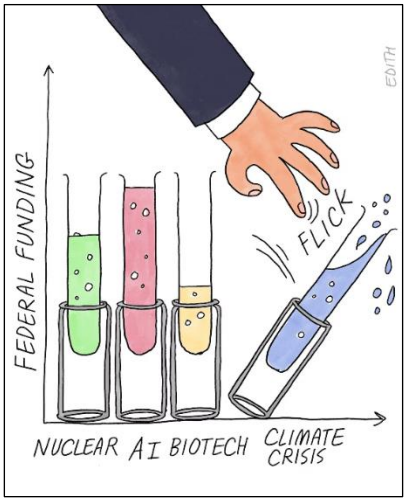
This is the first of two files on Science – A second one will focus on new technologies and space exploration. Gene-editing advances will be studied in the file on Health.

PART ONE – Science and (geo)politics



Edith Pritchett, "Federal funding for scientific research", *The Washington Post*, 5 July 2025

Leaders | Exit, pursued by an elephant

Text 1 - **MAGA's assault on science is an act of grievous self-harm**

America will pay the price most of all

The Economist, May 24th 2025 (+ AUDIO version of the text on Cahier de Prépa)

The attacks have been fast and furious. In a matter of months the Trump administration has cancelled thousands of **research grants** and withheld billions of dollars from **scientists**. Projects at Harvard and Columbia, among the world's best universities, have been abruptly cut off. A proposed budget measure would slash as much as 50% from America's main **research-funding bodies**. Because America's **technological and scientific prowess** is world-beating, the country has long been a magnet for talent. Now some of the world's brightest minds are anxiously looking for the exit.

Why is the administration undermining its own scientific establishment? On May 19th Michael Kratsios, a scientific adviser to President Donald Trump, laid out the logic. Science needs shaking up, he said, because it has become inefficient and sclerotic, and its practitioners have been captured by groupthink, especially on diversity, equity and inclusion (**DEI****). You might find that reasonable enough. Look closely at what is happening, though, and the picture is alarming. The assault on science is unfocused and disingenuous. Far from unshackling scientific endeavour, the administration is doing it grievous damage. The consequences will be bad for the world, but America will pay the biggest price of all.

One problem is that actions are less targeted than the administration claims, as our special Science section this week explains. As Mr Trump's officials seek to stamp out DEI, punish universities for incidents of antisemitism and cut overall government spending, science has become collateral damage. A suspicion that scientists are pushing "woke" thinking has led **grant-makers** to become allergic to words like "trans" and "equity". As a consequence, it is not only inclusive education schemes that are being culled, but an array of orthodox science. Funding has been nixed for studies that seek, say, to assess cancer risk factors by race, or the prevalence of sexually transmitted diseases by sex.

The attack on elite universities takes this to an illogical extreme. Because the White House sees colleges as bastions of wokeness and antisemitism, it has withheld **funding** for **research** at Harvard and Columbia, no matter in which subject. Overnight, projects on everything from Alzheimer's disease to quantum physics have been stopped. When scientists warn of the harm this does, they risk being seen as part of a scornful anti-MAGA elite that has been protected for too long.

