

Scientific Writing: Writing to Communicate Effectively

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Our writing is often ineffective

We are often:

- less clear than we think
- verbose
- indirect
- and our grammar is...well...not that great!!! (especially mine!)

Use plain, simple language, short words and brief sentences. That is the way to write English—it is the modern way and the best way. Stick to it; don't let fluff and flowers and verbosity creep in.

Mark Twain

— www.writerswrite.co.za

Letter to D. W. Bowser, March 1880

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Writing is a skill that requires practice



Calvin and Hobbes© Watterson, United Press Syndicate

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What is the purpose of writing*?>

Communication
Write for the **READER**

*Several points are adapted from Gopen & Swan

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Communication

“We cannot succeed in making even a single sentence mean one and only one thing; we can only increase the odds that a large majority of readers will tend to interpret our discourse according to our intentions.” – Gopen & Swan

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Communication

“Spoken language seldom remains ambiguous for long because we can always halt the conversation and swiftly correct our conversational partners. ... writing ensures that we’re seldom around to correct someone when what seemed patently transparent to us seems about as clear to our readers as mud.” - Douglas

Your written words are *always interpreted by others...*

If the reader fails to understand, the fault lies with you... not them.

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Communication

Horace knew he was going to have to break the lock to get free.

What images come to mind when you read this sentence?

Horace the spy Horace the wrestler

Even simple sentences may be miscommunicated. We interpret words, sentences, and paragraphs in context.

- Douglas

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Trust the reader

"If you write, you must believe... in the ability of the reader to receive and decode the message. *No one can write decently who is distrustful of the reader's intelligence...*"

- Strunk & White

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To understand your writing, readers must:

- 1) Decipher your meaning *Languages have rules to facilitate understanding.*
- 2) Minimize ambiguities *Rules create expectations.*
- 3) Pin words into *grammatical categories* (e.g., noun, verb)
- 4) File your information away
- 5) Compare that information to their existing knowledge
- 6) Decide what to remember

- Douglas

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Phases of reading

- Lexical: Identify the words being used
- Syntactic: Process the sentence syntax
- Inferential: Build an inference of what is being said
- Reading is hard...*
- Reading is cognitively demanding.*
- Our job is to make it easier by reducing the cognitive demand.*

- Douglas

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Writing for the reader

The reader must understand what you're attempting to communicate

Readers base their understanding on **words, structure, and content**

Readers use **structure** to **predict**. The **predictions** facilitate **understanding**.

We use predictions at the document, section, paragraph, and sentence levels. Accurate prediction → more rapid comprehension

Readers have **expectations** about **words** and **structure**.

Those **expectations** facilitate **prediction and understanding**.

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Prediction

Thirteen of the 27 genes significantly up-regulated at short reperfusion but not at long reperfusion encode for known transcription factors or inflammatory cytokines, suggesting roles in gene transcription and regulation at this early reperfusion time point.

Were you able to understand this sentence easily with only one read-through?

- Douglas

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Prediction

We think up-regulated is the verb...

Thirteen of the 27 genes significantly **up-regulated** at short reperfusion but not at long reperfusion encode for known transcription factors or inflammatory cytokines, suggesting roles in gene transcription and regulation at this early reperfusion time point.

- Douglas

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Prediction *The word **but** supports our prediction...*

Thirteen of the 27 genes significantly **up-regulated** at short reperfusion **but** not at long reperfusion encode for known transcription factors or inflammatory cytokines, suggesting roles in gene transcription and regulation at this early reperfusion time point.

- Douglas

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Prediction *But then we find the real verb...AHHH!!!*

Thirteen of the 27 genes significantly **up-regulated** at short reperfusion **but** not at long reperfusion **encode** for known transcription factors or inflammatory cytokines, suggesting roles in gene transcription and regulation at this early reperfusion time point.

- Douglas

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Prediction

Thirteen of the 27 genes significantly **up-regulated** at short reperfusion **but** not at long reperfusion **encode** for known transcription factors or inflammatory cytokines, suggesting roles in gene transcription and regulation at this early reperfusion time point.

Now, we have two choices, finish the sentence, knowing that we'll have to re-read it or...

- Douglas

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Prediction

Thirteen of the 27 genes significantly **up-regulated** at short reperfusion **but** not at long reperfusion **encode** for known transcription factors or inflammatory cytokines, suggesting roles in gene transcription and regulation at this early reperfusion time point.

...go back to the beginning and start over right away.

But both options require re-reading.

- Douglas

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Prediction and expectation

The sentence fails because we **expect** the verb to be close to the noun.

But in this case, we encountered another word, up-regulated, that we **predict** is the sentence's verb...it isn't.

Our **expectation** wasn't met. Our **prediction** was wrong.

That leads to **confusion**.

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Structure - Expectations



"It appears there were communication problems back then, too."

What happens if you read a paper and you find methods in the results section or results in the methods?

You have expectations about paper structure.

You have similar expectations all the way down to the sentence and even the word level.

21

Do NOT make the reader THINK

Failure to use expected structure makes the reader expend cognitive energy to create it.

Clear writing with the expected structure improves prediction and enhances comprehension.

Thinking (by the reader) usually means...

"Hmm, the reader doesn't get what I am trying to say. My writing isn't clear."

Not – "Oh, the reader isn't smart enough to understand what I am trying to say. They should read it again."



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Stages of writing

- 1) Thought: Plan the big picture
- 2) Plan the sections
- 3) Choose the section to start with
- 4) Motivation & inspiration
- 5) Write...a sentence
- 6) Write...a paragraph
- 7) Write...a section
- 8) Write...a manuscript

Rewrite & edit!
Rewrite & edit!
Rewrite & edit!



23

Content/Structure <> Writing/Editing

Write for content

Put your ideas down when you write your first draft.

