

“How to tell a story in a scientific paper”

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Why Do You Want to Publish Papers?

- To let people know your scientific findings.
- To establish priority.
- Because the authorities say that you have to publish papers in order to get your PhD.
- To stay on in your job.
- To get promoted or get the next job.
- To get citations and improve your h-index.

Can you write a scientific paper that is not just correct science, but is also beautiful?

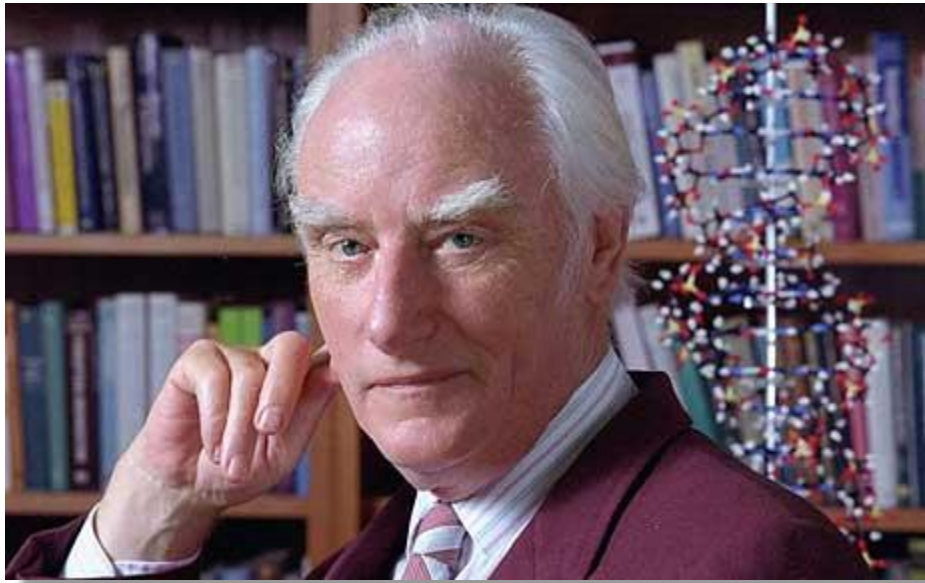
Writing Should Be Clear Writing Can Also Be Beautiful!



“Though it were foolish to colour or enamel upon the glasses of Telescopes, yet to gild or otherwise embellish the tubes of them, may render them more acceptable to the Users, without at all lessening the **Clearness of the Object** to be look’d at through them.”

-- Robert Boyle (1627-1691)

But ...Most Papers Are Neither Clear Nor Beautiful!



“There is no form of prose more difficult to understand and more tedious to read than the average scientific paper.”

- *Francis Crick*

A really good scientific paper:

- Conveys the science clearly
- Tells a story
- Is written with 'style'

A Brief Discussion of Style

Contrasting Styles...

A



B

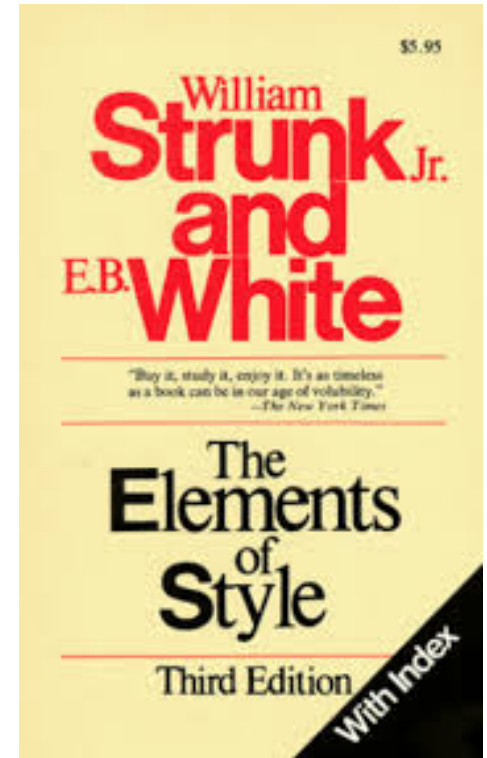


Which style appeals to you more?

Please type 'dress' and then 'A' or 'B' in the chatbox.

Style in Writing

“Who can confidently say what ignites a certain combination of words, causing them to explode in the mind? Who knows why certain notes in music are capable of stirring the listener deeply, though the same notes slightly rearranged are impotent? These are high mysteries...”



Let's pick just 2 'rules' today!

1. Choose a design and hold to it.

“Elements of Style”, Strunk & White

1. Choose a design and hold to it.

“Elements of Style”, Strunk & White

2. Omit needless words.

“Elements of Style”, Strunk & White

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“Elements of Style”, Strunk & White

Constructing a story

- Is this the same as “invent a story” ...
 - In literature?
 - In science?



How To Construct A Story

- 1) Assemble all the material
- 2) Decide what to keep and what to discard
- 3) Arrange in a logical sequence

Step1: Assembling Material

Mind Maps

Better when you have one main concept.

Start from the centre.

Concept Maps

Better when you have several related concepts.

Start from the top.

