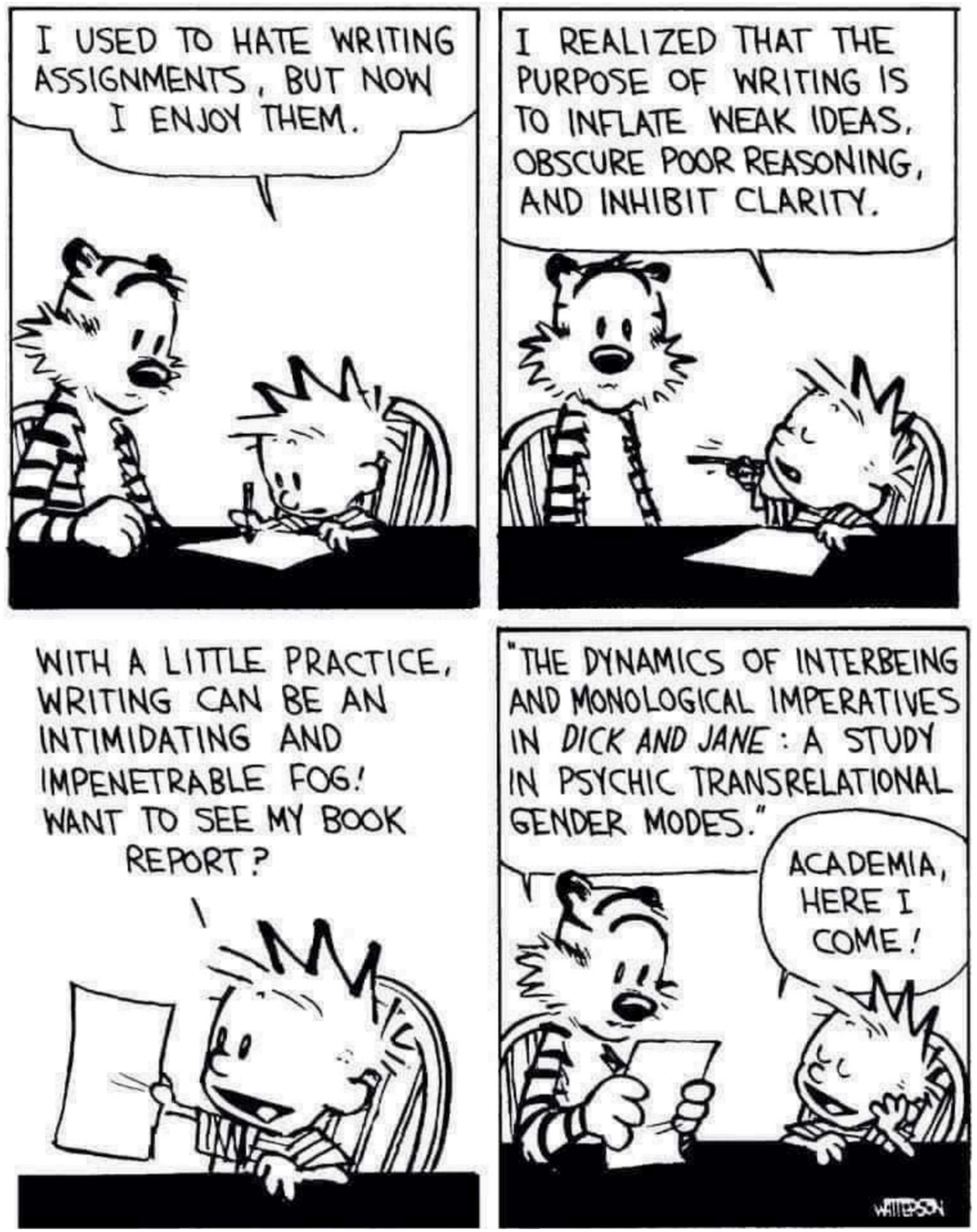
Academic Communication
in (Astro)Physics

Lecture 2: Good Style I

Breaking away from “Academese”
Writing for the Reader

Let's go back to our overwhelmed grad student...



Frequent shortcomings of scientific writing

- long and complicated sentences instead of short, clear sentences
- mixing creative and scientific writing
- scientific "story" not really apparent
- poor structuring of text
- mixing actual results and their discussion
- inconsistent use of technical terms and units
- misusing specific and generic terms

'Academese'

- Metadiscourse
- Signposting
- Hedging
- Apologising
- Professional narcissism
- Clichés
- Mixed metaphors
- Metaconcepts
- Zombie nouns
- Unnecessary passives

Today's lecture

- Understand what makes scientific writing (often) bad
  - "academese"
  - the curse of knowledge
- Reader expectations for the structure of prose
  - correlation between structure and function
  - how to write for the reader
- How to write for the reader
  - word choice
  - word location

Some of the vices of ‘academese’…

Signposting

Instead of signposting, good writing takes advantage of the reader's expectations of where to go next.

It accompanies the reader on a journey, or arranges the material in a **logical sequence** (general to specific, big to small, early to late), or **tells a story with a narrative arc.**

Signpost sparingly, as we do in conversation, and with a minimum of metadiscourse.

This chapter discusses the factors that cause names to rise and fall in popularity.	What makes a name rise and fall in popularity?
The preceding paragraph demonstrated that parents sometimes give a boy's name to a girl, but never vice versa.	As we have seen, parents sometimes give a boy's name to a girl, but never vice versa.
The previous section analyzed the source of word sounds. This section raises the question of word meanings.	Now that we have explored the source of word sounds, we arrive at the puzzle of word meanings.
The first topic to be discussed is proper names.	Let's begin with proper names.

*and since seeing implies seers, we no longer have to refer to paragraphs as "demonstrating" some things and sections "summarizing" other things, as if blocks of printing had a mind of their own.

