Writing a Scientific Paper, Step by (Painful) Step

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Introduction

Dense, specialized, and technical papers can be hard to read. After reading hundreds of such papers, most young scientists can learn to mimic the "academic style". But the average scientific paper makes a poor model for authors who want others to read and understand their work. Fortunately, many style guides and *How To* books have tips for writing a better than average scientific paper. In trying to write better scientific papers, I read as many *How To* books as I could and, although I was inspired by their advice, I became frustrated when trying to put recommendations into practice. It worked better for me to break up all that advice into little steps. If that sounds like it might work better for you, I've summarized the steps I take to write a paper. I give examples from my field of Ecology, but the general advice applies to any field. However, not every journal editor or reviewer shares my opinions. If they did, more scientific papers wouldn't be such a drag to read.

What Makes a Paper Scientific?

To be *scientific*, a paper must have the following elements. First, the work follows the scientific method, which fairly interprets measurements and comparisons to build on and advance knowledge (more on this below). Second, the Methods and Results describe what was done in enough detail that others can repeat the study and reach their own conclusions (including providing the raw data used in analyses). Finally, the author lets the results speak for themselves, without succumbing to the human tendencies to selectively favor a pet hypothesis or anticipated outcome. They also emphasize, rather than obscure, uncertainties and alternative explanations. Deviations from this are not uncommon, but they belong in the fiction section.

What's Your Problem?

Most scientific papers describe how the authors solved a "problem" or answered a question. Often, however, authors can get lost in the details and forget to communicate a concise problem to the reader. If so, you can rediscover your problem by working backwards from your results. The starting point for going backwards is to list your p-values (or key comparisons). Try to illustrate these comparisons with clear, simple, honest figures (see the figure tutorial below). Then, for each p-value/comparison, define the prediction it tests. Group these predictions under hypotheses, or, less frequently, the assumptions behind your hypotheses.

Problem (a pattern or phenomenon you are trying to explain)
Hypothesis 1 (an apriori plausible explanation for the pattern)
Prediction a (a result that will occur if H1 is true)
P-value a

Prediction b (a result that will occur if H1 is true)

P-value b

Hypothesis 2 (another an apriori plausible explanation for the pattern)

Prediction c (a result that will occur if H2 is true)

P-value c.

Assumption 1 (needed for Pc to explain H2)

Prediction d (result if A1 is true)

P-value d.

In addition to helping you find your problem, organizing your P-values as above will help you create a logical outline (see below) that leads from problem to solution. However, beware the temptation of using P-values to make posteriori interpretations look like apriori hypotheses. A prediction needs to be something you do BEFORE you look at your data. You can explore results after the fact, but be honest to the reader the difference between evaluating a prediction and exploring post hoc patterns. After outlining, you might find you address too many problems for a single paper (ideally a paper tackles one problem). If so, you might try cutting some results, breaking the paper into two, or putting supporting information in an appendix. On the other hand, you should ask whether your results actually solve a problem. If the answer is no, you and your readers might be better off if you seek more evidence before writing.

The narrative arc from problem to solution is a story as old as campfires. But unlike a campfire story, a scientific paper tells its story in four parallel ways: the figures, the abstract, the title, and the narrative. Exploring these in this order can be an efficient way to get your paper written.

Start by Making Figures

As a visual person, I think in figures. Figures can help illustrate the Methods, particularly if what you have done is creative or unconventional, or occurred in an unfamiliar location (make a map), or with an unfamiliar organism (provide an illustration). Figures in the Methods help make your study more concrete for the reader.

You might find it more natural to first make figures for your results. Once you decide how to illustrate your results, organize them in such a way that your story unfolds visually. A lazy reader like me wants to use your figures to understand the story without having to bother with the text or even the figure legends or tables. That said, be sure the figure legends describe what the figure is designed to illustrate.

Before making figures, ask: what relationships or comparisons illustrate how the data fit the predictions from my hypotheses? E.g., if the hypothesis is that X and Y correlate, make a scatter plot. Illustrate these key relationships and comparisons, but only these. Avoid tangential figures in the main document. A reader will assume that a figure is a main point and you will lead them astray with irrelevant plots that are better off in an appendix.