Timelines

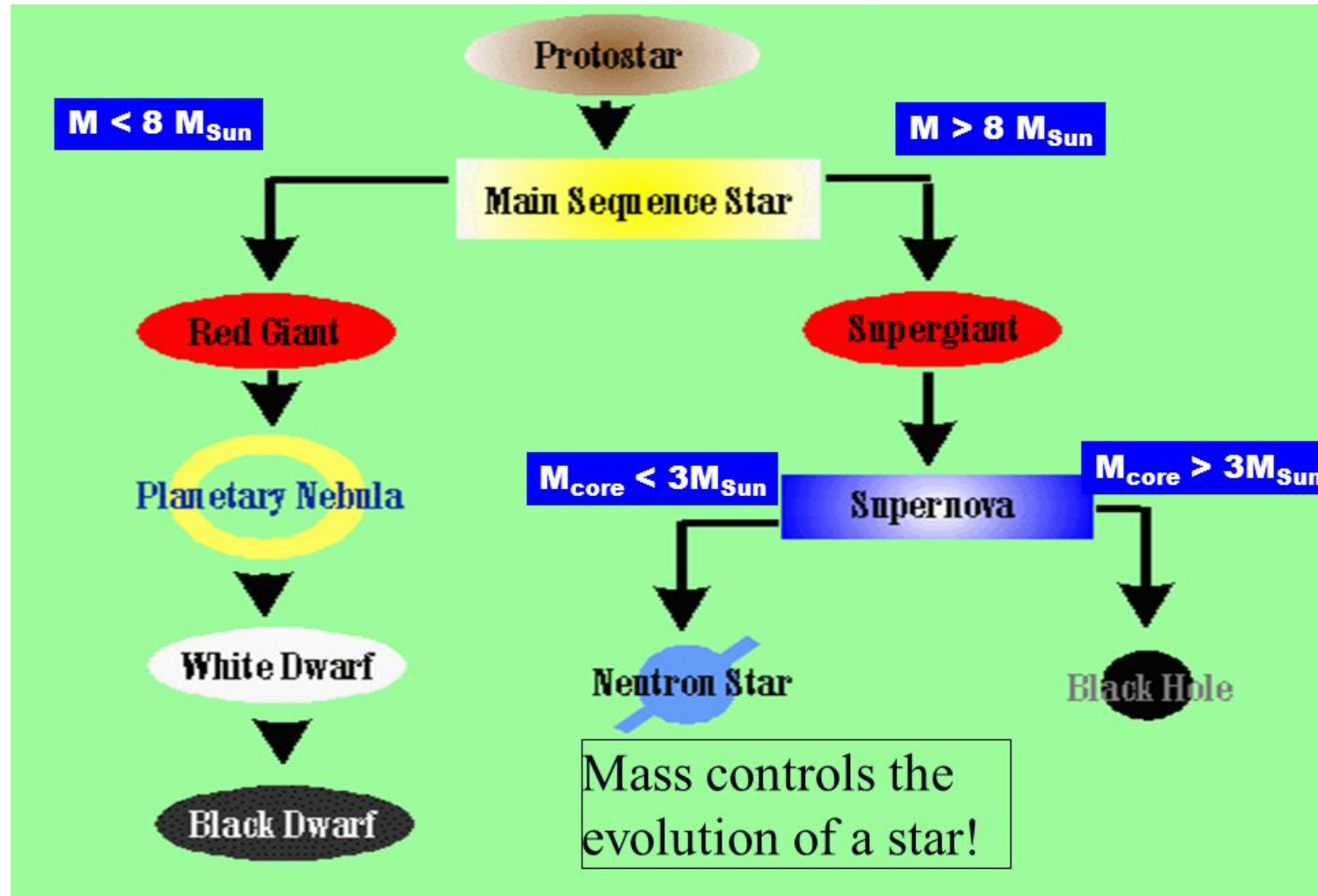
When you have one chronological sequence.