Rewrite for clarity and concision...and continuity...and coherence...and content

Fix the structure through rewriting and editing.

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Keys to better writing

- 1) Write simply
 - 2) Write concisely
 - 3) Avoid clutter
 - 4) Use structure to help comprehension (sentence, paragraph, section)
 - 5) Ensure continuity
 - 6) Vary cadence
 - 7) Follow the rules of grammar
 - 8) Be patient
- Points 1-7 will help you write more clearly...
So will number 8!!!

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Be clear

“But since writing is communication, clarity can only be a virtue. And although there is no substitute for merit in writing, clarity comes closest to being one.”

“Clarity, clarity, clarity. When you become hopelessly mired in a sentence, it is best to start fresh; do not try to fight your way through against the terrible odds of syntax.” - Zinsser

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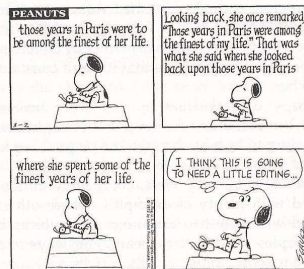
Write simply

“Simplify, simplify”

“Actually, a simple style is the result of hard work and hard thinking; a muddled style reflects a muddled thinker or a person too arrogant, or too dumb, or too lazy to organize his thoughts.”

- Zinsser

Edit to simplify!!!



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Clutter

“Clutter is the disease of American writing. We are a society strangling in unnecessary words, circular constructions, pompous frills, and meaningless jargon.”

“But the secret of good writing is to strip every sentence to its cleanest components.

Every word that serves no function, every long word that could be a short word, every adverb that carries the same meaning that’s already in the verb, every passive construction that leaves the reader unsure of who is doing what—these are the thousand and one adulterants that weaken the strength of a sentence.

And they usually occur in proportion to education and rank.” – William Zinsser

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Clearing out clutter

Fighting clutter is like fighting weeds: You (the writer) are always behind

We must first clear our heads of clutter

Clear thinking → clear writing → clearer thinking → clearer writing

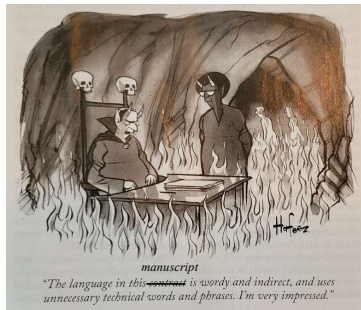
“Writers must constantly ask: what am I trying to say?”

- Zinsser

REMEMBER: You’re telling a story!

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Words



manuscript
“The language in this ~~manuscript~~ is wordy and indirect, and uses unnecessary technical words and phrases. I’m very impressed.”

The New Yorker, Feb. 6, 2023

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Write simply

"I never knew words could be so confusing," Milo said to Tock as he bent down to scratch the dog's ear.

"Only when you use a lot to say a little," answered Tock.

- The Phantom Tollbooth



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Simple words are better

Simple words provide concreteness → clarity

Invite the reader to easily see the connection between words

We read simple words more rapidly → comprehension

We retain simple words more easily

Words that are spoken quickly/easily are easier to remember → retention

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Simple words

A majority	Most
Utilize	Use
Demonstrates	Shows
Presently	Now
Initial	First
Attempt	Try
Referred to as	Known as, is

33

Simple, fewer words

A vast majority	Nearly all
A small number of	A few
agreement with	agrees
arrived at a decision	decided
red in color	red

34

One of my least favorite words

Individuals

35

One of my least favorite words

Individuals	People
	Persons
	Adults
	Children
	Men
	Women
	...

Reserve individual to contrast with a group:

The group's policy was XX but many individuals disagreed

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Omit needless words (Clutter!)

The question as to whether	Whether
There is no doubt that	No doubt, Undoubtedly, Doubtless, Certainly
Used for analytical purposes	Used for analysis, Analytically, We analyzed
She is a person who	She
In a hasty manner	Hastily
This is a subject that	This subject
Her story is a strange one	Her story is strange
The reason why is that	Because

adapted from Strunk & White

37

Practice being concise

In order to

To

38

Practice being concise

An innumerable number of	Many, numerous, countless
A large number of	Many
At this point in time	Now, currently
has been shown to be	is

39

Don't double down

English borrowed words from many languages
 Early English speakers often spoke English, French, Latin, & other languages

After the Norman invasion in 1066, people used language redundancy to help communicate (examples):

Various and sundry
 Fit and proper

- Douglas

40

Don't double down: Choose one

Aid and abet	Full and complete
Any and all	New and novel
Basic and fundamental	Null and void
Each and every	So on and so forth
First and foremost	True and accurate
Final and conclusive	

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Don't double down with modifiers

Basic fundamentals	Final outcome
Completely finish	Future plans
Consensus of opinion	Important essentials
Continue on	More specifically
Each individual	Personal beliefs
End result	Revolve around
Evidently clear	Split apart

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Avoid redundancies

- Absolute necessity
- Collaborate together
- Merge together
- New innovation
- Pooled together
- Serious crisis
- Throughout the entire
- Visible to the eye

43

Redundancies with abbreviations

- HIV virus
- STI infection
- PTSD disorder

44

Simplify negatives

- Not the same
- Not many
- Did not
- Does not have
- Did not accept
- Did not consider
- Not necessary
- Not certain
- Douglas

- Different
- Few
- Failed to
- Lacks
- Rejected
- Ignored
- Unnecessary
- Uncertain

Negatives=More cognitive burden
 Use positive framing when possible.
 Replace "not X" with a more active verb.

45

Concise

A dog with three legs

A three-legged dog

Territories with conditions of high population

Densely-populated territories

46

Homogeneous, heterogeneous

Use homogeneos, not homogenos

- homogenos = homologous (ie a genetic term)

Use heterogeneos, not heterogenos

47

Principle or principal?