Simplify figures to make simple points, but show the raw data where possible. E.g., choose a scatter plot or a quantile plot instead of a bar graph. Then add regression lines to emphasize the point you are making about the relationship.

Results usually have uncertainty, and uncertainty must be presented. Show standard deviations when you want to emphasize variability. Show confidence limits (preferred) or standard errors when you want to make comparisons. Be careful that you are using the correct tails for confidence limits, and be sure legends describe which measure you are using.

Don't just label panels or features with letters (A), (B); write out the comparison: e.g., "fished", "unfished". Have helpful axis legends that tell the story "PC1" is not helpful, whereas "Fish body size (PC1)" is. To avoid relying on text alone, illustrate figures with icons to make the relationship more concrete. I.e., if the figure compares a fish and a crab, add a fish icon and crab icon above the relevant points.

Don't be shy. Use large font, bold lines, and large symbol sizes. But don't crowd the figure. Use color sparingly, and remember that some people cannot distinguish green from red. Less is more.

Write the Small Stuff

Because writing a paper can be overwhelming, I tackle the abstract, title and outline first. This clarifies the thesis and helps me push through writer's block.

The Abstract

Often the abstract is an afterthought written the day you submit to the journal. But writing it early can impose discipline on your outline. Start by identifying the problem you set out to solve. Then mention the methods you took to solve it. Next, summarize the key results from your figures. Finally, end with some modest interpretation and a take-home message. Keep in mind that perhaps more than a hundred people will read your abstract for every one that reads your paper, so the abstract must be the paper's best paragraph.

The Title

Hollywood often has to translate movie titles so they make sense in other languages. For instance, in China, the title for the film *Pretty Women* was translated into the more tangible *I Will Marry a Prostitute to Save Money.* The best titles for scientific papers also simply explain the story. Once you have distilled your story into abstract form, distill it further into a title. A title should contain the study system and key findings without using jargon or hyperbole, or failed attempts to be clever. I, for instance, hesitate to read a paper with the phrase "size matters" or which claims "frameworks" or "frontiers". For instance, write: *A small riverine catfish eats large worms*, instead of: *Size matters: Body size ratio dependent dietary preferences of aquatic foragers in lotic ecosystems*. The second sounds lofty and scientific, but obscures the topic with scientific jargon and vagueness, making it hard for the reader to know if it is interesting to them. They are less likely to read a vague title, let alone cite it. When writing a title for a paper, I play the following game. I ask myself how someone would most likely cite the paper and try to morph that possible citation into a title. An example being: *Fish culling reduces tapeworm burden in Arctic charr by increasing parasite mortality rather than by reducing density-dependent transmission* (Henriksen et al. 2019), which I think is more likely to be cited than a paper titled *Pretty Tapeworm*.

The Outline

Having made figures, and written an abstract and title, you have now concisely defined your paper's problem, solution and thesis. Although it might be tempting to start writing up the details into a paper, I suggest you take some time to create an outline. Using an outline breaks the process up into small steps, and it keeps you from missing important elements or putting in unimportant ones. At the end of this document, I provide detailed outlines for a traditional scientific paper and review papers that should get you started.

Paragraph and Sentence Structure

Breaking up a paper into an outline means that you can divide a huge task into many small pieces, like paragraphs and sentences. Paragraph and sentence structure are essential for making your paper readable. If, like me, you went into science because you did poorly in English class, this part might not come naturally. Most of what comes next is advice you should have paid attention to in your first-year writing course. But even if you did pay attention, you might not realize how basic writing advice applies to scientific writing.

The Hook

The hook (or the lead) makes up the first couple sentences (in a book, it might be an entire paragraph) and engages and motivates the reader to read further. Common hooks are: questions (Why do fish have scales?), quotes ("Marry well", advised Darwin), statistics (The average killifish has 2000 parasites coating its brain), bold statements (Parasitism is the most popular lifestyle on earth), "poetic" statements (A Parasite's parasites are parasites), evocative imagery (The male angler fish spends its adult life as testicular cells attached to its permanent mate), dramatic action (A cercaria sticks to frog skin with its sucker, then secretes enzymes to force its way into the flesh), a mysterious setting (It was a dark, stormy night). The hook is so hard to do right, it might be the last thing you write. And it might seem strange to write it, but it will help the reader engage early. Most scientific papers don't have hooks. Instead, most openings translate roughly into: "blah, blah, blah".