Steven Pinker, *The Sense of Style*

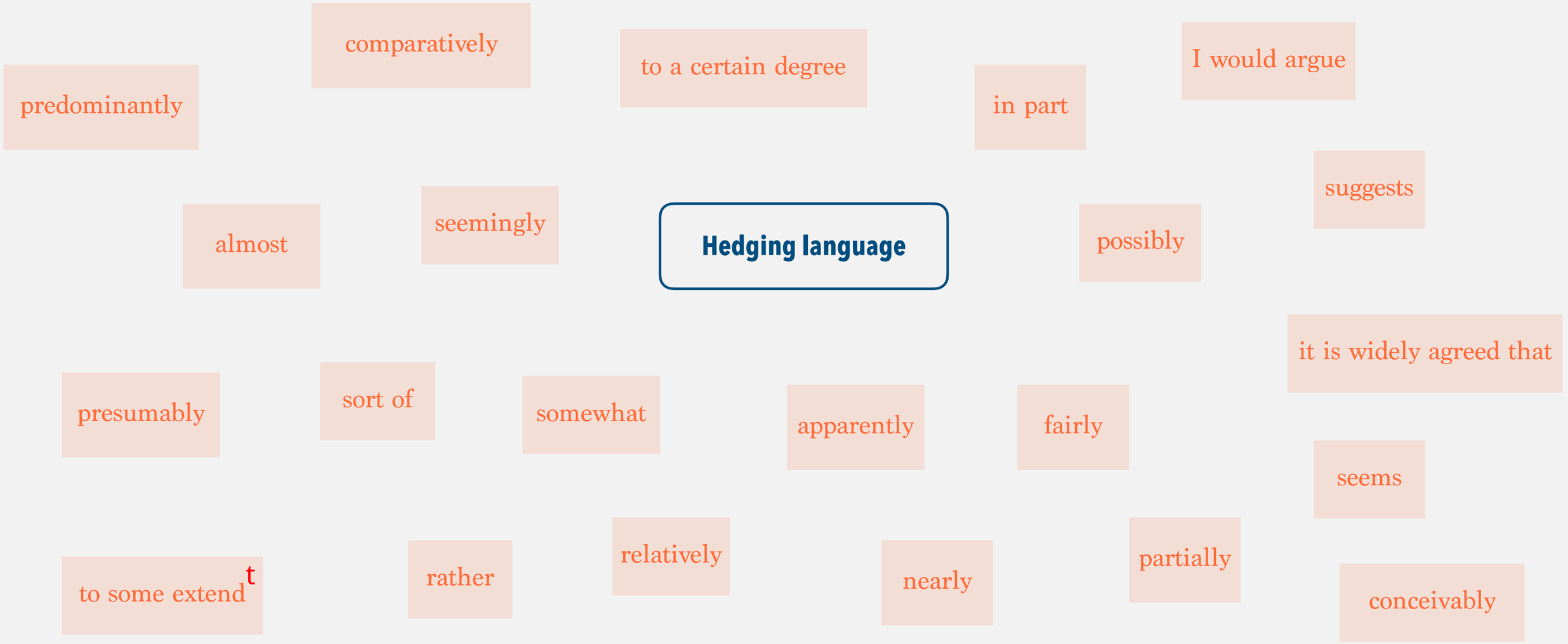
Metadiscourse

Discourse about discourse – often seen with professional narcissism.

In recent years, an increasing number of psychologists and linguists have turned their attention to the problem of child language acquisition. In this article, recent research on this process will be reviewed.	All children acquire the ability to speak language without explicit lessons. How do they accomplish this feat?
The measurement of the evolution of the cosmic star formation rate density of the universe is of great interest to astrophysicists.	Measuring how the density of star formation rate of the universe evolved tells us about how galaxies evolved throughout cosmic time.
The [CII] line redshifted to z=6-8 lies in a favourable frequency window for ALMA observations and has thus gained a lot of attention, not only to unveil the ISM conditions of early galaxies, but also to obtain their redshifts in the first place.	The [CII] line redshifted to z=6-8 lies in a favourable frequency window for ALMA observations. Therefore, this line has been used to both obtain their redshifts and study the ISM conditions of early galaxies.

Compulsive hedging

Sometimes a writer has no choice but to hedge a statement. Better still, the writer can **qualify the statement**, that is, spell out the circumstances in which it does not hold, rather than leaving themselves an escape hatch or being coy as to whether they really mean it. **Hedging should be a choice, not a tic.**



Intensifiers

very

highly

certainly

extremely

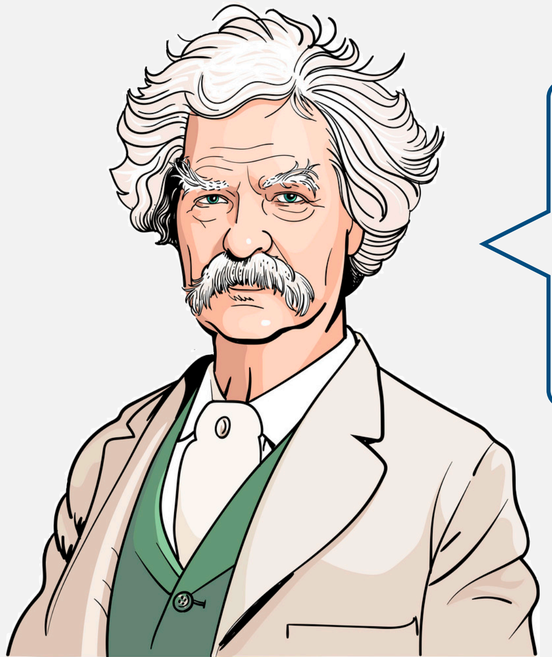
always

Paradoxically, **they can also work as hedging**.

They not only fuzz up a writer's prose but can undermine its intent.

Unmodified adjectives and nouns tend to be interpreted categorically: *honest* means "completely honest". As soon as you add an intensifier, you're turning an all-or-none dichotomy into a graduated scale.

