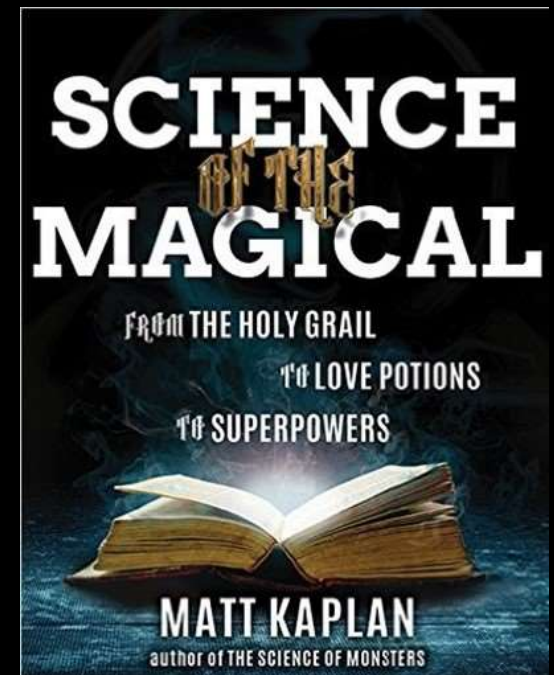
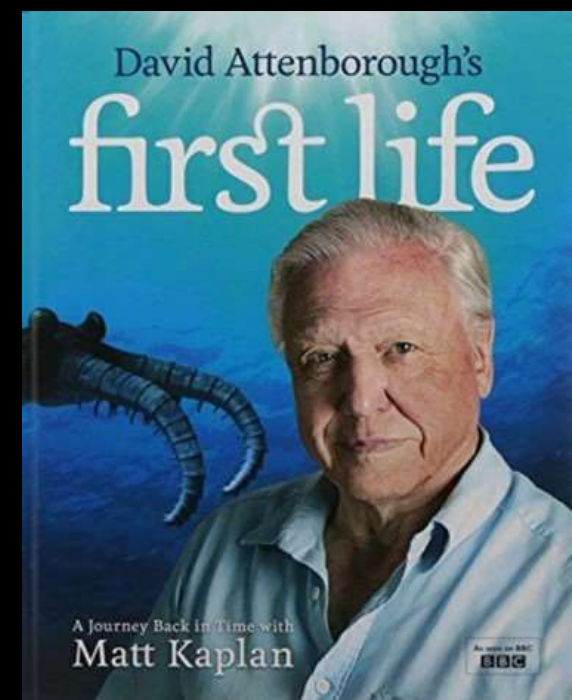
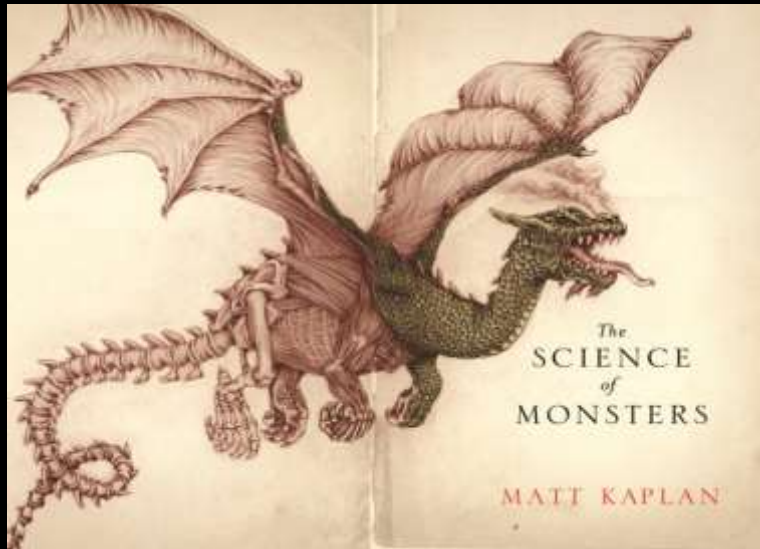


# Communicating Science Coherently

So who the heck am I  
and what do I know  
about science writing?



# Topics

- Audience
- Format
- Stories
- Story Structure
- Positive vs Negative
- Streamlining
- Tactics

# Audience

- Who is this for?
- What is their level of education?
- Will they read eagerly or must they be enticed?
- Do they already agree with you or do you need to change their mind?



# Audience Activity

- Who are your audiences?
- What is their level of education?
- Will they read eagerly?
- Do they already agree with you?



# Format

- Bullets
- Bullets are concise, simple and easy to read
- Bullets poorly connect cause and effect
- Bullets are easily forgotten
- Bullets do not change minds
- Stories
- Stories are longer and more complex
- Stories draw clear lines between cause/effect
- Stories are easily remembered
- Stories change minds

# Experiment

- Hungry
- Climbed
- Hole
- And
- Rock
- Hawk
- Berry
- Grabbed
- Safely
- Meal

The hungry mouse climbed up on the rock. It saw a tasty looking berry and went to eat it. Just as it took a bite, a hawk swooped out of the sky. The mouse grabbed the berry and dove into a hole where it safely finished its meal.