The Slant

A slant connects the hook to your topic like a bridge from the attention getting hook to the topic. Or, more appropriately, the slant is the line that connects the hook to your fishing pole. Without the line, you can't reel in the fish that bites. Let's say your topic is that parasites manipulate their prey host to increase transmission to the predator host. If you use the hook above: *The average killifish has 2000 parasites coating its brain*. Then a slant would be, *but those parasites can only reproduce if a bird eats that killifish*. With that slant as a bridge, you can connect to the first topic sentence of the paper.

The Topic Sentence

You learned about topic sentences in third grade. The topic sentence is the umbrella under which the other sentences in the paragraph find shelter. If that does not happen, you either need to broaden the topic sentence, or split the paragraph up. If in doubt, it is better to have two paragraphs on two related topics than one paragraph on two unrelated topics. In addition to naming the paragraph's topic, the topic sentence should help flow from the previous paragraph. It is easy to forget topic sentences when writing a scientific paper. Be

sure to have a place holder for a topic sentence when outlining your paper to remind you to write it. Start an outline by writing the topic sentences for each paragraph. Doing so will help you order paragraphs into a logical flow, just by ordering the topic sentences.

The Clincher Sentence

The final sentence of a paragraph needs to seal the deal with the reader the way a joke needs a punchline. Magazine writers are good at clincher sentences. Scientists are not. Scientists seem to want to get to the next paragraph before leaving a tombstone for the old one. Therefore, keeping a placeholder for the clincher in your outline can help remind you. Like a tombstone, the clincher sentence should clear, strong and summarize the paragraph's key point in a memorable way.

Paragraph Flow

Flow is how you connect two different thoughts. Each paragraph has a different topic sentence, but that sentence should relate somehow to the clincher sentence in the previous paragraph. Either the clincher sentence can help foreshadow the next paragraph, or the topic sentence can spring from the previous paragraph. Flow among paragraphs takes precedence over where you put your topic sentence. If your topic sentence can't be connected to the previous paragraph, you might need a flow sentence to start out the paragraph.

Sentence Flow

Connecting one sentence to the next establishes flow. For example, these three sentences lack flow: Pandas are from China. I just got back from China. I saw a panda there in the zoo. Better flow would be: I just got back from China. China has many strange animals like pandas. The only Panda I saw in China was in a zoo.

The best way to understand flow is to know that a good sentence usually has two parts: a topic (what the sentence is about) followed by a stress (what you learned about the topic). For instance, in the sentence, *The motion that caught my eye turned out to be a small bird*, the motion is the topic and the bird is the stress. The topic goes first because, (unlike in the German language) the reader should not have to read to the end to find out whether the sentence is about a motion or something else, like a sound. The stress is both new information and what you want to emphasize. The same words can be rearranged to switch topic and stress. In the sentence: *Bears eat salmon in the summer.*, bears eating salmon, is the topic and summer is the stress. However, for: *In the summer, bears eat salmon.,* summer is the topic and bears eating salmon is the stress. Flipping topic and stress is helpful, because the topic should be based on the stress of the previous sentence (even using the same words). For instance, here are three sentences that link: Topic-stress. Topic-stress. Topic-stress. *Something passed*

by in a blurr. The motion that caught my eye turned out to be a small bird. The bird then disappeared into the brush. One exception to sentence flow is if a paragraph lists somewhat independent elements. If this is the case, use numbers or letters, or other devices to let the reader know the paragraph contains a list, rather than a linear flow.