Try the sentence without these words and see if it improves – in most cases it does!



> Substitute *damn* every time you're inclined to write *very*; your editor will delete it and the writing will be just as it should be.
>
> Mark Twain

Hedging and intensifiers

Our results may indicate that chewing gum possibly reduces caries incidence.	Our results **suggest** that chewing gum reduces caries incidence. - or - Chewing gum **may** reduce caries incidence.
Figure 5 clearly shows that the star formation rates of galaxies correlate with their stellar masses.	Figure 5 shows that the star formation rates of galaxies correlate with their stellar masses.

Abstractions

Abstract words, that cannot be seen with the naked eye, should be minimized.

level, perspective, approach, assumption, concept, condition, process, range, role, tendency, variable, …

*these are metaconcepts: concepts about concepts

The researchers found that groups that are typically associated with low alcoholism levels actually have moderate amounts of alcohol intake, yet still have low levels of high intake associated with alcoholism, such as Jews.	The researchers found that in groups with little alcoholism, such as Jews, people actually drink moderate amounts of alcohol, but few of them drink too much and become alcoholic.
I have serious doubts that trying to amend the Constitution would work on an actual level. On the aspirational level, however, a constitutional amendment strategy may be more valuable.	I doubt that trying to amend the Constitution would actually succeed, but it may be valuable to aspire to it.
Individuals with mental health issues can become dangerous. It is important to approach this subject from a variety of strategies, including mental health assistance but also from a law enforcement perspective.	People who are mentally ill can become dangerous. We need to consult mental health professionals, but we also may have to inform the police.

Metaconcepts & zombie nouns

One of the signatures of academese.

"Nominalization takes a perfectly spry verb and embalms it into a lifeless noun adding a suffix like:
-ance, -ment, -ation, -ing

The writing scholar Helen Sword calls them **zombie nouns** because they lumber across the scene without a conscious agent directing their motion. ~~The~~ They can turn prose into night of the living dead." – Steven Pinker

Sometimes nominalizations are useful.

For example, they can be useful in connecting a sentence to those before, keeping the passage coherent for the reader.

> "We **quantified** the number of GFP-positive cells and found that they were at background level. This **quantification** demonstrated that our transfection experiment was unsuccessful."

Metaconcepts & zombie nouns

The problem with nominalizations is that academics **overuse** and **misuse** them, specifically when the zombie noun is being used to convey action. For example:

> We performed an **analysis** on the data.
>
> Here the verb is "to perform" but the intended action is "to analyse" (hidden in the nominalization analysis i.e. analysis is a zombie noun here). The point of this sentence has nothing to do with performance, but a reader has to consider this possibility (if subconsciously).

> We **analysed** the data.
>
> Here the verb and action are obvious to the reader.

- When writers **overuse** nominalizations, they burden their readers with having to do the work of identifying the main action of the sentence.
- When writers **misuse** nominalizations, they create a mental disconnect for the reader.

Metaconcepts & zombie nouns

Prevention of neurogenesis diminished social avoidance.	When we prevented neurogenesis, the mice no longer avoided other mice.
Participants read assertions whose veracity was either affirmed or denied by the subsequent presentation of an assessment word.	We presented participants with a sentence, followed by the word TRUE or FALSE.
Comprehension checks were used as exclusion criteria.	We excluded people who failed to understand the instructions.
It may be that some missing genes are more contributive to the spatial deficit.	Perhaps some missing genes contribute to the spatial deficit.
We make use of ALMA observations…	We use ALMA observations…

How to prevent the zombie apocalypse

1) **Interrogate your sentences.**
   Ask them: "Who is doing what?" If you don't get a straight answer, there's a high chance that a zombie noun has cannibalized the intended action of your sentence.
2) **Scan your document for overuse of prepositional phrases** (especially with linking words *of*, *by*, *to*, and *through*).
   Such phrases tend to drive subject and verb further and further apart – and they are especially common in the presence of zombie nouns.
3) **Employ the concrete noun + active verb combo.**
   Search for combinations of concrete nouns (subject), immediately followed by an active verb ("We analysed a set of…"/"We report on…"/"We observed…").
4) **Search through your document for suffixes** that likely indicate the zombification of an otherwise vivid verb.
   -tion, -ism, -ance, -ity, -ness, -able, -ment, -sion
5) **Animate abstract nouns with active verbs** and, when possible, explain abstract concepts using concrete examples.

