

**LEARN TO SMILE AS THE  
END OF THE WORLD IS  
NOT IMMINENT,  
HOPEFULLY.\***

Graham T Reader



<https://i.pinimg.com/originals/c4/52/9b/c4529bd689854da487b53f0021b775d6.jpg>

\* The Abstract is given on the last slide.

# SMILES VERSUS THE INTERNET & OTHER MEDIA?

- The internet and social media have expanded the scope for creating, circulating and perpetuating health and climate scares.\*
- The availability of misinformation increases almost instantaneously and once ‘out-there,’ it is almost impossible to correct.
- Even in the academic press, when it is discovered that the data and conclusions are no longer reliable, retractions of published papers are on the increase. These papers are not removed, merely flagged.
- Psychologists are warning about **Eco-Anxiety** or **Climate Anxiety** among the younger generations, the latter being a *‘heightened emotional, mental or somatic distress in response to dangerous changes in the climate system.’*

# Concerns - Changing Epithets Over the past 50 years.



Winter is Coming

**Global Cooling**



Anthropogenic GHG Emissions

**Global Warming**



Impact of more than 2°C rise

**Climate Change**

Homecoming for:-



Albertosaurus, Edmontosaurus, Tyrannosaurus rex + ~97 others



The End of the World is in sight (7 years).

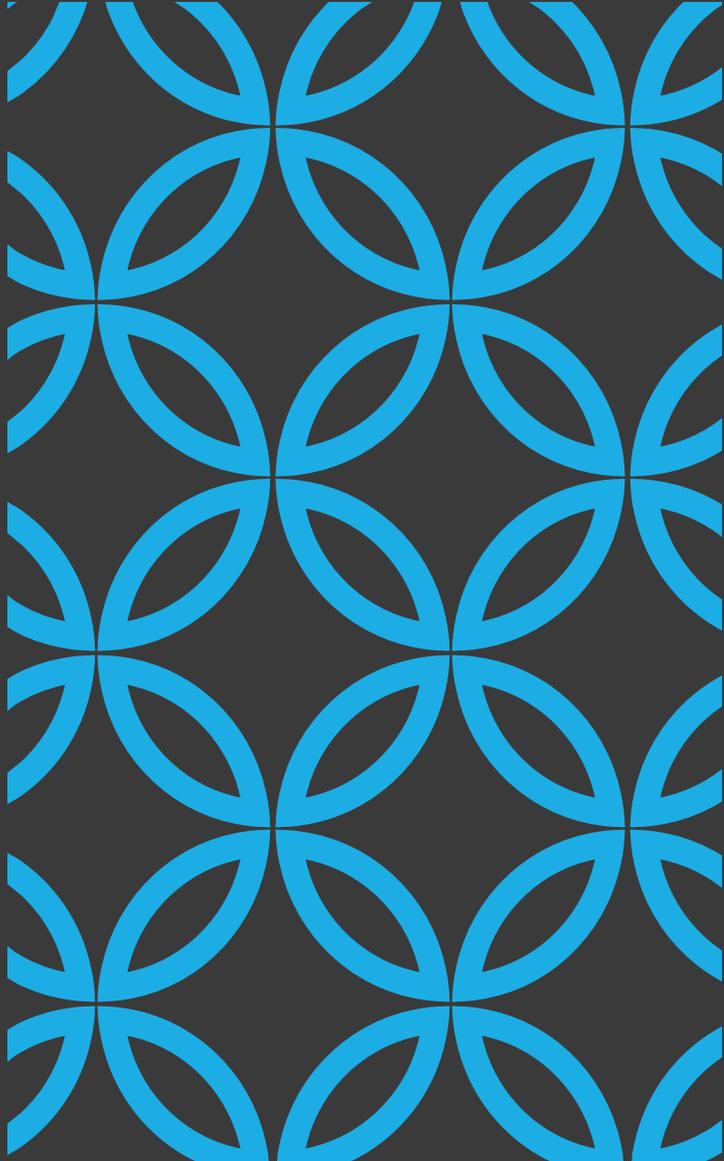
**Climate Crisis -  
Emergency**

# BRIGHTER TOMORROW

- ❑ It is likely unproductive trying to debate sincerely held beliefs even if the **facts** call them into question.
- ❑ Looking for someone or something to blame for these anxieties is probably fruitless.
- ❑ It has been proven scientifically that a genuine **smile** makes you appear more trustworthy and attractive. Causing less anxiety?



**BUT . . .**



# THE CASE FOR NOT SMILING

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# BY LAW — YOU CAN'T SMILE!

- ❖ Passport Photographs
- ❖ Driver's Licence
- ❖ Health Card
- ❖ Police 'Mug' Shots

*"A photograph is a most important document, and there is nothing more damning to go down to posterity than a silly, foolish smile caught and fixed forever."* Mark Twain



# HISTORICAL REASONS FOR NOT SMILING



“People had lousy teeth, if they had teeth at all, which militated against opening your mouth in social settings.”



‘Early photography took guidance from pre-existing customs in painting — an art form in which many found grins uncouth and inappropriate for portraits.’



The ‘cool’ and ‘moody’ pop-culture of the 1960s.

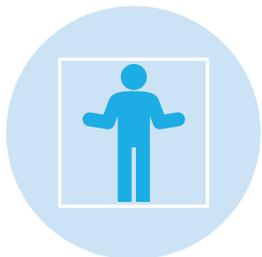
# MODERN REASONS FOR NOT SMILING



A fake or inauthentic smile can suggest duplicity.



Smiling at the wrong time, using certain facial micro-expressions, or smiling without your eyes could make you seem devious .



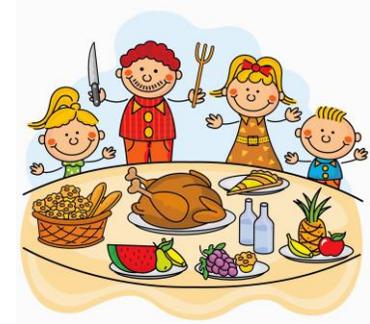
In spite of the prevailing belief among law enforcement and the public that micro-expressions reveal whether a person is being deceitful there is a lack of empirical evidence to support such contentions.



**'Microaggression** is a term used for commonplace verbal, behavioral or environmental slights, whether intentional or unintentional, that communicate hostile, derogatory, or negative attitudes toward those of different races, cultures, beliefs, or genders.'

# FROWNING BETTER THAN SMILING, PERHAPS

- ❑ Almost a thousand years ago, after the Norman Invasion, there followed a very detailed survey of England to determine its wealth, assets, and economic state down to the last blade of grass. An arduous and unpopular undertaking but it probably brought a **smile** to the face of at least one of the new inhabitants, the King, William the Conqueror, as he now knew what he had. The rest of the population were probably **frowning**.
- ❑ As engineers we know that negative feedback provides far better circuit stability than positive feedback.
- ❑ However, we now know that ‘negative’ frowning is good for muscle toning as it takes more effort than ‘positive’ smiling.
- ❑ So, is there any cause for smiling?



# Causes for Smiling?



Lachlan Cunningham/Getty Images



CANADA'S CHANTAL PETICLERC CELEBRATES VICTORY

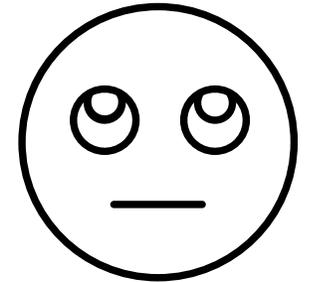
# HAVING A BAD DAY – SMILE OR ?

It takes 40 muscles to frown

It takes 28 to smile

BUT

***Only 4 to extend your arm  
and smack someone in the  
head***



# VIOLENCE TO SOLVE A DISAGREEMENT?

## NO, NO, BUT . . .

- **“While War [and conflict] is the worst imaginable way to create more peaceful societies, it is pretty much the only way humans have found.”\***
- For example, since its founding some 240+ years ago, the United States has been almost continuously involved in wars and conflicts.\*\*
- Humans have been entirely at peace for only 268 of the past 3,300 years or so, i.e., 8% of recorded history. However,
- “One of the results is that the average person is now **roughly 20 times less** likely to die violently than the average person in the stone age.”\*

\* Ian Morris, “War! What is it good for?”, ISBN 978-1-250-06250-5.

\*\*<https://sgp.fas.org/crs/natsec/RS21405.pdf>

# A SMILING CIVILIZATION – WHAT CAN WE LEARN?

- There was a flourishing Civilization some 3,000 to 5,000 years ago which had no conflicts.
- It had plumbing, air-conditioning, district sewer drains, ‘skyscraper’ type buildings, street grids, mass-production facilities, extensive trade routes, standardized weights and measures and, apparently, no class structure. It was the largest ancient civilization with a population of about 5,000,000.
- This was the Indus Valley or Harappan civilization located in the Punjab, parts of Pakistan and Afghanistan.
- ONE PROBLEM – WE CAN’T READ THEIR WRITING, YET.



**They had a lot to smile about, food, water, shelter, equality, no conflicts and all the ‘modern’ conveniences.**

If a civilization several millennia ago could achieve what we are still striving for, and likely smiling in the process, why can't we?