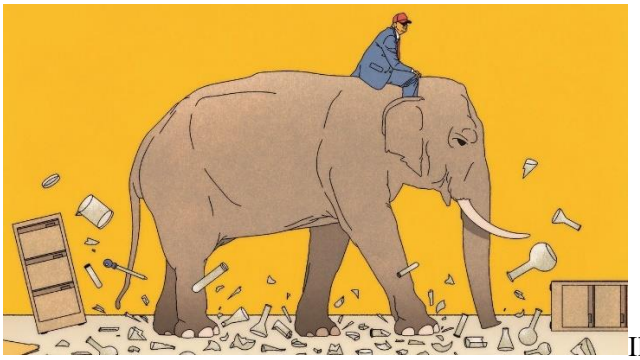


Illustration: Alvaro Bernis

More fundamentally, the claim that Mr Trump will stop groupthink is disingenuous. MAGA reserves a special hatred for public-health and climate researchers, whom it regards as finger-wagging worrywarts determined to suppress Americans' liberties—as they did in lockdowns and school closures during covid-19. The consequence is that spending on vaccine and climate research will be gutted most viciously of all. With the stroke of a pen, officials are trying to impose new rules that tell scientists what areas of inquiry they may pursue and what is off-limits—a shocking step backwards for a republic founded on the freethinking values of **the Enlightenment****. (…) (488 words)

Text 2 - **RIP American innovation**

Bina Venkataraman, ***The Washington Post***, 12 May 2025 (abridged)

It's fun to be from the most inventive country on Earth. Even when Team U.S.A. fails to medal in table tennis at the Olympics, even when the U.S. president starts a war based on fabricated weapons of mass destruction or raises tariffs on champagne, an American traveling abroad can still take pride in being from the nation that spawned the internet and GPS, and has the most **Nobel laureates** curing deadly diseases, making intelligent machines and shedding light on the dark secrets of the universe.

But, alas, even this trustworthy badge of honor is fraying — and might fall apart.

Whether they are geeks in garages or **eggheads** in **university labs**, American entrepreneurs have built their ideas and fortunes on the back of basic research supported by taxpayers, who then reap the rewards. It's not an accident of geography or artifact of culture that the United States has bred some of the best inventors of the 20th and 21st century. The hidden engine of the country's illustrious track record has been the **grants** given to academic researchers by federal agencies that the U.S. **DOGE**** Service has been decimating and that President Donald Trump proposes to shrink catastrophically in the next budget.

Lithium-ion batteries that power your smartphone and computer, weather forecasts that help you figure out what to wear, wings of airplanes that take you on vacation and all the messaging you do online can be traced to the symbiosis between research funded by government and private industry, the scaffolding for **mind-melds of scholars and entrepreneurs**. Moderna's multibillion-dollar coronavirus vaccine that saved millions of lives owes its origins to decades of research on mRNA, viruses and vaccines that was funded by the National Institutes of Health and the Defense Advanced Research Projects Agency (DARPA). Google arose from a National Science Foundation digital libraries grant that supported then-Stanford University **graduate student** Larry Page. We have QR codes, barcodes and MRIs today because of basic research investments in mathematics and physics.

That U.S. businesses have led the recent revolution in artificial intelligence is owed to the decades of research supported by the U.S. government in computing, neuroscience, autonomous systems, biology and beyond that far precedes those companies' investments. Virtually the entire U.S. biotech industry — which brought us treatments for diabetes, breast cancer and HIV — has its roots in publicly funded research. Even a small boost to **NIH**** funding has been shown to increase overall **patents** for biotech and pharmaceutical companies.

Don't count on the free market to fix what Trump and DOGE will destroy. Even though U.S. businesses have, over the past two decades, significantly increased the amount they invest in research, their projects tend to have a narrower focus and shorter time horizon than what government funds. That's fine for building a slightly better gadget, but not the same as funding a wide range of open-ended questions that can, over time, yield big **breakthroughs**.

Giving out grants for what might look frivolous or wasteful on the surface is a feature, not a bug, of publicly funded research. Consider that Agriculture Department and NIH grants to study chemicals in wild yams led to cortisone and medical steroids becoming widely affordable. Or that knowing more about the fruit fly has aided **discoveries** related to human aging, Parkinson's disease and cancer. […] (545 words)

Text 3 - **Europe Is Breaking Its Reliance on American Science**

U.S. News and World Report, By Reuters, Aug. 1, 2025

BRUSSELS/WASHINGTON/BERLIN, August 1 (Reuters) -European governments are taking steps to break their dependence on critical scientific data the United States historically made freely available to the world, and are ramping up their own data collection systems to monitor climate change and weather extremes, according to Reuters interviews.

