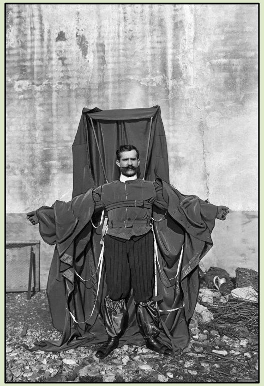
Inventions and Innovations

5 of the world's worst-ever inventions

Which is the worst? Why are those terrible inventions?

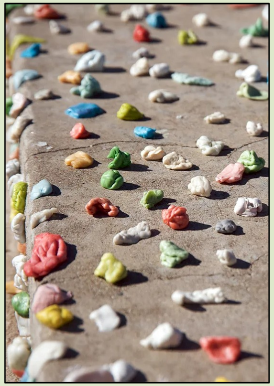
Make sure to use the comparative and superlative structures as well as the passive voice in your justifications.



The Parachute Coat

Coffee Pods

Airships



Chewing gum

Plastic carrier bags

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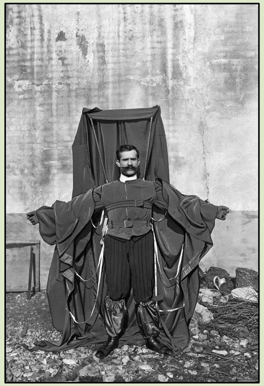

The Parachute Coat

Franz Reichelt, tailor by trade, was inspired to design a suit that could be used as a parachute by pilots. After initial tests using dummies, he was so sure his design would work that in 1912 he decided to test it by jumping from the lower level of the Eiffel Tower and fell to his death.

Inventions and Innovations

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Coffee Pods

Coffee pods are one of those inventions that must have seemed like an amazing idea on the drawing board, but in practice, they are incredibly wasteful. Even their inventor, John Sylvan, regrets inventing them. Their annual global footprint is well over half a million tonnes.

Inventions and Innovations

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Airships

Zeppelin had a great idea – equip an airship with a luxurious cabin and fly people across the Atlantic Ocean quickly and comfortably. During the late 1920s and early 1930s, this became a popular means of getting from Europe to the USA. What was less of a good idea was to fill these balloons with highly explosive hydrogen gas – accidents were fairly common. By the time of the Hindenburg disaster of 1937, aircraft design was already catching up. However, the airship could soon make a surprising return as they use an estimated 80 per cent less fuel than planes and are now filled with non-flammable helium.

Inventions and Innovations

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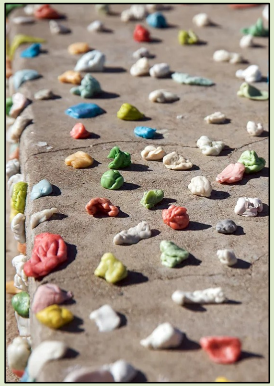


Chewing gum

One of the main ingredients in modern gum is polyvinyl acetate, a kind of plastic that is very difficult to remove when it comes into contact with things like shoes and pavements. And this also makes it very time-intensive and expensive to remove.

Inventions and Innovations

5 of the world's worst-ever inventions

Which is the worst? Why are those terrible inventions?

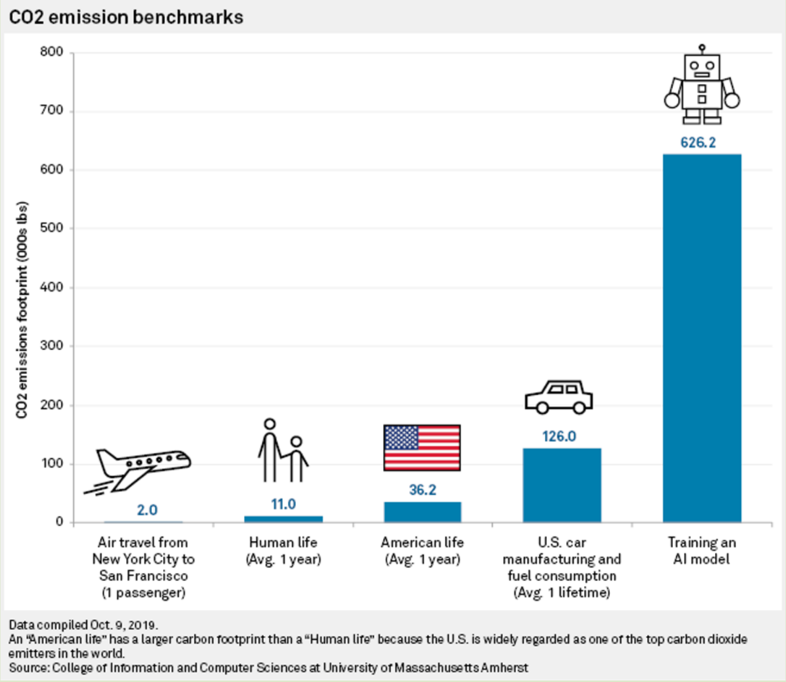
Make sure to use the comparative and superlative structures as well as the passive voice in your justifications.