MAYBE WE NEED FURTHER TRAINING

# SELF-HELP SMILE TRAINING!

- ✓ Obviously, smiles are important, but if you don't know how . . .
- ✓ **Help is on the way** through books, pamphlets and websites.
- ✓ How to Smile Naturally Co-authored by Adam Kealing and Christopher M. Osborne, PhD (wow)
- ✓ How to Smile, <https://www.wikihow.com/Smile>
- ✓ A BEGINNER'S GUIDE TO SMILING IN PUBLIC,  
<https://joshsteimle.com/marketing/a-beginners-guide-to-smiling-in-public.html>
- ✓ How to Smile for Pictures: 8 Tips for Perfect Portraits,  
<https://petapixel.com/how-to-smile-for-pictures/>



**TRAINING CAN  
WORK!**

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**At least in the  
Windsor Faculty of  
Engineering**

**THE HARAPPANS  
HAD REASONS  
TO SMILE, WHAT  
ABOUT MODERN  
CIVILIZATIONS?**

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**Increasing Life Expectancy**

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**Increasing Food Production**

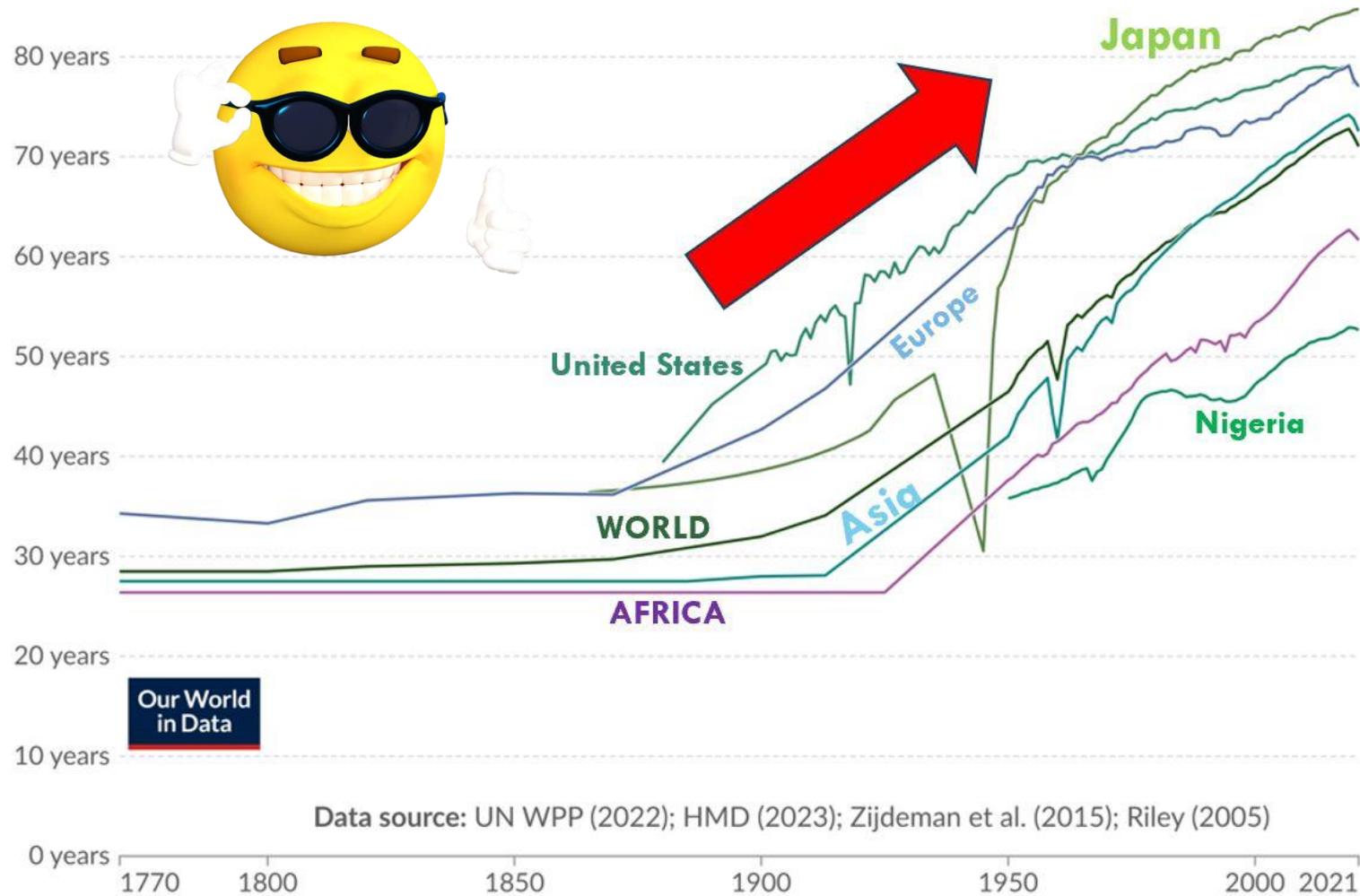
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**Decreasing Poverty**

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**More Educational  
Opportunities**

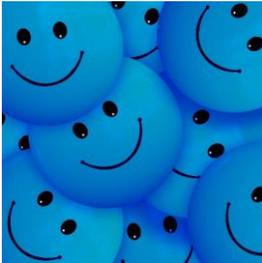
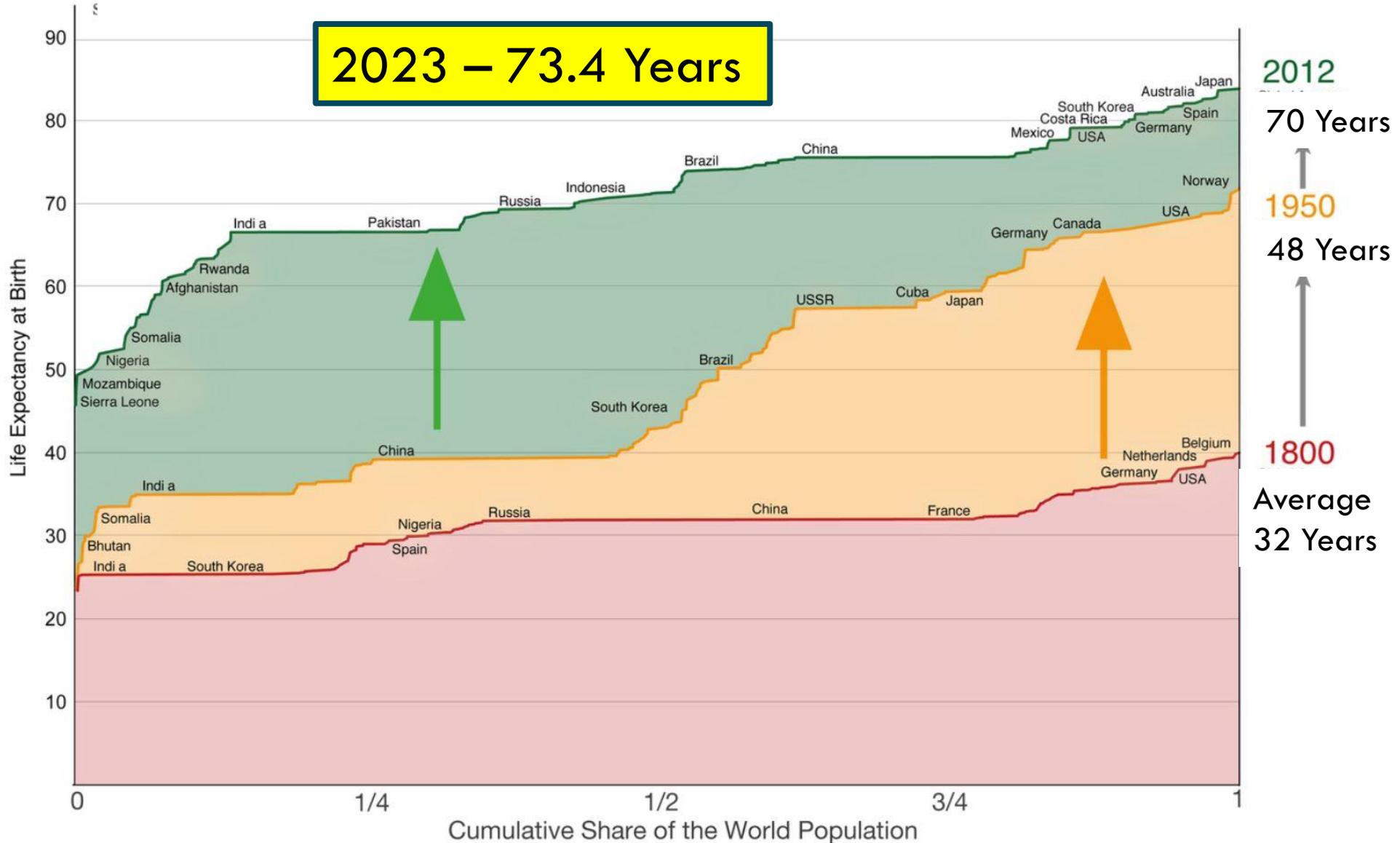
# LIFE EXPECTANCY