The effort - which has not been previously reported - marks the most concrete response from the European Union and other European governments so far to the U.S. government's retreat from scientific research under President Donald Trump's administration.

Since his return to the White House, Trump has initiated sweeping budget cuts to the National Oceanic Atmospheric Administration, the National Institutes of Health, the Environmental Protection Agency, the Centers for Disease Control and other agencies, dismantling programs conducting climate, weather, geospatial and health research, and taking some public databases offline.

As those cuts take effect, European officials have expressed increasing alarm that - without continued access to U.S.-supported weather and climate data - governments and businesses will face challenges in planning for extreme weather events and long-term infrastructure investment, according to Reuters interviews. In March, more than a dozen European countries urged the EU Commission to move fast to recruit American scientists who lose their jobs to those cuts.

Asked for comment on NOAA cuts and the EU's moves to expand its own collection of scientific data, the White House Office of Management and Budget said Trump's proposed cuts to the agency's 2026 budget were aimed at programs that spread "fake Green New Scam 'science,'" a reference to climate change research and policy."Under President Trump's leadership, the U.S. is funding real science again," Rachel Cauley, an OMB spokesperson, said via email.

European officials told Reuters that - beyond the risk of losing access to data that is bedrock to the world's understanding of climate change and marine systems - they were concerned by the general U.S. pullback from research. "The current situation is much worse than we could have expected," Sweden's State Secretary for Education and Research Maria Nilsson, told Reuters. "My reaction is, quite frankly, shock."

The Danish Meteorological Institute described the U.S. government data as "absolutely vital" - and said it relied on several data sets to measure including sea ice in the Arctic and sea surface temperatures. "This isn't just a technical issue, reliable data underpins extreme weather warnings, climate projections, protecting communities and ultimately saves lives," said Adrian Lema, director of the DMI's National Center for Climate Research.

Reuters interviewed officials from eight European countries who said their governments were undertaking reviews of their reliance on U.S. marine, climate and weather data. Officials from seven countries - Denmark, Finland, Germany, Netherlands, Norway, Spain and Sweden - described joint efforts now in the early stages to safeguard key health and climate data and research programs.

LEANING ON THE U.S.

As a priority, the EU is expanding its access to ocean observation data, a senior European Commission official told Reuters. Those data sets are seen as critical to the shipping and energy industries as well as early storm warning systems. Over the next two years, the senior official said, the EU plans to expand its own European Marine Observation and Data Network which collects and hosts data on shipping routes, seabed habitats, marine litter and other concerns. The initiative was aimed at "mirroring and possibly replacing US-based services," the senior European Commission official told Reuters.

Europe is particularly concerned about its vulnerability to U.S. funding cuts to NOAA's research arm that would affect the Global Ocean Observing System, a network of ocean observation programs that supports navigation services, shipping routes and storm forecasting, a second EU official told Reuters.

The insurance industry relies on the Global Ocean Observing System's disaster records for risk modelling. Coastal planners use shoreline, sea-level, and hazard data to guide infrastructure investments. The energy industry uses oceanic and seismic datasets to assess offshore drilling or wind farm viability. (645 words)

(Reporting by Kate Abnett in Brussels, Valerie Volcovici in Washington, Sarah Marsh in Berlin and Alison Withers in Copenhagen. Additional Reporting by Andreas Rinke. Editing by Suzanne Goldenberg)

Text 4 - **U.S. scientists are under attack. France wants to give them refuge.**

As the Trump administration cuts science jobs and funding, this university is offering a new home.

Opinion, Leana S. Wen - ***The Washington Post,*** August 13, 2025

(Illustration by Alex Eben Meyer/For The Washington Post)

For many American scientists, the second Trump administration has instilled a sense of fear and futility. Billions of dollars in federal grants to universities have been frozen or slashed. Thousands of scientists across federal agencies have been terminated. Entire research initiatives have been defunded for containing politically inconvenient keywords such as "health disparities," "climate change" and "coronavirus." The administration's budget proposal seeks to cut the nation's scientific infrastructure even further — the National Institutes of Health by 40 percent and the National Science Foundation by more than half.

