

You will write a lot of different things:

- memos or e-mails explaining analyses
- study protocols
- DSMB reports
- job descriptions
- reference letters
- tenure/promotion packages
- grant proposals
- journal articles
- talks
- books

I'm going to give you one principle and two techniques that you can use for writing all of these things.

Outline

Principle: You always write for a particular audience

Writing involves 3 cognitively distinct tasks:

1. Selecting and organizing material (Technique #1)
2. Writing a first draft (Technique #1)
3. Revising/editing (Technique #2)

Don't try to do these tasks at the same time for anything longer than 2 or 3 paragraphs.

Principle: You always write for a particular audience

I have explained statistical methods to these audiences:

- My Mom (MS Food Science, Penn State, 1945)
- AIDS activists
- Dental hygienists
- Dentists
- MDs
- MDs with an MPH
- Graduate-level biostat service courses
- PhDs in non-quantitative fields
- PhDs in quantitative fields other than stat
- A mix of dental researchers and PhD statisticians
- MS students in biostat
- PhD students in stat and biostat
- PhD statisticians who run clinical trials
- PhD statisticians who do methods research
- PhD statisticians who do methods research in my area

You must write so that you will communicate with the particular audience for which your document is intended.

- What do they know and not know?
- What do they care about?
- How do they interpret particular words?
- Are they receptive or hostile? Etc., etc., etc.

If you try to write something that works for all these audiences, you will fail to communicate to any of them.

1. Selecting and organizing material (Outlining)

The technique:

Don't try to produce an outline in the correct logical order

Instead, take advantage of your word processor:

- Type the points you want to make.
- Use the language you find most comfortable, because you're the only person who will use it.
- Keep the points short, one line if possible.
- Don't worry about order or style, just vomit them out.
- When you think you're done, use the word processor to re-arrange the order of the points so that they flow logically.
- If two points are redundant, combine them.
- You might need to add a point to make connect two points.
- Rough out tables and figures you need to make certain points.

When you're done, you have an outline.

Usually the points correspond to paragraphs, sometimes a point needs > 1 paragraph

2. Writing a first draft

DO NOT try to compose and edit at the same time.

If you try to, you will find it very hard to compose.

The main idea: Just write down the content in the right order.

- Don't worry about how long or how pretty it is.
- Just vomit it out; you edit it in the next step.

Technique: Take advantage of the technology

- Start with your outline, where 1 point = 1 paragraph
- Write sentences within paragraphs using the technique for outlining. (First vomit'em out, then re-arrange them.)

3. Revising/Editing

Once you have the right material in the right order, THEN you make your writing sing.

Problem: It's very difficult to read your own writing critically.

-- Ultimately, you must have somebody else read it, preferably a representative of your audience.

Partial solution: A technique I call "winnowing".

Besides ordinary editing, winnowing is a technique to reduce a document's length without removing any content.

(Go to "Winnowing: A Tool for Polishing and Tightening Prose".)

Winnowing: A Tool for Polishing and Tightening Prose

1. Introduction

This article gives a tool to help students and new faculty polish writing.

This tool address two common problems: making documents shorter and making their prose more crisp.

The method is called “winnowing”

Its objective is to reduce document length without removing content;

It promotes crisp style by forcing a writer to read familiar prose critically.

It is much like a game, which alleviates the tedium of editing.

It is readily demonstrated in classrooms or seminars, with audience participation.

2. Winnowing

The basic idea:

If you are counting pages, as statistics journals and granting agencies do: You make a document shorter by making individual paragraphs shorter; you make a paragraph shorter by making it a line shorter, until no more lines can be extracted. Start with the first paragraph, and see if you can make it shorter by a line without removing any content.

If you are counting words, as health-care journals do: Save many words in total by saving a few words in many places. Start with the first paragraph, and see how many words you can take out without removing any content.

An example in detail

Start with a paragraph of unedited prose; show how it gets shorter with each revision.

You can do this in a class or seminar.

At UM Biostatistics, we have done this in large seminars, in real time, as follows:

Project the computer's desktop onto a screen and edit on the screen.

