

Cutting the clutter

Eliminate there are/there is

On the topic of generating the schedule itself using mathematical models, there are a few articles that have been published.

Cutting the clutter

Omit needless prepositions:
“that” and “on” are often superfluous

On the topic of generating the schedule itself using mathematical models, there are a few articles that have been published.

Cutting the clutter

Eliminate there are/there is

If at a turn node, there are more arriving flights than departing flights, it means that there is a plane that sits on the ground for a while and then turns to a departing plane at one of the turn nodes below it.

Cutting the clutter

We also assume that for every equipment type there is a single station where balance-checks for that equipment type can be done and that this station is also a regular maintenance station.

Cutting the clutter

There is a one-to-one correspondence between Euler tours in the original graph and Hamilton circuits in the line graph.

Cutting the clutter

Anti-inflammatory drugs may be protective for the occurrence of Alzheimer's Disease.

from Kristin Sainani, Stanford online course "Writing in the Sciences"

Injuries to the brain and spinal cord have long been known to be among the most devastating and expensive of all injuries to treat medically.

Cutting the clutter

We will refer to this model as a flight (leg) based spill model.

Cutting the clutter

The airline has to decide the equipment type to use on each leg so that it can fly the schedule, while matching capacity to demand as much as possible and minimizing the total operating cost.

Cutting the clutter

An IQ test measures an individual's abilities to perform functions that usually fall in the domains of verbal communication, reasoning, and performance on tasks that represent motor and spatial capabilities.

from Kristin Sainani, Stanford online course "Writing in the Sciences"

Express co-ordinate ideas in similar form.

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“This principle, that of parallel construction, requires that expressions of similar content and function should be outwardly similar. The likeness of form enables the reader to recognize more readily the likeness of content and function. [...]

The unskilful writer often violates this principle, from a mistaken belief that he should constantly vary the form of his expressions.”

[Strunk, W., Jr. and White, E.B.: The Elements of Style]

Express co-ordinate ideas in similar form

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

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

An article or a preposition applying to all the members of a series must either be used only before the first term or else be repeated before each term.

The French, the Italians, Spanish, and Portuguese

The French, the Italians, the Spanish, and the Portuguese

In spring, summer, or in winter

In spring, summer, or winter (In spring, in summer, or in winter)

from Strunk, W., Jr. and White, E.B.: The Elements of Style

Express co-ordinate ideas in similar form

Correlative expressions (both, and; not, but; not only, but also; either, or; first, second, third; and the like) should be followed by the same grammatical construction.

It was both a long ceremony and very tedious.

A time not for words, but action.

from Strunk, W., Jr. and White, E.B.: The Elements of Style

Express co-ordinate ideas in similar form

Not Parallel:

If you want to be a good pilot, you must study hard, permanently plan ahead, and you should be a good team player.

from Kristin Sainani, Stanford online course "Writing in the Sciences"

Write with verbs

Write with verbs

- ❖ Use strong verbs
- ❖ Avoid turning verbs into nouns
- ❖ Don't bury the main verb

from Kristin Sainani, Stanford online course "Writing in the Sciences"

Use strong verbs

Compare:

“Loud music came from speakers embedded in the walls, and the entire arena moved as the hungry crowd got to its feet.”

With:

“Loud music **exploded** from speakers embedded in the walls, and the entire arena **shook** as the hungry crowd **leaped** to its feet.”*

*from the novel: Bringing Down the House, Ben Mezrich
from Kristin Sainani, Stanford online course “Writing in the Sciences”

Use strong verbs

Pick the right verb!

The WHO reports that approximately two-thirds of the world's diabetics are found in developing countries, and estimates that the number of diabetics in these countries will double in the next 25 year.

The WHO estimates that two-thirds of the world's diabetics are found in developing countries, and projects that the number of diabetics in these countries will double in the next 25 years.

from Kristin Sainani, Stanford online course "Writing in the Sciences"

Use strong verbs

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from Kristin Sainani, Stanford online course "Writing in the Sciences"

Use strong verbs

- ❖ Use “to be” verbs purposefully and sparingly.
- ❖ Don't kill verbs by turning them into nouns.
 - ⦿ During DNA damage, recognition of H3K4me3 by ING2 results in recruitment of Sin3/HDAC and repression of cell proliferation genes.
 - ⦿ During DNA damage, H3K4me3 recruits ING2 and Sin3/HDAC, which together repress cell proliferation genes.
 - ⦿ During DNA damage, ING2 recognises H3K4me3, which together recruit Sin3 and repress cell proliferation genes.
- ❖ Don't bury the main verb.
 - ⦿ **In one study** comparing the effect of aircraft noise to the effect of alcohol on cognitive performance, it **was found** that simulated aircraft noise at 65 dB(A) had the same effect on individuals' ability to recall auditory information as being intoxicated with a Blood Alcohol Concentration (BAC) level of at 0.10.
 - ⦿ One study found that simulated aircraft noise at 65 dB(A) had the same effect on individuals' ability to recall auditory information as being intoxicated with a Blood Alcohol Concentration (BAC) level of 0.10.

from Kristin Sainani, Stanford online course “Writing in the Sciences”

Use strong verbs

Really long subject!

Negatives

Passive verb

Buried predicate

“Hedge” word

The fear expressed by some teachers that students would not learn statistics well if they were permitted to use canned computer programs has not been realized in our experience. A careful monitoring of achievement levels before and after the introduction of computers in the teaching of our course revealed no appreciable change in students' performances.

from Kristin Sainani, Stanford online course “Writing in the Sciences”

Use strong verbs

Important studies to examine the descriptive epidemiology of autism, including the prevalence and changes in the characteristics of the population over time, have begun.

from Kristin Sainani, Stanford online course “Writing in the Sciences”

Writing: Reasons, Types & Audience

Writing: Reasons, Types & Audience

Determine length, structure, and the (language) level of your writing

Why?	What?	For whom?
disseminate ideas	(conference) paper	peer (same field)
proof we understood a topic	seminar paper, thesis, survey	professors (and peers)
educate somebody	newspaper article, book	laymen
clarify own ideas	(research) notes	ourselves, coauthors
ask for support	grant/fellowship proposal	peers, grant agencies
“make money”	recommendation letters	employers

Writing: Reasons, Types & Audience

- ❖ Assess the background of your readers.
- ❖ Judge your reader's level of expertise.
- ❖ Determine the degree to which formality is required.
- ❖ (Know enough about the demographics of your audience that you can avoid inadvertently insulting or infuriating some of your readers or listeners.)

from Lyn Dupré: "BUGS in Writing: A Guide to Debugging Your Prose", Addison-Wesley

How to make a story sticky?

