused first drafts...a grant-savvy scientist in another discipline is best qualified to catch fuzzy writing and jargon." (Janet Rosey)
 - "Give working drafts of your application to colleagues who work outside your specific area of research... areas of your application that are difficult for them to understand are likely to be trouble spots for reviewers too." (Otto Yang, p. 23)
 - Recruit 3 "pre-reviewers" to read your second draft: An expert in your scientific field to check for accuracy, a non-expert scientist to check for clarity, and a good editor to help you polish your proposal. (Liane Reif-Lehrer)

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Common mistakes to avoid making:

- Too little detail (consider your audience!)
- Too much detail (ditto!)
- Poor organization
- Lack of objectivity (be even-handed, never glib)
- Incoherence
- Hiding problems
- Promising what you don't deliver
- Not planning for unexpected occurrences
- Failing to cite essential literature

(adapted from Yang, 2005)


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Resources for clear and lively scientific writing:

- Everyone can write better (and you are no exception!) (H. H. Clark)
- Writing science in plain English. Greene, A. E. (2013). Chicago: U. Chicago Press
- *The science of scientific writing*. Gopen, G. D., & Swan, J. A. (1990). *American Scientist*, 78, 550–558
- Dancing with Professors: The trouble with academic prose (P. N. Limerick)
- The infectiousness of pompous prose (M. W. Gregory, 1992). *Nature* 360, 11–12
- Slides from “Writing Tricks of the Trade” presentation by M. Kiernan
- *Successful Scientific Writing* (Matthews, J. R. & Matthews, R. W., 2008). Cambridge: Cambridge University Press
- *A Writer's Handbook* (D. Hacker)
- *Guide to Effective Grant Writing: How to Write a Successful NIH Grant Application* (Yang, 2005; revised edition, 2012)
- *Grant Application Writer's Handbook*, 4th Ed. (L. Reif-Lehrer, 2005)
- *Dreyer's English: An Utterly Correct Guide to Clarity and Style* (B. Dreyer, 2019)


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EXAMPLE #1

1st year grad student (Level 2) in Psycholinguistics


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First-Year Graduate Student GRFP Award – (beginning, Personal Statement)

“Teaching runs through the veins of my family. My mother teaches special education, my father teaches at an elementary school, and my brother teaches at a high school. So, when I went off to college, it seemed only natural to pursue a career in education. I took all the appropriate steps: I volunteered at a charter school, I spent a summer as a 4th grade teacher, and I took courses related to education. However, a course in psychology made my plans come to a screaching halt. I found myself more interested in the science of psychology than in classroom management, and as a result, I switched my focus from education to psychology. I have not abandoned education; instead, this interest has manifested in my research on reading comprehension. In addition, I continued to tutor at the charter school during my undergraduate career, I worked as a preceptor for a statistics course, and in graduate school I have applied to become a mentor for minority undergraduate students searching for a path to graduate school. However, my journey was not as smooth as it seems in hindsight. My progression has been incremental, with each step contributing to the person I have become.”

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First-Year Graduate Student GRFP Award – (ending, Personal Statement)

"I am acutely aware of the level of privilege I enjoy compared to others from my home state of Hawaii. Pacific Islanders are chronically underrepresented in science, which I hope to rectify by representing their interests as I move through academia. My goal is to develop a stronger connection to this community as I develop as a researcher, and assist other Pacific Islander students who wish to pursue science by making myself available as a resource and a mentor. In pursuit of this goal, I have recently applied to become a mentor for underrepresented undergraduates at Stony Brook through the Turner Fellowship, which is awarded to incoming graduate students to increase diversity on campus. This fellowship allows me to more easily connect with other underrepresented students, and to participate actively in the community.

Moreover, having teachers as parents has raised my awareness of the obstacles and struggles many Pacific Islander students face with education and reading in particular, making my research especially relevant and applicable to this population. Although my research focuses on the psycholinguistics of reading comprehension, this program of research is applicable to improving textbook pedagogy as well as to helping students with reading deficits."