Mind Map for Black Holes



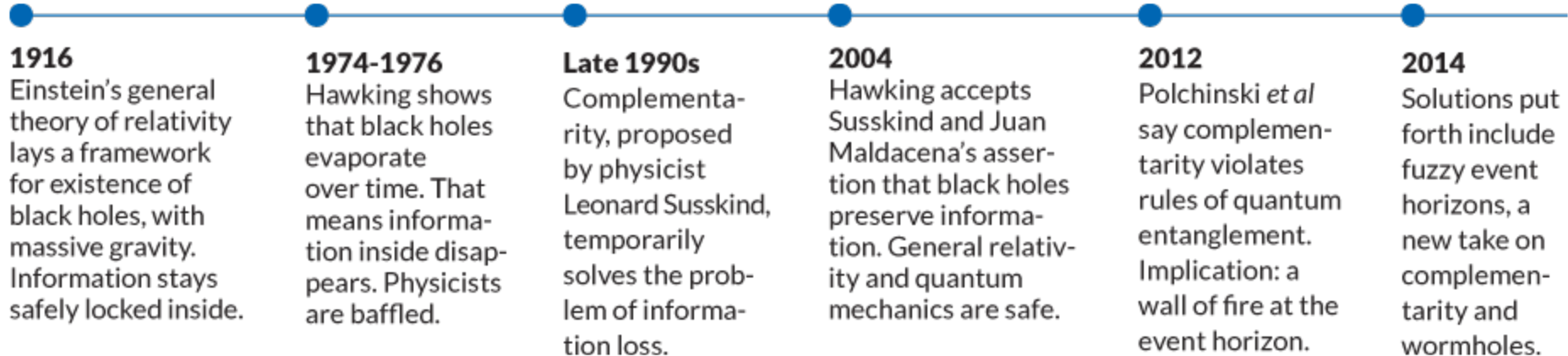
A. W. Peet

Concept Map for Stellar Evolution



From www

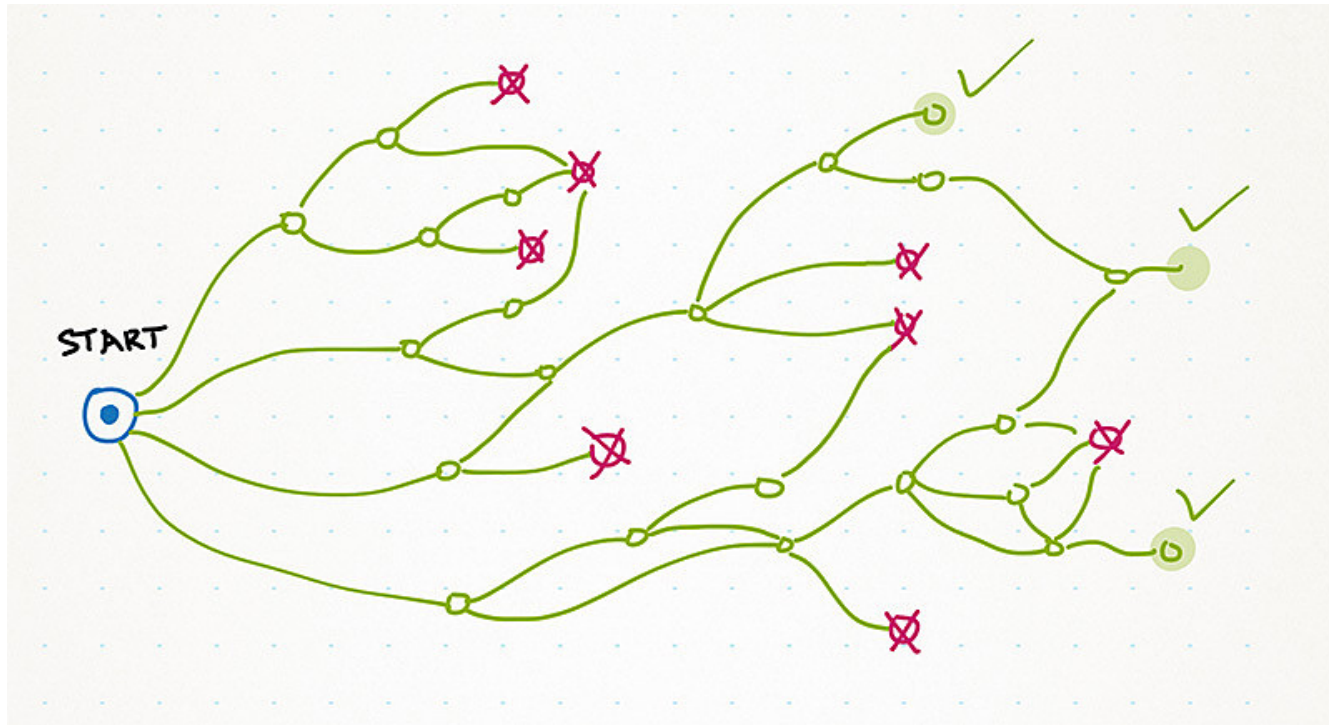
Timeline for Black Holes



Science News

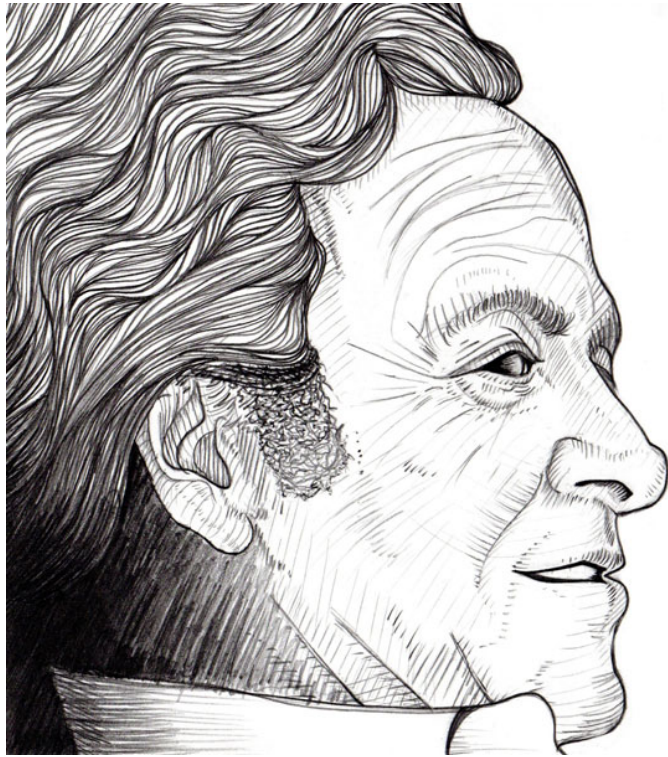
Step 2: Keeping and Discarding Information

Should you describe everything?



The Path to Scientific Discovery

Keeping & Discarding Information



“We have a habit in writing articles published in scientific journals to make the work as finished as possible, to cover up all the tracks, to not worry about the blind alleys or describe how you had the wrong idea first, and so on. So there isn’t any place to publish, in a dignified manner, what you actually did....”

--Richard Feynman

Be Clear What Your Message Is



“There is no form of prose more difficult to understand and more tedious to read than the average scientific paper.”

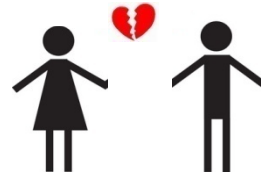
-- *Francis Crick*

Is The Message Obvious?

1. Boy Meets Girl.



2. Boy Loses Girl.



3. Boy Regains Girl.



A. Is all the interest in who the boy and girl are?

B. Is the interest in knowing how it is going to end?

C. Is the interest in how one got from (1) to (3)?

Type 'Love' and then 'A', 'B' or 'C' in the chatbox.

Possible Messages

- What is the most significant result?
- What is the second-most significant result?
- Does the work present a new technique/approach?
- Has an existing method been applied to a new area?
- Does the work contradict/confirm existing expectations?

Message sentences

An example:

Here, we show that engineered expression of TMPRSS2, a cellular protease that activates SARS-CoV-2 for entry into lung cells, renders SARS-CoV-2 infection of Vero cells insensitive to chloroquine.

Moreover, we report that chloroquine does not block SARS-CoV-2 infection of the TMPRSS2-positive lung cell line Calu-3.

These results indicate that chloroquine targets a pathway for viral activation that is not operative in lung cells and is unlikely to protect against SARS-CoV-2 spread in and between patients.

Hoffmann et al., Nature, 22 July 2020.

Message sentences

An example:

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The 'importance' sentence

Hoffmann et al., Nature, 22 July 2020.

Message sentences

field with a strength of the order of 1 V/nm.¹⁴ However, while both these ways of controlling cluster morphology are of considerable fundamental interest, they are perhaps not very practicable in actual applications. In this communication, we demonstrate, using first-principles density functional theory calculations, that the same goals can be achieved in a third way which is conceptually simple yet experimentally and technologically feasible: viz., by doping the MgO substrate with Al atoms.

Mammen, SN & de Gironcoli, J Am Chem Soc, 2011

Message sentences

However, none of these previous studies considered magnetic systems. In this work, we examine how the contact geometry affects the properties of spin molecular systems, in particular, the magnetoresistance. We show that this property is surprisingly easy to understand, and that the contact geometry plays a crucial role in determining the magnetoresistance.

Ulman, SN & Delin, J Chem Phys, 2014

The Path to Scientific Discovery



Should we tell only **this story**?

The Path to Scientific Discovery



Should we tell only **this story**?

...And what about **this story**??

The Path to Scientific Discovery



Let's not forget the
accidental
discoveries!



How to tell the story of an accidental discovery (for academic publication)?



A. “It has long been wondered whether one can travel west from Europe and reach India...To conclude, we found out that there is a hitherto ‘unknown’ continent to the west of Europe.”

B. “The aim of our journey was to discover a continent hitherto unknown to Europeans...To conclude, we succeeded in our goal.”