Which is correct:

Principle investigator

Principal investigator?

48

Do not overwrite

“Rich, ornate prose is hard to digest, generally unwholesome, and sometimes nauseating.”

“When writing with a computer, you must guard against wordiness...It is always a good idea to reread your writing later and ruthlessly delete the excess.” - Strunk & White

Ruthlessly delete the excess

49

Adverbs (Clutter!)

Adverbs are often unnecessary—especially with active verbs

- a radio blared loudly
- Clenched his teeth tightly

Strong verbs are weakened by redundant adverbs

50

Adjectives (more clutter!)

Adjectives are often unnecessary

Adjectives that exist as decoration is a self-indulgence for the writer and a burden for the reader

Adjectives should only do work that needs to be done.

- Zinsser

These ~~effacetic effects~~ have ~~insortain~~ implications for ~~hiv~~ ~~prevention~~ among ~~pwid~~ worldwide.

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Avoid little qualifiers (still more clutter!)

Prune out the small words that qualify a statement: a bit, rather, quite, very, in a sense

"This work is **quite** important." → "This work is important."

Little qualifiers undermine authority

Don't be **kind of bold**. Be **bold**.

Need to shorten a manuscript?

Delete every "very, quite, and rather".

You'll be surprised how often those words sneak in.

- Zinsser

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Do not overstate

"When you overstate, readers will be instantly on guard, and everything that has preceded your overstatement, as well as everything that follows it, will be suspect in their minds because they have lost confidence in your judgment or your poise."

"A single overstatement, wherever or however it occurs, diminishes the whole, and a **single carefree superlative has the power to destroy**, for readers, the object of your enthusiasm."

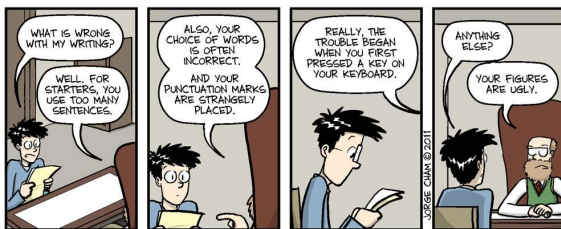
- Strunk & White

How do we overstate?

With adjectives and little qualifiers

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Sentences



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Reader expectations: the sentence

Three key elements:

Topic (Subject) *Readers use the topic as an anchor. It gives the reader the who or what.*

Verb *The verb gives the action. It tells the reader what is happening.*

Stress position (end of sentence) *Readers pay extra attention to the end of the sentence. The stress position completes the short story.*

55

Topic position

Make the subject the subject
- first things first.

The reader needs perspective and context

Control the topic position and use it effectively

56

The topic position – use it effectively

Our goal is communication about science, knowledge, and understanding.

Our goal is **not** to describe the literature or its history

In other words, the topics of our sentences should focus on what we've learned (what we know). The topic is not the literature itself. So...

57

The topic position – use it effectively

Avoid using “the literature” as the subject or “Previous research” or previous investigators “Gaynes, et al. have shown...”

Use the science instead.

58

Focus on the science not the literature! Avoid clutter!**

Previous research has shown that the earth is round.

The earth is round.^{REF}

Smith and Jones previously demonstrated that cats have whiskers.

Cats have whiskers.^{REF}

***And increase clarity!!!*

59

Use the science! Avoid clutter!

But what if the issue is less certain than the earth being round? What if the science is unclear or debatable?

The earth may be round.^{REF} *Uncertain, unknown, unclear, may, possible, probable, debatable, doubtful, dubious, controversial, disputed, questionable, ambiguous*

Cats probably have whiskers.^{REF}

We use words all the time to express uncertainty. We can do the same in our writing.

60

Avoid isolated pronouns (aka clutter)

Avoid use of: **It, There** *It is clear that...* *Clearly,*

It is important that we understand...

We must understand...

When used at the start of a sentence, these isolated pronouns are **signals of clutter**.

Anytime you see these, look for an alternative sentence structure that is more direct (and concise!)

61

Avoid isolated pronouns (aka clutter)

In the 1990's, **there** were approximately 600,000 hysterectomies performed in the US annually...

How can we rework this sentence to make it more direct (and concise)?

62

Avoid isolated pronouns (aka clutter)

In the 1990's, **there** were approximately 600,000 hysterectomies performed in the US annually...

In the 1990's, approximately 600,000 hysterectomies were performed in the US annually...

Which to use? It depends on what the sentence is about!

In the 1990s, gynecologists performed approximately 600,000 hysterectomies annually in the US...

63

Removing clutter: There

Within an enumerated part of the Hlabisa sub-district, there are two surveys that can be linked together with a unique identifier.

64

Removing clutter: There

Within an enumerated part of the Hlabisa sub-district, there are two surveys that can be linked together with a unique identifier.

Can you spot another problem with the original sentence?

Within an enumerated part of the Hlabisa sub-district, two surveys can be linked with a unique identifier.

65

Removing clutter: There

Within an enumerated part of the Hlabisa sub-district, there are two surveys that can be linked together with a unique identifier.

Within an enumerated part of the Hlabisa sub-district, two surveys can be linked with a unique identifier.

Avoid redundancies!

66

Removing clutter: There

Since **there** is no standardized definition of mastitis, ...

Since the definition of mastitis is not standardized, ...

Since mastitis is not defined consistently, ...

These subtle changes makes the phrase more direct and easier for the reader to digest

67

Avoid isolated pronouns (Use the science!)

“It remains unclear whether CTL function is impaired in HAM/TSP patients.”

Whether CTL function is impaired in HAM/TSP patients is unclear.

The impairment of CTL function is uncertain (unknown, unclear) in HAM/TSP patients.

CTL function may be impaired in HAM/TSP patients.