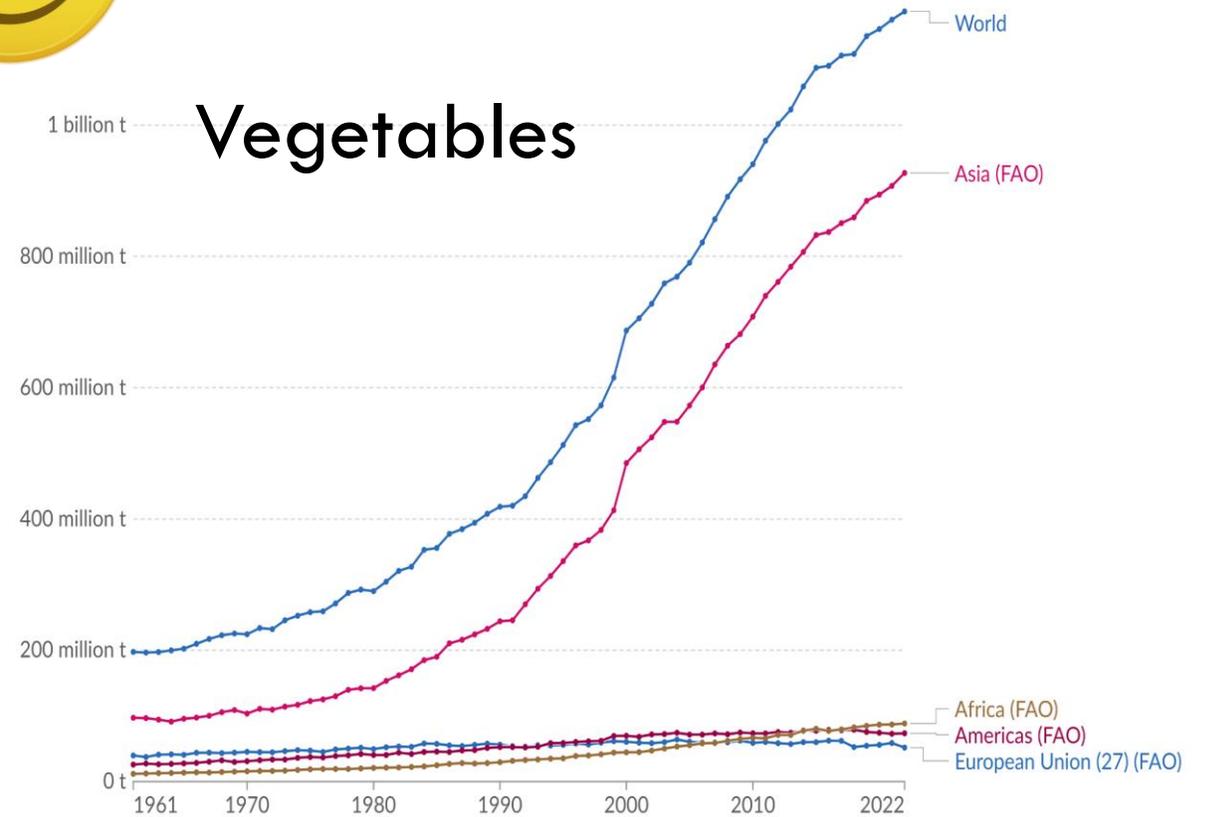
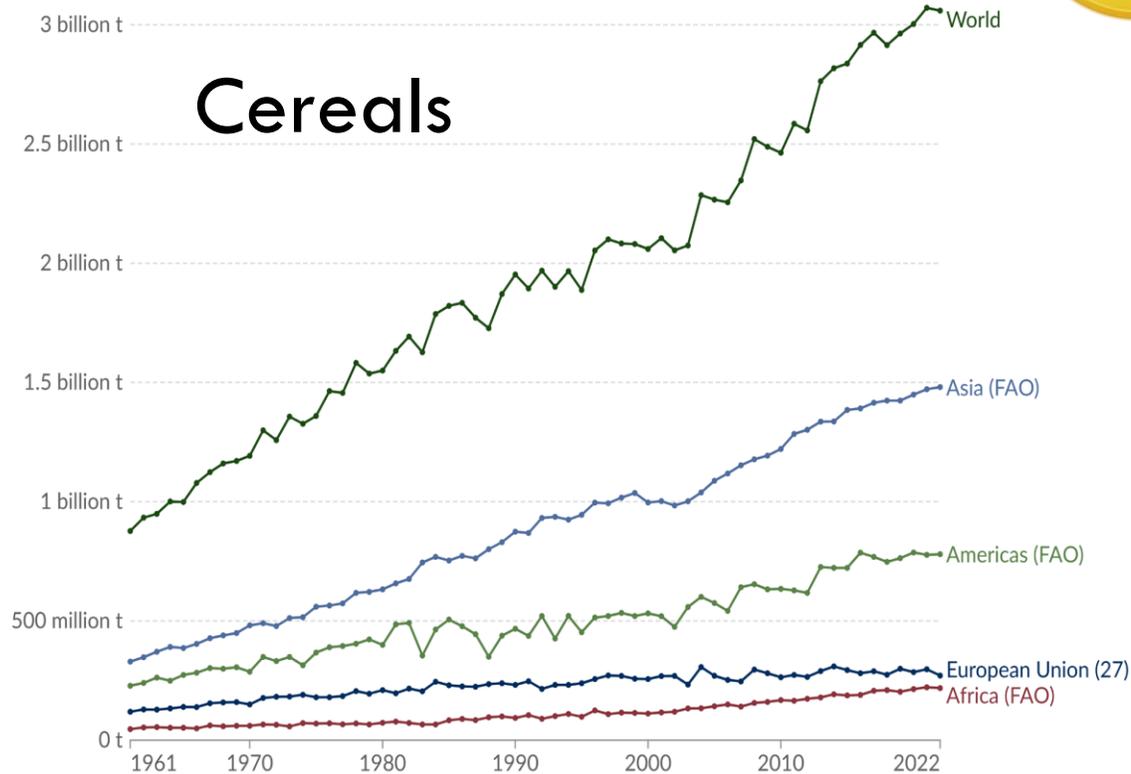
# Life Expectancy of the World Population in 1800, 1950 and 2012



**2023 – 73.4 Years**



# World Food Production 1961-2021



Data source: UN Food and Agriculture Organization (FAO)

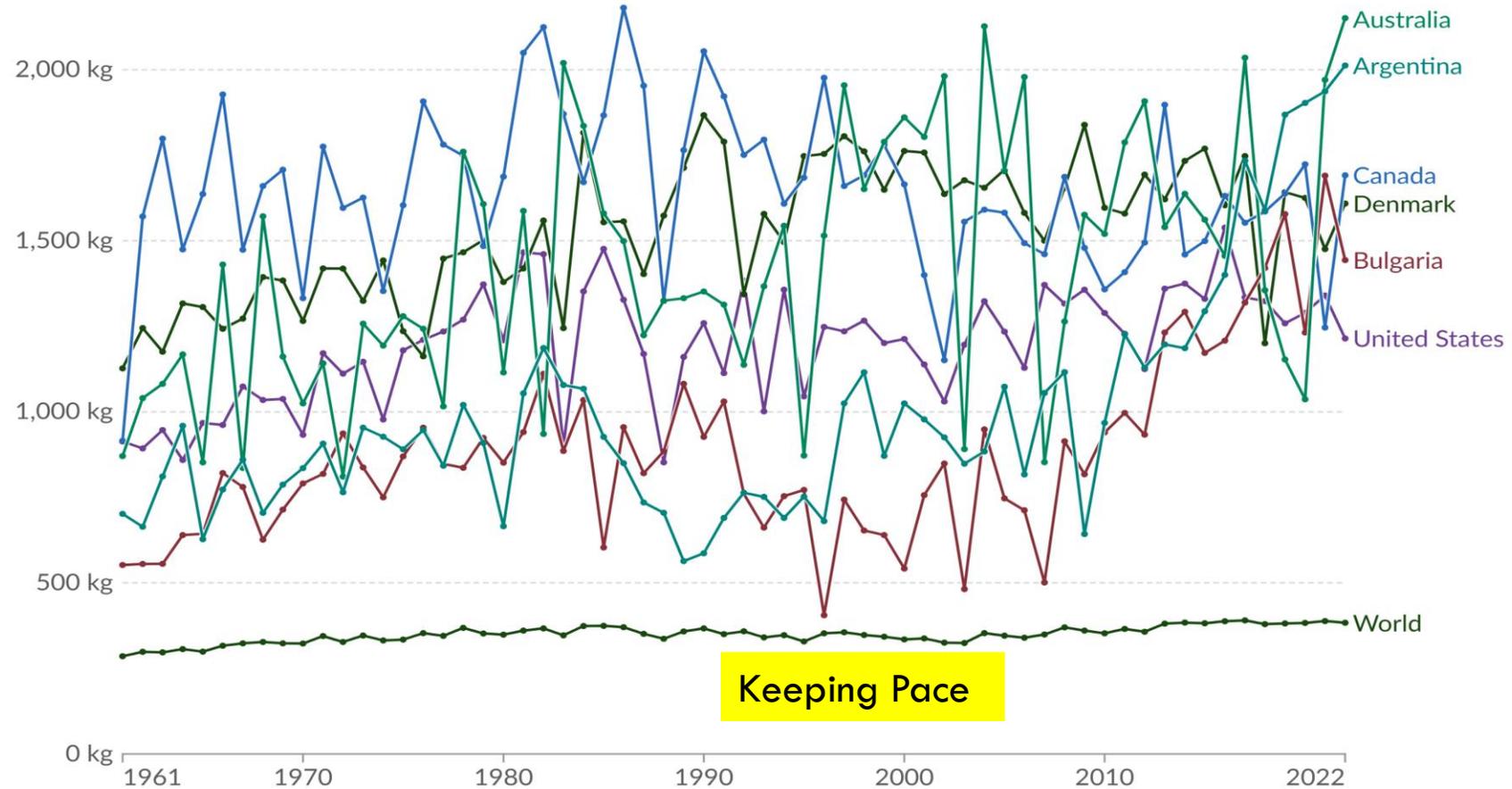
Note: Cereals include wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains.

Data source: UN Food and Agriculture Organization (FAO)

CC BY

**But there are more people**

# Per capita cereal production, 1961 to 2022

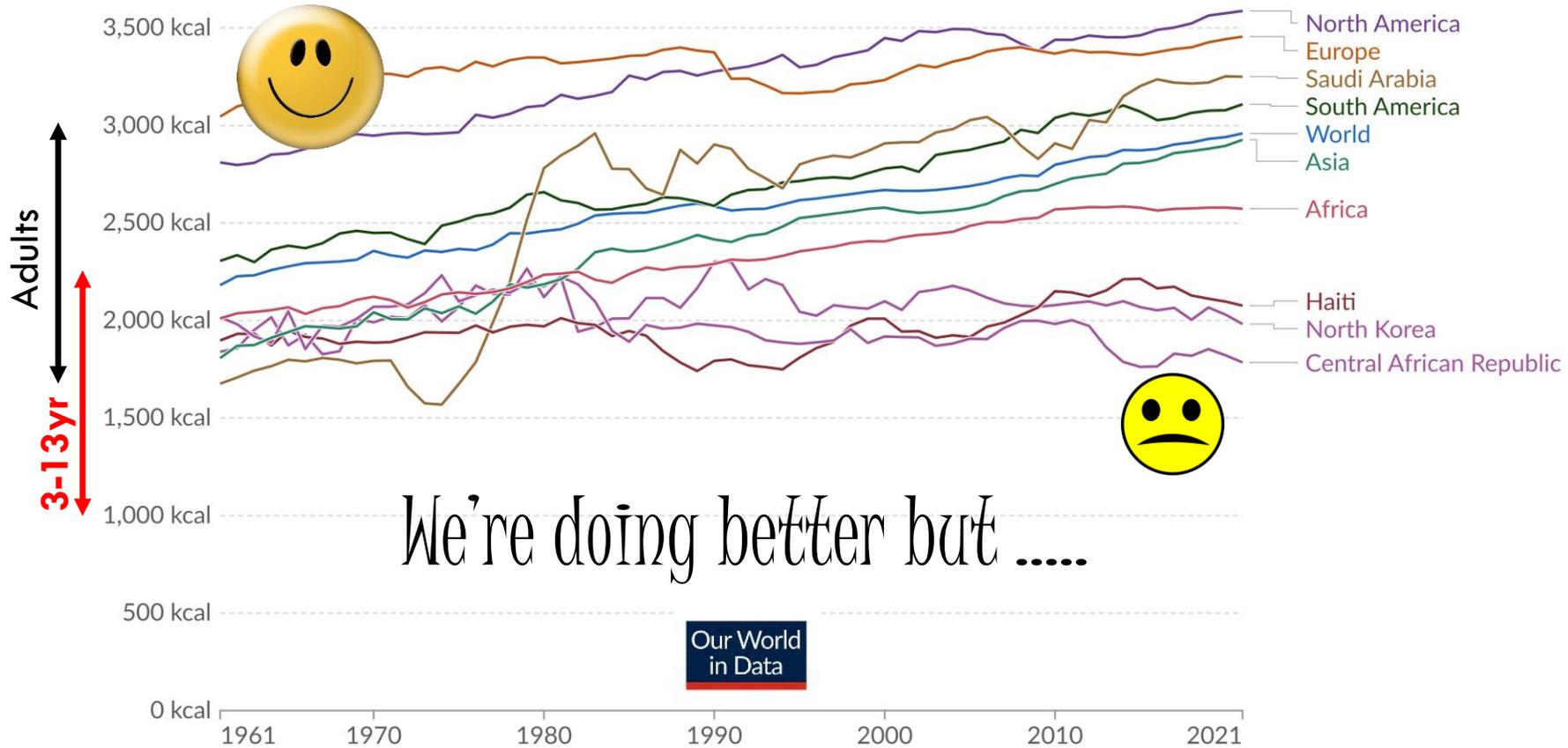


Data source: UN Food and Agriculture Organization (FAO)