Against this backdrop, a university in southern France is welcoming America's "scientific refugees" with open arms. Though its efforts won't stop the ongoing dismantling of what was once the beacon of global scientific leadership, it is a principled stand to safeguard intellectual pursuits free from political interference.

The school is Aix-Marseille University, one of the oldest and largest higher-learning institutions in France. Its president, Éric Berton, an engineer with a PhD in fluid mechanics, is an unlikely hero in the resistance to the Trump administration's offensive on science. In March, as he saw the stream of news about mounting budget cuts, dismissals and censorship, he knew the moment demanded more than words.

"We have colleagues whose funding was cut, whose databases were erased," he told me in an interview. "Some were fired, others lost grants, so they no longer have the means to continue their research."

So he established the Safe Place for Science program, tasked with recruiting American researchers and providing them with three years of dedicated funding. Berton mobilized his university to commit 15 million euros (more than $16 million) to support 15 scientists, who would use the funds to cover laboratory supplies, their salaries, and those of postdoctoral fellows and other staff.

"We were quickly overwhelmed by requests," he said. In three weeks, the program received about 300 applications; in total, it has some 600 applicants, including scientists from universities such as Harvard, Columbia, Stanford and Johns Hopkins. The French government has provided additional funding, and Berton told me the program is on track to welcome 31 new colleagues this fall.

One of the scientists considering Berton's offer is Kartik Sheth, the former associate chief scientist at NASA whose entire office was eliminated this year. An astrophysicist trained at the California Institute of Technology, Sheth had worked at NASA for nearly 10 years. He oversaw missions such as the James Webb and Spitzer space telescopes, which allow scientists to study the earliest galaxies and planets beyond the solar system.

Sheth learned about the Safe Place for Science program through French collaborators. He told me he was considering the opportunity but was hesitant to uproot his life. He and his wife must care for their elderly parents, and a move abroad would involve significant logistical challenges. Moreover, the salary for professors in France is substantially lower than in the United States. (…)

The university already runs a program for displaced researchers from Ukraine, Syria, Lebanon and other countries affected by war and political instability. No one imagined the United States would join that list. In fact, the moment marks a striking reversal of history: During the two world wars, it was Europe's scientists who sought refuge in America.

Berton's idea is gaining momentum. He joined forces with former French president François Hollande, now a member of Parliament, to introduce a bill creating a new immigration status for "scientific refugees." If passed, it would ease visa procedures for researchers and their families.

Several other European universities, including Max Planck Society in Germany, Vrije University in Brussels and the Netherlands Institute for Advanced Study, have launched similar initiatives aimed at recruiting American scientists. The European Commission also pledged 600 million euros (about $700 million) to "make Europe a magnet for researchers."

Though it is heartening that some scientists will rebuild their careers in more welcoming environments, the scale of the crisis is overwhelming. Even if every European institution offered refuge, they could not absorb all the scientists whose work is now at risk. The situation also shows what the U.S. stands to lose when it turns its back on science. Still, with many American university leaders unwilling or unable to stand up to the Trump administration, Berton's initiative serves as a powerful reminder that academia must never surrender its moral courage. (718 words)

Text 5 - **America's Brightest Minds Will Walk Away**

Neel V. Patel, ***The New York Times,*** 4 April 2025 (abridged)

America is at risk of losing a generation of scientists. Amid sweeping cuts to federal research funding by the Trump administration, job opportunities for young scientists are being rescinded, postdoctoral positions eliminated and fellowships folded as labs struggle to afford new researchers. As countless scientific projects come to a halt, the researchers who will suffer the most are those just beginning their careers. […]

Most American scientists understood a second Trump term was unlikely to be friendly to their kind, but few anticipated such a rapid bulldozing. The N.I.H. — the largest public funder of biomedical and behavioral research in the world — announced it would slash funding to universities for overhead, or indirect, costs, which often covers laboratories' operational needs. Though legal challenges have stalled enforcement, federal grant money remains withheld in many cases. Elon Musk's so-called Department of Government Efficiency team has also turned its hatchet on the N.I.H. The agency has lost nearly one-fourth of its 18,000 employees because of job cuts, buyouts and some employees' choosing early retirement, according to reporting by NPR.