Plastic carrier bags

When invented by Swedish engineer Sten Gustaf Thulin in 1965, the plastic bag was believed to be an item that could be continually reused. But the world today has a massive problem with plastic pollution, with single-used plastic bags still being used in their millions. Some studies predict that by weight, there will be more plastic in the sea than fish by 2050.

Inventions and Innovations

5 of the world's worst-ever inventions

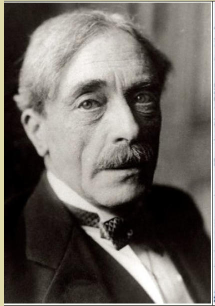


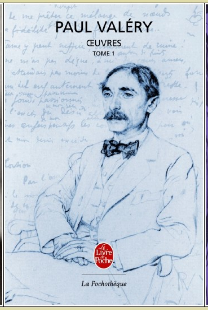
Inventions and Innovations

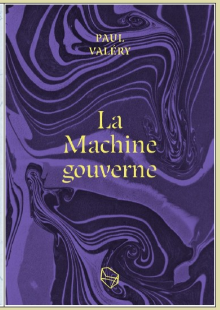
Translation

Paul Valéry, *Essais quasi politiques, Œuvres complètes*, Paris: Gallimard, Pléiade, 1957: 357

La machine gouverne. La vie humaine est rigoureusement enchaînée par elle […]. Ces créatures des hommes sont exigeantes. Elles réagissent à présent sur leurs créateurs et les façonnent d'après elles. Il leur faut des humains bien dressés […]. Elles se font donc une humanité à leur usage, presqu'à leur image.





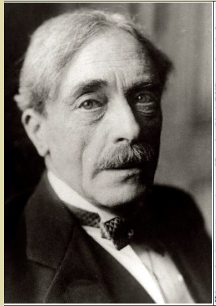


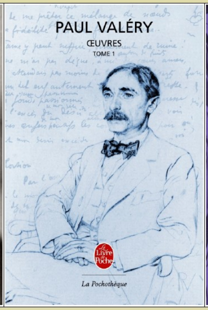
Inventions and Innovations

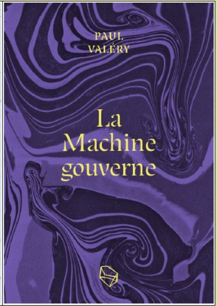
Translation

Paul Valéry, *Essais quasi politiques, Œuvres complètes,* Paris: Gallimard, Pléiade, 1957: 357

The machine rules. Human life is rigorously shackled by it / enslaved by it. These creatures made by men/humans are demanding. Now they react and impact their creators / they act back on their creators who are shaped / fashioned after them. They need / require well-tamed humans. They thus shape / fashion humanity according to their use, almost in their image.







Inventions and Innovations

Albert Einstein

Robert Oppenheimer

Does Science Need War ? Case Studies

Albert Einstein

Robert Oppenheimer

Does Science Need War ? Case Studies

Domain of science discussed	Question	Topic chosen to give one answer to the question	Argument(s)	Precise example (with names, figures and details) to support the thesis

Does Science Need War ? Case Studies

Does Science Need War?

19:14-22:12

War, is it all the fault of scientists?

(simplistic question)

Some scientists have been compromised by war and yet war has generated new knowledge and integrated scientific innovations.