Note: Cereals include wheat, rice, maize, barley, oats, rye, millet, sorghum, buckwheat, and mixed grains.

CC BY

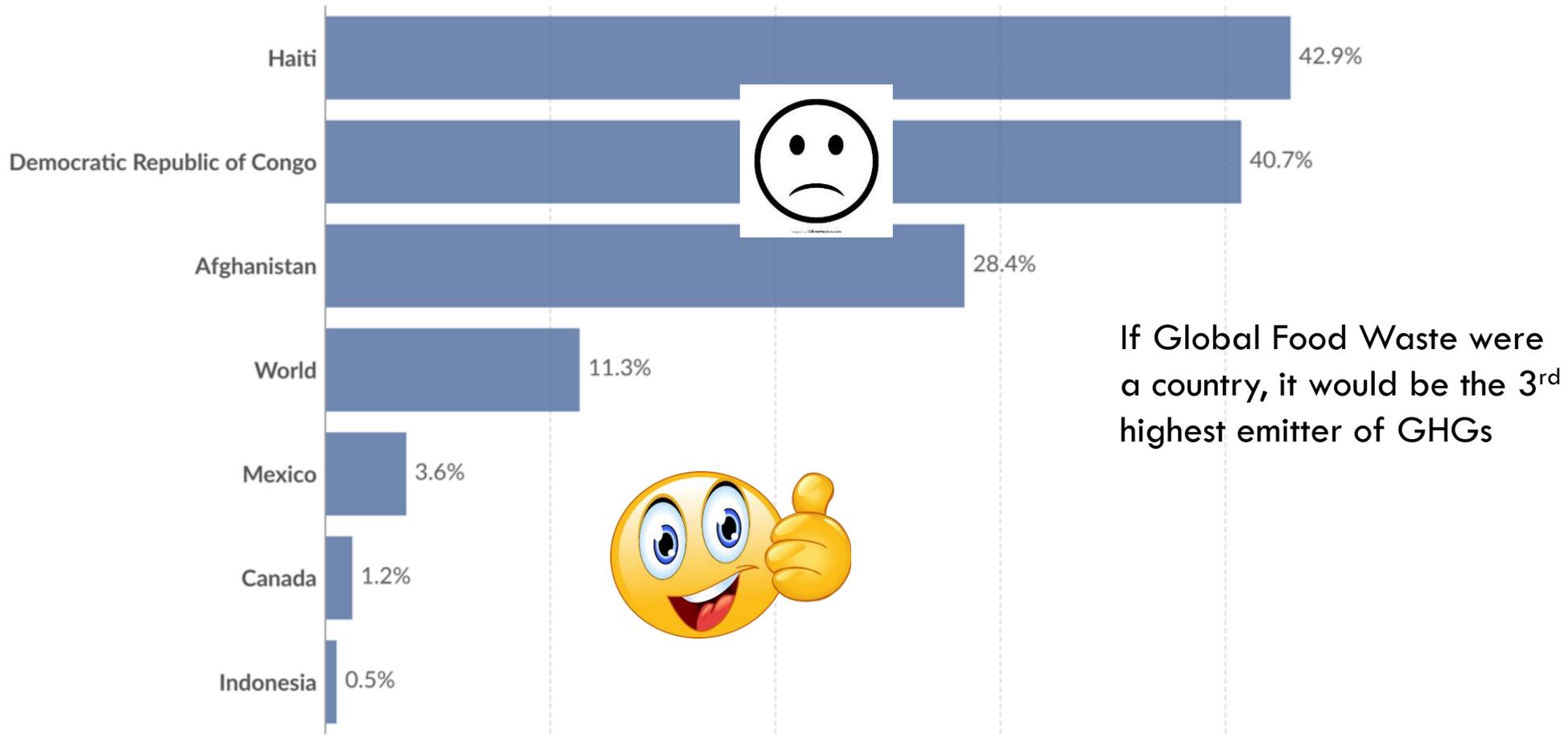
# Per capita kilocalorie supply from all foods per day, 1961 to 2021



We're doing better but .....

Our World  
in Data

Data source: UN Food and Agriculture Organization (FAO)



# SHARES OF POPULATIONS WITH SEVERE FOOD INSECURITY: CONFLICTS OR POVERTY?

# POVERTY — SOME THOUGHTS

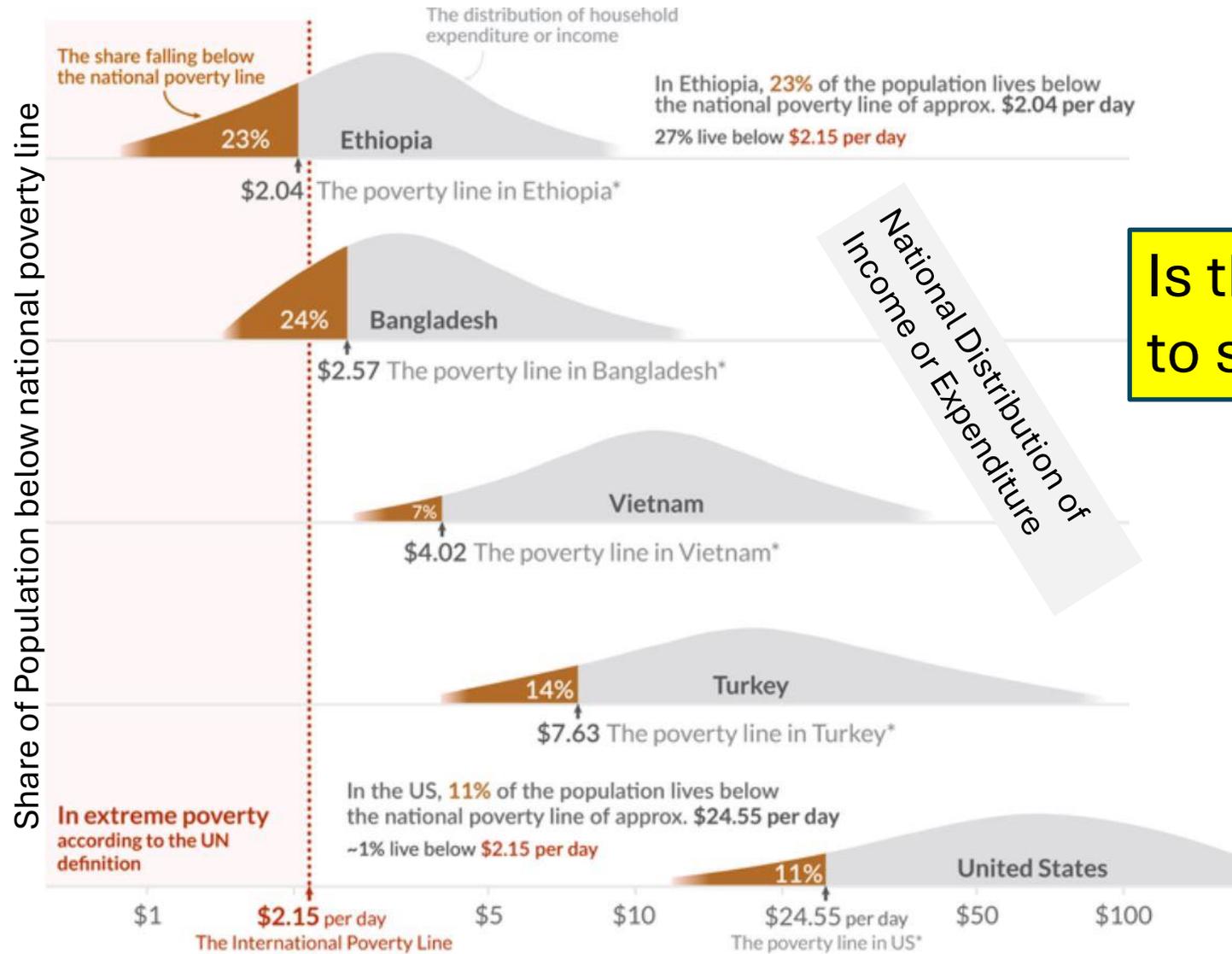
**“The true energy transition is from poverty to prosperity, without it, nothing else happens.”** *S Tinker*

**“Households facing energy poverty start at a disadvantage in the energy transition.”** *Mylene Riva*

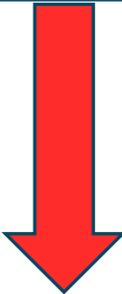
**“If we continue to misdiagnose the problem of poverty, we will continually fall short in solving it.”** *William J. Barber*

**“Income inequality in the world is so large that Americans who are poorer than 90% of other Americans are richer than more than 70% of the world population.”** *Max Roser*