Many research grants overseen by the N.I.H., the National Science Foundation, the Department of Agriculture, the Department of Energy, the Department of Veterans Affairs and other agencies are frozen or canceled. When federal money for scientific research disappears, so do the university labs that young scientists rely on as steppingstones of essential training and experience they can later apply toward projects of their own.

Those actions could mean America's demise as the most powerful force for innovation in science, health and technology for the 21st century. Competitors like China will be able to usurp that position, and other countries are already making concerted efforts to recruit American scientists.

Many young researchers say they are having to choose between staying in the United States and staying in science. America shouldn't take scientific progress in medicine, artificial intelligence, energy and more for granted. If the youngest, brightest minds aren't soon reassured that the United States can support their work — and that scientific inquiry will be protected from political interference — they will walk away.

American science has been a beacon for aspiring researchers since the end of World War II, when a rivalry with the Soviet Union spurred the United States to make huge investments in science and technology research and recruit the most brilliant thinkers from abroad. Scientists saw the United States as a kind of nationwide laboratory for pursuing work under the best conditions possible — a remarkable combination of positive pressure and competition that pushed them to their best work, paired with support that provided the time, space and resources needed to realize that work's full potential.

This American brain trust has resulted in over 400 Nobel laureates, more than any other country in the world. As of 2023, an estimated 1.2 million people around the world held a Ph.D. in science, engineering or health earned at an American institution. The United States accounts for 27 percent of the world's total research and development activity — the most of any nation — though China, at 22 percent, is closing in. This is still far ahead of the next largest players: Japan (7 percent), Germany (6 percent) and South Korea (4 percent).

This investment has been essential to our economy. More than 408,000 jobs are supported by N.I.H. grants. It's estimated that every dollar of N.I.H. funding produces $2.56 in economic activity.

So much of that success is due to the U.S. government's willingness to support the kind of basic science work that takes years, even generations, before resulting in monumental breakthroughs. Hundreds of millions of federal dollars established the groundwork for key breakthroughs in mRNA technology before the Covid-19 pandemic, which helped set up Operation

Warp Speed for success. Ozempic and other GLP-1 drugs were inspired in part by N.I.H.-supported research into Gila monster venom in the 1980s; without that work, we might not have had the current weight-loss revolution. Fifty years ago, fewer than 60 percent of children diagnosed with pediatric cancer survived after five years. Now, thanks to treatments funded and spearheaded by the N.I.H., that survival rate is 85 percent.

America had also been an attractive destination for science because of its express support for free inquiry — the ability of researchers to study what mattered most to them, even if there wasn't a straight path to success and profit. That commitment appears to be crumbling. "I mourn a world in which science must defend itself through its end products, rather than its underlying search for truth and beauty," said Daniel Bauman, a 25-year-old Stanford University graduate student studying evolution. "When efficiency is mandated, current and future careers are lost or abandoned. If science funding is made contingent on immediately beneficial results, who will be left to tell the story of nature? Will anyone even be listening?" […] (802 words)

See also

● https://www.economist.com/science-and-technology/2025/05/21/america-is-in-danger-of-experiencing-an-academic-brain-drain

● Read the entire article "**RIP American innovation** **"** - Bina Venkataraman, *The Washington Post*, 12 May 2025

Text 6 - **UK recovers position in EU's Horizon Europe science research programme**

Scientists received €735m in grants in 2024 after UK rejoined programme as associate member post-Brexit

Lisa O'Carroll, *The Guardian,* Tue 12 Aug 2025

The UK is quickly recovering a prime position in the EU's £80bn science research programme 18 months after becoming a participating member following the resolution of Brexit problems, data shows.