C. “It has long been wondered whether there are ‘undiscovered’ continents ...To conclude, we found out that there is a hitherto ‘unknown’ continent to the west of Europe. “

D. “It is generally believed that the only existing continents are Europe, Asia and Africa...To conclude, we have discovered a hitherto ‘unknown’ continent to the west of Europe.”

Which do you think is best?

(Vote by typing ‘Accident’ and then A/B/C/D in the chatbox).

How to tell the story of an accidental discovery (for academic publication)?



A. "It has long been wondered whether one can travel west from Europe and reach India....To conclude, we found out that there is a hitherto 'unknown' continent to the west of Europe."

Goal and conclusions do not match

B. "The aim of our journey was to discover a continent hitherto unknown to Europeans. We succeeded in our goal."

Untrue...but does that matter?

C. "It has long been wondered whether there are 'undiscovered' continents ...To conclude, we found out that there is a hitherto 'unknown' continent to the west of Europe. "

No lies told!

D. "It is generally believed that the only existing continents are Europe, Asia and Africa. We have discovered a hitherto 'unknown' continent to the west of Europe."

No lies told! More specific

How to tell the story of an accidental discovery? In a popular science article



A. “Columbus sailed west, hoping to find a new sea route to India....Totally by accident, he ended up ‘discovering America’!”

B. “Columbus sailed west, always suspecting that there was an ‘unknown’ continent there...he was right, he ‘discovered America’! “

Which do you think is better?

(Type ‘Sail’ and then ‘A’ or ‘B’ in the chatbox.).

Step 3: Arrange in a Sequence

- The sequence can be **chronological** or **logical**.
- These need not be the same!
- In scientific papers: logical sequence usually better!

Chronological Order

First this happened



Then this happened



Then this happened



Finally this happened

Playing With

Chronological Order

First this happened



Then this happened



Then this happened



Finally this happened



FLASHBACK

Chronological Order

First this happened



Then this happened



Then this happened



Finally this happened



FLASHBACK

Chronological Order

First this happened



Then this happened



Then this happened



Finally this happened



FLASHBACK

Chronological Order

First this happened



Then this happened



Then this happened



Finally this happened



FLASHBACK

Chronological Order

First this happened



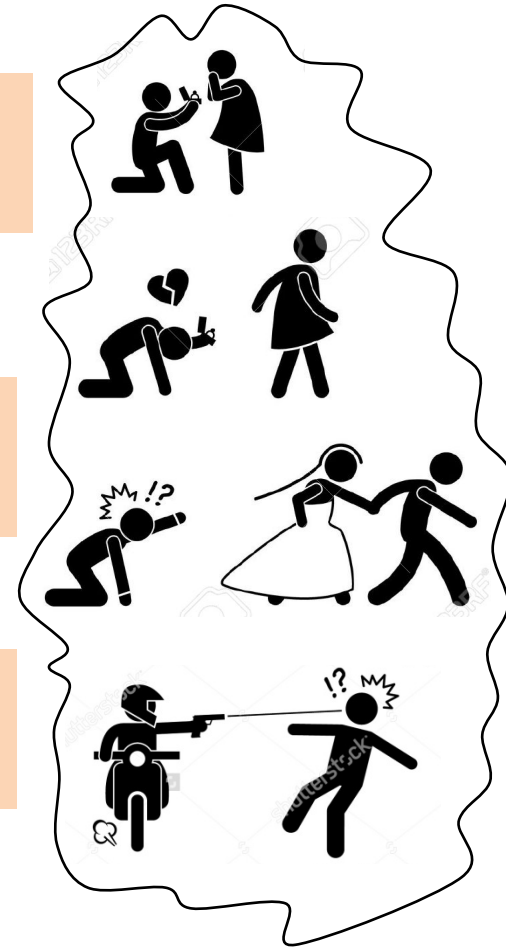
Then this happened



Then this happened



Finally this happened



Chronological Order

First this happened



Then this happened



Then this happened



Finally this happened



“I think playing with the chronological order by making use of the flashback made the story more interesting.”

Type 'drama' and then T or F online in the chatbox.

Chronological Order

First this happened



Then this happened



Then this happened



Finally this happened

Logical Order

First this



Therefore this



Therefore this



Finally this

Exercise

- You are given 4 pictures.
- Construct a story by arranging them in what you think is a logical sequence (Note: there is no unique answer!)
- Write down the message of your story (omit needless words!)

Arrange in a "Logical" Sequence



Arrange in a Sequence

I think the logical sequence is:

- A) a, b, c, d
- B) a, c, d, b
- C) d, b, a, c
- D) b, a, c, d
- E) None of the above

Type the sequence and the message in the chatbox.



“Bullies will be bullied in their turn”



“Bullies will be bullied in their turn”



“Bullies will be bullied in their turn”



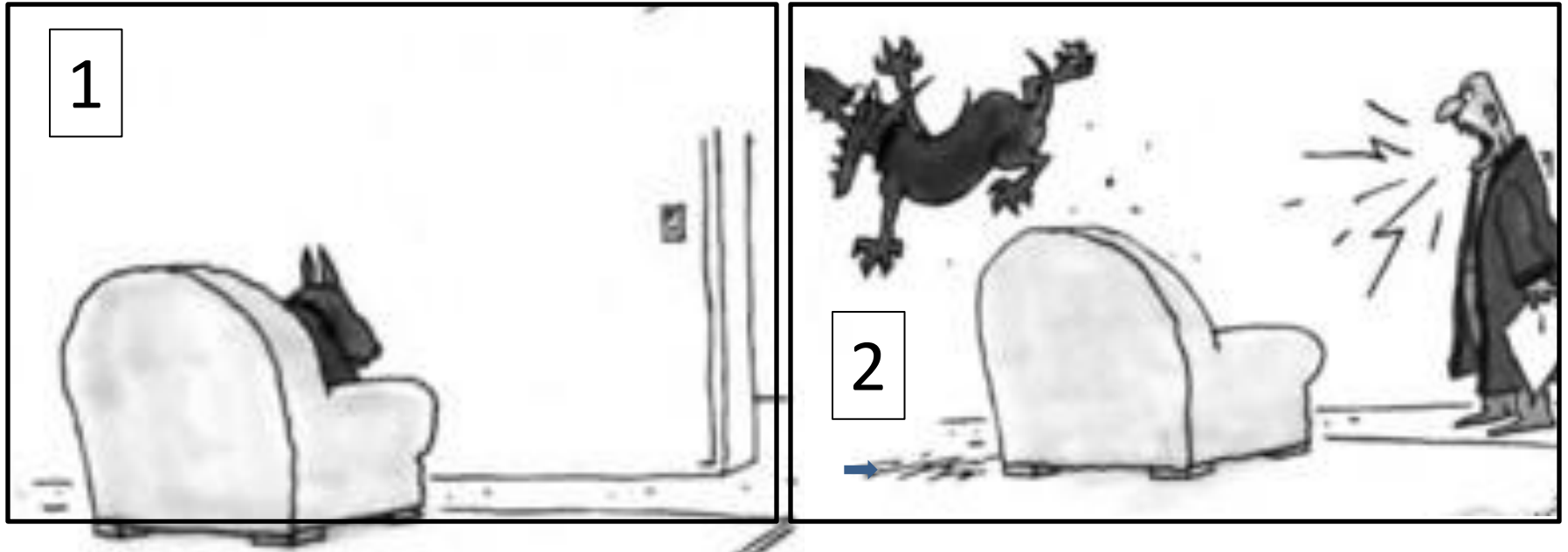
“Bullies will be bullied in their turn”