How to make a story sticky?

Why do some ideas stay with you while others are eminently forgettable?

SUCCES*

S: Simple

U: Unexpected

C: Concrete

C: Credible

E: Emotional

S: Stories

*from Chip and Dan Heath, Made to Stick (Random House, 2007)

How to make a story sticky?

Simple:

Simple message that captures the essence of an issue.

Prioritise.

NOT simplistic: a simple message does not trivialise the issue.

Even a great idea loses its meaning if it is bogged down by details.

“It’s the economy, stupid.”

Schemas:

Express your thoughts in a language that builds off ideas that your readers already know.

How people learn: start with existing schemas and then attach new information.

It’s hard to learn if you cannot fit it into an existing schema.

Establish schemas and then expand and modify them.

If you build off established schemas it makes ideas feel simple.

from Chip and Dan Heath, *Made to Stick* (Random House, 2007)
and from Joshua Schimel, *Writing Science*; how to write papers that get cited and proposals that get funded

How to make a story sticky?

Unexpected:

Use surprise—generate *interest* and *curiosity*.

The surprise shouldn't be too outlandish!

Best way to keep the reader's attention is to open gaps of knowledge.

And then fill those gaps.

from Chip and Dan Heath, *Made to Stick* (Random House, 2007)

How to make a story sticky?

Concrete:

“If those who have studied the art of writing are in accord on any one point, it is this: the surest way to arouse and hold the reader’s attention is by being specific, definite, and concrete.” [Strunk, W., Jr. and White, E.B.: The Elements of Style]

Abstract ideas are difficult to remember and understand, and they leave room for interpretation.

Explain your ideas in terms of human actions, in terms of sensory information.

“A bird in hand is worth two in the bush.”

Proverb: abstract truth, concrete language.

from Chip and Dan Heath, Made to Stick (Random House, 2007)

How to make a story sticky?

Credible:

Honesty and trustworthiness of a source.

A few people enjoy authority on certain topics, but most of us do not.

We have to establish the credibility of our ideas:

- Ground them in previous work, cite the sources
- Describe the methods how you obtained your data, present the data clearly
- Show that your conclusions grow from the credible data

Not just presentation of statistics:

- Can be helpful to illustrate a relationship between two concepts
- Rarely meaningful in themselves
- Remember that it's the relationships, not the numbers, that are important

from Chip and Dan Heath, *Made to Stick* (Random House, 2007)

How to make a story sticky?

Emotional:

“How do we get people to care about our ideas?”

Research shows that people are more likely to make a charitable gift to a single needy individual than to an entire impoverished region.

We are wired to feel things for people, not for abstractions.

from Chip and Dan Heath, *Made to Stick* (Random House, 2007)

How to make a story sticky?

6

MADE TO STICK

The Truth About Movie Popcorn

Art Silverman stared at a bag of movie popcorn. It looked out of place sitting on his desk. His office had long since filled up with fake-butter fumes. Silverman knew, because of his organization's research, that the popcorn on his desk was unhealthy. Shockingly unhealthy, in fact. His job was to figure out a way to communicate this message to the unsuspecting moviegoers of America.

Silverman worked for the Center for Science in the Public Interest (CSPI), a nonprofit group that educates the public about nutrition. The CSPI sent bags of movie popcorn from a dozen theaters in

CSPI called a press conference on September 27, 1992. Here's the message it presented: "A medium-sized 'butter' popcorn at a typical neighborhood movie theater contains more artery-clogging fat than a bacon-and-eggs breakfast, a Big Mac and fries for lunch, and a steak dinner with all the trimmings—combined!"

showed, coconut oil was also brimming with saturated fat.

The single serving of popcorn on Silverman's desk—a snack someone might scarf down between meals—had nearly two days' worth of saturated fat. And those 37 grams of saturated fat were packed into a *medium*-sized serving of popcorn. No doubt a decent-sized bucket could have cleared triple digits.

The challenge, Silverman realized, was that few people know what "37 grams of saturated fat" means. Most of us don't memorize the USDA's daily nutrition recommendations. Is 37 grams good or bad? And even if we have an intuition that it's bad, we'd wonder if it was "bad bad" (like cigarettes) or "normal bad" (like a cookie or a milk shake).

from Chip and Dan Heath, *Made to Stick* (Random House, 2007)

How to make a story sticky?

Emotional:

Slightly awkward for scientists.

Good science = objective about your work

But, fundamental: curiosity.

Engage our curiosity: ask a novel question.

E is closely aligned with U—unexpected things create curiosity.

Shift from “what’s my answer?” to “what’s my question?”

Engage and then satisfy our curiosity.

from Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded

How to make a story sticky?

Stories:

See your work as a story and present it that way.

Stories are modular: a single large story consists of a collection of small stories.

Think about the internal structure of your paper and how to integrate story modules.

When a leader makes an argument in support of a new idea, these arguments encourage evaluation, judgment, debate, and criticism. When a new idea is presented as part of a story, however, the audience is engaged in the idea and welcomed to participate in exploring its implementation.*

from Joshua Schimel, *Writing Science*; how to write papers that get cited and proposals that get funded

* from Kylie Goodell, review of Chip and Dan Heath, *Made to Stick* (Random House, 2007)

Story Structure

Story structure

Opening (O).