Tightening Language

If you are like me, you write like a scientist: long winded, tedious, vague, and filled with jargon. It can be inhibiting to fix this as you write. So write with abandon, then revise by following the steps listed here:

a) replace common jargon with simpler alternatives. Search jargon and delete or replace it. See many *Word replacements* below.

b) minimize adverbs (ly): they make you sound pleading, whiny, and melodramatic. Delete an adverb if the meaning does not change when the adverb is removed, or, if possible, replace with specifics. E.g., replace "highly relevant" with "relevant". Find adverbs by searching "ly". However, adverbs are often useful in sentence structure when used in introductory clauses.

c) Reduce "metadiscourse": E.g., "we found X happened" vs "X happened". We found that, We argue that, Our initial hypothesis was that, These data might indicate, To conclude, In conclusion (search these phrases and replace them).

d) Break up noun strings like "the 5m nylon mesh blocking seine" (here is where using "of" can be helpful)

e) "Of" often indicates a sentence that can be simplified (change "X of Y" to "Y X"), but avoid building long noun strings.

f) Use active voice (but keep flow) We measured fish vs Fish were measured.

g) use the first person We measured fish vs Fish were measured.

h) Avoid paragraph openers that lead off with "time" words ("first," "next," "after," "then") or "listing" words ("also," "another," "in addition"). Although they don't always signal trouble, these paragraph openers often indicate that an essay's thesis and structure need work.

i) For lists within a sentence "I like ice cream, pickles and horse radish", try for three elements. Three has a stronger rhythm than four. Use two elements if they contrast.

j) write out numbers less than 11.

k) Check comma use (see below).

Comma Use

Commas look innocent enough, but they are behind most grammatical errors. If you are comma-curious, or just tuned out in the fourth grade, you might want to review online guides for comma usage. Here are some basics to be familiar with.

Set off dependent clauses with commas if they lack a conjunction.
Use a comma to set off independent clauses joined by a conjunction.
After we washed the dog, we cleaned up the mess that he made.
We washed the dog, and we cleaned up the mess that he made.
Don't use a comma if the dependent clause is joined by a conjunction
We washed the dog and then cleaned up his mess
Optional commas:
before and/or in a list. We did A, B and C.
If a dependent clause has only one word. E.g., starting a sentence as *Here X Y Z.*., or *However X Y Z..* does not <u>need</u> a comma (choose depending on if you want the reader to pause), but *For example, X Y Z..* does need a comma.

Four Revision Steps

All that revision advice can be hard to follow, so I have made a check list where you (1) read and revise the paper until it is complete and coherent. (2) confirm the paragraph and sentence structure/flow. (3) correct common wording mistakes. (4) proof it and send the draft out for comments. When you get those comments back, revise and return to step one. Each step could take a full day's work the first round, or a few minutes on a later round.

1) Read through once without editing. Then ask what is the most important question and result and be sure that is obvious to the reader.
2) Correct the structure
   a) Is there an opening to each section?
   b) Does each paragraph have a consistent theme?
      Otherwise breakup / rearrange
   c) does each paragraph open with the topic?
   d) does each paragraph end with the clincher/memorable point?
   e) Do paragraphs flow into each other?
   f) Do sentences flow into each other? Yes, you must inspect each sentence.
3) Tighten the language
   a) replace jargon
   b) minimize adverbs
   c) Reduce "metadiscourse"
   d) break up noun strings
   e) Avoid "of"
   f) Use active voice (but keep flow)
   g) Use the first person
   h) Avoid paragraph openers that lead off with "time" words, "listing"
   i) Specify sentences with vague openers like "It" or "There"
   j) For lists, try for three things rather than two or four.
   k) Check comma use.
4) Proof
   a) check citations match the reference list
   b) check that figures have correct #s, and legends
   c) spellcheck/grammar check
   d) read over hard copy for errors
   e) repeat until no errors are found
   f) send out for comments (then revise and start again!)

Your paper will be ready to submit when it is about 99% polished. Yet rather than get it 99% right on your first draft, it can be far more efficient to aim to improve by 90% each round. Solving .99^n = .9 indicates that it might take about n = 10.5 versions to polish a manuscript this way. So expect to write several incrementally better drafts. It is not uncommon for me to write dozens of drafts before I am happy sending to a journal. Warning: this strategy only works if coauthors prioritize revisions. If your collaborators claim to be too "busy" to revise a manuscript promptly, they are in the wrong business. Get new collaborators.

Outlines

Outline for a traditional empirical hypothesis-testing paper. Numbers represent paragraphs. Letters represent elements (often sentences) within a paragraph.

Title: the study system and key findings

Abstract: Problem, Hypotheses, System, Methods, Results, Importance.

Introduction (use present tense in reference to published work): Overall tell a story about a problem (a gap in knowledge) and how you aim to solve it.