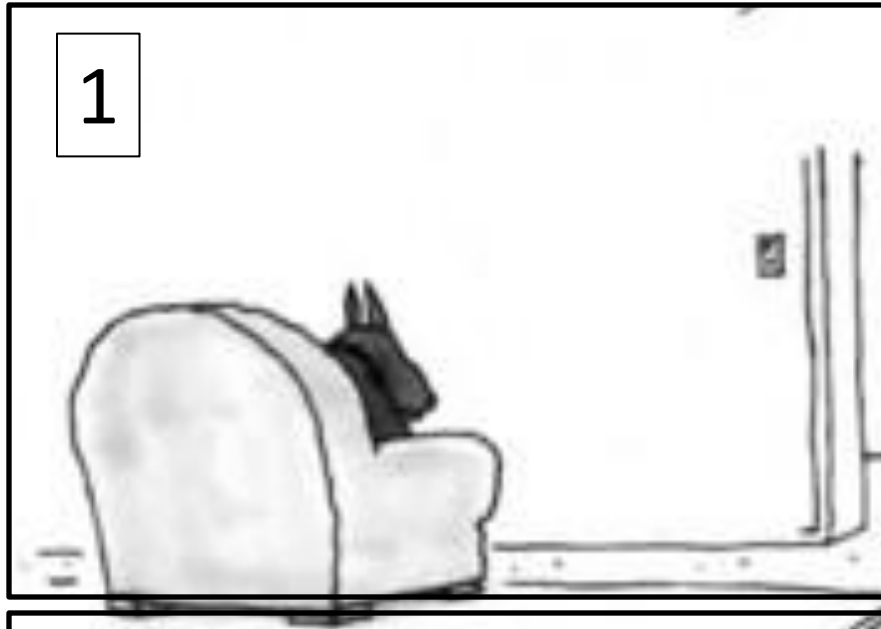
“Why Evil is Perpetuated in the World”



“Why Evil is Perpetuated in the World”



“Why Evil is Perpetuated in the World”



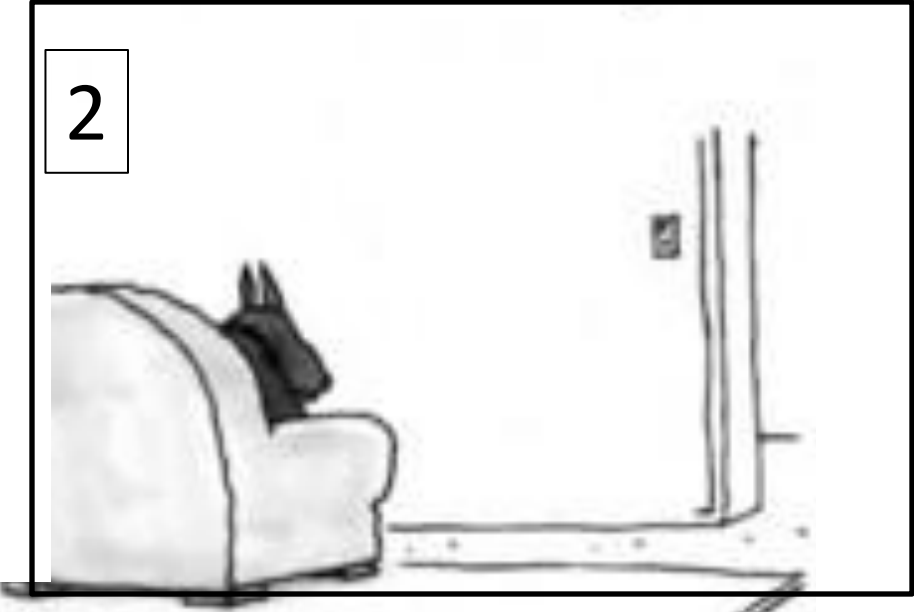
“Why Evil is Perpetuated in the World”



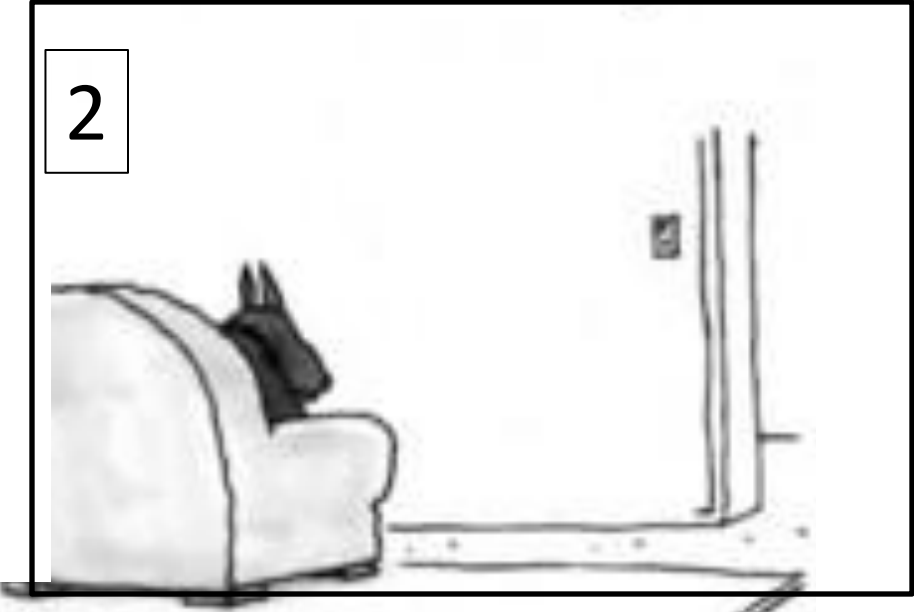
“I used to be mean to others until someone was mean to me”