Whom is the story about? Who are the characters? Where does it take place? What do you need to understand about the situation to follow the story? What is the larger problem you are addressing?

Challenge (C).

What do your characters need to accomplish? What specific question do you propose to answer?

Action (A).

What happens to address the challenge? In a paper, this describes the work you did.

Resolution (R).

How have the characters and their world changed as a result of the action? What did you learn from your work?

OCAR

from Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded

OCAR

There exist other story structures that do not follow this order, here, we concentrate on just that.

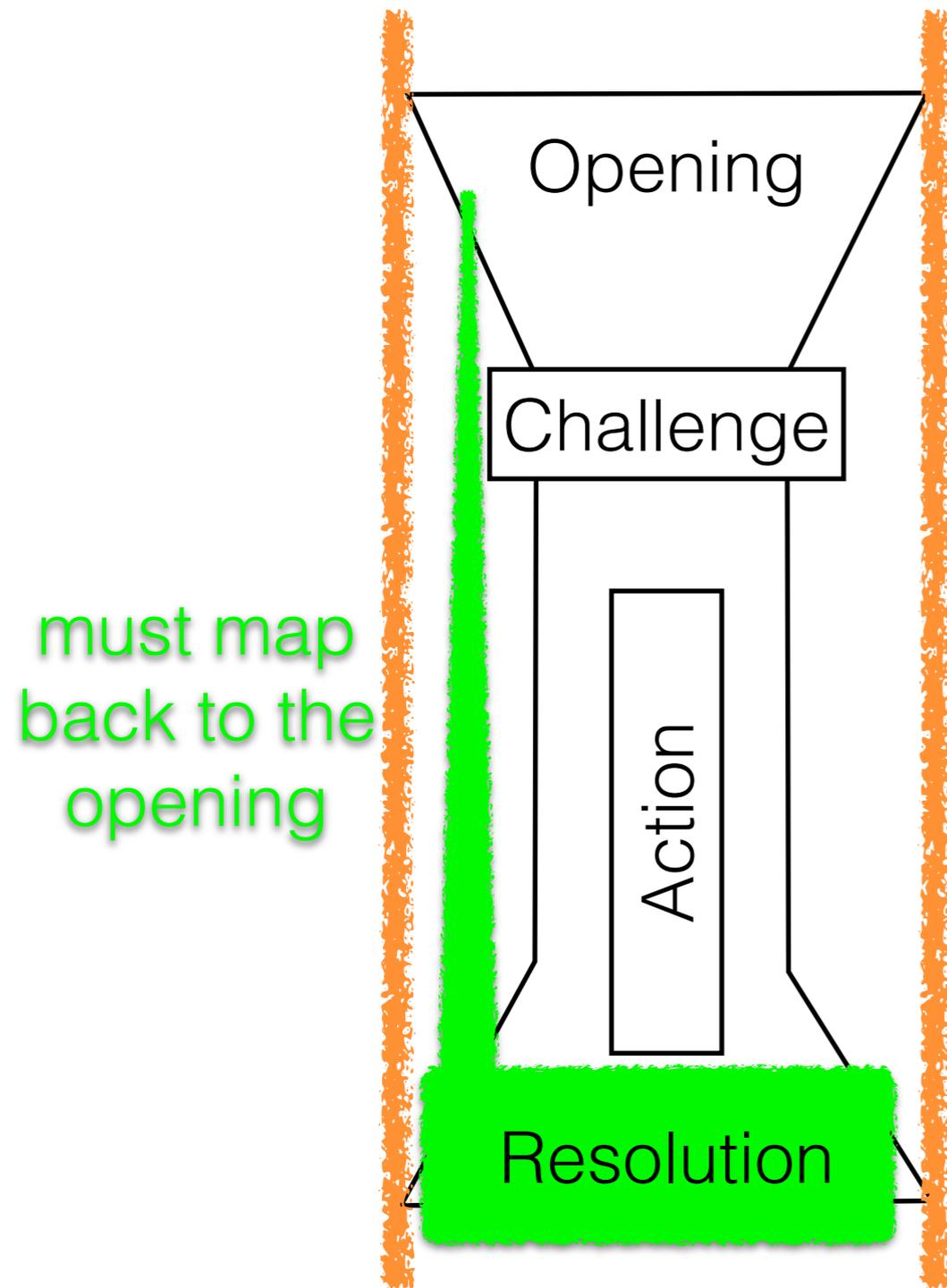
OCAR needs a “patient” reader.

Paper’s challenge at the end of the introduction.

Paper’s conclusion at the end.

Other structures, see for example Joshua Schimel, *Writing Science*; how to write papers that get cited and proposals that get funded.

Story structure



Introduction: introduce characters and question. Give Background. Narrow down to your specific question.

Materials, Methods, Results: What you did and what you found

Discussion: What it means

Conclusion: Take home message

from Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded

Story structure

Opening (O).

Identify the problem that drives the research/the report, introduce the characters, and target an audience.

Identify a problem of broad interest and give the reader a sense of where the story is going.

Do not use an opening that explains a widely held schema.

Ok to explain things to yourself in a first draft, but when you revise, figure out where the real story starts.

You must know the intended audience to tailor the writing to them.

Schimel et al. submitted proposals to two agencies:

- National Science Foundation
- Agency with a management focus (California Environmental Protection Agency)
- The influence of fog on ecological and hydrological processes in coastal zones has long intrigued scientists.
- California's coastal forests are among its most distinctive and treasured national resources.

from Joshua Schimel, *Writing Science*; how to write papers that get cited and proposals that get funded

The Funnel: Connecting the O and C

Opening: Identifies a large problem

Challenge: Defines a specific question

Main body of the introduction must connect these elements.

Build the argument that to make progress on the large problem, you must answer the specific question.

Frame the knowledge gap: U and E

from Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded

Challenge (C).

Describe the specific knowledge you hope to gain.

Start with the question that drove your work!

“to learn X, we did Y.”

Not just “we did Y”, and leave out “to learn X...”

from Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded

Action (A).

“You are not just presenting your results, you are telling a story.”