What does science do during war?
How did scientists behave during war?

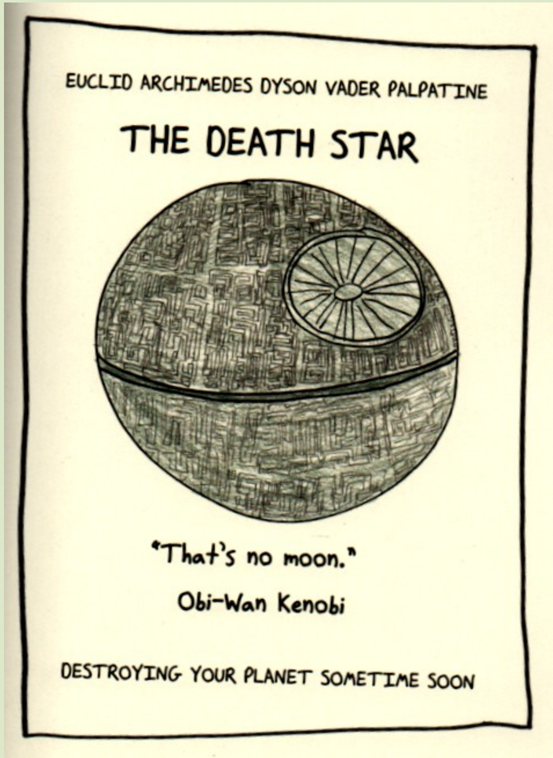
Does Science Need War ? Case Studies

Domain of science discussed	Question	Topic chosen to give one answer to the question	Argument(s)	Precise example (with names, figures and details) to support the thesis

Does Science Need War ? Case Studies

Domain of science discussed	**Question**	**Topic chosen to give one answer to the question**	**Argument(s)**	**Precise example (with names, figures and details) to support the thesis**
Medical world	When do we start to see the history of innovation changing due to war? Is the great advantage of war the fact that so many guinea pigs were created?	War advances certain branches of medicine > here focus on **traumatic surgery** and **the birth of reconstructive plastic surgery**	Difficult relationship with **science and technology – neutral things that can both help us and hurt us** The birth of plastic surgery as a very good example > not just an innovation but **an attempt by medicine to try and mitigate the consequences of a technology that helped you and then hurt you**	**Archibald McIndoe** **The Guinea Pig Club** (*1941*) Royal Air Force fighters – *Spitfire and Hawker* Hurricane fighter planes *(a fuel tank was placed directly in front of the pilot)* **Marvel of engineering** (three decades after the Wright brothers' first flight, can fly 400mph, can carry a formidable platform of weapons) > the problem is it is made out of wood, burst into flames as soon as you struck a light to it, filled with fuel while other pilots shoot bullets at the plane (bad idea) > **essential aircraft in the Battle of Britain BUT price to pay > people burnt beyond all recognition** What to do with people who have survived horrific injuries and are parachuted back to their country? > **do something to mitigate the consequences of that initial work of engineering** > Queen Victoria Hospital and Archibald McIndoe's team decided to try and reconstruct these people **> taking one step forward in what had been rudimentary plastic surgery** by rebuilding people's entire faces > birth of reconstructive plastic surgery (*cycle or spiral of innovation?*)

Does Science Need War ? Case Studies



The Death Star: A Case Study in Engineering

"Geometry yields to no one, not even evil empires" (Ben Orlin)

1. Would you say the Death Star is a great design?

2. What (scientific) questions could you ask about it?

Questions in English

Question Word + auxiliary + subject + verb + [...] ?