Edit (say) two paragraphs submitted by volunteers before the seminar.

To do the editing, take suggestions from the seminar attendees. (Our attendees, including non-native speakers, have participated enthusiastically.)

Keep the original on the screen as well as the edited version, so they can be compared in detail, not just by word or line counts.

3. An auxiliary tool: Tables of examples [See "Omit Needless Words.doc"]

These tables give examples from actual documents I've written, co-authored, or edited, with alternative wordings. They may be particularly helpful for non-native speakers.

Examples are grouped into tables by types of constructions that tend to use needless words.

Each table's title is a readily-spotted symptom of the table's type of construction, e.g., "the preposition 'of'", "the passive voice".

Omit Needless Words

8/8/07, Jim Hodges

This note presents methods for shortening documents, following Strunk's maxim "Omit needless words". The principle is: save many words in total by saving a few words in many places.

Examples are grouped by types of constructions that tend to use needless words. Some examples fit in two groupings and appear in both places. These are not prescriptions; unclarity or awkward style is worse than a few extra words, although the shorter alternative usually reads better as well. All examples are from actual documents, some from my own documents, so don't be embarrassed if you recognize one!

Word counts were made using Microsoft Word (2001 Macintosh edition). The last group of examples gives little ways to cheat Word's word-counting algorithm.

The preposition "of"

Example	Shorter alternative (words saved)
<u>Analyses of healing bone</u> condition . . . were performed	Healing bone condition . . . was analyzed (2)
The <u>condition of the healing bone</u> . . .	The healing bone's condition . . . (2)
The purpose of this study was to . . .	This study's purpose was to . . . (2)
. . . loading efficacy for the <u>stimulation of bone formation</u> loading efficacy for stimulating bone formation (2)
The earliest approach was <u>that of X</u> [citation], who measured . . .	The earliest approach was X's [citation]; she [or "they"] measured . . . (2)
The <u>perception of color</u>	Color perception (2)
limited <u>mobility of the jaw</u>	limited jaw mobility (2)
. . . after the <u>initiation of treatment</u>	. . . after treatment initiation (2)
to obtain an accurate reproduction of a dental arch . . .	to accurately reproduce a dental arch . . . (3) [If you hate split infinitives, move "accurately" before "to" or after "reproduce"]
The use of the <u>three-dimensional optical digitizer allowed for</u> measurement of distortion . . .	<u>The three-dimensional digitizer allowed</u> measurement of distortion . . . (5)

The passive voice (see also "Convoluting sentence structure" below)

Example	Shorter alternative (words saved)
Cervical bone losses . . . <u>are given in</u> Figure 2.	Figure 2 gives cervical bone losses . . . (2)
In the present study, the hypothesis that . . . <u>was tested was that</u>	The present study tested the hypothesis that . . . (4)
Five days' loading <u>was applied to a</u> prolonged-healing implant	A prolonged-healing implant was loaded for five days (1)
An approach using only one liquid <u>has been proposed by</u> X	X proposed an approach using only one liquid (3)
These criteria <u>were assessed by</u> one of two examiners (X, Y)	One of two examiners (X, Y) assessed these criteria. (2)
Recently extracted . . . first premolars . . . <u>were used in this study</u>	<u>This study used</u> recently extracted . . . first premolars (2)

The verb "to be"

Example	Shorter alternative (words saved)
The estimates for the unknowns yielded by this simultaneous analysis <u>are identical to</u> those from separate analyses.	This simultaneous analysis gives estimates identical to those from separate analyses. (6)
Infectious resorption <u>was not the cause of</u> bone loss	Infectious resorption <u>did not cause</u> bone loss (2)
. . . the critical surface tension, which <u>is an</u> approximation to X	. . . the critical surface tension, which <u>approximates</u> X (3)
<u>There is</u> a consensus that . . .	Clinicians generally agree that . . . (1)
<u>There is other evidence that corroborates</u> the present study's findings.	Other evidence corroborates the present study's findings. (3)
The underlying mechanisms . . . <u>may be</u> different	The underlying mechanisms . . . <u>may differ</u> (1)
These findings <u>are in conflict with</u> expert opinion . . .	These findings <u>conflict with</u> expert opinion . . . (2)

A second objective is to see if there are certain subgroups of veterans who might be at particularly high risk of poor outcomes . . .