Broader Impacts – (1) Excellent, (2) Excellent, (3) Very Good
Intellectual Merit – (1) Excellent, (2) Very Good, (3) Excellent


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First-Year Graduate Student GRFP Award - REVIEWS
 Review comments for **Broader impacts**

- (1) EXCELLENT. The applicant does a **very good job of addressing the broader impacts criteria. The applicant is an outstanding young scholar who is poised to begin a very successful research career.**
- (2) EXCELLENT. The candidate has been **active in providing mentoring support** at the University. Direct broader impacts of the proposed research are also substantial in that **findings could offer evidence-based approaches for rehabilitation of comprehension difficulties. This is a novel proposal from an individual with extensive background in discourse comprehension. The proposed experiments will contribute significantly to our understanding of time representation in narrative discourse. The proposal could be strengthened by clearer specification of theoretical implications.**
- (3) VERY GOOD. The applicant has described a number of activities, **indicating that mentoring and teaching, particularly of members of under-represented groups, have played an important role in his development and will continue to do so. The application could be strengthened with additional explicit consideration of the links between the reading comprehension basic research and practice. An interesting and important proposal from an impressive candidate.**


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EXAMPLE #2

First-year grad student (Level 2) in Social Psychology

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Level 2 GRF – “Multiculturalism” – Personal Statement

Intellectual Merit – (1) Excellent, (2) Good, (3) Very Good
Broader Impacts – (1) Excellent, (2) Excellent, (3) Very Good

"With a sigh of relief, I took a seat on a jet commissioned to whisk my classmates and me out of Egypt in the midst of its "Arab Spring" revolution. During my junior year, I was studying abroad in a remote area of Egypt when the country descended into protest and violence. Despite the urgent necessity to evacuate, some students struggled to understand and identify with the ethnic divisions and strife surrounding us. While our time in Egypt afforded us some opportunities for cultural exchange, such occasional cross-cultural contact did not prepare us for the depth of the political divide and unrest reflected in the uprisings. **My experience as a bicultural, Middle Eastern-American imbued me with the ability to recognize that superficial cross-cultural contact alone is not sufficient to transcend cultural barriers successfully.** Instead, one must study the mechanisms at the core of others' perspectives to discover ways to promote less biased cultural exchange and interpersonal understanding. Drawing on some of my personal experiences of cultural contact through travel, observations of intergroup conflict, and encounters with stereotyping and prejudice as a Persian/Arab Jew in the post 9/11 world, I have sought to integrate my academic, research and teaching interests to reflect a focus on intergroup relations and methods of countering stereotypes."

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Level 2 GRF – “Multiculturalism” – Personal Statement

Intellectual Merit – (1) Excellent, (2) Good, (3) Very Good
 Broader Impacts – (1) Excellent, (2) Excellent, (3) Very Good

(Second paragraph)

“From an early age, my observations of society’s treatment of stigmatized individuals, deprived of equal opportunity, fueled my determination to understand and study group behavior, and engage in civic action. In high school, I logged two thousand community service hours, leading and engaging with others in various activities, including planning weekly activities for elderly individuals at assisted living homes, fundraising for a local school for deaf persons, and running a literacy program for at-risk elementary school students. Additionally, after observing the unique academic challenges some students faced, I engaged in tutoring my peers, serving as a foreign language teacher assistant, and teaching remedial math to ESL students with unconventional education backgrounds. In the same vein, I sought to ameliorate the previously hostile and homophobic atmosphere for LGBT individuals by founding my high school’s Gay Straight Alliance (GSA). Along with the executive board of GSA, I helped to expand LGBT education in the mandatory health curriculum, lead workshops for teachers on how to address LGBT issues in the classroom as well as develop a safe space campaign for students, which eventually permeated into the middle school.”

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Level 2 GRF – “Multiculturalism” - REVIEWS


Intellectual Merit – (1) Excellent, (2) Good, (3) Very Good
 Broader Impacts – (1) Excellent, (2) Excellent, (3) Very Good

(1)The applicant has demonstrated commitment to broader impact concerns through prior efforts and expresses intent to continue such activities relative to the proposed research through several avenues, including outreach, dissemination, and mentoring. The applicant also recognizes the potential societal benefit of the research findings. The applicant has demonstrated commitment to broader impact concerns and appears well-positioned to meaningfully contribute to scholarship in this area.

(2)The applicant is uniquely suited to study bi/multicultural identities. She has also had several experiences founding and leading organizations geared toward education and improving intergroup relations. Her research also has the potential to have broad impacts, improving the college transition for bi/multicultural individuals. I have no doubt that she has the ability and motivation necessary to assure that her research will be disseminated. One limitation to her application was that her scientific writing seemed too technical and I had concerns that she might have trouble writing for a lay audience. Overall, the applicant seems likely to assure that her research has an impact in her local community. The applicant could work on improving the intellectual merit of her proposal and clarifying items in her proposed research.