HAM/TSP patients may have impaired CTL function.

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What might you change?

A directed acyclic graph was used to identify the covariates used in this analysis. These were gender, age, year of first HCT report...

69

Avoid isolated pronouns: This, These, Those

A directed acyclic graph was used to identify the covariates used in this analysis. **These** were gender, age, year of first HCT report...

These what?

A directed acyclic graph was used to identify the covariates used in this analysis. The covariates were gender, age, year of first HCT report...

70

This, these, those – Pointing words

Pointing words (deictic terms) – point directly at an antecedent (a word in the previous sentence or phrase)

But the antecedent may be unclear

Improve clarity (and reduce cognitive burden) by including the antecedent

Ensure **the reader** can answer “This what?” or “These what?”

71

Concise

Women develop mastitis due to a number of different causes that fall into two categories: ...

The causes of mastitis fall into two categories:

Causes of mastitis may be considered in two categories:

The two categories of mastitis causes are...

72

Reader expectations – Subject & verb

Keep subject and verb close together whenever possible

Anything in between is a distracting interruption

Without the verb, we don't know what the subject is doing

We must keep the subject in our executive memory until we have the verb

The longer the interruption, the greater the cognitive disturbance—and the greater the likelihood that your reader will have to reread the sentence

73

Subject-verb separation

The smallest of the URFs (URFA6L), a 207-nucleotide (nt) reading frame overlapping out of phase the NH2-terminal portion of the adenosinetriphosphatase (ATPase) subunit 6 gene, has been identified...

The smallest URF is URFA6L, a 207-nucleotide (nt) reading frame overlapping out of phase the NH2-terminal portion of the adenosinetriphosphatase (ATPase) subunit 6 gene.

Gopen & Swan, American Scientist 1990

74

Passive & active voice

Passive	Active
It is recommended by the authors of the present study that...	

75

Passive & active voice

Passive	Active
It is recommended by the authors of the present study that...	We recommend

76

Passive & active voice

Passive	Active
It is recommended by the authors of the present study that...	We recommend
The following results were obtained	

77

Passive & active voice

Passive	Active
It is recommended by the authors of the present study that...	We recommend
The following results were obtained	We obtained these results; We observed

78

Passive & active voice

Passive	Active
It is recommended by the authors of the present study that...	We recommend
The following results were obtained	We obtained these results; We observed
It was discovered that a sustained coordinated effort would be required	

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Passive & active voice

Passive	Active
It is recommended by the authors of the present study that...	We recommend
The following results were obtained	We obtained these results; We observed
It was discovered that a sustained coordinated effort would be required	We need a sustained coordinated effort

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Passive & active voice

Passive	Active
It is recommended by the authors of the present study that...	We recommend
The following results were obtained	We obtained these results; We observed
It was discovered that a sustained coordinated effort would be required	We need a sustained coordinated effort BUT...

81

What is the sentence about?

Bees disperse pollen.

Pollen is dispersed by bees.

Which is preferable?

It depends!!!

82

Active vs. passive

Active is *usually better*, but...

In some cases, the paragraph may be about the passive item.

If the paragraph is about pollen, its story is a passive one when thinking about the bees.

Pollen is dispersed by bees.

83

Verbs

Most important of your writing tools

- Verbs push a sentence forward and give momentum

Active verbs activate your sentence

- Verbs reduce words by making appended prepositional phrases unnecessary

84

Verbs: Locate the action

Use meaningful verbs when possible:

To be or not to be?

Not to be

With too many "is's" or "ares", the story is often lost (or dulled)

Make the "actions" of the actors (the topic) clear by using strong verbs

Handwriting practice lines for page 85.

85

Unearth verbs buried as nouns

Antibody detection was accomplished by Team A.

Antibody detection was accomplished by Team A.

Team A detected antibodies.

Antibodies were detected by Team A. (passive, only if necessary)

Handwriting practice lines for page 86.

86

Buried verbs (nominalizations) are everywhere!

Utilization, development, communication, measurement, penetration

Any noun that you can make into a verb (even love, hope, liberty) is a nominalization

Nominalizations tend to be complex, abstract, difficult to picture

Nominalizations often make the sentence dull because you've stolen an active verb

If the buried verb occurs close to a form of to be, unbury it.

- Douglas

Handwriting practice lines for page 87.

87

Find the buried verb(s)

There ~~was~~ first a review of the measurement of systolic blood pressure.

88

Find the buried verb(s)

There ~~was~~ first a review of the measurement of systolic blood pressure.

First, we reviewed the measurement of systolic blood pressure.

A simple sentence but two fundamentally different interpretations:

First, we reviewed how to measure systolic blood pressure.

First, we reviewed how systolic blood pressure was measured.

89

Fix the following:

A high concentration of sialic acids, which are a group of substances principally composed of amino sugars attached to polysaccharides, lipids, or proteins, are found in the mammalian epididymis.

90

Subject-verb agreement

A high concentration of sialic acids, which are a group of substances principally composed of amino sugars attached to polysaccharides, lipids, or proteins, are found in the mammalian epididymis.

Identify the intervening phrase

Omit it

Check the subject-verb agreement

91

Fixed:

A high concentration of sialic acids, substances composed principally of amino sugars attached to polysaccharides, lipids, or proteins, is found in the mammalian epididymis.

Maybe we should remove the intervening clause:

Sialic acids are composed principally of amino sugars attached to polysaccharides, lipids, or proteins. Sialic acids are highly concentrated in the mammalian epididymis.

92

Reader expectations: Stress position

Readers naturally pay attention to the material at the end of the sentence as important.

The stress position tells us something important about the subject.

The end of the sentence receives the greatest emphasis.

93

Use the stress position effectively

Don't allow a sentence to limp to a conclusion.
Arrange the sentence to put the key information at the end.