In a paper: Materials, Methods, Results, most of the Discussion.

Embed the action within the larger story.

What is the point of all that work?

What do these results mean?

Do they answer your question?

from Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded

Story structure

Resolution (R).

People remember the last thing you say.

“Take-home message”

Show how your understanding has advanced.

Good resolution: reiterates the action, answers the questions raised in the challenge, and demonstrates how those answers contribute to the larger problem.

Do not put anything but that new insight in your resolution.

If the most important thing you discover is that there is a new question, make the question concrete, and be clear how it grew from your work—you didn't fail to fill one knowledge gap but identified a new one.

Not good:

- Weak: summarise the results, tell your reader that they are important, but do not clarify how. Not an answer to the questions raised.
- Distracting: include ideas that should be in the introduction or in a textbook.
- Undermine your conclusions: “more research is needed to clarify our findings”.
➔ Focus on what you *haven't* accomplished.

from Joshua Schimel, *Writing Science*; how to write papers that get cited and proposals that get funded

Resolution (R).

To conclude, 3-methyl-ambrosia offers a new approach for thyroid carcinoma therapy. Our data provide evidence on safety and in vivo activity of this compound in patients with this condition, although the proof for clinical benefit remains to be established in future clinical trials.

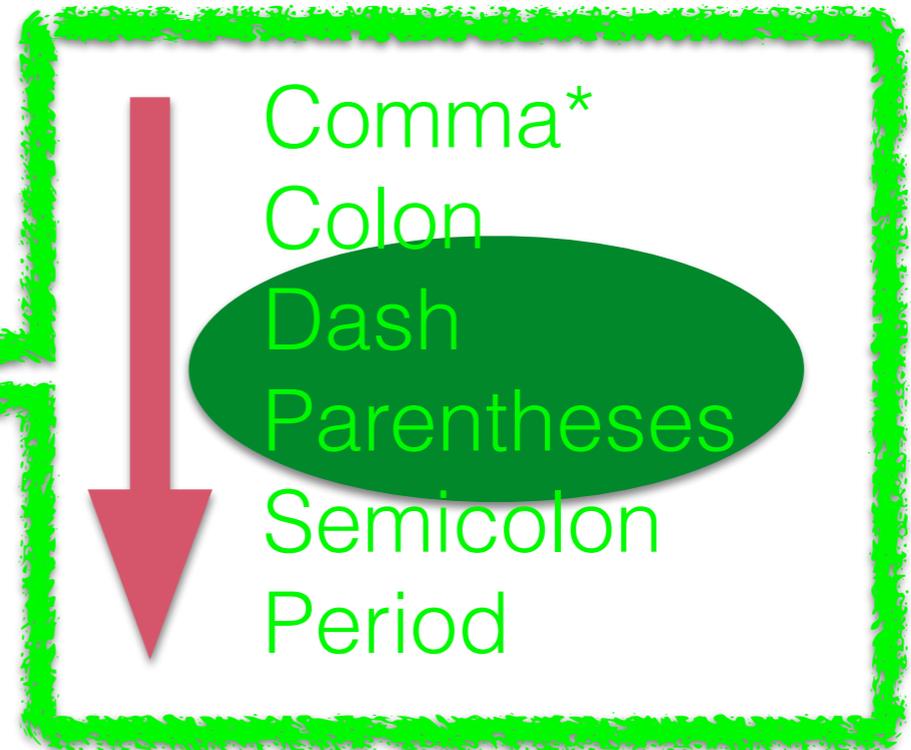
While further clinical trials will be necessary to establish the full benefits of 3-methyl-ambrosia as a therapeutic agent, our data provide evidence that it is safe and shows in vivo activity against thyroid tumors. 3-Methyl-ambrosia therefore may offer a new approach for treating patients with thyroid carcinoma.

from Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded

Punctuation

less formal

- Use punctuation
- ❖ Correctly
 - ❖ To vary sentence structure



Increasing power to separate

*from Kristin Sainani, Stanford online course "Writing in the Sciences"

Punctuation

Why correctly?

What should this mean?

We had one problem only Janet knew we faced bankruptcy

We had one problem: only Janet knew we faced bankruptcy.

We had one problem only: Janet knew we faced bankruptcy.

We had one problem only, Janet knew: we faced bankruptcy.

We had one problem only Janet knew we faced: bankruptcy.

Bad punctuation:

We had one problem only, Janet knew we faced bankruptcy.

from R.L. Track, Penguin Guide to Punctuation

Punctuation

FULL STOP/PERIOD:

- ❖ Marks the end of a sentence expressing a statement.

Something wrong?

Norway has applied for EC membership, Sweden is expected to do the same.

Two complete sentences, but the first one has been punctuated only with a comma.

Norway has applied for EC membership. Sweden is expected to do the same.

Each statement has its own full stop.

Norway has applied for EC membership, and Sweden is expected to do the same.

We used the connecting word *and* to combine the two statements into a longer statement.

from R.L. Track, Penguin Guide to Punctuation

COMMA:

- ❖ When making lists.
- ❖ Bracketing information that is not central to the sentence.
- ❖ After linking words like however, furthermore, additionally, ... at the start of a sentence, or after a phrase that qualifies or introduces the main part of the sentence.
 - In this section, we survey the airline fleet assignment problem.
- ❖ NO comma goes before “that” in sentences like:
 - ..., and we demonstrate that schedule reliability is highest for direct routing.