The country was frozen out of Horizon Europe for three years in a tit-for-tat row with the then prime minister, Boris Johnson, over the Northern Ireland trading arrangements.

While the UK has to play catch-up, entering three years into the seven-year 2020-27 funding programme, data shows British scientists are punching above their weight with €735m (£635m) in grants in 2024.

That ranks the UK as the fifth most successful country in the programme, which is open to 47 nations: the 27 EU member states and 20 non-EU associate members also including New Zealand, Canada and Norway.

Germany, the top participant in Horizon in 2024, won €1.4bn (£1.21bn) in grants and Spain, which came second, got €900m (£777m).

Scientists have said previously they were "over the moon" to be back working with EU colleagues. They said they knew it would take time to return to the top three because of the time it took to build multinational consortiums to apply for funds.

But in terms of grants for proposals by individual scientists, which are easier to assemble, the UK now ranks as the second-most successful participating country after Germany, with €242m (£209m) in funds.

The UK is the single most successful applicant country when it comes to Marie Skłodowska-Curie Actions, one of the most prestigious grant programmes for doctoral and post-doctoral research in the world.

UK scientists have said repeatedly the Brexit lockout damaged Britain's reputation on the world stage and made it difficult for universities to recruit researchers from the EU.

In terms of recipients, the universities of Oxford and Cambridge are neck and neck, with awards of over €65m each, followed by University College London and Imperial College.

With projects ranging from the research to develop brain catheters inspired by wasps to efforts to create aviation fuel from yeast and greenhouse gases, the UK has been catapulted to the top of the league of non-EU beneficiaries by number of grants.

Ferdinando Rodriguez y Baena, a professor in medical robotics at Imperial College London recently completed a 15-year Horizon-backed research project creating a cranial catheter inspired by a conversation he had with the renowned zoologist Julian Vincent about wasps' ability to penetrate hard tree bark to lay eggs.

Smaller grantees have included individual projects on topics such as textile recycling, conservation and robots on farms.

The UK was one of the leading beneficiaries of Horizon, earning more in grants than it contributed in funds before Brexit. (436 words)

Text 7 - **Explainer - What does rejoining EU's Horizon scheme mean for UK research and innovation?**

Scientists relieved they can once again apply for funding from world's largest such programme after three-year hiatus
Ian Sample *and Lisa O'Carroll,* ***The Guardian***, Thu 7 Sep 2023

The UK has rejoined the flagship Horizon Europe research programme, to the widespread relief of the scientific community. But what is Horizon Europe and what does it mean for UK science?

What is Horizon Europe?

With a budget of £85bn, Horizon Europe is the world's largest transnational research and innovation programme. It is open to EU member states and countries that associate to the programme, as the UK has now done after leaving it due to Brexit. The funding supports international collaborations focused on a wide range of issues, from cancer and infectious diseases to the climate crisis, food security, artificial intelligence and robotics.

What does association mean?

Rejoining the programme means UK researchers can again apply for grants from Horizon Europe. Because the current cycle of funding runs until 2027 and will be replaced by a seven-year funding cycle and another seven-year cycle after that, it provides scientists with long-term financial support.

Universities UK talked of "the 30-year" collaboration that had been interrupted by Brexit.

What about PhD students and other recruits?

It will help secure scientific talent. While the UK was locked out of Horizon Europe, it could not take the lead on research and therefore could not recruit EU scientists to work out of British universities. Britain can now throw open the door to academics including fellows and PhD students who are vital to research teams.

It means that Britain will once again be an attractive prospect for many top young scientists who want to be sure that they can conduct world-class research wherever they settle.