# Storytelling? Isn't that just for kids?



Images blurred in compliance  
with copyright regulations



# Bullets or Stories?

- If your audience knows the subject well and already agrees with you?
- If your audience is unfamiliar with your subject and needs to be convinced?
- If your content depends upon being presented in a specific order?
- If you are communicating key findings to other experts who already agree with you?
- If you are communicating to a non-expert who is interested but will have little time to listen?
- If you are communicating to a disinterested non-expert who will have little time to listen?

# Challenging Scenarios

- If your audience is composed of both experts and non-experts?
- If your audience is composed of both interested and disinterested people?
- If 50% of your audience agrees with you and 50% do not?
- If 90% of your audience agrees with you but 10% do not?

# Story Structure

- Every story must have a beginning, middle and end.
- Before you do anything else, note what you will discuss in these sections.
- The middle will likely have multiple parts, identify these early.
- Outline what you will discuss in each part of the middle before you start writing.
- Think carefully about the order of the middle sections. Does one section logically come before another? Does one require another?

# Power of the Positivity

- Disney is a multi-billion dollar company for a reason.
- In our work, it is so easy to go negative. This is okay... to an extent.
- Find your happy ending. A future happy ending is definitely acceptable.



# Streamlining

- Less is more
- This applies to your structural outline
- It also applies to final text
- Minimise jargon, particularly acronyms

Incidentally,  
what does NEA  
mean?

# When less isn't possible... break things up!

- The planet is facing multiple and severe environmental challenges; climate change, biodiversity loss, land and sea degradation, and pollution, observed globally, are interconnected with food, energy, and water insecurities, the rise of inequalities, and with poverty, health disruption and peoples' displacement.
- The planet is facing multiple and severe environmental challenges. Climate change, biodiversity loss, land degradation, sea degradation and pollution are interconnected with food, energy, and water insecurity. These forces are also increasing inequality, increasing poverty, displacing people and harming human health.

# Tactics

- Can I use an analogy?

Sedimentary rocks are laid down in layers called strata. A stratum is defined as a layer of rock that has a uniform lithology and texture. Strata form by the deposition of layers of sediment on top of each other with the oldest at the bottom and the youngest at the top.

Sedimentary rocks are laid down in rows that look like what we see in a cake. Like cake layers, those at the bottom must be prepared by the baker first and set down before those on top.

# Tactics

- Did the written analogy not work? Go visual!





## Extracting power from waves

## Like clockwork

## A simple but ingenious mechanism may give wave power a boost

**I**N A WORLD where new technology is dominated by the movement of electrons and the manipulation of biomolecules, it is good to know that old-fashioned mechanics can sometimes get a look-in, too. Admittedly, electron movement is also involved in the device dreamed up by Wang Zhonglin of the Beijing Institute of Nanoenergy. But its true ingenuity lies in a mechanical arrangement that would have delighted an 18th-century watchmaker.

Dr Wang, who has just published a description of his device in *ACS Nano*, is interested in using ocean waves to generate electricity. That is not a new idea, but it has not taken off in the way that wind and solar power have. There are many reasons why. One is the hostile environment. Seawater is chemically corrosive and the very waves which provide the power can become destructive during a storm. A second is that servicing and maintaining a piece of floating engineering is difficult and costly. And a third is that waves are even more variable as sources of energy than wind or sunlight.

These challenges mean wind and solar have left wave-power far behind. But some still hanker to change that, and Dr Wang is one. In particular, his invention addresses the third point—waves' variability as a power source. As he observes, existing designs are optimised to extract energy from large waves. But, though such waves are individually powerfully, small waves collectively carry a lot of energy too. So a sensible generator would harness both.

Dr Wang's answer to the problem is also twofold. First, he ditches the conventional

approach to electricity generation, which is to move a coil of wire through a magnetic field, in favour of what he calls triboelectricity. The coil-and-magnet method requires the coil to move rapidly, which is fine for capturing energy from big waves, but useless when waves are small. Triboelectricity can cope with slower movements, too. It is like the party trick of rubbing a balloon on a woollen pullover to generate static electricity, except that in this case the balloon is a set of plastic strips and the pullover is a series of copper electrodes, which conduct the electricity away as soon as it is generated.

Second, he uses an elegant piece of clockwork to regulate the process. Instead of having a single triboelectric generator in each unit, there are two, each rotated by a small cogwheel. These cogs are rotated by a larger one attached to a pendulum with a paddle on its other end.

This paddle is immersed in the water on which the device floats, so is wafted to and fro by passing waves, rotating the central cog as it swings. That, in turn, rotates the generator cogs. But not necessarily both of them, for the central cog has a gap in its teeth. This gap means it is continuously engaged with only one of the generator cogs, so that when the ocean swell is small, the transmitted force is not dissipated by having to rotate too much machinery. Only when a wave of large amplitude passes does the pendulum swing far enough for the central cog to engage the second generator, thus applying the extra force now available to boost the power output.