Credit: Anahita Vieira, *Medium*

The curse of knowledge

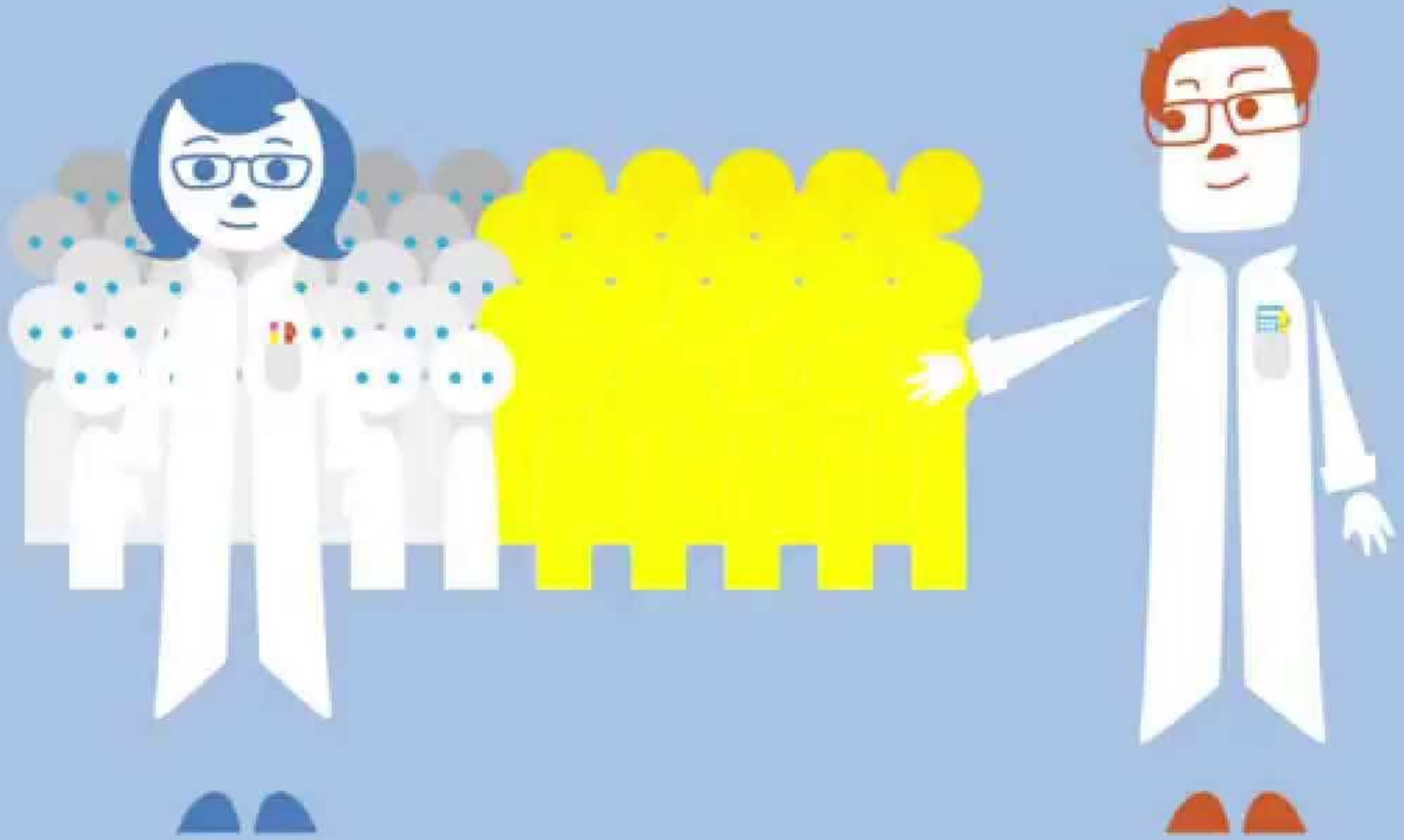
It's a type of **cognitive bias**: a difficulty in imagining what it is like for someone else not to know something that you know.

We have a poor theory of mind. A three-year-old who sees a toy being hidden while a second child is out of the room assumes that the other child will look for it in its actual location rather than where she last saw it. Adults aren't much better.

The curse of knowledge is the single best explanation for why good people write bad prose. It simply doesn't occur to the writer that their readers don't know what they know. And so they don't explain the jargon, or spell out the logic, or supply the necessary detail.

How can we lift the curse?

- Imagining the reader over your shoulder. **Your readers know a lot less about your subject than you think they do**, and unless you keep track of what you know that they don't, you are guaranteed to confuse them.
- Be aware of specific pitfalls the curse sets in your path: e.g., jargon, abbreviations, and technical vocabulary.



The curse of knowledge

In general it's wiser to assume the reader knows too little than too much.

Every audience is spread out along a bell curve of sophistication; and inevitably we'll bore a few at the top while baffling a few at the bottom; the only question is how many there will be of each. The curse of knowledge means that we're more likely to overestimate the average reader's familiarity with our little world than to underestimate it.

And in any case one should **not confuse clarity with condescension – explain in plain language without patronizing the audience.**
The key is to assume that your readers are as intelligent and sophisticated as you are but they happen to not know something you know.

The importance of concrete language

The curse of knowledge is insidious, because it conceals not only the contents of our thoughts from us but their very form. When we know something well, we don't realize how abstractly we think about it.

e.g., a galaxy loses angular momentum = a galaxy spins more slowly

We think/write too abstractly. The antidote is concrete language.

Many experiments have shown that readers understand and remember material far better when it is expressed in **concrete language** that allows them to form visual images.

A commitment to the concrete does more than just ease communication; it can lead to better reasoning.

Revise your drafts until the language is concrete and the ideas are communicated clearly.
Get out of your head – show them to some people to check that the reader understands. Revise again.

The importance of concrete language

Participants were tested under conditions of good to excellent acoustic isolation.	We tested the students in a quiet room.
Management actions at and in the immediate vicinity of the airports do little to mitigate the risk of off-airport strikes during departure and approach.	Trapping birds near an airport does little to reduce the number of times a bird will collide with a plane as it takes off or lands.
We believe that the ICTS approach to delivering integrated solutions, combining effective manpower, canine services and cutting-edge technology was a key differentiator in the selection process.	They chose our company because we protect buildings with a combination of guards, dogs, and sensors.

Sometimes clear writing style can be a matter of life or death. Compare these:

Steven Pinker, *The Sense of Style*

We've seen what causes BAD academic writing...

...now let's go over specific advice for GOOD writing.

Before you write…

Audience

Always write with the audience (i.e. reader) in mind. Consider what they might already know or not know. Always envisage an audience who might not know as much as you about the topic – help them by being clear.

Writing with the reader in mind also determines two other qualities of your writing: register and tone.

Register

Where the writing falls in the continuum from informal to formal. Types of register: informal, popular, conventional, abstract. **Aim for conventional register.**

Language register is the level and style of your writing.
It should be appropriate for the situation you are in.

Examples:
- Formal
- Informal
- Neutral / Conventional

Informal | Popular | Conventional | Abstract

Have you ever wondered, “How the heck do porcupines manage to mate with all those spines everywhere?” Well, the answer to that question is pretty hard to figure out because porcupines are hard to see at the best of times, but it’s almost impossible when they’re courting. It turns out that the whole affair is up to the woman. When she is ready to become pregnant, she produces a very strong odour that can drive the male porcupine crazy!