Does Science Need War ? Case Studies

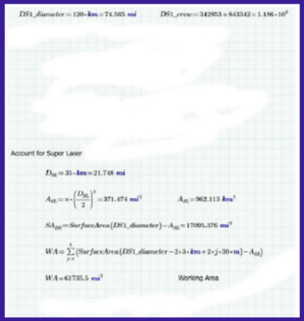
The Death Star: A Case Study in Engineering

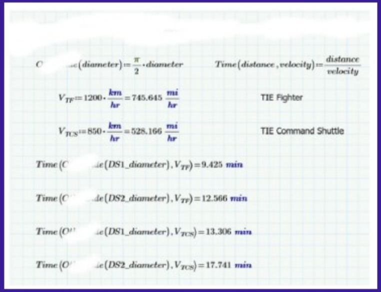
"Geometry yields to no one, not even evil empires" (Ben Orlin)

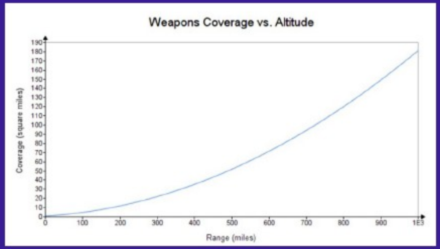
1. Would you say the Death Star is a great design?

2. What (scientific) questions could you ask about it?

3. Look at the scraps from an engineer's calculations. What could he be studying in each case?







4. Match the title of the issue being analyzed, the drawing exemplifying it, and the quotation alluding to it.

1. Throwing aerodynamics to the wind

3. West Virginia, floating in space

2. Too big to fail, too small to sphere

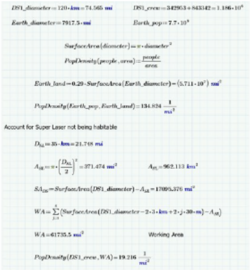
Does Science Need War ? Case Studies

Real-World Math Shows The Death Star Was A Terrible Design

Dave Martin, 12/13/2019

How Cramped Are People?

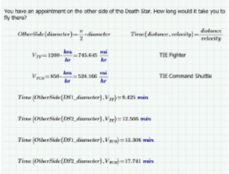
I've always wondered how cramped people were on the Death Star. A buddy of mine from work took me on a tour of the nuclear attack submarine he served on in the US Navy, and he lived with two other lieutenants in a space the size of my bathroom. The director of "Star Trek 2: The Wrath of Khan" gave a talk at work and explained that he tried to convey the feeling of people being crammed in confined spaces like World War II movies.



I calculated the population density using a variety of different methods, and finally settled on one that measured the surface area of the 4 decks located a distance below the thick armored plating. That puts 1.19 million people over 62,850 square miles, for a population density of just over 19 people per square mile.
For reference, the Earth has a population density of 134.8 people per square mile of land. If the Death Star were a country, it would rank below 194 of the 232 countries.
Why does this matter? The lack of people explains why four humans, a Wookiee, and two droids were able to travel relatively freely through the battle station without getting caught.

How Long Does It Take to Get Around in the Death Star?

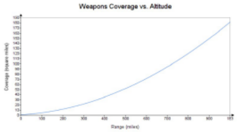
The Death Star has a vast series of horizontal and vertical elevators for travelling from one place to the other. But the interior of the Death Star is largely taken up by the hypermatter reactor, superlaser, hyperdrive, and ion sublight engines. Often when people are trying to get between locations, rather than take an elevator, they will actually fly from one hangar bay to another because it's faster.
Let's say that you have a meeting on the exact opposite side of the Death Star from where you are, and you decide to fly a TIE fighter there. Let's see how long it would take:



You can be on the other side of the first Death Star in less than 10 minutes and under 13 minutes for the second Death Star. Most people on the Death Star aren't TIE fighter pilots, so the dignitaries would most likely be taking a TIE command shuttle, which has a lower velocity. In that situation, it would take just under 14 minutes for Death Star I and 18 minutes for Death Star II.

Could It Stand Up to Snub Fighters?

Arrogance and hubris were two of the greatest weaknesses for the Death Star.
The rebel forces attacked the Death Star with merely 30 fighters: 8 Y-Wing bombers and 22 X-Wing fighters. The Death Star has over 7000 TIE Fighters. If only a third of those are available at any time due to maintenance and flight crew availability, imperial forces had an overwhelming air superiority of over 77 to 1.
The Empire planned the Death Star as a weapon of fear and intimidation. Sure, the superlaser could destroy an entire planet, but the first Death Star could fire only once every 24 hours. The rest of the weapons – ion cannons, turbolasers, and laser cannons – were designed more to engage with capital ships and ships of the line, rather than snub fighters.
But here's the thing: The Death Star didn't have many of these weapons. There were 20,000 of these other weapons, but when you look at their distribution across the surface area (not including the superlaser), you have one every 0.855 square mile, which is a square with sides of 0.92 miles.
The area that they have to cover increases by the square with altitude (and of course the volume increases at a cubic rate). If you're a gun crew and you're engaging targets at a distance of 1,000 miles, the sector you have to cover is 181 square miles. Here's a chart from PTC Mathcad showing the coverage area for each weapon as a function of the distance from the Death Star surface:



The problem with such a huge weapon is that you have a huge space to defend and huge sectors of fire that you have to attack, and the Death Star lacked firepower to do so.

My Take?

When you do the math, you realize the Death Star was actually a terrible design with significant security and operational issues. No wonder such a small group of rebels at a technological disadvantage were able to take it out twice.

https://www.mathcad.com/en/blogs/engineer-analyzes-death-star

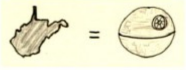
Does Science Need War ? Case Studies

a. The problem that still haunts me is the heating. It's outer space, right? Cold. You want to retain heat, and a sphere is great for that. Minimum surface area means minimum heat loss. But apparently, we did our jobs too well, because early simulations showed that the station would be prone to overheating. […] [S]o [we] put in thermal vents. Nothing big. A few meters wide. Release the heat into space; problem solved. I didn't think… I mean, when I heard that the rebels had destroyed the station by exploiting a thermal vent…

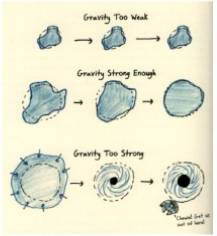
b. Look, I'm no propaganda expert, but the physics is pretty clear. All matter attracts all other matter. More matter, more attraction. […] So, toss a bunch of ingredients together in the mixing bowl of space, and every bit is mutually drawn toward every other bit. They congregate around a kind of 3D balancing point: the center of mass. Over time, the outlying clumps and mire distant protrusions are drawn toward this center, until it reaches the final equilibrium shape: a perfect sphere. But that's only if you've got enough matter. […] The magic size, where you're big enough to go spherical, depends on what you're made of. Ice will go spherical at a diameter of about 400 kilometers, because it's pretty malleable. […] For a material like imperial steel, designed to withstand tectonic-level forces, it'd be even larger. Maybe 700 or 750 kilometers. And the Death Star? It was only 140 kilometers across. A pebble.

c. Imagine you're flying an airplane. No matter how good a pilot you are, you're going to have A LOT of collisions. I'm referring, of course, to air molecules. Best-case scenario? The air molecules travel parallel to your surface. Then, they won't impact you at all. They're like passing traffic in the neighbouring lane. The worst-case scenario is that the air molecules hit perpendicular to your surface, at 90-degree angles. Then, your vessel bears the full force of the impact. That's why you don't build airplanes with big, flat fronts: it'd be like trying to weasel through a crowd while wearing a giant sandwich board on your torso.

d. There were about 2.1 million people on the Death Star; that's counting droids. Meanwhile, with a radius of 70 kilometers, it had a surface area of almost 62,000 square kilometers. Now, assuming that you bring everybody to the surface level, you'll have a population density of about 30 people per square kilometer. That's five soccer fields per person. […] Want to picture social life on the Death Star?

I. 

II. 

III. 

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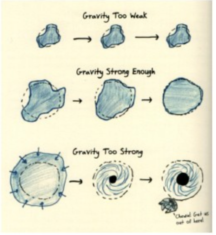
1. Throwing aerodynamics to the wind

c. Imagine you're flying an airplane. No matter how good a pilot you are, you're going to have A LOT of collisions. I'm referring, of course, to air molecules. Best-case scenario? The air molecules travel parallel to your surface. Then, they won't impact you at all. They're like passing traffic in the neighbouring lane. The worst-case scenario is that the air molecules hit perpendicular to your surface, at 90-degree angles. Then, your vessel bears the full force of the impact. That's why you don't build airplanes with big, flat fronts: it'd be like trying to weasel through a crowd while wearing a giant sandwich board on your torso.

II. 