Poverty is no Respector of Nations



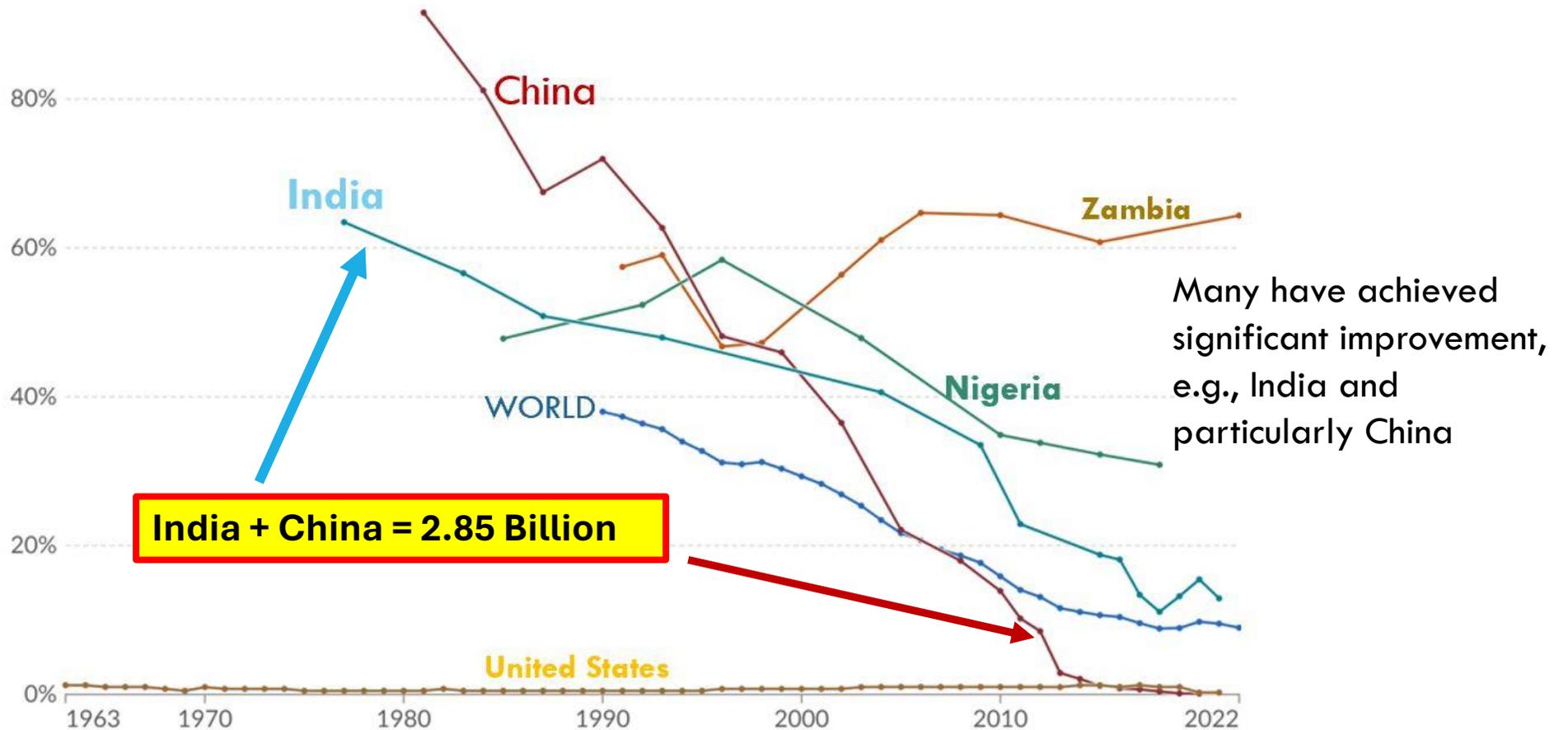
Is there anything to smile about?



YES

# Share of population living in extreme poverty, 1963 to 2022

Not Perfect but  
more smiles  
since the 1980s



**India + China = 2.85 Billion**

# MEASURING A SMILE – THE WORLD HAPPINESS INDEX (WHI)\*

- ❑ WHI is based on Surveys of quality-of-life factors: GDP per capita, Healthy Life Expectancy, Social support, Freedom to make life choices, Generosity, Corruption Perception;
- ❑ Conducted each year by Gallup®, the Oxford Wellbeing Research Centre, and the UN Sustainable Development Solutions Network;
- ❑ Started in 2012 following a 2011 UN resolution.\*\*
- ❑ In 2024, the top 10 countries remained much the same as pre-COVID; Finland is still top, with Denmark very close, and all five Nordic countries in the top 10. None of the most populous countries are in the top 20; Countries in the top 20 have populations under 30 million, except Canada (#15) and the United Kingdom (#20).
- ❑ Since 2006-10, **happiness among the young (aged 15-24) has fallen sharply in North America** – to a point where the young are less happy than the old. Conversely, in Sub-Saharan Africa life satisfaction has increased among the young.

\*Helliwell, J. F., Layard, R., Sachs, J. D., De Neve, J.-E., Aknin, L. B., & Wang, S. (Eds.). (2024). World Happiness Report 2024. University of Oxford: Wellbeing Research Centre.

\*\*Happiness : towards a holistic approach to development - UN A/RES/65/309

# Improved Opportunities to Smile With a 'Better' Education?

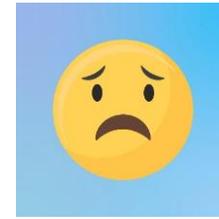


# Share of Population with Tertiary<sup>1</sup> Education projected to 2040



1. Tertiary education: Tertiary education (International Standard Classification of Education Level 5 to 8) expands upon secondary education by offering specialized learning activities in various fields. It targets advanced levels of complexity and specialization, encompassing both academic and advanced vocational or professional education.

# CANADIAN CONCERNS — A RECENT STUDY



- ✓ One of the reasons for Canada not keeping up with global education trends maybe eco-anxiety among ‘unhappy’ young Canadians (16-24).\*
- ✓ The young “*believe the formal education system should be doing more to support them.*”
- ✓ About three-quarters think that the future is frightening but also that climate change impacts their overall mental health.
- ✓ The majority reported feeling “*afraid, sad, anxious, and powerless.*”

Lindsay P. Galwaya & Ellen Field <https://doi.org/10.1016/j.joclim.2023.100204>

\*Climate emotions and anxiety among young people in Canada: A national survey and call to action

# JUST HAVE A THINK

- Do we explain that climate projections are based on computer models and **what-if** scenarios?
- We teach statistics but do we call attention to the pitfalls as much as we do to their usefulness?
- Do we make sure that the difference between causation and correlation is appreciated?
- Do students understand that engineering is based on raw empirical evidence, but many 'trusted' agencies depict 'modelled' climate data as 'empirical' – but forget to mention that?
- Are students encouraged, or denied, to contest and debate opinions and beliefs with rationalities and facts?
- Do university teachers strive to provide a balanced unbiased learning experience?

**Alarmism\*** is excessive alarm of a real or imagined situation which attempts to excite fears of great danger in a way that is overstated, overemphasized or unsubstantiated

# 'NULLIUS IN VERBA' WITH A DASH OF SCOTT TINKER



“The Royal Society's motto, 'Nullius in verba', is taken to mean **'take nobody's word for it.'** It is an expression of the determination of Fellows\* to withstand the domination of authority and to **verify all statements by an appeal to facts** determined by experiment.”\*\* {c.1662}

*“Let’s be completely factual and **factually complete**”* \*\*\* {c.2021}

\* <https://royalsociety.org/about-us/history/>

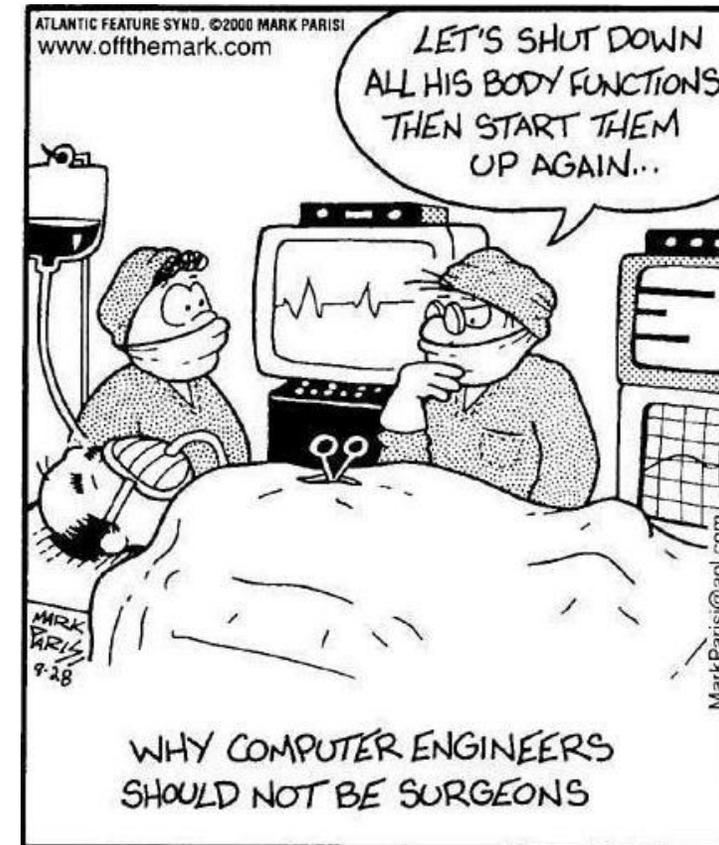
\*\* Fellows of the Royal Society, FRS

\*\*\* S. Tinker <https://energyworkforce.org/council-hosts-dr-scott-tinker-for-engaging-discussion-on-the-future-of-energy/>

# Approach's Old yet New



College for the Promoting of Physico-Mathematical, Experimental Learning' at Gresham College, London.