- Conversational and often emotional
- Assumes familiarity between writer and reader
- Can frame a good story
- Not appropriate for scientific writing (but in some situations, small doses of informal register can transmit spirit and enthusiasm)

Informal | **Popular** | Conventional | Abstract

Porcupines are arboreal creatures and in the Nevada region, they live and mate in thick riparian vegetation in which it is impossible for researchers to move quietly. So, although Sweitzer has come close to catching the creatures mating, he has had to settle for stumbling upon the pairs that seem to be on the verge of reproduction — animals that provide only indirect hints about how porcupines find and pick mates. But these clues have been sufficient for Sweitzer along with fellow researcher Joel Berger of the University of Nevada, Reno, to put forward a theory that has earned some notoriety in the select circle of experts who study this creature.

- The popular register is typical of popular science magazines that are written for a broad audience
- Pieces in this register often tell a story (in this case, about trying to find breeding porcupines)
- Readers can visualise the characters and actions (the characters here are the porcupines and researchers)
- The writing is clear and contains few technical terms

Informal | Popular | **Conventional** | Abstract

I tracked the movements of North American porcupines (*Erethizon dorsatum*) in the Great Basin of northwestern Nevada. I related these movements to breeding activities during the late summer and fall of 1991 and 1992. Male porcupines are polygamous and defend several females, and I hypothesized that (1) competitively dominant males would have larger home ranges than both subordinate males and adult females, and (2) the size of home ranges of adult males would vary and be positively correlated with breeding success.

- The conventional register is characteristic of clearly written journal articles, theses, and proposals directed at a broad scientific audience
- It is more formal than the popular register, but still clear
- It tells a story with identifiable characters that do things; it features many verbs in the active voice
- It is emotionally neutral, and assumes that the reader is familiar with some technical terms.

Informal — Popular — Conventional — **Abstract**

> The assessment of strong directional tendencies of the North American porcupine (*Erethizon dorsatum*) in the Great Basin of northwestern Nevada was made in relation to sex-specific behavioural heterogeneity during the late summer and fall periods of 1991 and 1992. A mate-defence polygynous mating system was exhibited, and it was hypothesized that (1) comparatively larger home ranges would be defended by competitively dominant males in comparison to the home ranges of subordinate males and females and (2) male home size range size variation would be positively correlated with reproductive success.

- Most of what scientists read and write every day is in the abstract register
- It is unclear, wordy, pompous, and dull
- No characters or action verbs – the story element is gone
- Passive verbs, technical terms, long strings of nouns – this register disguises your message and confuses your readers (may put them to sleep!)

Before you write…

Audience

Always write with the audience (i.e. reader) in mind. Consider what they might already know or not know. Always envisage an audience who might not know as much as you about the topic – help them by being clear.

Writing with the reader in mind also determines two other qualities of your writing: register and tone.

Register

Where the writing falls in the continuum from informal to formal. Types of register: informal, popular, conventional, abstract. **Aim for conventional register.**

Tone

The writer's attitude towards themselves, the subject, and the audience. Choosing the right tone influences how the audience feels about you and your subject. In scientific writing, **we should adopt a tone that projects confidence rather than doubt**.

Which proposal do you think got funded?

Horned beetles could provide an opportunity to combine studies of trait development with experiments looking at sexual selection and the evolutionary significance of enlarged male weapons (horns). After almost ten years of research, the PI may now have the opportunity, if funded, to piece together disparate parts of the research program, offering opportunities to train young scientists, and possibly providing a picture of the evolution of unusual animal shapes.

Horned beetles provide an unusual opportunity to combine studies of trait development with experiments exploring sexual selection and the evolutionary significance of enlarged male weapons (horns). By building on almost ten years of research, the PI now has the opportunity to forge a truly integrative research program, offering unique possibilities for inspiring and training young scientists, and providing a comprehensive picture of the evolution of some of nature's most bizarre animal shapes.

Which proposal do you think got funded?

Horned beetles could provide an opportunity to combine studies of trait development with experiments looking at sexual selection and the evolutionary significance of enlarged male weapons (horns). After almost ten years of research, the PI may now have the opportunity, if funded, to piece together disparate parts of the research program, offering opportunities to train young scientists, and possibly providing a picture of the evolution of unusual animal shapes.

The tone is weak and tentative

Horned beetles provide an unusual opportunity to combine studies of trait development with experiments exploring sexual selection and the evolutionary significance of enlarged male weapons (horns). By building on almost ten years of research, the PI now has the opportunity to forge a truly integrative research program, offering unique possibilities for inspiring and training young scientists, and providing a comprehensive picture of the evolution of some of nature's most bizarre animal shapes.

Conveys a sense of excitement and confidence

Notice how subtle changes can completely change the tone!

Writing for the reader

If the reader is to grasp what the writer means,
the writer must understand what the reader needs.

George Gopen & Judith Swan
The Science of Scientific Writing, American Scientist (1990)

About readers

To understand how to write clearly, you must **understand how readers go about reading**. The expectations and perceptions of readers are widely studied in the fields of rhetoric, linguistics, and cognitive psychology.

- Readers do not simply read – they **interpret**.
- When reading a scientific paper, readers are affected not only by the **content** and **format** but also by its **composition** and **style**.
- Readers interpret based not only on words, sentences, and paragraphs; but, above all, on the structural location of these elements.
- Understanding the **correlation of structure and function** in a sentence, paragraph, or section is what underlies ***the science of scientific writing***.

We will explore what linguistic theory tells us about what readers look for when reading complex, unfamiliar information.

Substance ⇔ Structure

A scientist tracks the temperature of a liquid over a period of time.

Which is clearer?