A second objective is to see if certain subgroups of veterans are at particularly high risk of poor outcomes . . . (4)

It may be that at least 5 years of followup is required . . .

At least 5 years of followup may be required . . . (3)

They have also been found to be predictors of . . .

They have also been found to predict . . . (2)

Needlessly long expressions

<u>Example</u>	<u>Shorter alternative (words saved)</u>
On the other hand, . . .	"However, . . ." or "Nonetheless . . ." (3)
prior to	before (1)
as well as	and (2)
"Leads to" or "results in"	causes (1)
with the exception of	except for (2)
surgical intervention	surgery (1)
"Whether or not . . ." or "If X or not"	"Whether" or "If X" (2 each); "or not" is redundant
Using <u>a number of</u> diverse approaches	Using <u>several</u> diverse approaches (2)
These studies suggest that <u>a significant number of</u> closed-lock patients . . .	These studies suggest that <u>many</u> closed-lock patients . . . (3)
once per month	once monthly (1)
A ball of wax was applied to the apical portion of the root to seal the foramen <u>to allow for the maintenance of patency of the foramen</u>	A ball of wax was applied to the apical portion of the root to seal the foramen <u>to keep it patent</u> [or "to maintain its patency"] (6)
The 'D' superscript refers to dispersion components and the 'P' superscript refers to polar components.	The 'D' and 'P' superscripts refer to dispersion and polar components, respectively. (3)

X is called "X", after those who developed it

X is called "X", after its developers (or "its creators") (2)

Due to the hygroscopic nature of liquids E, F, and G, . . .

Because liquids E, F, and G are hygroscopic, . . . (3)

the findings were inconclusive due to low statistical power

low statistical power made the findings inconclusive (2)

The only other randomized trial that evaluated medical management . . .

The only other randomized trial evaluating medical management . . . (1)

All treatment-strategy groups improved according to jaw function

All treatment-strategy groups had improved jaw function (1)

Other evidence corroborates the present study's findings.

Other evidence corroborates our findings. (2) [Although using personal pronouns may create a stylistic problem]

Patient compliance with treatment was assessed . . .

Treatment compliance was assessed . . . (2) [who else *could* comply with treatment?]

The main effect of custom vs. stock tray usage answers the question of whether these two groups differ . . .

The main effect of custom vs. stock tray usage addresses whether these two groups differ . . . (3)

. . . men denied SSDI benefits . . . suffered levels of impoverishment that were substantially worse than that of successful SSDI beneficiaries. . .

. . . men denied SSDI benefits . . . suffered impoverishment substantially worse than successful SSDI beneficiaries. . . (6)

Our analyses will take into account . . .

Our analyses will account for . . . (1)

In the event that an association is observed . . .

If an association is observed . . . (3)

Further studies could involve an examination of other types of . . .

Further studies could examine other types of . . . (3)

There is also a higher degree of difficulty involved in fabricating a porcelain butt shoulder . . .

It is also more difficult to fabricate a porcelain butt shoulder . . . (4)

Needless words or expressions

Example	Shorter alternative (words saved)
<u>It is important to note that</u> [sentence]	"Note that [sentence]" (4) or just "[sentence]" (6); if [sentence] were unimportant, you'd exclude it
in order to	"to" (2) -- I have never seen an instance in which "in order to" improves clarity, though it may improve rhythm or style (i.e., if you <u>want</u> to sound stuffy)
were found to be	were (3)
The underlying mechanisms . . . may <u>be different</u>	The underlying mechanisms . . . may <u>differ</u> (1)
<u>The results showed that</u> X was greater than Y	X was greater than Y (4)
<u>The results of this investigation support</u> the use of . . .	"This investigation supports the use of . . ." (3) or "These results support the use of . . ." (3)
This is an indication of . . .	This indicates . . . (3)
In choosing <u>the</u> solids for the experiments . . .	In choosing solids for the experiments . . . (1)
Good wetting . . . is an important factor in <u>the</u> retention of removable prostheses	Good wetting . . . is an important factor in retention of removable prostheses (1)
PMMA is polar and is <u>a material</u> commonly used in dentistry	PMMA is polar and is commonly used in dentistry. (2) [The author had already said that PMMA is a material.]
scores range from 0 to 1, <u>with</u> higher scores being worse	scores range from 0 to 1, higher scores being worse (1)

all groups showed significant improvement ($P < 0.01$)