COMMA:

❖ *Listing comma:*

- As a kind of substitute for the word *and*, or sometimes for *or*.
- Used in a list when three or more words, phrases or even complete sentences are joined by the word *and* or *or*.
- In a series of three or more terms with a single conjunction, use a comma after each term except the last. (Oxford comma, serial comma.)
 - ➔ ...red, white, and blue.
 - ➔ He opened the letter, read it, and made a note of its contents.

from R.L. Track, Penguin Guide to Punctuation and Strunk, W., Jr. and White, E.B.: The Elements of Style

Punctuation

Oxford comma



<https://www.youtube.com/watch?v=0jS3VyRYYCQ>

We invited the strippers, JFK, and Stalin.
The woods were lovely, dark and deep,

COMMA:

❖ *Joining comma:*

- Joins two complete sentences into a single sentence, and it must be followed by a suitable connecting word: and, or, but, while and yet.
- ➔ Norway has applied for EC membership, and Sweden is expected to do the same.
- ➔ Many airlines use a combination of hub-and-spokes and direct routings, and Jeng has shown that a mixed system is generally more efficient.

from R.L. Track, Penguin Guide to Punctuation and Strunk, W., Jr. and White, E.B.: The Elements of Style

Punctuation

COMMA:

❖ *Gapping comma:*

- To show that one or more words have been left out when the missing words would simply repeat the words already used earlier in the sentence.
- ➔ Some Norwegians wanted to base their national language on the speech of the capital city; others, on the speech of the rural countryside.

❖ *Bracketing comma:*

- A **pair** of bracketing commas is used to mark off a weak interruption of the sentence—that is, an interruption which does not disturb the smooth flow of the sentence.
- ➔ These findings, we would suggest, cast doubt upon his hypothesis.
- ➔ An airline schedule, for our purposes, is a list of flight legs that the airline plans to fly.

from R.L. Track, Penguin Guide to Punctuation

Punctuation

❖ Do not join **independent clauses** by a comma.

If you join two or more clauses, that are

- Grammatically complete and
- Not joined by a conjunction

➔ Use a **semicolon**

⦿ It is nearly half past five; we cannot reach town before dark.

We could just write it as two sentences.

⦿ It is nearly half past five. We cannot reach town before dark.

If we insert a conjunction, the proper mark is a comma.

⦿ It is nearly half past five, and we cannot reach town before dark.

If the second clause is preceded by an adverb (accordingly, besides, so, then, therefore, or thus), and not by a conjunction, the semicolon is still required.

[Strunk, W., Jr. and White, E.B.: The Elements of Style]

Punctuation

COLON:

- ❖ A colon signifies that what follows it expands on or explains what precedes it.**
- ❖ To introduce a list, quote, explanation, conclusion, or amplification.
 - ⦿ Participants of this course are: , , ...
 - ⦿ In the following, passenger travel time components are grouped into three categories: In-flight time, ground time [...], planned delay time included in the schedule as a buffer against random delays.
 - ⦿ Washington has a simple solution to most governments it doesn't like: isolate them, slap sanctions on them, and wait for their downfall.*
- “The colon has more effect than the comma, less power to separate than the semicolon, and more formality than the dash.” [Strunk, W., Jr. and White, E.B.: The Elements of Style]
- ❖ To divide the title of a manuscript into two halves.
 - ⦿ Selecting Aircraft Routes for Long-Haul Operations: A Formulation and Solution Method
 - ⦿ The Fleet Assignment Problem: Solving a Large-Scale Integer Program
 - ⦿ Airline Scheduling: An Overview

*from Kristin Sainani, Stanford online course “Writing in the Sciences”

**from Lyn Dupré: “BUGS in Writing: A Guide to Debugging Your Prose”, Addison-Wesley

COLON misuse*:

- In one project we have a nutritionist, a psychologist, statisticians, a computer specialist, and dietitians: a whole range of specialties.
 - ➔ In one project we have a whole range of specialties: a nutritionist, a psychologist, statisticians, a computer specialist, and dietitians.

*from Kristin Sainani, Stanford online course “Writing in the Sciences”

Punctuation

SEMICOLON:

- ❖ Connects two independent, complete clauses into a single sentence when all of the following conditions are met:
 - The two sentences are felt to be too closely related to be separated by a full stop.
 - There is no connecting word which would require a comma, such as and or but.
 - The special conditions requiring a colon are absent.
- ➔ It was the best of times; it was the worst of times.*
- ❖ Separates items in lists that contain internal punctuation.
 - They dramatically reduced the number of series in production: in 1935, fourteen series were circulating; in 1940, nine; by 1980, when the syndicate was in its final years, only four. **