“I used to be mean to others until someone was mean to me”



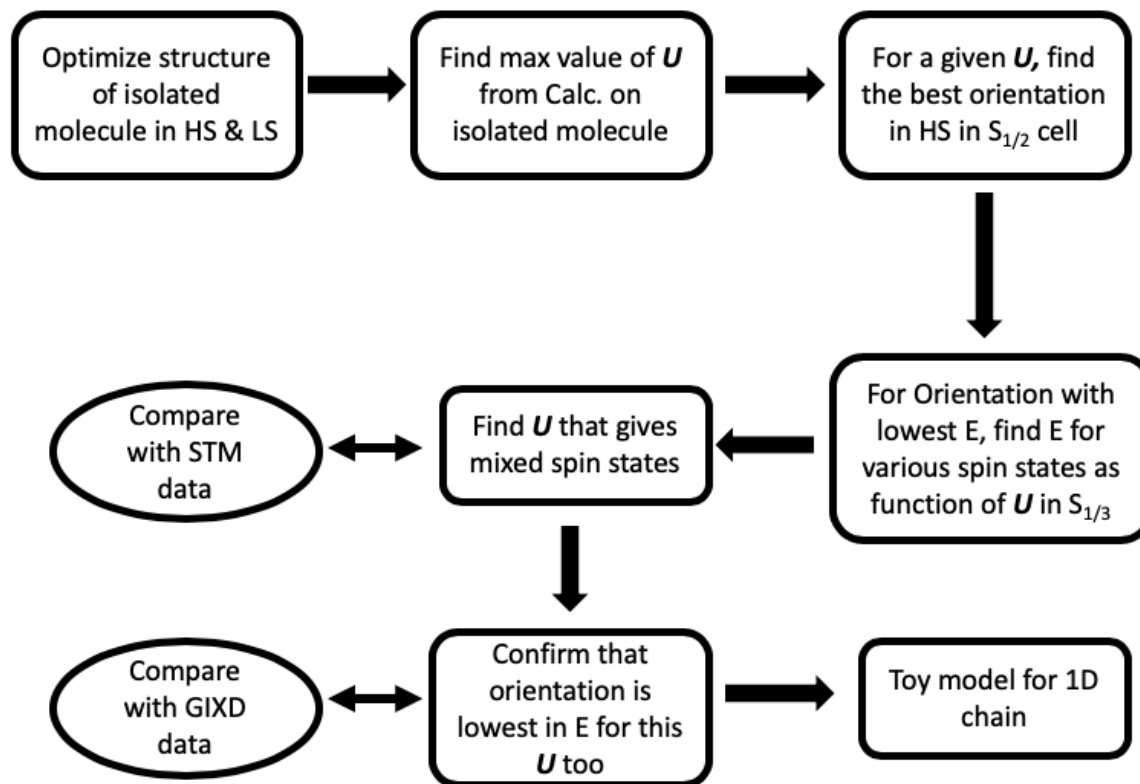
“I used to be mean to others until someone was mean to me”



“I used to be mean to others until someone was mean to me”



Good Idea to Make a Flow Chart of Your Paper, Before Writing



Sourav Mondal

First sentence

for popular science article on DNA testing

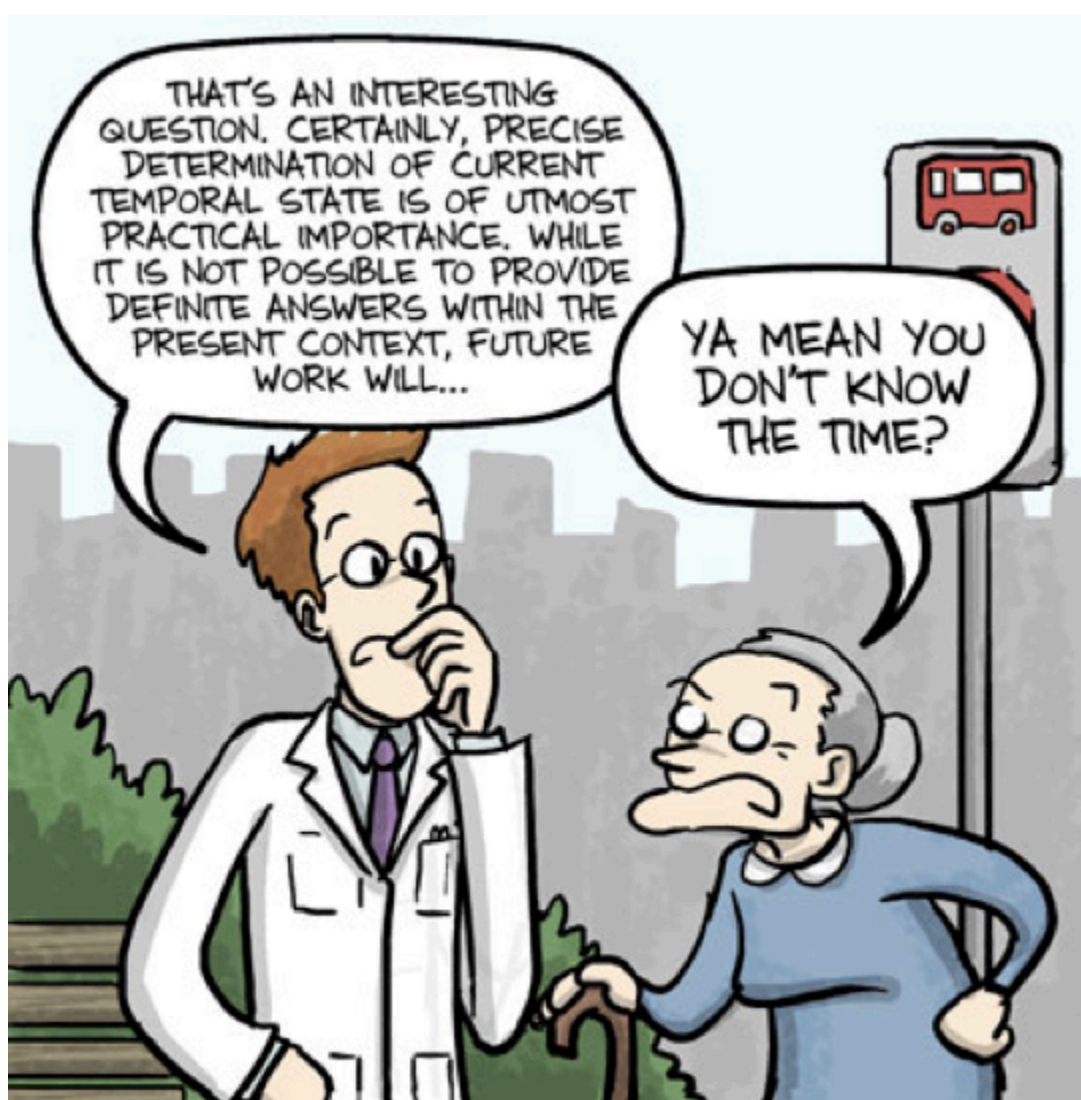
- A. DNA is an extremely important molecule for life on earth.
- B. First established in 1985 by Sir Alec Jeffreys, DNA testing has become an increasingly popular method of identification and research.
- C. DNA testing played a role in solving the infamous 'tandoori murder case' and in proving that politician ND Tiwari fathered a son outside marriage.
- D. Actress Angelina Jolie elected to have preventive surgery after DNA tests revealed that she was a BRCA1 gene mutation carrier, which puts her at very high risk for breast and ovarian cancer.
- E. DNA testing has shown that all humans have more in common "on the inside" than outward physical differences may seem to indicate.