Will the funding change?

No. It will resume at similar levels to the predecessor programme Horizon 2020. European grants have been a substantial boon to UK research in the past. Before Brexit the UK used to get about £2bn a year from Horizon 2020. When the UK was locked out of Horizon Europe in 2020, the UK government stepped in to replace funding. However, as one source said, it has turned into "life support" in the last two years.

UK scientists could still collaborate with European counterparts but were barred from leading programmes. Their participation withered, with the UK government issuing just £1bn for 2021 and 2022 to scientists, a quarter of receipts under Horizon 2020.

Can the UK make up lost ground?

UK researchers were among the greatest beneficiaries of previous Horizon programmes and the country sometimes landed more awards than Germany, at the forefront of European science.

After being locked out of Horizon they were "level with Belgium or the Netherlands", said one British source.

Whether the UK can return to the top flight is uncertain, but both London and Brussels have expressed confidence that with a "turbo boost" in promotion of Horizon Europe, the UK can claw back its previous leading position in the programme within one to three years.

The EU has agreed to send a communique to all scientists to announce that they can, from Thursday, work with British scientists again. To avoid any confusion, the same language will be used in communiques sent out by the British government.

What about Copernicus?

Along with Horizon Europe, the UK has joined Copernicus, the EU's Earth observation programme. The system draws on satellites and air, ground and sea sensors to provide rapid information on natural disasters such as floods and fires and climate and the environment more broadly. Being part of Copernicus is seen as crucial for UK climate researchers and means UK aerospace firms can bid for satellite contracts with hundreds of millions of euros.

How much will it cost?

The UK is expected to pay £2.2bn a year (€2.43bn) into Horizon Europe and Corpernicus with about £2.1bn going to the science programme. One of the issues that delayed the deal was the correction mechanism that allows for rebates if the UK's participation is financially disastrous. Under the 2020 trade deal, the UK would have been allowed to enter negotiations on compensation if its awards were 16% lower than its contributions. But under a hardening-up of the trade and cooperation agreement, "underperformance clause" compensation will kick in automatically at the 16% threshold. Both sides have indicated they are confident this clause will never be triggered.

Will Euratom involvement continue?