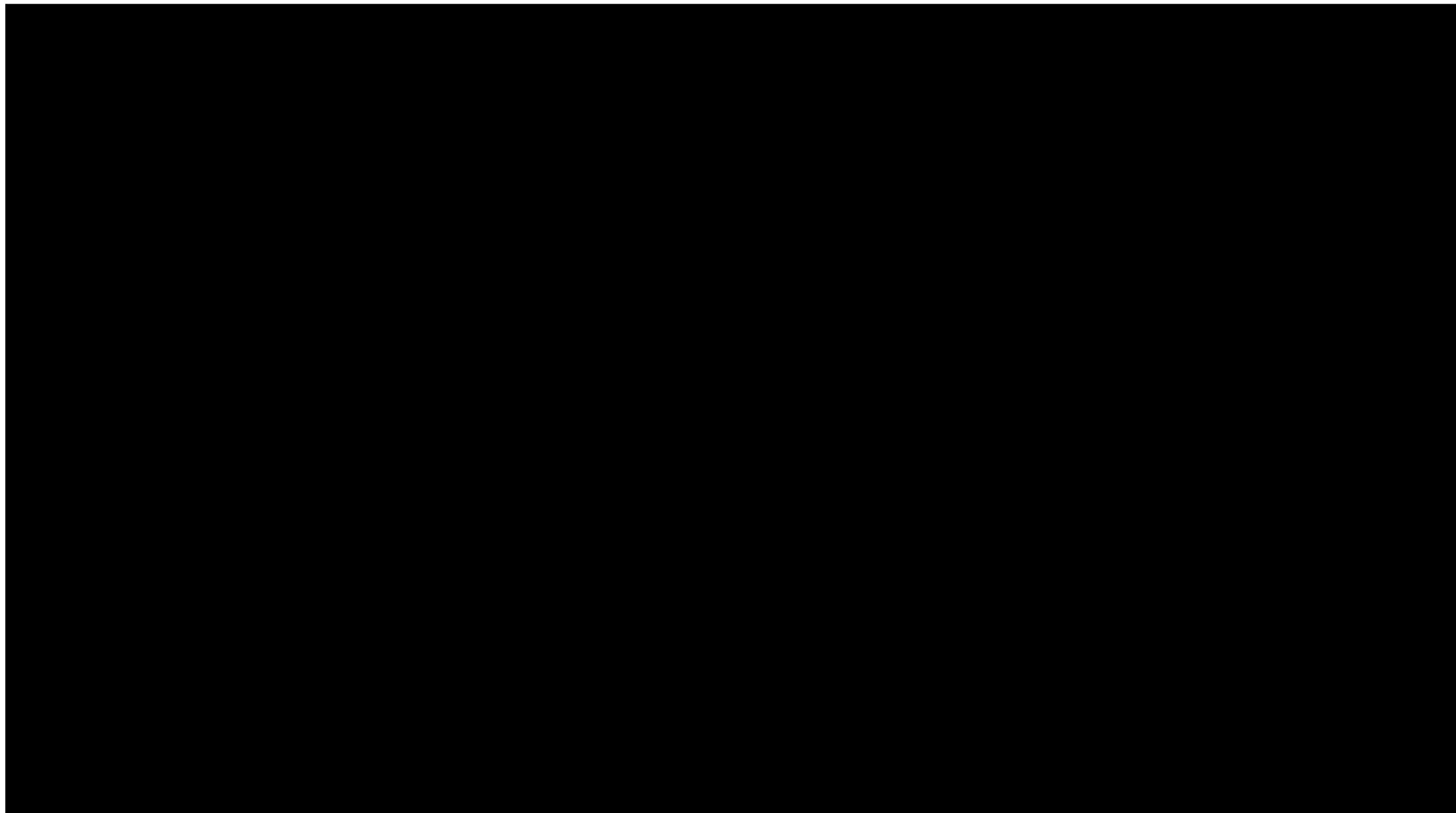
from R.L. Track, Penguin Guide to Punctuation

*Charles Dickens, A Tale of Two Cities

**from Kristin Sainani, Stanford online course "Writing in the Sciences"

Punctuation

SEMICOLON:



<https://www.youtube.com/watch?v=-OoNjz6s4jg>

Punctuation

A semicolon must be preceded by a complete sentence and followed by a complete sentence!!

SEMICOLON:

- ❖ I don't like him; not at all.
- ❖ In 1991 the music world was shaken by a tragic event; the death of Freddy Mercury.

Correct?

- ❖ I don't like him, not at all. (bracketing comma)
- ❖ In 1991 the music world was shaken by a tragic event: the death of Freddy Mercury.

from R.L. Track, Penguin Guide to Punctuation

PARENTHESES:

- ❖ Use parentheses to insert text (an afterthought or explanation) into a sentence that is grammatically complete without it.
 - ⦿ Large simulation models are required to determine to what extent some disturbance of the schedule (e.g., through inclement weather, or through airspace congestion) propagates throughout the system.
 - ➔ If you remove the text in parentheses, the rest of the sentence should not change.
 - ➔ Allow reader to skip over the material.

DASH:

- ❖ To add emphasis.
 - ❖ To insert an abrupt definition of description almost anywhere in the sentence.
 - ❖ To set off a short summary after a complete main clause.
 - ❖ Do not overuse it!
-
- “A dash is a mark of separation stronger than a comma, less formal than a colon, and more relaxed than parentheses.” [Strunk, W., Jr. and White, E.B.: The Elements of Style]
 - “Use a dash only when a more common mark of punctuation seems inadequate.” [Strunk, W., Jr. and White, E.B.: The Elements of Style]

DASH:

- At the bottom of Pandora's box lay the final gift—hope.
- Through various forms of discount fares, it is possible to change the time preference and—to a lesser extent—even the destination of a sizeable part of the passenger demand.

How would the feel of the sentences change with parentheses or commas?

With commas instead:

- Through various forms of discount fares, it is possible to change the time preference and, to a lesser extent, even the destination of a sizeable part of the passenger demand.

clunky and long...

With parentheses instead:

- At the bottom of Pandora's box lay the final gift (hope).
- Through various forms of discount fares, it is possible to change the time preference and (to a lesser extent) even the destination of a sizeable part of the passenger demand.

buries the info

Punctuation

Researchers who study shipworms say these mislabeled animals—they're clams, not worms—are actually a scientific treasure.

emphasis and added information

Researchers who study shipworms say these mislabeled animals, they're clams, not worms, are actually a scientific treasure.

not strong enough to set off a clause

Researchers who study shipworms say these mislabeled animals (they're clams, not worms) are actually a scientific treasure.

buries the information

from Kristin Sainani, Stanford online course "Writing in the Sciences"

Punctuation

The store—which is windowless and has clusters of unsmiling security guards standing at its entrances, as if it were the embassy of a particularly beleaguered nation—caters to rich Brazilians, members of the ten per cent of the population who command nearly half the national income, and wear Chanel, Valentino, or Dolce & Gabbana.

long description

The store, which is windowless and has clusters of unsmiling security guards standing at its entrances, as if it were the embassy of a particularly beleaguered nation, caters to rich Brazilians, members of the ten per cent of the population who command nearly half the national income, and wear Chanel, Valentino, or Dolce & Gabbana.

too long-winded without an abrupt pause

The store (which is windowless and has clusters of unsmiling security guards standing at its entrances, as if it were the embassy of a particularly beleaguered natio) caters to rich Brazilians, members of the ten per cent of the population who command nearly half the national income, and wear Chanel, Valentino, or Dolce & Gabbana.

takes away from the description

from Kristin Sainani, Stanford online course “Writing in the Sciences”

EXCLAMATION MARK:

- ❖ Used at the end of a sentence or short phrase which expresses very strong feeling.
- ❖ Do not use. (Exception: math notation $n!$)

QUESTION MARK:

- ❖ At the end of a sentence which is a direct question.
- ❖ Used in introduction and discussion parts of a paper.