2. Too big to fail, too small to sphere

b. Look, I'm no propaganda expert, but the physics is pretty clear. All matter attracts all other matter. More matter, more attraction. […] So, toss a bunch of ingredients together in the mixing bowl of space, and every bit is mutually drawn toward every other bit. They congregate around a kind of 3D balancing point: the center of mass. Over time, the outlying clumps and mire distant protrusions are drawn toward this center, until it reaches the final equilibrium shape: a perfect sphere. But that's only if you've got enough matter. […] The magic size, where you're big enough to go spherical, depends on what you're made of. Ice will go spherical at a diameter of about 400 kilometers, because it's pretty malleable. […] For a material like imperial steel, designed to withstand tectonic-level forces, it'd be even larger. Maybe 700 or 750 kilometers. And the Death Star? It was only 140 kilometers across. A pebble.

III. 

3. West Virginia, floating in space

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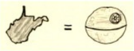
I. 

It's about the same size, population, and population density as West Virginia.

Does Science Need War ? Case Studies

5. Imagine the corresponding title and drawing for the last one.

a. The problem that still haunts me is the heating. It's outer space, right? Cold. You want to retain heat, and a sphere is great for that. Minimum surface area means minimum heat loss. But apparently, we did our jobs too well, because early simulations showed that the station would be prone to overheating. […] [S]o [we] put in thermal vents. Nothing big. A few meters wide. Release the heat into space; problem solved. I didn't think… I mean, when I heard that the rebels had destroyed the station by exploiting a thermal vent…

4. Maybe we did our jobs too well

a. The problem that still haunts me is the heating. It's outer space, right? Cold. You want to retain heat, and a sphere is great for that. Minimum surface area means minimum heat loss. But apparently, we did our jobs too well, because early simulations showed that the station would be prone to overheating. […] [S]o [we] put in thermal vents. Nothing big. A few meters wide. Release the heat into space; problem solved. I didn't think… I mean, when I heard that the rebels had destroyed the station by exploiting a thermal vent…

IV.

Does Science Need War ? Case Studies

5. Imagine the corresponding title and drawing for the last one.

6. Rephrase the following sentence resorting to the double comparative structure: "Minimum surface area means minimum heat loss."

7. Find in the text the words matching the following definitions.

a division of a road according to speed or direction
a large number of people gathered together
to throw lightly or casually
to be in a steady position; related to an even distribution of weight ensuring stability
a compacted or agglutinated mass
a small stone made smooth and round by the action of water or sand
a straight line from the centre to the circumference of a circle or sphere
likely to suffer from, do, or experience (something unfortunate)

8. Finally, what are your conclusions? Sum them up as an abstract.

6. Rephrase the following sentence resorting to the double comparative structure: "Minimum surface area means minimum heat loss."

"Minimum surface area means minimum heat loss." > The smaller the surface area, the less heat is lost.

7. Find in the text the words matching the following definitions.

A lane: a division of a road according to speed or direction
A crowd: a large number of people gathered together
To toss: to throw lightly or casually
Balancing: to be in a steady position; related to an even distribution of weight ensuring stability
A clump: a compacted or agglutinated mass
A pebble: a small stone made smooth and round by the action of water or sand
A radius: a straight line from the centre to the circumference of a circle or sphere
Prone to: likely to suffer from, do, or experience (something unfortunate)

8. Finally, what are your conclusions? Sum them up as an abstract.

"Abstract"
Perhaps the greatest construction project in the history of geometry is the Death Star. Before being destroyed by a blond desert-boy in the tragic finale to the film *Star Wars*, it was pure terror. It was sheer beauty. It was a near-perfect sphere, a hundred miles across, armed with a planet-vaporizing laser. And yet even this behemoth, designed to compel the obedience of an entire galaxy, could not help but obey a high master in turn: geometry. Geometry yields to no one, not even evil empires. I convened the team responsible for creating the Death Star to discuss the geometry behind history's most controversial solid. They brought up several considerations involved in building a tremendous spherical space station: its near-perpendicular surface relative to the direction of travel; its gravitational properties relative to naturally arising spheres; its personnel capacity as a function of surface area; and its uniquely low surface-area-to-volume ratio.