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phone: (216) 371-8600 / e-mail: ft@funnytimes.com

**Verify all statements by an appeal to facts**

# COMPLETELY FACTUAL AND **FACTUALLY COMPLETE?**

There were numerous media headlines about the **doubling** of electricity use in the U.S. transportation sector in 2022 but no mention of the fact the overall share had only increased from **0.1% to 0.2%**

<https://www.eia.gov/energyexplained/electricity/use-of-electricity.php>

# FITTING THE EVIDENCE TO THE THEORIES - 1

- ❖ Students are told that Global Warming and Climate Change are CAUSED by Carbon Dioxide Emissions and that if CO<sub>2</sub> emissions are doubled the average surface temperature will rise by up to 4.5<sup>0</sup>C. What they may not be told is that the range of increase is predicted to be between 1.5<sup>0</sup>C and 4.5<sup>0</sup>C compared to 'pre-industrial' temperatures.
- ❖ 'Pre-Industrial' is a very flexible waypoint. Many take it as the year 1880 – almost 30 years after the 'Great Exhibition of the Works of Industry of All Nations' held in London, England and 80 years after the start of the frequent French National Industrial Expositions. Thus, as Historians identify 1760 as the beginning of the modern Industrial revolution, **why pick 1880?** Could it be that the average global temperature in 1880 was the lowest recorded between 1875 and 2023, except for 1932? **What if 1879 had been chosen when the average temperature was 2.3<sup>0</sup>C higher than 1880, or 1881 when it was 2.1<sup>0</sup>C higher?**

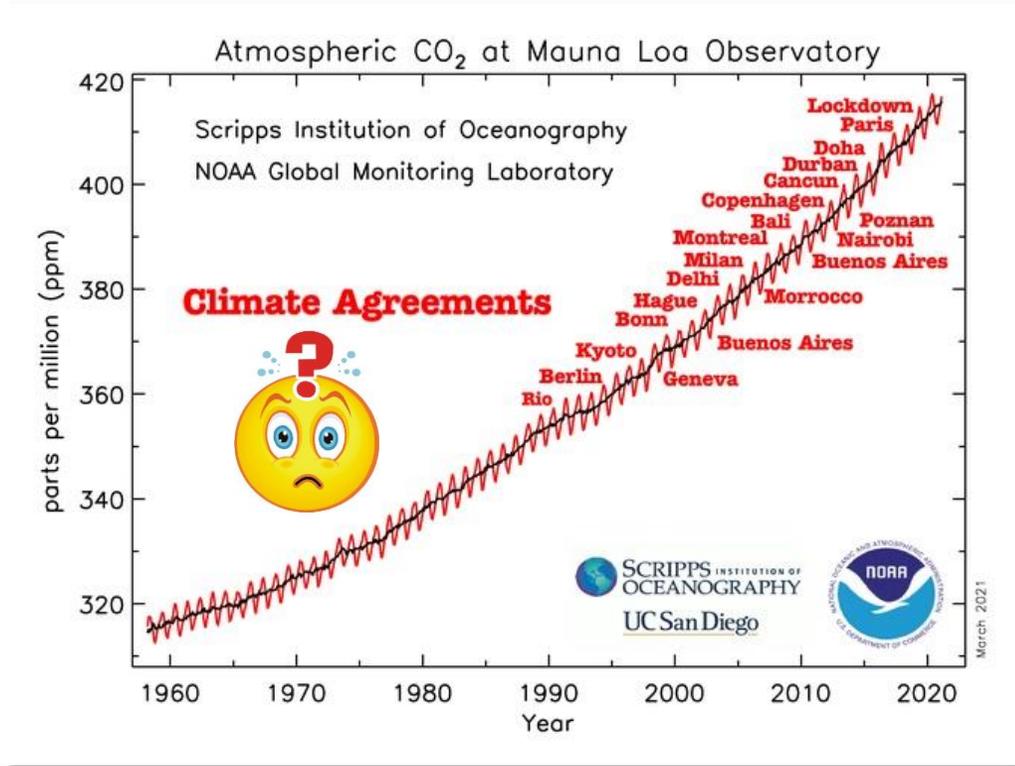
What a difference a year makes.

# FITTING THE EVIDENCE TO THE THEORIES - 2

- ❖ Modern temperature data presentations use ‘**anomalies,**’ rather than actual temperatures, determined by comparisons to a reference time interval, e.g., 1850-1900, 1961-1990, 1991-2020, which differ according to the involved agencies and researchers. **Why anomalies at all?**
- ❖ According to NOAA: *“Absolute estimates of global average surface temperature are difficult to compile for several reasons. Some regions have few temperature measurement stations .... Anomalies more accurately describe climate variability over larger areas.”*

Think of the implications of this statement!

# 'AN APPEAL TO FACTS'



- The average global temperature between 2015 and 2023 has decreased from 13.5°C to 13.1°C, but CO<sub>2</sub> keeps increasing with international agreements, treaties and commitments having little noticeable effect.
- Are other factors involved?
- Can we numerically calculate the rise in temperature with the increase in CO<sub>2</sub> concentrations in the atmosphere?



# EUNICE, JOHN AND SVANTE

- ❖ So, do we have a formula, and can we calculate?
- ❖ It appears that the first to try was the Nobel Prize Winner, Svante August **Arrhenius**, a Swedish Physical Chemist, in an often-misquoted but important paper on the 'Greenhouse' effect in which he estimated the role played by CO<sub>2</sub>. *Albeit some four decades\* before, first the American, Eunice Foote, and then the Anglo-Irish polymath, John Tyndall, had experimentally demonstrated that increases in CO<sub>2</sub> and other gases, such as Water Vapour and Ozone, would accumulate surface heat and make for a warmer planet.* But, today, it is Arrhenius that is the most cited perhaps because he sought to calculate the effect numerically.
- ❖ He assumed that the Earth, in radiation terms, was a 'black-body', which it isn't, and he determined that if the CO<sub>2</sub> emissions were **halved** that the surface temperature would decrease by **4-5°C** but if they were **increased by half** that the temperature would rise by **5-6°C**. Since Arrhenius's 1896 paper, annual CO<sub>2</sub> emissions have increased over **25-fold** but temperatures by a little over **2°C**. So, while Arrhenius confirmed the earlier work of Foote and Tyndall, his predictions weren't even close.

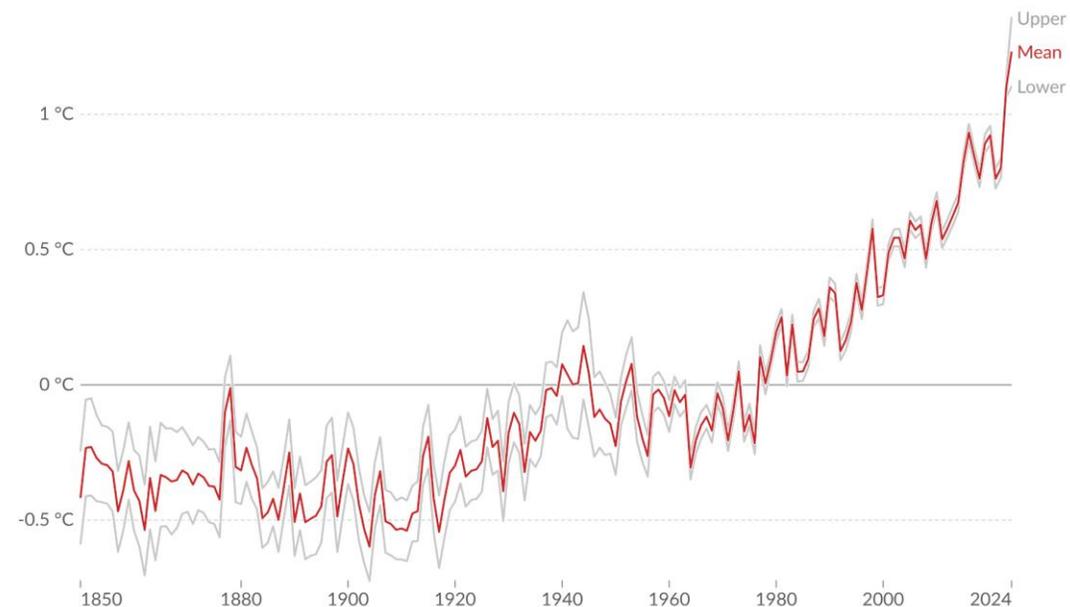
\*<https://www.ucl.ac.uk/news/2020/jul/opinion-john-tyndall-forgotten-co-discoverer-climate-science>

<https://earthobservatory.nasa.gov/features/Tyndall>

# CORRELATION? STUDENT ANXIETY OR SMILES?

## Average temperature anomaly, Global

Global average land-sea temperature anomaly relative to the 1961-1990 average temperature.



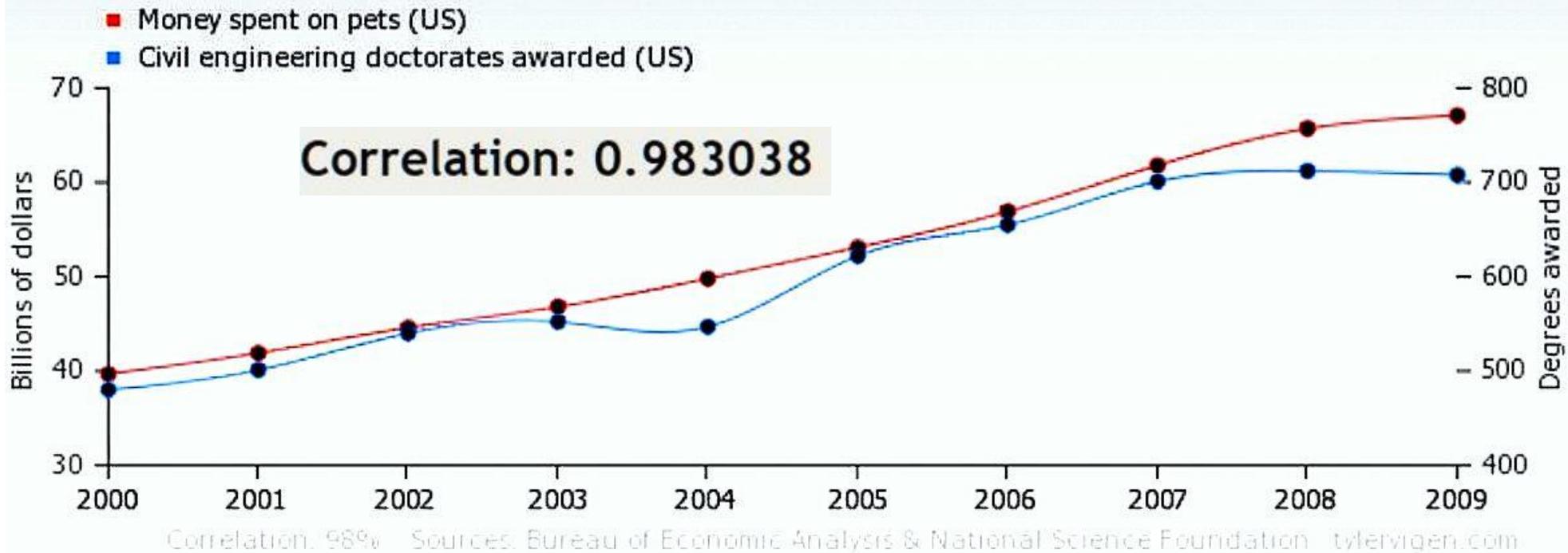
Data source: Met Office Hadley Centre (2024)

OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

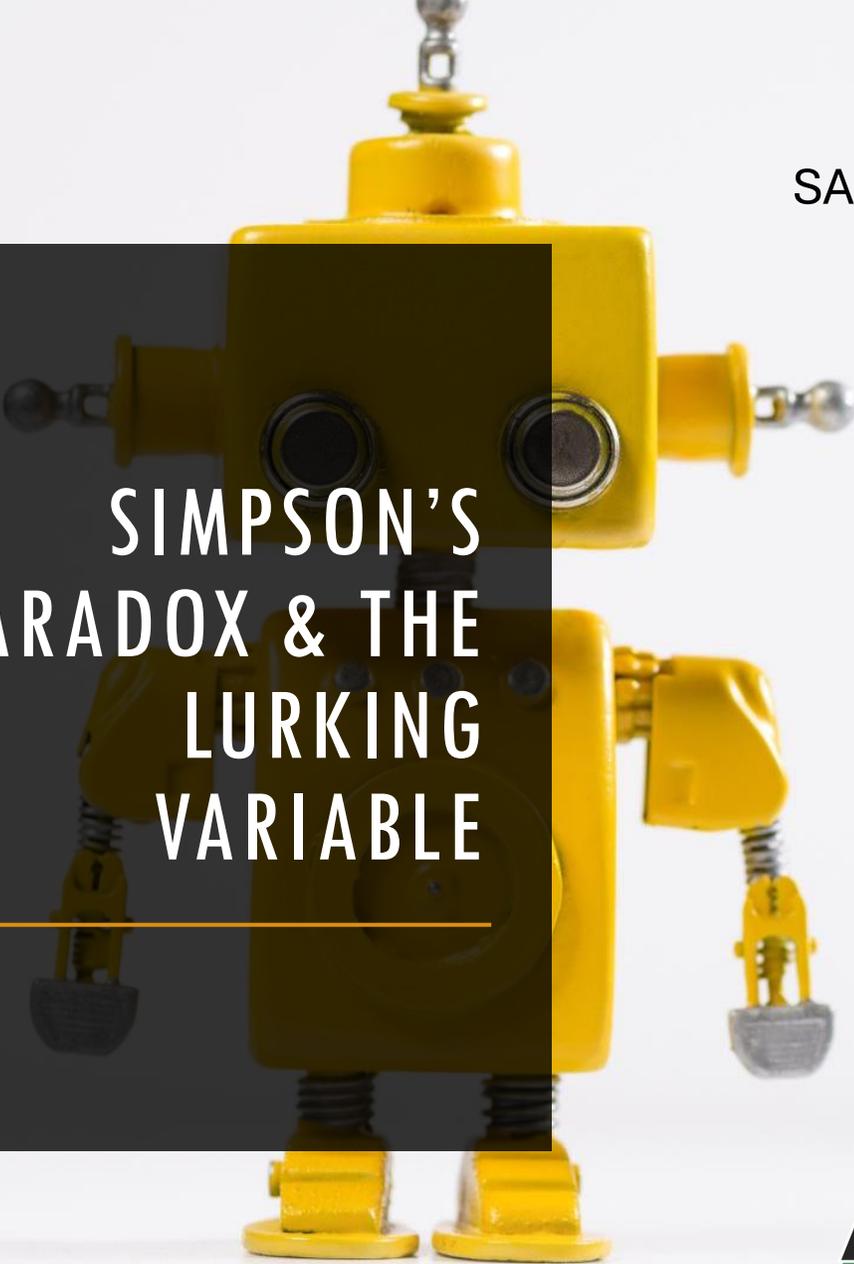
Note: The gray lines represent the upper and lower bounds of the 95% confidence intervals.

- If direct calculation is so difficult, even with curve-fitting adjustments (fudge factors?) can we illustrate the CO<sub>2</sub>-temperature relationship by correlating anomalies?
- Well, yes, as shown.
- We can even calculate a correlation coefficient such as the Pearson 'r' correlation to indicate the 'quality of the correlation'.
- However, the application of such correlation techniques is not straightforward and requires the underlying assumptions of the method to be fully satisfied **otherwise**.....

# Money spent on pets (US) correlates with Civil engineering doctorates awarded (US)



Spurious Correlations  
by Tyler Vigen ISBN: 0316339431



## SIMPSON'S PARADOX & THE LURKING VARIABLE

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### SAME DATA – DIFFERENT CONCLUSIONS WHY?

*"A lurking variable is a variable that is not included as an explanatory or response variable in the analysis but can affect the interpretation of relationships between variables. A lurking variable can falsely identify a strong relationship between variables, or it can hide the true relationship."*

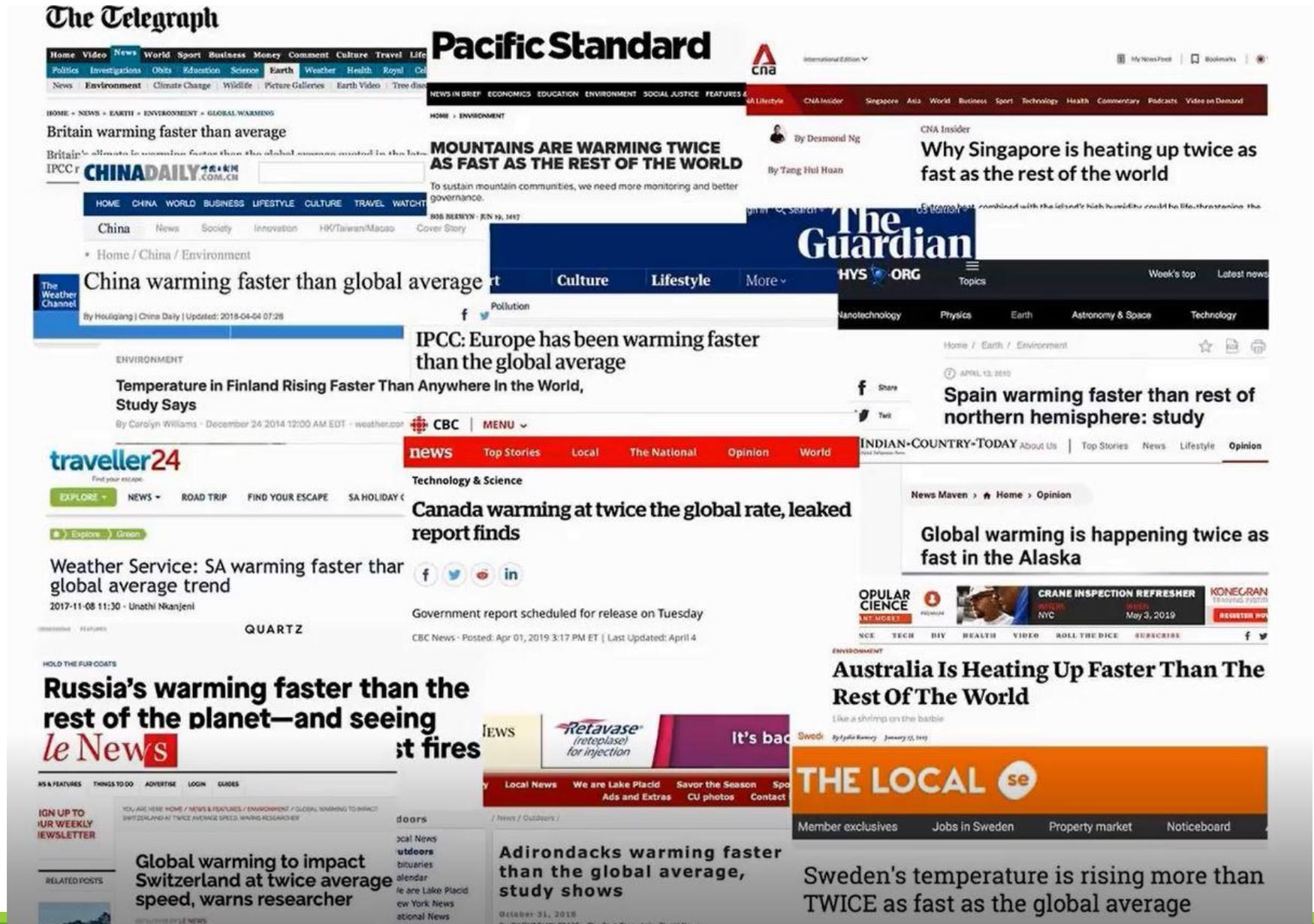
- Magnify the real effect.
- Weaken the appearance of the relationship.
- Change the sign of a correlation.
- Mask an effect that actually exists.
- Create phantom correlations where none exist!

# Are Students Aware?

# CONCERNS

But can *everywhere* be warming faster than the global average?

[https://www.youtube.com/watch?v=D\\_kVoQYRTDA](https://www.youtube.com/watch?v=D_kVoQYRTDA)



## How can *everywhere* be warming faster than the global average?

- Are the claims accurate or misleading?
- The global average is based on ocean surface temperatures and land-based temperatures. It takes far longer for ocean temperature changes to happen compared with land surface temperatures changes.
- As oceans cover ~ 70% of the Earth's surface then the overall global surface value will be heavily weighted to the ocean temperature.
- Thus, as land warms faster than the ocean, if ocean + land temperatures are used to calculate the global average then it is accurate, albeit meaningless, to make the claim that lands are warming faster, BUT it *is* a headline grabber.
- So, are such announcements meant to inform the public or to frighten them?

**What do you think?**



# AFTER 2<sup>0</sup>C THE END OF THE WORLD IS NEAR?

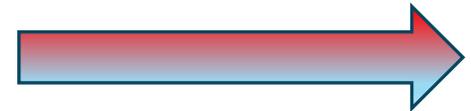
Period	Increase in Average Temperature °C	Did the World End? 
1880-1900	3	No
1880-2023	3.9	Not So Far
1882-1901	4.3	No
1912-1921	3.5	No
1932-1940	5.6	No
1942-1953	3.5	No
1964-1974	4.6	No
1975-1982	2.7	No
1985-1994	2.8	No
2002-2012	4.6	No
2014-2023	0	Umh 

Inform  
Anxious  
Students?