1

t(time)=15′, T(temperature)=32°; t=0′,T=25°; t=6′,T=29°; t=3′,T=27°; t=12′,T=32°; t=9′,T=31°

2

time (min)	temperature (°C)
0	25
3	27
6	29
9	31
12	32
15	32

Substance ⇔ Structure

If the two side of the table are reversed, it becomes much harder to read.

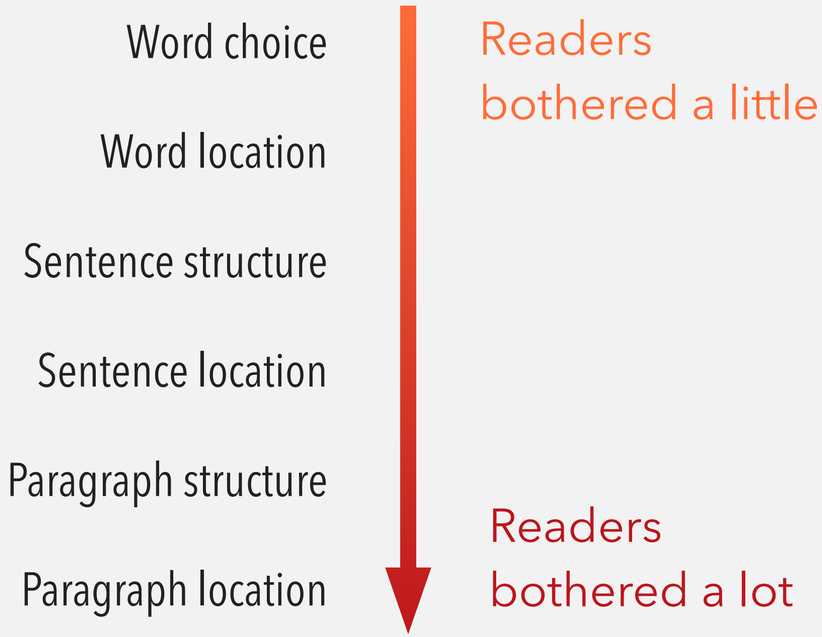
temperature (°C)	time (min)
25	0
27	3
29	6
31	9
32	12
32	15

Information is interpreted more easily and more uniformly if it is placed where most readers expect to find it.

Substance ⇔ Structure

Readers have relatively fixed expectations about where in the structure of prose they will encounter particular items of its substance.

It is more important to logically organize and present one's ideas than to worry about perfect grammatical form or word choice (though those are important too!).



Substance ⇔ Structure

Research articles are divided into recognizable sections (Introduction, Methods, Results, and Discussion).

When the sections are confused – when too much experimental detail is found in the Results section, or when discussion and results intermingle – readers are left equally confused.

The same is true at the paragraph and sentence level: **readers look for certain information in particular places.**

If these structural expectations are continually violated, readers risk spending more energy unravelling the structure of a passage than understanding its content. This increases the possibility of misinterpretation or non-interpretation – communication fails.

Let’s read an example of scientific prose…

The smallest of the URF's (URFA6L), a 207-nucleotide (nt) reading frame overlapping out of phase the NH_2-terminal portion of the adenosinetriphosphatase (ATPase) subunit 6 gene has been identified as the animal equivalent of the recently discovered yeast H^+-ATPase subunit 8 gene. The functional significance of the other URF's has been, on the contrary, elusive. Recently, however, immunoprecipitation experiments with antibodies to purified, rotenone-sensitive NADH-ubiquinone oxido-reductase [hereafter referred to as respiratory chain NADH dehydrogenase or complex I] from bovine heart, as well as enzyme fractionation studies, have indicated that six human URF's (that is, URF1, URF2, URF3, URF4, URF4L, and URF5, hereafter referred to as ND1, ND2, ND3, ND4, ND4L, and ND5) encode subunits of complex I. This is a large complex that also contains many subunits synthesized in the cytoplasm.

Why is this hard to read?

Same passage, with the difficult words temporarily lifted:

The smallest of the URF's, and [A], has been identified as a [B] subunit 8 gene. The functional significance of the other URF's has been, on the contrary, elusive. Recently, however, [C] experiments, as well as [D] studies, have indicated that six human URF's [1-6] encode subunits of Complex I. This is a large complex that also contains many subunits synthesized in the cytoplasm.

URF = “uninterrupted reading frame”, describes a segment of DNA organized in such a way that it could encode a protein, although no such a protein product has yet been identified

Both APTase and NADH oxido-reductase are enzyme complexes central to energy metabolism.

Why is this *still* hard to read?

- What has the first sentence of the passage to do with the last sentence?
- Does the third sentence contradict what we have been told in the second sentence?
- Is the functional significance of URF’s still “elusive”?
- Will this passage lead us to further discussion about URF’s, or about Complex I, or both?

Look again at the first sentence.

It is long (42 words); but that's not the issue...

> The smallest of the URF's (URFA6L), a 207-nucleotide (nt) reading frame overlapping out of phase the NH_2-terminal portion of the adenosinetriphosphatase (ATPase) subunit 6 gene has been identified as the animal equivalent of the recently discovered yeast H^+-ATPase subunit 8 gene.

Look again at the first sentence.

It is long (42 words); but that's not the issue…

> The smallest of the URF's (URFA6L), a 207-nucleotide (nt) reading frame overlapping out of phase the NH_2-terminal portion of the adenosinetriphosphatase (ATPase) subunit 6 gene has been identified as the animal equivalent of the recently discovered yeast H^+-ATPase subunit 8 gene.

The issue is a <u>structural defect!</u>

The subject (*the smallest*) has been separated from its verb (*has been identified*) by 23 words — more than half the sentence.

<u>Readers expect the subject to be followed immediately by the verb.</u>
This stems from a pressing need for syntactic resolution, fulfilled only by the arrival of the verb.

Anything of length that intervenes between the subject and the verb is read as an interruption, and therefore as something of lesser importance.