1) Identify the subject, question or problem to be solved, making its importance obvious to the reader (without saying it is "important"). Often, the problem is an unexplained phenomenon that you are investigating. Note, this is not the place for a broad introduction to a topic (e.g., "Biodiversity is declining..", "Climate is changing.."). Instead, identify the specific problem/question you will solve/answer. E.g., "Why is biodiversity declining in California estuaries?"
    a. Hook (a literary device to grab attention, see below)
    b. Slant the hook to introduce the problem that your results deal with (the unanswered question). This replaces your topic sentence.
    c. To clarify the problem's importance, indicate the motivation for the study, emphasize why it is important to solve the problem (without just saying it is "important").
    d. Clincher sentence (see below).

2) Briefly review what has been done (This might take more than one paragraph.)
    a. Topic sentence that links the problem to the literature on the problem.
    b. Build on past work and point out on knowledge gaps in that work. Use brief, concrete examples to illustrate concepts. Show scholarship to develop trust. Be generous with credit.
    c. Clincher sentence

2) Describe the biological system you are studying. This might take more than one paragraph, depending on the details.
    a. Topic sentence introducing the biological system
    b. Why the biological system is relevant for the question
    c. Details about the location, habitat type, species, physical setting, etc.
    d. Clincher sentence
3) State <u>your</u> hypotheses (potential solutions to the problem). These stem from your predictions below. You can have a new paragraph for each major hypothesis.
    a. Topic sentence with the word "hypothesis" in it.
    b. Each hypothesis is a potential explanation for an observation. Link them in a sentence. Hypotheses might need logical justification, and you might cite past work where these hypotheses were initially raised.
    c. Be sure to explore assumptions implicit in the hypotheses (like "all else being equal")
    d. Clincher sentence.
4) Give the predictions that stem from your hypotheses. Note that each P-value in your results belongs to a prediction (i.e., you can work backwards from your results). And that each prediction stems from a hypothesis (often with more than one prediction per hypothesis). You can intersperse predictions and hypotheses, or list the hypotheses first, then the predictions. There might be several paragraphs here, depending on how many hypotheses you are testing (please don't test too many though).
    a. Topic sentence
    b. I.e., If hypothesis A, predictions a1, a2, a3. If hypothesis B, predictions b1, b2, etc.
    c. Clincher sentence.
5) Introduce and justify your methods
    a. Topic sentence
    b. to test these predictions we used X, Y and Z because…)
    c. Clincher sentence
6) briefly give your principal results
    a. Topic sentence
    b. The paper is not a mystery novel. Summarizing the results up front helps the reader evaluate the evidence for your claims.
    c. Clincher sentence

Materials and Methods (use past tense)

1) In an introductory paragraph, start with a brief/general methods summary.

a. Topic sentence
b. To test our predictions a-c, we did X, Y and Z
c. Clincher sentence

2) Describe your lab set up or study sites
    a. Topic sentence
    b. A reader should be able to revisit your field site or duplicate your lab set up.
    c. Clincher sentence.
3) For each section, X, Y, Z above, … (organize chronologically or in sections (use sub-headings). Omit details that can be cited (e.g., we surveyed sharks on transects following McCauley (2010)).
    a. Topic sentence
    b. describe experimental or sampling design and exp. Subjects
    c. describe experimental or sampling procedures
    d. describe the measurements taken
    e. indicate any shortcomings in the methods
    f. justify why you used them anyways
    g. give methods (but don't cite ordinary statistical procedures) so that someone could repeat your statistical test. E.g., what are the different variables, transformations, covariates, variable assignments (random, ordinal..).
    h. provide enough detail for repeatability
    i. describe data that verifies methods
    j. indicate compliance with Animal Care and other regulations
    k. Clincher sentence

Results (use past tense)

1) Present by methods subheading or present order that tests hypothesis
    a. Topic sentence
    b. Refer briefly back to the relevant method, hypothesis and prediction.
    c. Give mean values (controls first), p values or confidence intervals, variability (e.g., Standard Deviation) and sample size.
    d. note negative results.
    e. Illustrate a story using simple figures.
    f. Limited data are best put in text, rather than tables.
    g. Be short and to the point.
    h. Be sure to refer to tables and figures in order
    i. Save sidelines and details for appendices.
    j. How much data to show? Enough that someone could repeat your analysis.
    k. Clincher sentence