BUT from 1875 to 2023, the average Temperature has increased from a balmy 11.4<sup>0</sup>C to a frightening 13.1<sup>0</sup>C

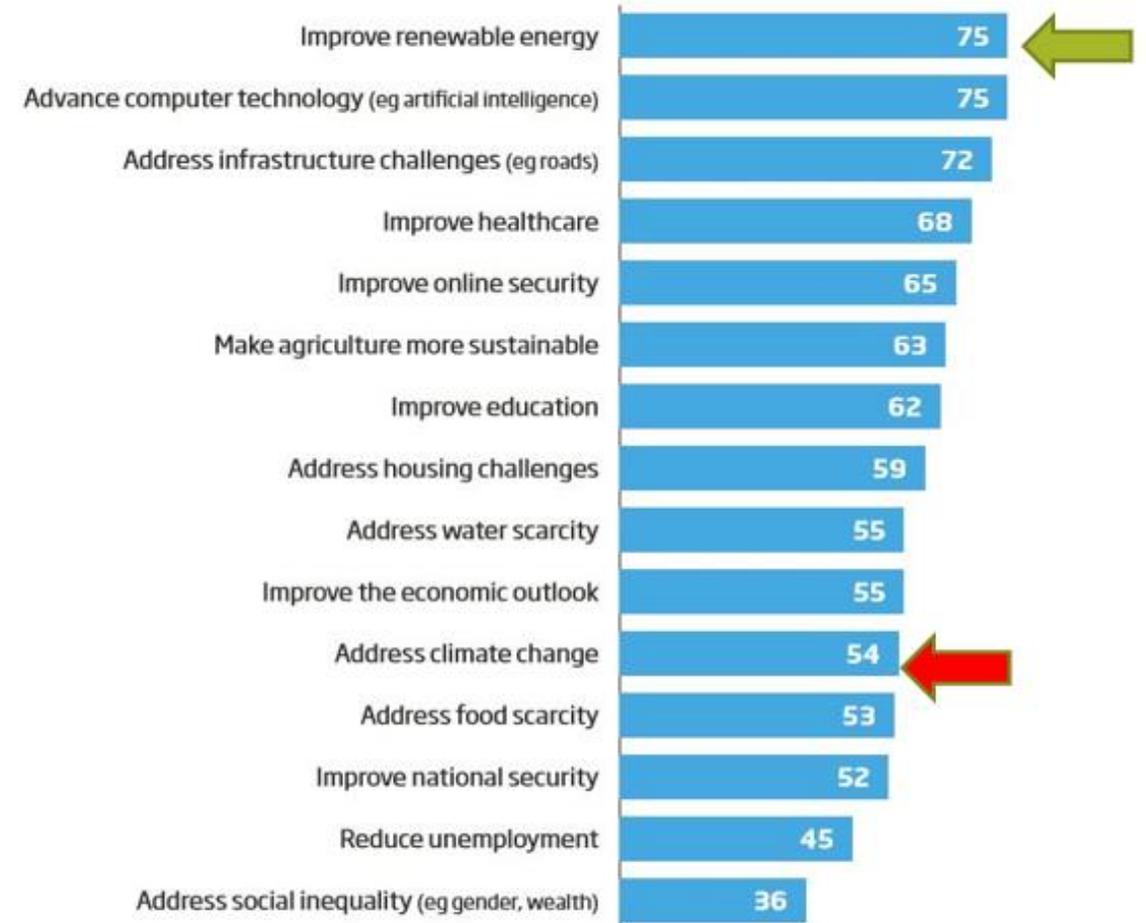
Don't live in the Maldives, the temperature is rarely below 25<sup>0</sup>C

# How Can Engineers Help Society and Maybe Reduce Eco-Anxiety?

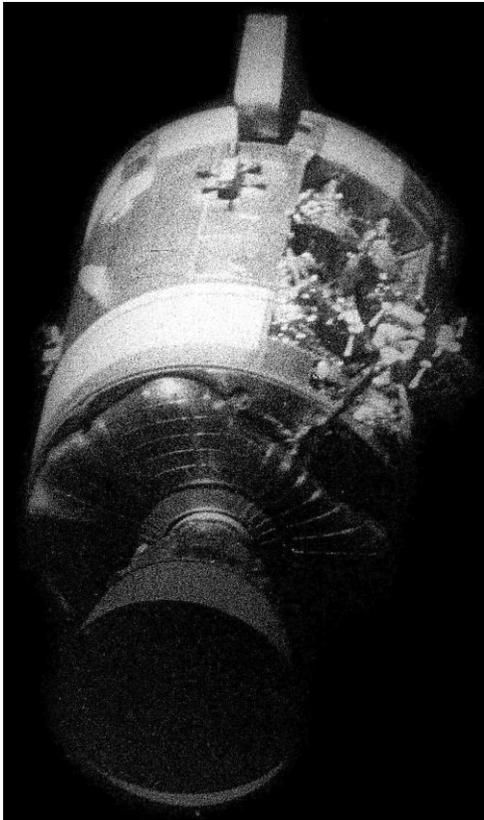


# WHAT GLOBAL SOCIETY EXPECTS OF ENGINEERING

THE ROLE OF ENGINEERING IN THE NEXT 20 YEARS		
<b>1st</b>	To <b>solve the world's problems</b>	57%
<b>2nd</b>	To <b>inspire</b> new innovations	55%
<b>3rd</b>	To <b>improve</b> the quality of people's lives	55%
<b>4th</b>	To drive progress in society	54%
<b>5th</b>	To <b>solve my country's problems</b>	54%
<b>6th</b>	To help the <b>economy grow</b>	53%
<b>7th</b>	To provide new job opportunities to my community	49%
<b>8th</b>	To raise public awareness of challenges and progress	46%
<b>9th</b>	To <b>inspire today's youth</b>	45%
<b>10th</b>	To address social issues in society	41%
<b>11th</b>	To inform public policy	40%



# And If We Fail . . .



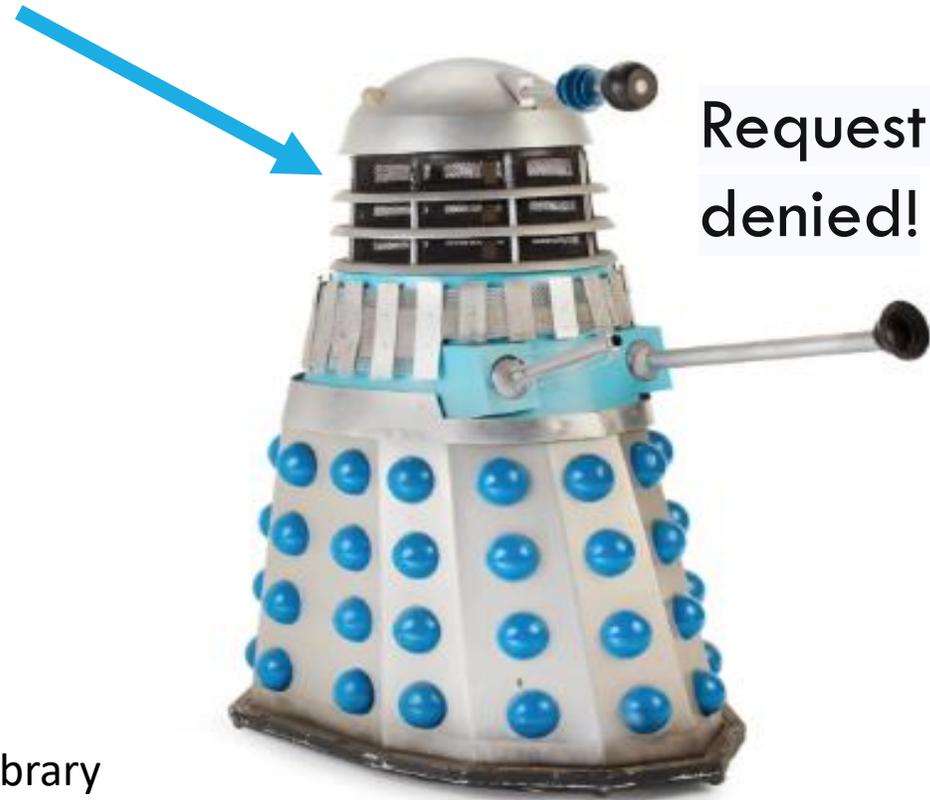
“Ah, Houston, we've had a problem”.

“Failure is not an option.”

— **Gene Kranz**  
Flight Director of Apollo 13

Kipp Teague: Apollo 13 Image Library

<https://commons.wikimedia.org/w/index.php?curid=139110321>



# A PRAYER FOR THOSE STILL STRESSED

Grant me the serenity to accept the things I cannot change

The courage to change the things I can

And the wisdom to hide those who  
don't know the difference.



# THANK YOU



“Nothing diminishes anxiety faster than action.”

Walter Anderson

“Idealism is fine, but as it approaches reality the cost becomes prohibitive”.

William F Buckley, Jr.

“Relax. No one else knows what they’re doing either”.

Ricky Gervais

# ABSTRACT

According to some media reports, from a high-income country, half of the teenagers there believe the world may end in their lifetime, meaning by the end of the century. One of the reasons for this phenomenon, suggested by psychologists, is 'Eco-Anxiety', a fear of climate change. This fear is also said to be causing the plummeting birth rates in rich countries. Yet don't these generations know that their inheritances in terms of increases in living standards, access to technologies, air and water quality, medical care, communications, and information, could only be dreamt of by their ancestors? Apparently not! Do people in less well-off countries have the same fears? If so, why is immigration at record heights with the equivalent of the total population of a country the size of Pakistan moving to the favoured destinations of Australia, New Zealand, North America, and Europe in search of a better life, especially for their young families? Looking for someone or something to blame for this anxiety is likely unproductive as is trying to dispute sincerely held beliefs even if the facts call them into question. Maybe by presenting examples of the many human achievements, especially of the past couple of centuries, more people will stop frowning and learn how to smile, but maybe that is a *forlorn hope* or "Qui audet adipiscitur."