Omit Needless Words



"To make a long story short, what it all boils down to in the final analysis is that what you should take away from this is..."

Rule #5: Omit needless words.



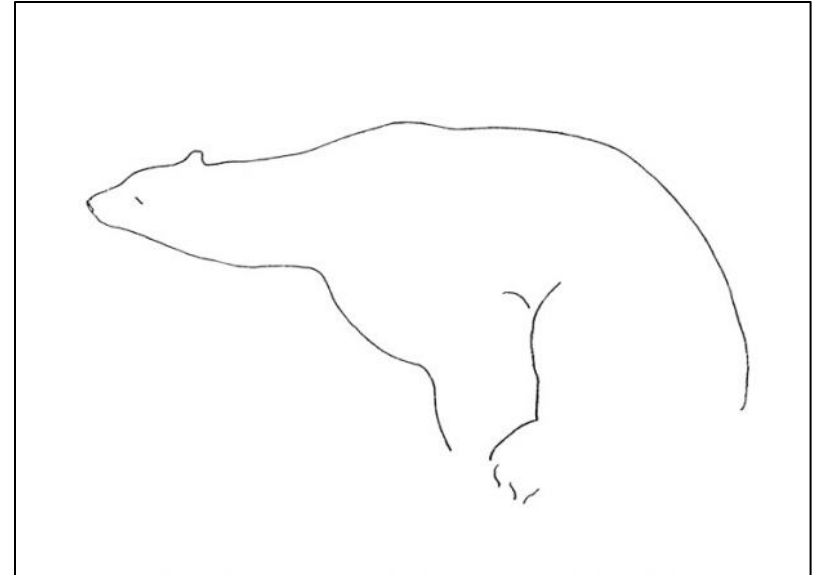
Style in art

A



Eric Wilson

B



I. Noguchi

Which artwork depicting a polar bear do you prefer?

Write 'bear' and then A or B in the chatbox.

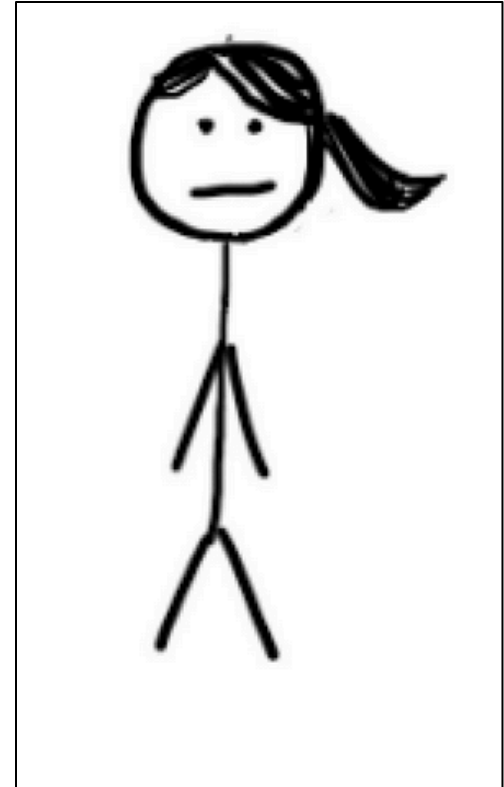
Style in art

A



Raja Ravi Varma

B



Which artwork depicting a woman do you prefer?
Write 'woman' and then A or B in the chatbox.

Do you like the design of this website?

The screenshot shows the homepage of LINGSCARS.COM. The main header features the company name in large blue letters, a traffic light icon, and a 'FREE collector's badges' offer. Below the header is a navigation menu with links like 'Home', 'Cars and Vans', 'How It Works', 'Price Lists', 'About Ling', 'Customers', 'Fun Stuff', and 'Quote/Order'. A large chat window is open on the right side, displaying a search for 'Qashqai 1.6 Visia' and a list of tweets. The left sidebar contains sections for 'CAR LEASING', 'ABARTH CAR LEASING', and 'ALFA ROMEO LEASE CARS'. The bottom of the page features a 'UK GOVERNMENT' endorsement, a 'Hi! I am Ling' announcement, and a 'Live Visions' counter.

Ailsa Chibnall, Border7

“I think this is a well-designed website” .
Write ‘nice’ then **T** or **F** in the chatbox .

Do you like the design of this website?


Cars home > Cars for sale

AA Motoring

Need some new wheels?

Buy & Sell your car on
AA Carfair

List your car for free



Search for new cars and used cars online. Whether you are selling a car, buying a car or just looking for advice on how to buy or sell a car, start your search with AA Carfair.