In our example, if the interruption is important…

> The smallest of the URF's, URFA6L, is a 207-nucleotide (nt) reading frame overlapping out of phase the NH_2-terminal portion of the adenosinetriphosphatase (ATPase) subunit 6 gene; it has been identified as the animal equivalent of the recently discovered yeast H^+-ATPase subunit 8 gene.

If not…

> The smallest of the URF's, URFA6L, has been identified as the animal equivalent of the recently discovered yeast H^+-ATPase subunit 8 gene.

Only the author knows which version reflects their intentions!

Avoid interruptions between the subject and the verb, and the verb and the object.

Since 1995, more than 150 **exoplanets**, most of them in orbits quite different from those of the giant planets in our own solar system, have been discovered.	Since 1995, more than 150 **exoplanets** have been discovered; most of them are in orbits quite different from those of the giant planets in our own solar system.
Previous **determinations** of the Eddington ratio distribution, which indicate a sharp peak at ratios near 0.25, are in sharp contrast with our results.	Previous determinations of the Eddington ratio distribution indicate a sharp peak at ratios near 0.25; these are in sharp contrast with our results.
We conclude, based on models of reverberation mapping, that the broad-line region has what resembles a disk-like structure.	Based on models of reverberation mapping, **we** conclude that the broad-line region resembles a disk.
We quantitatively compared, using a Bayesian method and MCMC analysis, the X-ray and IR-selected AGN samples.	**We** quantitatively compared the X-ray and IR-selected AGN samples, using a Bayesian method and MCMC analysis.

Substance ⇔ Structure

A simpler example of how structure affects and even defines the substance.

a) Although Fred's a nice guy, he beats his dog.

b) Although Fred beats his dog, he's a nice guy.

c) Fred's a nice guy, but he beats his dog.

d) Fred beats his dog, but he's a nice guy.

Those four sentences say the same but they don't convey the same impression – the structure defines the substance.

What is at the end is most important and will convey the message… but the first impression will lead the judgment.

e) Fred is a good husband, a caring father, a good colleague, and an altogether nice guy, even though he beats his dog.

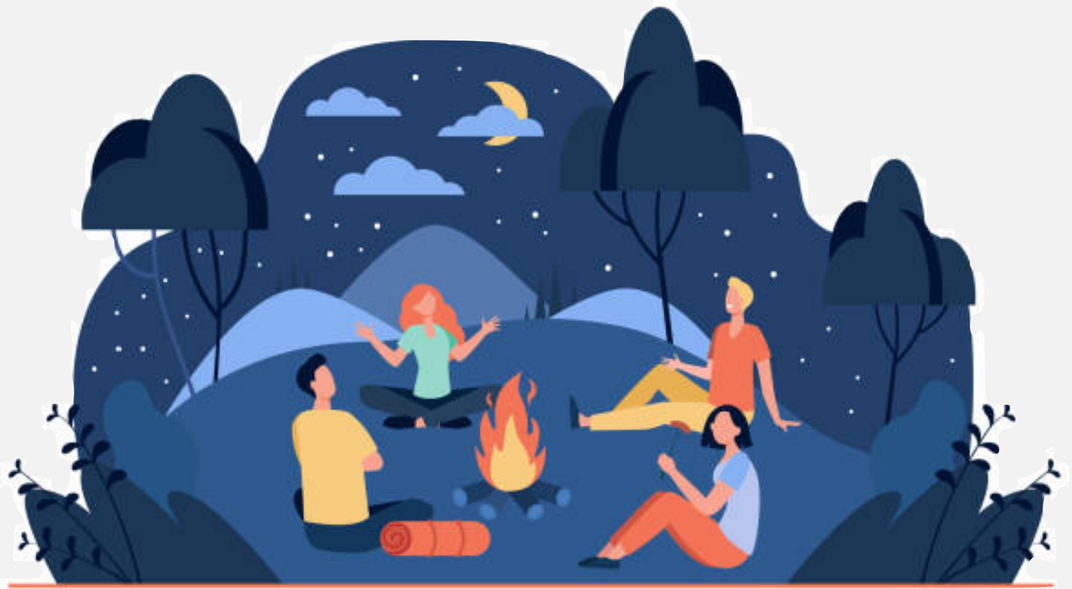
Here by increasing the length, we put more emphasis on the good things.

f) Even though he beats his dog, Fred is a good husband, a caring father, a good colleague, and an altogether nice guy

We have four good things and one bad, but the bad one is at the beginning, so it is considered least important. By the time we have finished the sentence, we forgot that Fred beats his dog and remember only the good things.

Tell a story

Storytelling is our natural form of communication as humans.



Our brains are wired to recognize stories with a particular structure, one that features characters and their actions, and information presented in this way becomes compelling and memorable.

Tell a story

Make characters subjects and their actions verbs. By characters we tangible, *concrete nouns* (e.g., trees, galaxies, T-cells); the more concrete the characters and vigorous their actions, the better the story. Avoid using *abstract nouns* derived from verbs (e.g., understanding, observation, interpretation) or adjectives (e.g., accuracy, efficiency, applicability).

Place subjects and verbs close together. Once readers identify the subject as the character in the story, they immediately look for the verb that describes what the character is doing. The closer the verb is to the subject, the clearer the sentence.

Use strong verbs. When we change verbs into abstract nouns, we rob our sentences of strong verbs, and often replace them with weak verbs that do not adequately describe the characters actions. Two particularly weak verbs: *be* and *have*.

Favour the active voice

Voice describes whether the subject of a sentence is:
– **doing** the action (active voice), or
– **receiving** the action (passive voice).

Pooh ate the honey. (active voice, actor mentioned)

The honey was eaten by Pooh. (passive voice, actor mentioned)

The honey was eaten. (passive voice, actor not mentioned)

"When a grammatical construction is associated with politicians you can be sure that it provides a way to evade responsibility." — Steve Pinker on the passive voice

Mistakes have been made.	I made mistakes.