Discussion (use present tense in reference to published work)

1) Give an introductory paragraph lets the Reader know you are in Discussion mode.
    a. Topic Sentence
    b. briefly summarize the results and how they support or do not support your hypotheses
    c. Clincher sentence

2-5) For each of three or so key "results" (i.e., P-value), write a paragraph that does the following.
    a) Topic Sentence
    b) identify the result to discuss and present the principles, relationships, generalizations and interpretations
    c) point out the exceptions to general patterns
    d) mention complications in interpretation
    e) relate your results to the literature
    f) discuss theoretical implications
    g) clincher sentence

6) Caveats / future work.
    a) Topic Sentence
    b) what are the key weaknesses/ambiguities/uncertainties?
    c) what would be needed to address these weakness
    d) clincher sentence

7) Give an indication that you are concluding
    a) Topic sentence (but don't start with "In conclusion")
    b) Rephrase the original problem/question.
    c) How does answering the question help?
    d) Are there next steps (if extensive, this is another paragraph)?
    e) Explain why the results are important (don't just say they are important)
    f) Clincher sentence

Outline for a Review paper (or a talk):

Section structure: the reader expects a certain order.

1) Introductory paragraph
    - Hook/Orient the reader to the section
    - Identify the focus/purpose
    - Background (anything that needs defining or introducing)
    - Outline the Scope (what are the topic boundaries)
    - State your thesis/expectations
    - List the evidence you will present for your thesis (the body paragraphs)
2) Body paragraphs (3 is the classic number) in linear order
    - Topic sentence to introduce a theme and how it relates to the thesis
    - Background
    - Supporting details
    - Counter arguments
    - Concluding sentence supporting the author's point
3) Conclusion paragraph
    - Return to the hook / Restate thesis
    - Summarize evidence for the thesis
    - Clincher sentence (a punch line) or new idea

Each section should indicate: what is the topic/question, what is the evidence, how do you support the evidence, why the results/conclusion is important/relevant.

Alternative structures:

Traditional Scientific paper (OCAR)
Opening: Topic, System, context, background, problem to be addressed (Intro)
Challenge: What will be answered? (Intro)
Action: Methods and Results
Resolution: What was learned (Discussion)

Message Box (communicating to the public)
What is the problem?
Why is it important?
What are the solutions to the problem?
What were the benefits to solving the problem?

Proposal 1
Action
Background
Development
Climax
Ending

Proposal 2
Lead
Development
Resolution

Proposal 3 (the most effective for tired reviewers)
Newspaper style / press release
Lead (the intro and punchline)
Development (the details)
Repeat, with increasing detail.
The reader should get the most important information first and the end of each paragraph concludes a complete document.

Word replacements

Common jargon in scientific papers, and suggested replacements, taken from various style guides. Use a Word Macro to find these in a document.

Potential Jargon	Potential replacement
as to	about(blank)
came	(weak verb)
criteria	(plural of criterion)
issues	(concerns)
of	(of signals a weak sentence)
serve	(weak verb)
very	(reduce)
very necessary	necessary
very unique	unique
a considerable amount of	much
a considerable number of	many
a majority of	most
a number of	many
a small number of	few
access	(acc ess should be a noun, not a verb)
accounted for by the fact	because
actually	(blank)
additionally	also
adjacent to	near
admonish	warn
afford an opportunity	let
afterwards	afterward
all of the	all
along the lines of	like
an example of this is	for example
analysis	USE analyze INSTEAD?
and/or	A or B or both
apparent	clear
approach	USE as VERB?
approximately	about
are of the same opinion	agree
as a consequence of	because
as a matter of fact	in fact(blank)
as a means of	to