Search for cars

Body type

Make

Model and/or keywords

Year



Nissan Bluebird 1993

278,738km

Silver 4 Door door Sedan – Petrol

Hawkes Bay

₹ 1,500

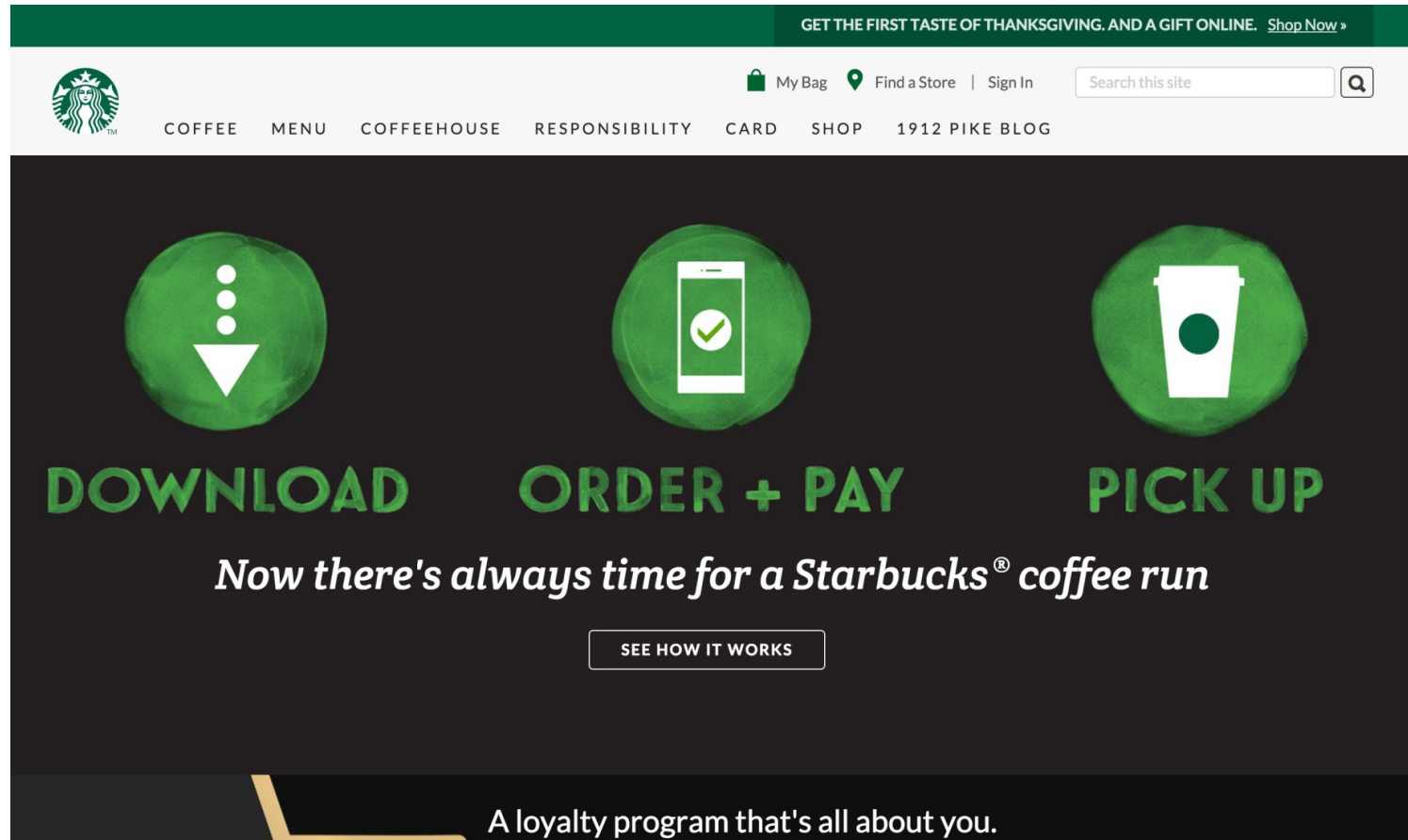
More info

Private seller

der.co.nz/external/aacarfair/sell-your-car

Write 'cool' then T or F in the chatbox.

Do you like the design of this website?



“I think this is a well-designed website”
Write **coffee** then **T** or **F** in the chatbox.

Purple Prose

Prose that is too elaborate or ornate.

“Fearing that the world might plunge back into the terrifying depths of sanity after *Kick* runs its course at the theatres, Chetan Bhagat decided to save the serial Facebook friend-request senders, photo-likers, blank callers and stalkers of all stripes from catching the depression bug.” –*Firstpost*

“Every substance that coruscates is not fashioned from the aureate metal.” –*Proverb*

First sentence of a novel

“India, which hangs like a wet washcloth from the towel rack of Asia, presented itself to Tex as he landed in Delhi (or was it Bombay?), as if it mattered because Tex finally had an idea to make his mark and fortune and that idea was a chain of steak houses to serve the millions and he wondered, as he deplaned down the steep, shiny, steel steps, why no one had thought of it before.”

(From the Bulwer-Lytton Fiction Contest)

“I think this is a good first sentence for a novel” .

Yes or No?

Write **India** then **yes** or **no** in the chatbox.

First sentence of a novel

“I told the boys to stay quiet while I went to fetch my gun.”

- Dick Francis, *Reflex*

“I think this is a good first sentence for a novel” .

Yes or No?

Type ‘Quiet’ and then ‘Yes’ or ‘No’ in the chatbox.

First sentence of a scientific paper

“We wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.).”
- *Watson & Crick, Nature*

“I think this is a good first sentence for a scientific paper.”

Yes or No?

Type ‘DNA’ and then ‘Yes’ or ‘No’ in the chatbox.

First sentence of a popular science article

“First thing that happens when you have a heart attack, an unlucky part of your heart turns white.”

-L. Taddeo, Esquire

“I think this is a good first sentence for a popular science article (on regenerating heart cells).”

Yes or No?

Type ‘Heart’ and then ‘Yes’ or ‘No’ in the chatbox.

How long should a sentence be?

The average length of a sentence should be 15 to 20 words.

- Prof. Sir A.J. Leggett



Absolutely no plagiarism!

Even in the Introduction and Methods sections, you cannot reproduce text verbatim (word-for-word) from an earlier publication.

This is true even if the earlier publication was authored by you.

In the Methods section, this can be particularly difficult....

Ernest Hemingway and the short short story



Ernest Hemingway and the short short story



**"For sale:
baby shoes,
never worn."**