Punctuation

Three kinds of dash:

- hyphen
- en dash
- em dash

HYPHEN:

- ❖ Tie together two words that modify a third, when the third follows the first two.
Compound adjectives.
- ❖ You should not place a hyphen between two words:
 - That together constitute a noun
 - That together describe an activity
- ⦿BAD: Decision-making under uncertainty can be stressful.
- ⦿But: BAD: Decision making paradigms are scarce.
- ⦿GOOD: We have not used pre-processing strategies.

from Lyn Dupré: “BUGS in Writing: A Guide to Debugging Your Prose”, Addison-Wesley

Punctuation

Three kinds of dash:

- hyphen
- en dash
- em dash

EN DASH:

- ❖ Use an en dash when you use a dash to indicate a range.
- ❖ Use an en dash to indicate an equal-weighted pair that is currently serving an adjective.
 - GOOD: If you travel the San Francisco–New York route, you can use a red-eye flight.

from Lyn Dupré: “BUGS in Writing: A Guide to Debugging Your Prose”, Addison-Wesley

Punctuation

Three kinds of dash:

<https://www.youtube.com/watch?v=NnAaywvd1uk>

Punctuation

APOSTROPHE:

❖ **Contractions.** Shortened forms of words from which one or more letters have been omitted: it's, we'll, they've, can't, o'clock (of the clock).

❖ **Unusual Plurals.** As a general rule, we never use an apostrophe in writing plural forms.

In the rare case in which you need to pluralise a letter of the alphabet or some other unusual form which would become unrecognisable with a plural ending stuck to it.

➡ Mind your p's and q's.

➡ How many s's are there in Mississippi?

❖ **Possesives.** The basic rule is: a possessive form is spelled with 's at the end.

➡ my brother's house

The rule applies in most cases even with a name ending in s:

➡ Thomas's job

Three types of exception:

1. A plural noun which already ends in s takes only a following apostrophe: the girls' excitement.

2. A name ending in s takes only an apostrophe if the possessive form is not pronounced with an extra s: Socrates' philosophy, Ulysses' companions.

3. Pronouns: The cow lowered its head.

from R.L. Track, Penguin Guide to Punctuation

Colon:

Evidence-based medicine teaches clinicians the practical application of clinical epidemiology, as needed to address specific problems of specific patients. It guides clinicians on how to find the best evidence relevant to a specific problem, how to assess the quality of that evidence, and perhaps most difficult, how to decide if the evidence applies to a specific patient.

*from Kristin Sainani, Stanford online course “Writing in the Sciences”

Punctuation - Practice

Dash:

A long descriptive clause that could be set off by a dash.

Finally, the lessons of clinical epidemiology are not meant to be limited to academic physician-epidemiologists, who sometimes have more interest in analyzing data than caring for patients. Clinical epidemiology holds the promise of providing clinicians with the tools necessary to improve the outcomes of their patients.

No transition.

*from Kristin Sainani, Stanford online course "Writing in the Sciences"

Paragraphs

“Make the paragraph the unit of composition:
one paragraph to each topic.”

[Strunk, W., Jr. and White, E.B.: The Elements of Style]

Paragraphs

“But how do you make a paragraph [...] a unit of composition?”

What do those terms even mean?

Paragraphs tell stories.

Not surprisingly, therefore, a paragraph becomes a unit of composition when it tells a complete short story with a coherent structure, a story that fits into and contributes to the larger work.

If you string sentences together until you need to come up for air, and then throw in a paragraph break, you will not have a unit of composition.”



one paragraph

Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded.

Paragraphs

- ❖ 1 paragraph = 1 idea
- ❖ Beginning of each paragraph: signal to the reader that a new step in the development of the subject has been reached.
- ❖ As a rule, begin each paragraph with a topic sentence; end it in conformity with the beginning. [Strunk, W., Jr. and White, E.B.: The Elements of Style]
 - Reader remembers the first sentence and the last sentence best.
 - ➔ Make the last sentence stick!
- ❖ Point-first paragraph:*
 - topic sentence that makes a point, which the rest of the paragraph develops
- ❖ Point-last paragraph:*
 - assemble an argument, pulling threads together to weave them into a conclusion
- ❖ Logical flow of ideas.
- ❖ Parallel sentence structure.

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Logical flow of ideas:*

- ❖ Sequential in time
- ❖ General \rightarrow specific
- ❖ Logical arguments (if a then b; a; therefore b)

*from Kristin Sainani, Stanford online course “Writing in the Sciences”

Paragraphs

In deregulated markets, passenger airlines have the freedom to choose flight schedules and prices for routes generated by flight schedules. These decisions are very important for an airline that wishes to maximize its profit. The flight schedule fixes a large fraction of an airline's cost, and also the routes the airline can offer. The schedule determines the quality of the airline's service in terms of departure times and transit durations of routes. Quality of service and prices affect the airline's ability to attract travelers.

Logical structure:

1. Airlines have freedom to choose flight schedules and prices for routes.
2. Flight schedule fixes large fraction of cost, the routes, and quality of service.
3. Quality of service and prices affect choice of travelers.

G. Dobson and P.J. Lederer: Airline Scheduling and Routing in a Hub-and-Spoke System.

Paragraphs

Usually, when a defendant absconds, a bondsman hires a bounty hunter to find and arrest him within the grace period (which, in California, is six months). If that fails, the bondman tries to seize any collateral that the defendant put down to secure the bond, or sues the defendant's "indemnitors," who signed the bail application as guarantors. But Zabala hadn't put down any collateral, and so far Green—one of the few bondsmen who always do their own bounty hunting—had found neither him nor his indemnitors. The grace period was nearly up. Soon, Green would have to pay the court thirty-one thousand dollars.

Organized by time sequence and general —> specific

1. First, a bondsman hires a bounty hunter to find and arrest the defendant within the grace period.
2. Then, if that fails, the bondman seizes collateral or sues indemnitors.
3. Now, in this specific case, the defendant (Zabala) is AWOL (absent without leave) and has no collateral or available indemnitors
4. Conclusion: the bondswoman (Green) is out of options.