as already stated	BLANK
as is the case	as happens
as of this date	today
as to whether	whether
ascertain	find out
assure	(ass ure:guarantee, en sure:making certain
at a rapid rate	rapidly
at an earlier date	previously
at an early date	soon
at some future time	later
at the conclusion of	after
at the present time	now
at this point in time	now
attempt	try
back to the drawing board	(Cliché)
based on the fact that	because
be advised that	BLANK
beat a dead horse	(Cliché)
beside	(be side: next to, be sides:in ad dition to)
besides	(be side: next to, be sides:in ad dition to)
blessing in disquise	(Cliché)
boggles the mind	(Cliché)
bone of contention	(Cliché)
both of the	both
bring to a conclusion	(END, CONCLUDE)
by means of	by(with)
can of worms	(Cliché)
can't see the forest for the trees	(Cliché)
capability	ability
causal factor	cause
come to a head	(Cliché)
compare	(“contrast” if noting differences between items)
completely	(blank)
completely full	full
compliment	complement (unless expression of praise)
component	part
consensus of opinion	consensus
considerable amount of	much
consume	eat
contiguous	touching
control group	control
cutting edge	(Cliché)
deem	think

definitely proved	proved
demonstrate	show
despite the fact that	although
development	USE develop INSTEAD?
did not have	lacked
different than	(use different from unless followed by a clause)
disease process	disease
draw a blank	(Cliché)
due to the fact that	because
duration	length of time
during the course of	during
during the time that	while
each and every	(Cliché)
easier said than done	(Cliché)
echelons	levels
elucidate	explain
employ	use
empowerment	(Cliché)
enclosed herewith	enclosed
encounter	meet
end result	result
endeaver	try
ensure	(assure:guarantee, ensure:making certain
entirely eliminate	eliminate
epidemic	(epizootic if used with non-humans)
equivalent	equal
etiology	cause
eventuate	happen
evidenced	showed
exhibit a tendency to	tend
fabricate	make
facilitate	(EASE, HELP)
fatal outcome	death
feel	believe (unless touch, then f eel)
few and far between	(Cliché)
finalize	end
first of all	first
firstly	first
food for thought	(Cliché)
for a period of	for
for the purpose of	for
for the reason that	since(because)
forgo	(for go: to do without, fore go: go before)

forseeable future	(Cliché)
fraction	(fraction is often not informative)
from the point of view of	for
fully diversified	(Cliché)
fully integrated	(Cliché)
future plans	plans
get nowhere fast	(Cliché)
give an account of	describe
give consideration to	consider
give rise to	cause
glass ceiling	(Cliché)
grind to a halt	(Cliché)
hard on the heels	(Cliché)
has been engaged in a study of	has studied
has the capability of	can
has the capacity to	can
have the appearance of	look like
having regard to	about
heated argument	(Cliché)
higher in comparison to	higher than
impact	AFFECT IF A VERB
important essentials	essentials
in a number of cases	some
in a position to	can(may)
in a satisfactory manner	satisfactorily
in a timely manner	pr omptly
in a very real sense	in a s ense(blank)
in almost all instances	nearly always
in any case	(over used)
in appearance	(blank)
in case	if
in close proximity	close(near)
in color	(blank)
in connection with	about(concerning)
in lieu of	instead of
in many cases	often
in most cases	usually
in no case	never
in order to	to
in other cases	otherwise
in relation to	toward(to)
in respect to	about
in some cases	sometimes

in spite of the fact that	although
in terms of	about
in the absence of	without
in the amount of	use
in the event that	if
in the first place	first
in the majority of cases	usually
in the nick of time	(Cliché)
in the not too distant future	soon
in the possession of	has(have)
in the vast majority of cases	usually
in this case	here
in this day and age	now
in view of	because
in view of the fact that	because
inasmuch as	for(as, because)
inception	start
inclined to the view	think
including but not limited to	including
incumbent upon	must
influence	USE as VERB?
initiate	begin(start)
innocent bystander	(Cliché)
insure	(assure:guarantee, ensure:making certain
interaction	USE interact INSTEAD?
irregardless	(irregardless is not a word)
is defined as	is
is knowledgable of	knows
it goes without saying	(Cliché)
it has been reported	(Smith reported)
it has long been known that	(GIVE REFERENCE)
It is	(uninformative start to a sentence)
it is apparent that	apparently
it is believed that	I think
it is clear that	clearly
it is doubtful that	possibly
it is evident that	(blank)
it is generally believed	many think
it is important to note	(BLANK)
it is my understanding	I understand
it is of interest to note that	(blank)
it is often the case that	often
it is possible that	(delete and place might in the sentence)