This opinion shows the fallibility of treatment recommendations that are based on clinical observations and case series

Even with disc repositioning surgery, 86% of discs re-displaced by 2.2 years, most within 2 to 6 months of surgery.

Averages and standard errors of the WA area values were determined . . .

The color change, which occurs in a tooth adjacent to a metal ceramic restoration, is greater than . . .

When examining the metal frameworks separately[,] it can be seen that there exists no significant difference . . .

Each of the 20 impressions was then poured up with green die stone . . . that was mixed according to . . .

The four metal frameworks effect a . . . change in tooth color . . .

Some of the light is permitted to be transmitted or passed through the porcelain . . .

The . . . wavelengths that are present in the incident light determine its qualitative nature . . .

all groups improved ($P < 0.01$) (2)

This opinion shows the fallibility of treatment recommendations based on clinical observations and case series (2)

Even after disc repositioning surgery, 86% of discs re-displaced by 2.2 years, most within 2 to 6 months. (2)

Averages and standard errors of the WA areas were determined . . . (1)

The color change in a tooth adjacent to a metal ceramic restoration is greater than . . . (2; the commas are gone, too)

Examining the metal frameworks separately, there is no significant difference . . . (6)

Each of the 20 impressions was then poured up with green die stone . . . mixed according to . . . (2)

The four metal frameworks change tooth color . . . (3)

Some of the light is transmitted or passed through the porcelain . . . (3)

The . . . wavelengths in the incident light determine its qualitative nature . . . (3)

Convoluting sentence structure

Most of these involve the passive voice.

Example	Shorter alternative (words saved)
There were statistically significant within group improvements relative to baseline at all follow-up intervals for all 4 treatment groups ($p < 0.01$)	All groups showed significant improvement ($P < 0.01$) compared to baseline at all followup intervals (7)
Patients' overall satisfaction with their care and ratings of their overall success were assessed and there were no significant differences between groups for these outcomes (Table VII)	The groups did not differ according to their ratings of overall satisfaction and success of their treatments (Table VII) (8) [the methods section describes how they were assessed]
These authors speculated that persistent decreased range of motion in some patients may have been due to the permanently displaced disc being an obstacle.	These authors speculated that reduced range of motion may have persisted in some patients because the permanently displaced disc was an obstacle. (2 -- and it reads much better)
This characteristic combined with the high accuracy, reliability, and operator error reduction found with the digitizer made it an excellent measuring device to use.	This characteristic, combined with the digitizer's high accuracy and reliability and low operator error, made it an excellent measuring device. (4) [Note the role of the commas.]
There still exists with the use of opacious dentin porcelain a need for adequate reduction so that there is room for . . .	Opacious dentin porcelain still requires adequate reduction to allow room for . . . (10, and you can tell what it means)

Excessive qualification

Example	Shorter alternative (words saved)
A second objective is to see if there are certain subgroups of veterans <u>who might be</u> at particularly high risk of poor outcomes . . .	A second objective is to see if certain subgroups of veterans <u>are</u> at particularly high risk of poor outcomes . . . (4)
If these results <u>should be found to be</u> generalizable . . .	If these results <u>are</u> generalizable . . . (4)

Little ways to trick Microsoft Word

Example	Shorter alternative (words saved)
closed lock patients	closed-lock patients (1) [joining two words with a hyphen makes Word count them as a single word]
<u>Twenty six</u> of these patients elected not to participate	Of these, 26 elected not to participate (2) ["Twenty six" is 2 words while "26" is 1 word]
<u>U. S.</u>	U.S. or US (1) [the space between "U." and "S." makes Word count it as 2 words]