Writer didn't write "first", "then", the organization of sentences gives readers these clues without spelling them out.

*from Kristin Sainani, Stanford online course "Writing in the Sciences"
example from *The New Yorker*

Paragraphs

Usually, when a defendant absconds, a bondsman hires a bounty hunter to find and arrest him within the grace period (which, in California, is six months). If that fails, the bondman tries to seize any collateral that the defendant put down to secure the bond, or sues the defendant's "indemnitors," who signed the bail application as guarantors. But Zabala hadn't put down any collateral, and so far Green—one of the few bondsmen who always do their own bounty hunting—had found neither him nor his indemnitors. The grace period was nearly up. Soon, Green would have to pay the court thirty-one thousand dollars.

Logical structure:

Transition words used
long short long

A bondsman has these and only these options:

1. Hire a bounty hunter to find and arrest the guy within a grace period.
2. If (1) fails, seize collateral or sue indemnitor.
3. Pay the money herself.

In this case,

1. Grace period nearly done without arrest.
2. No collateral, no indemnitors.

... Green (the bondswoman) will be responsible for the \$31,000.

*from Kristin Sainani, Stanford online course "Writing in the Sciences"
example from *The New Yorker*

Paragraphs

topic sentence that makes a point, which the rest of the paragraph develops

An Argument: We conclude that the increase of the diurnal temperature [DTR] over the United States during the three-day grounding period of 11-14 September 2001 cannot be attributed to the absence of contrails. While missing contrails may have affected the DTR, their impact is probably too small to detect with a statistical significance. The variations in high cloud cover, including contrails and contrail-induced cirrus clouds, contribute weakly to the changes in the diurnal temperature range, which is governed primarily by lower altitude clouds, winds, and humidity.

G.P. Yanh Hong, P:Minnis, Y.X. HU, and G.North, "Do Contrails Significantly Reduce Daily Temperature Range?" *Geophysical Research Letters* 35 (2008): L23815
FROM: Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded.

Paragraphs - Practice

Headache is an extraordinarily common pain symptom that virtually everyone experiences at one time or another. As a pain symptom, headaches have many causes. The full range of these causes were categorized by the International Headache Society (IHS) in 1988. The IHS distinguishes two broad groups of headache disorders: primary headache disorders and secondary headache disorders. Secondary headache disorders are a consequence of an underlying condition, such as a brain tumor, a systemic infection or a head injury. In primary headache disorders, the headache disorder is the fundamental problem; it is not symptomatic of another cause. The two most common types of primary headache disorders are episodic tension-type headache (ETTH) and migraine. Although IHS is the most broadly used/recognized classification system used, a brief comment on others would be appropriate – especially if there are uses that have epidemiologic advantages.

from Kristin Sainani, Stanford online course “Writing in the Sciences”

Paragraphs - Practice

Headache is an extraordinarily common pain symptom that virtually everyone experiences at one time or another. As a pain symptom, headaches have many causes. The full range of these causes were categorized by the International Headache Society (IHS) in 1988. The IHS distinguishes two broad groups of headache disorders: primary headache disorders and secondary headache disorders. Secondary headache disorders are a consequence of an underlying condition, such as a brain tumor, a systemic infection or a head injury. In primary headache disorders, the headache disorder is the fundamental problem; it is not symptomatic of another cause. The two most common types of primary headache disorders are episodic tension-type headache (ETTH) and migraine. Although IHS is the most broadly used/recognized classification system used, a brief comment on others would be appropriate – especially if there are uses that have epidemiologic advantages.

from Kristin Sainani, Stanford online course “Writing in the Sciences”

Sentences

“A sentence tells a story, just the shortest one possible.”

Joshua Schimel, *Writing Science*; how to write papers that get cited and proposals that get funded.

“You can’t write strong papers with weak sentences.”

Joshua Schimel, *Writing Science*; how to write papers that get cited and proposals that get funded.

Sentences

A sentence tells a story \Rightarrow principles of story structure that we already saw apply:

- Readers need to meet the characters (opening)
- Readers need to learn what they did (action)
- Readers need to learn what the outcome was (resolution)

O	Opening: Who is the story about?	Subject
C/A	Challenge/action: what happened	Verb
R	Resolution: what was its outcome?	Object

Give the information in order, otherwise the reader has to hold it aside until you provide the essential pieces.

In English, the last word or phrase in a sentence's main clause carries the strongest emotional weight.

Joshua Schimel, *Writing Science*; how to write papers that get cited and proposals that get funded.

Sentences

- ❖ A sentence has a single topic.
- ❖ Whatever you put at the beginning of a sentence, readers interpret as the topic: who or what the sentence is about.
- ❖ It should be a schema or character the readers are familiar with. (Common knowledge or introduced earlier)
- ❖ Then develop the schema by adding new information.
- ❖ If you put new information at the beginning of a sentence, you possibly confuse your reader: you give them new information, but you suggest it is old.

- ❖ Endings are power positions = stress
- ❖ Use the power of the stress by putting key words there: the main message and new ideas or terms.

Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded.

Sentences

Viruses = “old information”
Expands understanding of where viruses are important

1. Viruses were not studied in the sea until 1989 yet are its most abundant biological entities.
2. The most abundant biological entities in the sea are viruses, yet they were not studied until 1989.
3. The most abundant biological entities in the sea were not studied until 1989: viruses.

both about biological entities in the sea - “sea creature” schema

Emphasises when they were first studied

Emphasises that the surprising information is that the most abundant entities are viruses.

Joshua Schimel, Writing Science; how to write papers that get cited and proposals that get funded.

Sentences

- 1.The topic should be short and clear.
- 2.The main verb should follow it immediately.
- 3.The key message should come at the stress.

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Sentences

- ❖ Use a mixture of short and long sentences.
- ❖ Good long sentence: make the key point in a short initial clause, and then add others to add depth and nuance.

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