This arrangement therefore extracts energy from waves both great and small, significantly increasing its potential. Admittedly, the yield of a single unit is minuscule, for the units themselves are tiny by the standards of electricity generation. Minus pendulum and paddle, Dr Wang's prototype measures 23 x 11 x 10cm. But he imagines an arrangement that would carpet areas of sea measured in hectares, if not

square kilometres, with rafts composed of arrays of these devices, much as a battery is composed of individual cells.

Back-of-the-envelope calculations suggest this arrangement would match the output of other designs for wave-power generators in areas where waves are predominantly large, while handily outcompeting them in places where they are of variable size. That would greatly extend the range of places where wave-powered generation could be considered.

Whether such a scale-up is feasible is a different question. Dr Wang's design does not overcome the environmental-hostility and ease-of-servicing problems. But his new approach certainly shows that wave power's supporters have not lost their enthusiasm for the fray. ■

## Tuberculosis

## Making resistance useless

## Most resistance-causing mutations in TB have now been identified

**U**NTIL SARS-COV-2 emerged, the most destructive pathogen on the planet was *Mycobacterium tuberculosis*, the bug that causes TB. In 2020, according to the latest report from the World Health Organisation, published on October 14th, this organism cut short 1.5m lives—a figure 100,000 higher than the previous year (and the first annual rise since 2005), mainly because of disruptions to health services caused by covid-19. People whose immune systems have been wrecked by HIV are particularly at risk. Some 200,000 of the 680,000 annual AIDS deaths are a result of secondary TB infections.

More than a dozen antibiotics and other drugs are used to treat TB. But strains of *M. tuberculosis* that are not susceptible to one or more of these have emerged and are spreading at an alarming rate. Nearly 500,000 of the 10m cases of tuberculosis in 2019, for example, were drug-resistant. Good news, however, emerged on October 19th, when the Comprehensive Resistance Prediction for Tuberculosis International Consortium (CRYPITC, for short), an international collaboration that has been searching for quick ways to diagnose resistant strains, published the fruits of its labours. The result of the consortium's analysis of more than 15,000 samples from patients in 27 countries is a way of detecting any and every resistance-inducing mutation in a particular bacterium's genome.

At the moment, determining whether the strain causing a particular case of TB is resistant to a particular drug is tricky. ▶▶

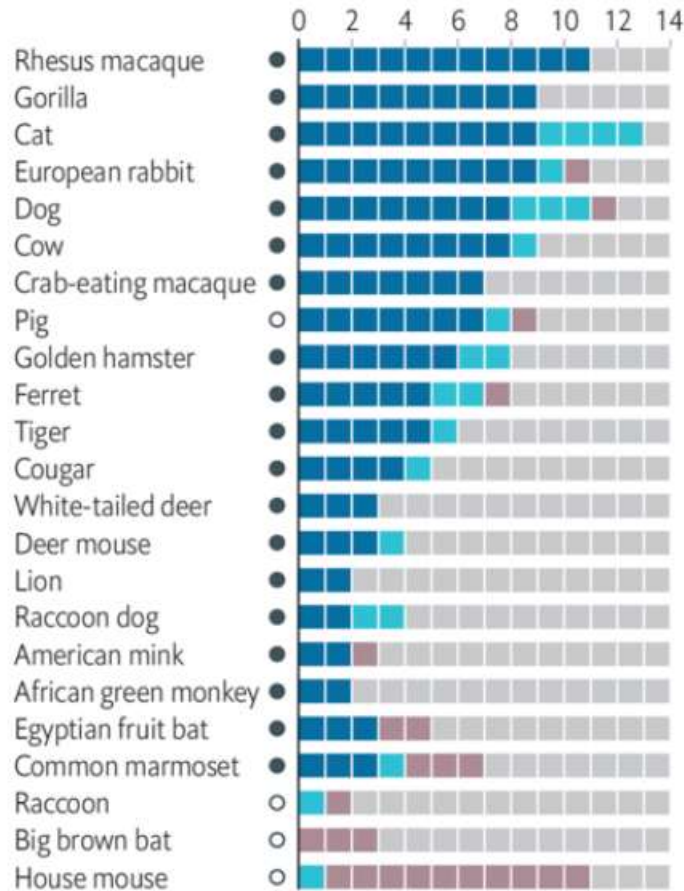
## Reservoir dogs, cats and monkeys

Predicted susceptibility to covid-19, number of studies

### Results

■ High ■ Medium ■ Low ■ N/A

Infection in animal: ● Confirmed ○ Unconfirmed



Source: "Predicting the zoonotic capacity of mammals to transmit severe acute respiratory syndrome coronavirus 2", by Barbara Han et al., 2021