Favour the active voice

Benefits of the active voice:

- it almost always improves the writting (makes it more clear);
- it reflects the way we speak in everyday life, so readers find it easier to follow;
- it uses less words (by 30% on average!);
- active sentences have a direct character-action-goal order – **better storytelling**.

In this work stellar mass-to-light ratios are derived using spectral population synthesis models.	In this work we derive stellar mass-to-light ratios using stellar population synthesis models.

Favour the active voice

The wavelength coverage, resolution, S/N, and general high quality of the SDSS spectra make them extremely well suited for the derivation of nebular abundances. However, the spectrophotometric calibration and the small size of the fiber aperture relative to the target galaxies pose some concern. The SDSS spectrographs do not employ an atmospheric dispersion corrector, and the spectra are frequently acquired under non-photometric conditions. The survey has nevertheless been able to obtain a remarkable level of spectrophotometric precision by the simple practice of observing multiple standard stars simultaneously with the science targets. (The artifice in this case is that the "standards" are not classical spectrophotometric standards but are halo F subdwarfs that are calibrated to stellar models; see Abazajian et al. 2004 for details.) To quantify the quality of the spectrophotometry, we have compared magnitudes synthesized from the spectra with SDSS photometry obtained with an aperture matched to the fiber size. The 1 σ error in the synthetic colors is 5% in $g - r$ and

Tremonti et al. (2004)

Favour the active voice

If the passive voice is used excessively, writing becomes dull and dense. But sometimes it is useful and appropriate.

Proper uses of the passive voice:

- The passive helps you keep same or similar subjects in a series of sentences in a paragraph.
- The passive voice helps you move words to strategic parts of a sentence to give them emphasis, or to connect them to words in the preceding sentence.
- It can help you compose a sentence where the action that was done is important, but who did it is not. Avoid repeating “We…” a lot. Sometimes it is irrelevant who performed the action (in this case minor characters would be distracting).

Do not overuse the passive; apply it sparingly and mindfully.

The passive voice helps keep similar subjects in a series of sentences in a paragraph; e.g.:

Supernovae deposit enormous amounts of energy into their surroundings. They play a key role in the heating of their host galaxies and in the enrichment of the interstellar medium with heavy elements that form the building blocks of life. They have been well studied at radio, X-ray, infrared, and optical wavelengths, yet the actual explosion mechanism is not well understood.

The passive voice helps keep move words to strategic parts of the sentence; e.g.:

(i) *PAH and near-infrared continuum emission.* The mid-infrared spectra of most normal star-forming galaxies are dominated by strong emission features at 3.3, 6.2, 7.7, 8.6, 11.3 and 12.7 μm. Although still uncertain, the carriers of these features are generally accepted to be PAH molecules transiently excited to high internal energy levels after the absorption of single UV photons (Leger & Puget 1984; Allamandola, Tielens & Barker 1985; Leger, D'Hendecourt & Defourneau 1989; Allamandola, Hudgins & Sandford 1999). PAH emission tends to peak in the 'photodissociation regions' at the interface between ionized and molecular gas in the outskirts of H II regions, where PAH molecules can survive and transient heating is most efficient (e.g. Cesarsky et al. 1996; Verstraete et al. 1996; Rapacioli, Joblin & Boissel 2005). In these environments, the non-ionizing UV radiation from young stars dominates the energy balance and can dissociate molecules such as H_2 and CO (see Hollenbach & Tielens 1997 for a review).

da Cunha et al. (2008)

Use passive voice when the action is important, but who did it is not; e.g.:

I cooled the samples on ice, returned them to Arizona State University, and froze them until I used them.	Samples were cooled on ice, returned to Arizona State University, and frozen until used.
Observers at the ALMA observatory carried out our Band 4 continuum observations between 2015 December 26 and 2016 January 1, as part of the Cycle 3 Project #2015.1.00948.S (PI: E. da Cunha).	Our ALMA Band 4 continuum observations were carried out between 2015 December 26 and 2016 January 1, as part of the Cycle 3 Project #2015.1.00948.S (PI: E. da Cunha).

Use strong, active verbs

Strong and active verbs energize your writing and help you tell a story.

Verbs make sentences direct and easy to follow. If you hide verbs by using nominalizations (i.e., abstract nouns derived from verbs and adjectives), your writing will be heavy and hard to comprehend for readers.

Buried verb/nominalization	Active verb
assessment	assess
made the decision	decide
is dependent on	depends on
existence	exist
is following	follow
formation	form
inhibition	inhibit
measurement	measure
removal	remove

Avoid weak verbs:

- occurred
- was observed
- was seen
- caused
- was done
- make
- was noted
- produced
- get

Use strong, active verbs

Understanding seasonal habitat ranges and their distribution is critical for Greater Prairie Chicken conservation and management.	Before we can conserve and manage Greater Prairie Chickens, we must understand their seasonal habitats.
Their suggestion for us was a different analysis of the data.	They suggested that we analyze the data differently.
A 10% increase in temperature occurred.	Temperature increased 10%.
This wavelength caused a decrease in the molar absorption coefficient.	This wavelength decreased in the molar absorption coefficient.
Upon early inflammation of organ transplantation, allografts are rejected.	When organ transplants become inflamed early, allografts are rejected.

Analysis and revision

To find and revise sentences that may confuse your readers, analyze your sentences:

1) Underline the first 8 to 10 words in the main sentence, ignoring introductory phrases.
2) For the underlined words, identify the central character of the sentence or paragraph.
3) Make the character the subject.
4) Look for the action.
5) If the actions are nominalizations, change them into verbs if necessary.
6) Replace weak verbs with strong, active verbs if necessary.
7) Rewrite the sentence using conjunctions such as “because”, “if”, “when”, “although”, “that”, or “whether”. If necessary, turn a prepositional phrase into a dependent clause.
8) Avoid other nominalizations and abstract nouns in the remainder of the sentence as well – change them to verbs.