The participants reported **no adverse events during the last six months of follow-up.**

During the last six months of follow-up, the participants reported **no adverse events.**

- Douglas

94

Simple sentences

"Each sentence contains one thought—and only one. Readers can process only one idea at a time, and they do it in linear sequence. Much of the trouble that writers get into comes from trying to make one sentence do too much work. Never be afraid to break a long sentence into two short ones, or even three." - Zinsser

95

Long sentences are hard to read

Long sentences contain few cues to inform readers which information is important

Long sentences have the same amount of space for emphasis (the end)...but proportionately, this space is reduced.

Long sentences place excessive demands on working memory, which makes them difficult to read.

Readers tend to forget virtually everything else but the stress position and subject in a long sentence.

96

Vary sentence length for readability

Use mostly short sentences

But repeated sentences with similar structure can be choppy → and therefore difficult to read

Vary sentence length to improve flow

Use transitions to help with the variation (more on transitions in a bit)

97

Word and Sentence Myths

Never end a sentence with a **preposition**

Never split an **infinitive** (e.g. to boldly go)

Never split a **verb phrase** (e.g. have seen)

Never begin a sentence with **and** or **but**

Never begin a sentence with **because**

Never use **since** to mean because

Never write a **one sentence paragraph**

Never use **I** or **me**

MYTHS!!!

98

A lengthy example

Pay attention to:

- 1) Unnecessary words and clauses
- 2) Concision
- 3) Clarity

Read through the full two paragraphs.

Consider how easy or difficult it is to understand the paragraphs

99

Several lines of evidence suggest that a selective “bottleneck” contributes to the restricted diversity at HIV-1 transmission. If the homogeneity in the transmitted virus reflected stochastic selection of 1 or a few variants for transmission, we would expect that the transmitting virus would most frequently resemble the predominant species in the source. Although limited by infrequent sampling that can skew the relative frequency of the different variant populations detected, many transmission studies demonstrate differences between the transmitted virus and the predominant variant in the blood [5, 6, 14, 15] or genital tract [16] of the source subject. In addition, HIV-1 transmission is characterized by the strict selection for variants that use the C-C chemokine receptor type 5 (CCR5) coreceptor, despite C-X-C chemokine receptor type 4 (CXCR4) variants in the partner [6, 17–19]. Finally, recently transmitted variants of HIV-1 subtypes A and C, though not necessarily subtype B, typically have shorter envelopes and/or fewer potential N-linked glycosylation sites than chronically infected subjects [14, 15, 20–24]. Together, these data suggest that the limited viral diversity during HIV-1 transmission is not simply a stochastic event, but rather that it may also involve selective pressure for particular envelope features.

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In 1993, Zhu et al proposed that HIV-1 selection is reset at transmission, with evolution starting over in newly infected individuals [6]. More recently, several investigations have suggested that transmitted and/or early variants are more closely related to the donor’s ancestral sequences. In an examination of HIV-1–infected subjects followed longitudinally, Herbeck et al found that HIV-1 interhost genetic diversity and divergence are significantly less during early infection, suggesting evolution toward an ancestral state following transmission [20]. Sagar et al directly examined the characteristics of viruses selected during transmission by examining 13 linked heterosexual transmission pairs from the Rakai Community Cohort Study (RCCS) [14]. The transmitted variants differed from the donor sequences and were more closely related to the computed most recent common ancestor of the donor virus than they were to the majority of contemporaneous viruses, suggesting that variants with ancestral features were favored for transmission [14]. These studies left open the question of whether early donor viruses are archived and favored for retransmission or whether the virus evolves immediately after transmission in the absence of the selective forces driven by a robust immune response [20, 25].

101

Rewrite

When HIV-1 is sexually transmitted, only one virus variant is typically transmitted from the index to the previously uninfected partner. If the transmitted variant was selected randomly, we would expect the index partner’s predominant viral variant to be transmitted most commonly. But this predominance is not observed. Instead, transmitted variants pass through a bottleneck; certain variants with specific characteristics are transmitted more often. Characteristics that enhance transmission include the use of the C-C chemokine receptor type 5 (CCR5) coreceptor and, for HIV-1 subtypes A and C, shorter envelopes and/or fewer potential N-linked glycosylation sites.

Transmitted variants are closely related to ancestral HIV-1 variants, suggesting an adaptation for transmission. Among people with early HIV-1 infection, viral genetic diversity is considerably less between persons. Furthermore, in the Rakai Community Cohort Study, the viruses in the newly infected partners resembled the most recent common ancestral virus among the couples more than contemporaneous circulating viruses in the transmitting partners. This observation supports the hypothesis that ancestral variants have a transmission advantage. Alternatively, the virus could evolve rapidly after transmission to the ancestral state given the absence of a robust immune response during early infection.

102

Paragraphs

“Make the paragraph the unit of composition.”

- Strunk & White

<https://www.facebook.com/smbccomics/photos/a.244839402250990/1710728732328709/?type=3>

103

Continuity

Paragraphs should flow.

They begin with a paragraph head (or topic sentence).

The body of the paragraph builds off the paragraph head.

The paragraph should be easy to read—that ease comes from continuity, created by a critical concept...

104

Improving continuity, flow, and clarity

Familiar-unfamiliar

Old before New

Old before new is one of the most critical concepts in writing clarity and flow.

105

Old before New

Old information in the topic position: linking backward to previous sentence

New information in the stress position: new, emphasis-worthy information

Topic & stress positions principle:
 "Put in the topic position the old information that links backward; put in the stress position the new information you want the reader to emphasize."
 - Gopen & Swan

106

Old before New

Referential continuity: One sentence refers implicitly or explicitly to the content of the preceding sentence(s)

Allows readers to use what is in their working memory to interpret the next sentence

Creates an unobtrusive chain of references the seem continuous

107

Old before New: Your answer to "It doesn't flow"

Old before new will almost always correct problems with flow.