it is recommended that consideration be given to	we recommend
it is suggested that	I think
it is worth pointing out that	note that
it may	however, be noted that
it may be that	I think
it should be emphasized that	(BLANK)
it should be particularly emphasized that	(BLANK)
it was observed	(passive)
join together	join
kinds of	(blank)
lacked the ability to	couldn't
large in size	large
last but not least	(Cliché)
latter	(second of two, not last of three or more)
level playing field	(Cliché)
liase with	coordinate with
ly	ly(delete if possible)
made	(weak verb)
majority of	most
make an assumption	assume
make preparations for	prepare
make reference to	refer to
many of the	many
may	c an or might(unless referring to permission)
meaningful dialogue	(Cliché)
meeting the challenge	(Cliché)
methodology	method
militate against	prohibit
month of	month
mortality	death
movement	USE move INSTEAD?
necessary	USE need?
needless to say	(blank, might leave out what follows)
ness	USE adjective INSTEAD?
new initiatives	initiatives
not different	similar
not later than	by
of great importance	useful
of insufficient magnitude	too small
of long standing	old
of the opinion	think

on a daily basis	daily
on account of	because
on behalf of	for
on no occasion	never
on the basis of	by
on the grounds that	(because)
on the part of	by(among, for)
on the shoulders of	(Cliché)
optimum	best
owing to the fact that	because
penultimate	next to last
perform	do
performed	did
permit	let
place a major emphasis on	stress
placed	(weak verb)
plays a role in	(Cliché)
pooled together	pooled
pose a threat	(Cliché)
possible worlds	(Cliché)
practicable	practical
predominant	(pre dominate:verb, pre dominant: adjective
predominantly	pre dominately
predominate	(pre dominate:verb, pre dominant: adjective
predominately	(pre dominate:verb, pre dominant: adjective
preparing for the 21st century	(Cliché)
preparing for the next millennium	(Cliché)
presents a picture similar to	resembles
previously	before
prior to	before
provided	(weak verb)
provided that	if
quantify	measure
quite	(BLANK)
rather interesting	interesting
referred to as	called
renumeration	(pay, payment)
result would seem to indicate	result indicates
resultant effect	result
root cause	cause
s were performed	ed(add were before this word)
sacrifice	(kill)
sacrificed	(killed)

secondly	second
send a message	(Cliché)
serious crisis	crisis
seriously consider	(Cliché)
serves a role	(Cliché)
serves the function of being	is
shortfall	shortage
since	(s ince refers to time, otherwise use because)
smaller in size	smaller
so as to	to
some of the	some
subject matter	subject
subsequent to	after
sufficient	enough
suggestion	USE suggest INSTEAD?
surreptitiously	secretely
take into consideration	consider
take-home message	(Cliché)
terminate	end
the bad news is	(Cliché)
the bottom line	(Cliché)
the fact of the matter is	(Cliché)
the fact that	(Cliché)
the good news is	(Cliché)
the great majority of	most
the majority of	most
the next level	(Cliché)
the opinion is advanced that	I think
the period of time of	(blank)
the predominant number of	most
the question as to whether	whether
the reason is because	because
the vast majority of	most
There are	(uninformative start to a sentence)
there is reason to believe	I think
through the use of	by(with)
time period	time
tip of the iceberg	(Cliché)
to the extent that	if
to the fullest possible extent	fully
totally	(avoid or replace to tally)
towards	toward
transitioning	(a noun used as a verb)

ultimate	last
uninamity of opinion	agreement
unique	(needs no qualifier like v ery unique)
until such time as	until
up in the air	(Cliché)
utilize	use
validate	confirm
venue	(Cliché)
viable alternative	(Cliché)
was of the opinion that	believed
was performed	ed(add was before this word)
ways and means	ways(means)
were of the opinion that	believed
what is the explanation of	why
when all is said and done	(Cliché)
whether or not	whether
while	although or whereas (unless time)
window of opportunity	(Cliché)
wish to	(blank)
with a view to	to
with reference to	about(blank)
with regard to	concerning(about, blank)
with the possible exception of	except
with the result that	so that
within the realm of possibility	possible
witnessed	saw
would seem to	(blank)
yield	USE as VERB?
Whether	(Use If for dependent clauses)