(3)Strong history of relevant service; well articulated statement of broader impacts. Very coherent linkage between proposed research and personal experiences. Well articulated research proposal and statement of broader impacts.


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EXAMPLE #3

Undergraduate (Level 1) in Social Psychology
 (applied to both Social Psych and Clinical Programs)

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Level 1 GRF - “Social Dynamics” – Personal Statement

Intellectual Merit – (1) Very Good, (2) Very Good, (3) Excellent
 Broader Impacts – (1) Excellent, (2) Good, (3) Very Good

“My fascination with the natural world began with experimentation. As a 12 year old, I relished in the process of discovering how things worked; on weekends I concocted homemade vitamin C indicators and an organic corn-based home insulation. By competing in regional and state science fairs, I noticed that most of my young colleagues came from school districts with greater access to resources than my own. I wondered if these differences translated to dissimilarities in the behaviors and interests of students from those areas compared to my classmates. My fascination with psychological phenomena only flourished from there, and I sought to find a way to connect the social realm of human interaction to my developing scientific process.

It was not until I arrived at the University of X that I narrowed my interests to studying dyadic social dynamics. I enrolled in a Social Psychology course, where I learned the ways that researchers use theoretical approaches to develop a hypothesis-driven method of attaining new information. My instructor introduced Social Learning Theory, which posits that behavior is shaped from observation and modeling the actions of others, as an explanation for the intergenerational transmission of maladaptive family outcomes and violence. I was captivated by the simple notion of stimulus-response learning, and I sought to find research articles identifying the factors of unhealthy family dynamics to confirm my observations.”

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Level 1 GRF - "Social Dynamics" – **Research Statement**

Intellectual Merit – (1) Very Good, (2) Very Good, (3) Excellent
 Broader Impacts – (1) Excellent, (2) Good, (3) Very Good

"Broader Impact: Results from this study will inform social-psychological approaches to understanding marital dysfunction. Recently, social cognition theories have received support from researchers in neuroimaging, and a mirror-neuron system has been proposed as the basis of perspective-taking ability. Findings obtained with the collaborative referencing paradigm have the potential to broaden our understanding of the social-cognitive components of meaningful dyadic interaction to inform future studies of intimate partners. Further, applying this paradigm to healthy participants will provide a context for performance deficits in patient studies by establishing a normal range of ability for familiar dyadic interaction."

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Level 1 GRF - "Social Dynamics" – **REVIEWS**

(1) EXCELLENT. The applicant has demonstrated the implications of her proposed research in the broadest context. She not only understands the scientific implications of her work but also how it might be applied as potential interventions to improve peoples' lives. *The strongest applicant in the pool at this level of all those I reviewed. She made the case of why her work is important to her, but also as to why it should be important to us.*

(2) GOOD. The applicant **does discuss some** of the potential broader impacts of her work. **Further explanation of how this might add to the well-being of individuals would have been useful.** The applicant has a **solid history of research dissemination - impressive for a student at her developmental level.** *Overall, this is a strong candidate for this award. She has demonstrated some early strengths and appears to be on a trajectory towards a promising career. Further elaboration in some points of her application would have been helpful however.*

(3) VERY GOOD. The author has **ambitiously and proactively sought opportunities** to extend her academic learning and to seek mentorship experiences that will allow her to cultivate her knowledge and skill to further her program of work. **Additional explanation is needed to clarify her singular focus on the selected graduate program** and how it is uniquely tailored to help her to achieve her goals. Is there a contingency plan or alternative if study at that one institution does not work out? In addition, **how will the research program be translated/applied toward educational outreach and actual practice?** General thoughts on these extensions would be helpful. **Excellent proposal and program of work.** Additional attention could be granted to the points made above.

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Don't forget: If your research is in human biology or your program is Clinical Psych...

- Emphasize basic scientific principles in your statements.
- *Don't express your motivation as disease- or health-related*, such as drug development, physical or mental health therapies, or animal disease models. A better motivation is your curiosity for uncovering the truth or for creating new knowledge.
- For broader impacts that are related to health, emphasize how your basic research lays a scientific foundation that could support others' future research in these more applied areas.

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GRFP Resources

- [2022 GRFP Solicitation](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf22614&org=NSF): https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf22614&org=NSF
- To apply on FastLane: www.fastlane.nsf.gov/grfp
- NSF contact info 866-NSF-GRFP (673-4737) or info@nsfgrfp.org
- **Your SUNY campus's Fellowships Office can help!**

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and finally...

Good luck!

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