Flow issues arise from two basic problems:

a) inversion of a sentence (new before old)

 Old → new. New → old.

b) logical gaps

 Old → new. New → new.

108

Logical gaps

We expect new information will be followed by additional information about that item.

Sometimes, a new sentence has no linkage at all to previous ones. This absence creates a gap in the flow.

You must *bridge the gaps* from one sentence to another.

Old before new still applies!

Let's look at some examples!

109

Old before New

Young women in South Africa face an unparalleled HIV burden; by the time they reach the age of 21, more than a third will be infected.

Based on what you have read, what do you predict the next sentence to be about? What do you expect to be in the topic position of the next sentence?

110

Old before New

As originally written:

Young women in South Africa face an unparalleled HIV burden; by the time they reach the age of 21, more than a third will be infected. Unequal sexual relationship power may play an important role in contributing to high HIV incidence among young South African women.

111

Old before New

Young women in South Africa face an unparalleled HIV burden; by the time they reach the age of 21, more than a third will be infected. Unequal sexual relationship power may play an important role in contributing to high HIV incidence among young South African women.

Young women in South Africa face an unparalleled HIV burden; by the time they reach the age of 21, more than a third will be infected. The high HIV burden among young South African women may be attributable, at least in part, to unequal sexual relationship power.

112

Old before New - Rewrite

Young women in South Africa face an unparalleled HIV burden; by the time they reach the age of 21, more than a third will be infected. The high HIV burden among young South African women may be attributable, at least in part, to unequal sexual relationship power.

What would you expect to be in the topic position of the next sentence?

We now have two bits of "old" information, right?
HIV burden/incidence OR unequal sexual relationship power
Most likely the latter, given the way the sentence is written.

113

PWID with HIV often engage with HIV treatment services late.

What do we expect the next sentence to be about?

114

New information

PWID with HIV often engage with HIV treatment services late. Viral suppression and possibly mortality could be improved by enhancing HIV-infected PWID's engagement in HIV care.

Old information

PWID with HIV often engage with HIV treatment services late. Improving access to HIV care could increase viral suppression and, possibly, reduce mortality.

115

Old before New

Pay-for-performance (P4P) schemes transfer cash or some other material good to healthcare providers, conditional on some measurable action or achievement of a predetermined performance target.¹ Well-designed P4P schemes can align incentives with public health goals, mitigating cost growth by improving disease management and prevention.² Because these strategies distribute financial incentives (FI's) to providers based on their clinical performance, these strategies may improve clinical practice by relying on providers' intrinsic motivation and expertise, sparing healthcare systems in resource constrained settings the need for costly oversight and monitoring systems. Chronic under-testing of STD patients in many clinical settings in LMIC is attributed to lack of awareness or concerns about confidentiality and stigma on the patient side,[REF] as well as provider limitations in the form of heavy patient load or time constraints that limit the time and effort they are able to invest in informing or counseling their more hesitant patients.

116

Old before New: Logical Gap

Pay-for-performance (P4P) schemes transfer cash or some other material good to healthcare providers, conditional on some measurable action or achievement of a predetermined performance target.¹ Well-designed P4P schemes can align incentives with public health goals, mitigating cost growth by improving disease management and prevention.² Because these strategies distribute financial incentives (FI's) to providers based on their clinical performance, these strategies may improve clinical practice by relying on providers' intrinsic motivation and expertise, sparing healthcare systems in resource constrained settings the need for costly oversight and monitoring systems. Chronic under-testing of STD patients in many clinical settings in LMIC is attributed to lack of awareness or concerns about confidentiality and stigma on the patient side,[REF] as well as provider limitations in the form of heavy patient load or time constraints that limit the time and effort they are able to invest in informing or counseling their more hesitant patients.

117

Old before New- paragraph

Improving surgical outcomes in the elderly is rapidly becoming a leading priority among professional surgical societies. In a press release last month, the American College of Surgeons set forth landmark guidelines for optimal quality care of the geriatric surgical patient.⁶ These guidelines specify 13 key issues of preoperative care in the elderly, including functional and nutritional status, cognitive impairment, frailty, comorbidities, and preoperative testing.

The abbreviated geriatric assessment represents a clinical tool that addresses each of these 13 domains. Work in the medical oncology setting suggests its feasibility and clinical predictive utility.⁷⁻⁸ Furthermore, biomarkers of aging, such as p16^{INK4}, may represent a clinical adjunct that is easily measured in serum and may correlate with functional status and outcomes.⁹

118

Paragraph structure

If a paragraph doesn't flow, ask yourself if the topic & stress positions flow logically and align properly:

List out the topic positions, old material

List out the new, emphatic material (stress positions)

List out the verbs

Is there new before old? Should some of the stress material be topic?

119

Paragraph structure

Quite common to put the new information before the old
- Especially in the early drafts

Recognize this tendency and revise

The more you practice, the better it will be the first time.

120

Continuity: Use transitions

Transitions help link backward to the material in the previous sentence.

Example transitions: Also, furthermore, but, and, although

Best when used before the verb

- Douglas

121

Transitions

Continuity: Also, and, besides, furthermore, in addition, similarly

Contrast/Exception: But, although, conversely, in contrast, despite

Frequency/Time: After, before, now, recently, during

Order: first, second, third, last, primarily, most importantly,

Example: for example, for instance, specifically

Cause/Result: as a result, because, therefore, accordingly, consequently, thus, so

Conclusion: Finally, in conclusion, in summary, in short

- Douglas

122

Mood changes

Use a word at the beginning of the sentence to clearly state the change (transition) in mood/direction.

But, yet, however, nevertheless, still, instead, thus, subsequently

123

A plea for but

Given the intervention's emphasis on MAT, participants may have overstated MAT use. **However**, the validity of the intervention's effect on these self-reported measures is supported...

Given the intervention's emphasis on MAT, participants may have overstated MAT use. **But** the validity of the intervention's effect on these self-reported measures is supported...

But is a strong word at the beginning of a sentence. **Use it.**

I almost never use the word "however" anymore.

*I use **but** instead.*

It's more direct and nearly always more effective.

124

Transitions

No meaningful differences in implementation and uptake of systems navigator sessions were identified across sites. **In contrast**, site-specific differences in psychosocial counseling encounters were observed.

The modest uptake of MAT may have several contributing factors. **Although** designed to address both ART and MAT, ART initiation was emphasized as a first priority in the intervention. **In addition**, MAT initiation was often limited by local government restrictions on MAT access. **Finally**, many PWID expressed a reluctance to initiate MAT, despite counseling regarding its benefits.

125

Parallel construction

Express coordinate ideas in similar form.

Formerly, science was taught by the textbook method, while now the laboratory method is used. →

Formerly, science was taught by the textbook method; now it is taught by the laboratory method.

126

Paragraph heads (Topic sentences)

Paragraph heads are 1-3 sentences at the start of a paragraph that telegraph the content.

A topic sentence is one sentence that does the same.

Paragraph heads enhance comprehension by giving a road map to the paragraph

Should capture the important information within a paragraph

127

Paragraph heads (Topic sentences)

Critical for good scientific writing

How do you read quickly?

When skimming, paragraph heads/topic sentences provide the tool for deciding whether to read further

128

Frailty, a measure of multi-system impairment which may estimate patients' physiologic reserves, has been suggested as a more accurate predictor of post-operative outcomes.⁶ While this allows for a more global assessment of the patient, it can also be criticized for requiring tedious subjective assessments, utilizing the patient's interpretation of weakness, fatigue, and physical activity. Linked to frailty but more straightforward to assess, sarcopenia is an objective measure of muscle mass depletion and has demonstrated clinical utility in risk stratifying oncologic patients. Worse outcomes have been identified among sarcopenic patients treated with chemotherapy for breast, prostate, renal cell, and pancreatic carcinomas.⁷⁻⁹

129

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130

Post-hoc outlines (or Pre-hoc!)

After completing a draft, copy the topic sentences (and remainder of paragraph head if used) to a new document

Read through the topic sentences

Do the topic sentences flow?

Is the story clear and the message conveyed?

Essentially everything important in the paper should be evident from this post-hoc outline

Use a similar strategy as a way to outline your paper before you start writing

131

Grammar, punctuation & other tidbits

132

<http://www.youtube.com/watch?v=8Gv0H-vPoDc>

Search: Weird AI Word Crimes

133

Avoid anthropomorphizing

This study aims	In this study, we aim
	The aims of this study are
These data suggest	We observed
	These results are consistent with

134

Adjectives ending with -ic and -ical

Sometimes meaningful differences: historical, historic

Avoid needless variants:

- biological, not biologic
- epidemiological, not epidemiologic (although epidemiologic is common)
- empirical, not empiric (a noun, really)
- virological, not virologic

Also, recognize when you really mean "the study of":

- Should it be viral or virological; methods or methodological?

- adapted from Garner's Modern American Usage

135

Which is correct?

Ten liters **is** a good yield.

Both!

Ten liters **were** poured into jars.

136

Data

Due to the small sample size, the data was imprecise.

NO!

But keep in mind that in journalism, the style is to use data as singular (sadly)

The data **were** imprecise.

These data... not **this data.**

137

Conveying results

Use approximate numbers when possible in the prose
- about half; about two-thirds, etc.

Avoid use of "statistically significant" and p-values
- focus on the point estimate and precision
- if "not statistically significant", consider whether groups are similar

Interpret odds ratios properly: not "twice as likely" because you're talking about odds; instead, "the odds were two times as high"

Risk ratios – "two times as likely" but not "two times more likely"

138

Acronyms & Initialisms

Which is correct: *Capitalize only if it is a proper noun.*

Chlamydial infection is a sexually transmitted infection (STI).

Chlamydial infection is a Sexually Transmitted Infection (STI).

139

A panda walks into a café. He orders a sandwich, eats it, then draws a gun and fires two shots into the air.

“Why?” asks the confused waiter, as the panda makes toward the exit. The panda produces a badly punctuated wildlife manual and tosses it over his shoulder.

“I’m a panda,” he says. “Look it up.”

The waiter turns to the relevant entry and, sure enough, finds an explanation.

“Panda. Large black and white bear-like animal, native to China. Eats, shoots and leaves.”

- Lynne Truss, Eats, Shoots, and Leaves

140

Let’s eat Grandma!

Let’s eat, Grandma!

141

Please call me Bill.

Punctuation matters!

Please pay attention to it.

Please call me, Bill.

142

Commas

Remember commas after introductory clauses:
Although these approaches have been effective, combining prevention strategies...

And in lists:
The fruits included apples, oranges, and pears. (US)
The fruits included apples, oranges and pears. (UK)

143

Semi-colons: Two fundamental uses (1)

Separating a complex list

The fruits include apples, citrus, such as oranges, limes, and lemons, and pears.

The fruits include apples; citrus, such as oranges, limes, and lemons; and pears.

144

Semi-colons: Two fundamental uses (2)

Separating two clauses (each with full sentence structure)

“Those with addiction are given agency in deciding whether they want to be addicted; success or failure is placed squarely at their feet.”

Often (very often!), two sentences would be just fine.

145

Quotation marks

Direct quotes

Identify a word as the word itself (We use the term “risk” to refer to ...)

Designate dialogue in fiction

Designate sarcasm or irony (scare quotes)

Not emphasis

- use **bold** and *italics* for emphasis

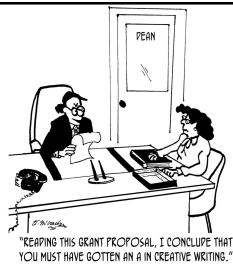
146

Style

Will writing simply and concisely hinder your “style”?

“Trying to add style is like adding a toupee. At first glance the formerly bald man looks young and handsome. But at second glance—and with a toupee there’s always a second glance—he doesn’t look quite right.”

- Zinsser



147

Style

Hear the words you write in your own ear.

Sound and rhythm are important for engaging the reader.

- Vary cadence and rhythm
- Vary length of sentences
- Use transitions
- Read the difficult pieces aloud – or even the whole document.

148

Don't try to be perfect

Everything I said not to do, I do in my first drafts. But first drafts don't matter. No one else sees them. Trying to get a first draft perfect is paralyzing.

- Schimel

A warning: If you think about these principles as you draft, you may never draft anything.

- Joseph Williams

Rewriting is the essence of writing well: it's where the game is won or lost. ... The point is that clear writing is the result of a lot of tinkering.

Careful writers can't stop fiddling.

149

Rewriting

When rewriting, and especially if you're struggling, remember to remind yourself what the manuscript is really about.

Dare to be strong to slice out bits that don't contribute. Be strong. You can do it.

Even though those pieces aren't there anymore, they still linger in the ether of the manuscript.

"Readers should always feel that you know more about your subject than you've put in writing."

-Zinsser

150

Writing well

“Writing well means believing in your writing and believing in yourself, taking risks, daring to be different, pushing yourself to excel. You will write only as well as you make yourself write.” - Zinsser

151

Final thoughts

Tell one story

Make it:

*In the field of STIs,
casual sex can be causal sex.
Beware the Hippo...*

Simple
Clear
Concise
Coherent

THANK YOU!!!

Bill Miller
bill_miller@unc.edu

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153

Exercise 1 (Part 1)

In the 1990s, there were approximately 600,000 hysterectomies performed in the United States annually and 55% of these also involved bilateral salpingo-oophorectomy,¹ many done solely to reduce the risk for ovarian cancer. It has been suggested that elective bilateral salpingo-oophorectomy be considered for women older than 40 years,²⁻⁴ whereas surveys in the United Kingdom revealed that 85-90% of physicians recommended bilateral salpingo-oophorectomy for postmenopausal women coming to hysterectomy.^{5,6} However, Parker et al,⁷ citing evidence that postmenopausal ovaries secrete androgens important to health, performed a risk-benefit analysis and concluded that ovarian conservation benefits long-term survival for women at "average risk" for ovarian cancer undergoing hysterectomy for benign disease. A subsequent study using observational data from the Nurses' Health Study on all and various causes of mortality for hysterectomized women with and without oophorectomy supported their conclusion.⁸

154

Exercise 1 (Part 2)

In addressing the value of bilateral salpingo-oophorectomy, Parker et al distinguished average-risk women from those with known *BRCA1* or *BRCA2* mutations or a strong family history of breast and ovarian cancer. In the latter group, bilateral salpingo-oophorectomy may truly be beneficial in reducing risk for both breast and ovarian cancer.⁹ Genetic or familial risk factors or both, however, account for a small proportion of ovarian cancer. Consequently, it is important to assess ovarian cancer risk among women who lack the genetic or familial profile. In this article, we describe a risk-factor score that may be of value in further categorizing risk for ovarian cancer in women without a personal or family history of cancer to provide additional guidance to women and their physicians regarding elective bilateral salpingo-oophorectomy at the time of hysterectomy. (271 words)

155

Exercise 1 (Rewrite)

Over half of the 600,000 hysterectomies performed annually in the United States include bilateral salpingo-oophorectomy. Presumably, these procedures are done to reduce ovarian cancer risk. But the benefits of elective bilateral salpingo-oophorectomy among women older than 40 years are unclear.²⁻⁴ To date, bilateral salpingo-oophorectomy has had no demonstrable impact on mortality. And bilateral oophorectomy eliminates beneficial ovarian androgen secretion in postmenopausal women.

The potential risks and benefits of bilateral salpingo-oophorectomy are likely to be heterogeneous: Women with known *BRCA1* or *BRCA2* mutations or a strong family history of ovarian or breast cancer likely benefit more than average risk women. But genetic or familial risk factors account for only a small proportion of ovarian cancer. Consequently, most women may benefit from risk stratification to guide clinical decision-making regarding bilateral salpingo-oophorectomy.

Here, we describe a risk-factor score to categorize risk for ovarian cancer in women without a personal or family history of cancer. (152 words)

156

Exercise 2

It remains unknown why only a small number of HTLV-I-infected individuals develop HAM/TSP, while the majority of the infected persons remain disease-free. It has been clearly demonstrated that elevated HTLV-I proviral loads increase the risk of HAM/TSP development [7, 22]. In addition, HAM/TSP patients have more HTLV-I-specific CTLs than do asymptomatic carriers [8, 23]. Recently, it has been postulated that CTLs in HAM/TSP patients have impaired function in association with degranulation of cytolytic molecules as compared with CTLs in asymptomatic carriers, which may result in an insufficient control of the virus [24]. However, it remains unclear whether CTL function is impaired in HAM/TSP patients. (106 words)

157

Exercise 2 (Rewrite)

The mechanisms underlying progression of HTLV-I infection to its most severe form, HAM/TSP, are unknown. Persons with HAM/TSP have higher proviral loads and more HTLV-I-specific cytotoxic lymphocytes (CTL) than asymptotically infected persons. We hypothesize that these CTL may be impaired functionally, especially the degranulation of cytolytic molecules. This impairment may cause insufficient viral suppression. (54 words)

158