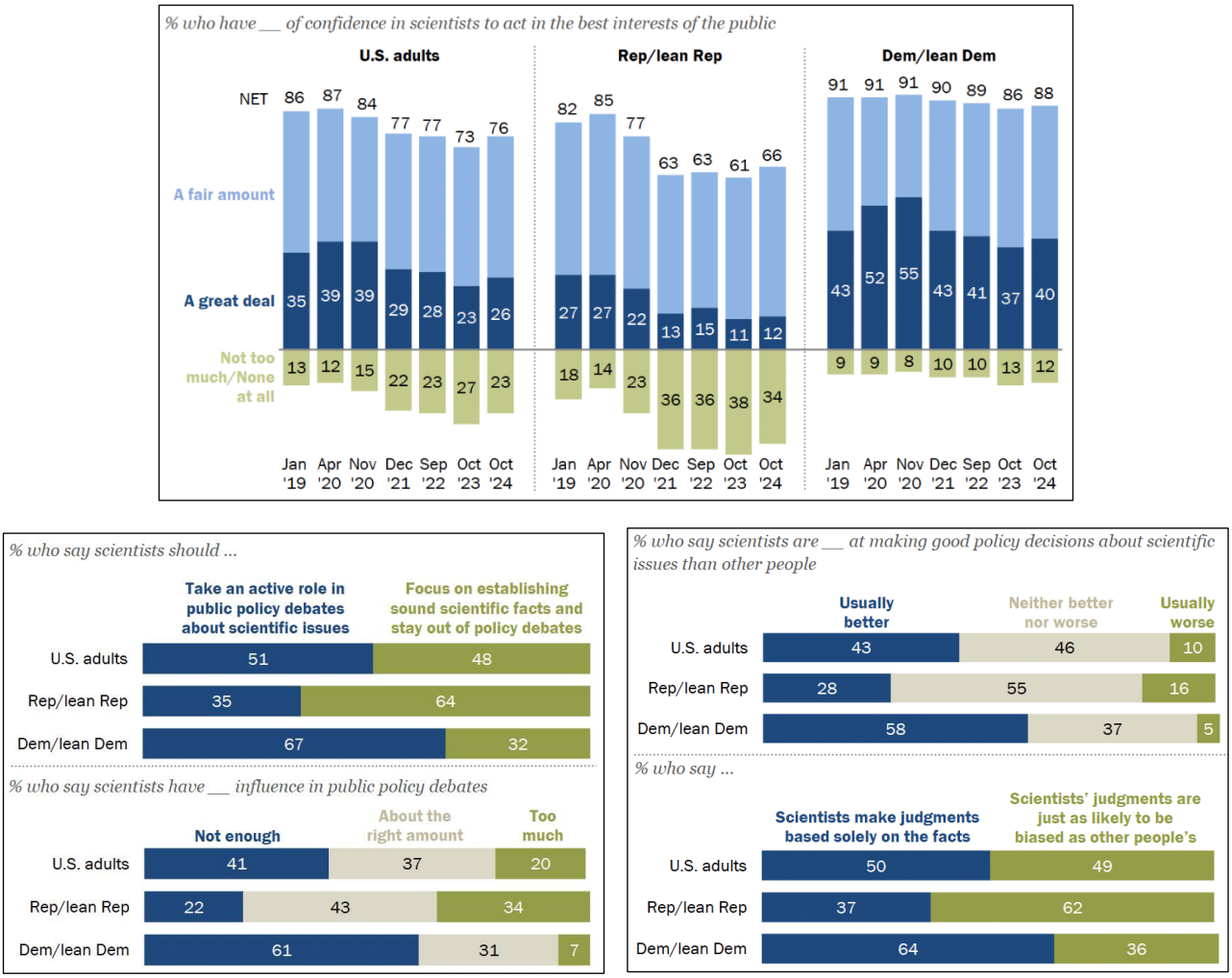
No. Under the new deal, the UK will leave Euratom, the EU's nuclear research programme. That puts an end to the UK's involvement in Iter, the multibillion-euro project to build a prototype nuclear fusion reactor in the south of France. While the science community was almost unanimous that the future lay in Horizon Europe, those working on peaceful, including medical, uses of nuclear energy said the near three-year absence from Euratom meant there was no longer a strategic value in paying into the programme. Instead, the UK will focus on its own fusion energy strategy backed by up to £650m to 2027.

What changed to clinch the Horizon deal?

Once the path was cleared in March for a deal with the new Northern Ireland trading relations, association with Horizon Europe should, as Ursula von der Leyen had promised, have been swift. Sources say the EU's initial offer to the UK was to cancel any bill for 2021 and 2022 but they wanted the full £2bn or thereabouts to be paid for 2023 even when they were already four months into the calendar year and January 2023 funding rounds had already come and gone. The new deal gives the UK a free pass for the remainder of 2023 and no contributions kicking in until 2024, to give time to scientists to work up submissions for next year's rounds.

PART TWO – Science and truth (in the age of misinformation and authoritarianism)

DOCUMENT 8



Pew Research Center, "Public Trust in Scientists and Views on Their Role in Policymaking", November 14, 2024

Text 9 - **Fraudulent Scientific Papers Are Rapidly Increasing, Study Finds**

A statistical analysis found that the number of fake journal articles being churned out by "paper mills" is doubling every year and a half.

By Carl Zimmer, ***The New York Times*****,** Aug. 4, 2025 (extracts)

For years, whistle-blowers have warned that fake results are sneaking into the scientific literature at an increasing pace. A new statistical analysis backs up the concern.

A team of researchers found evidence of shady organizations churning out fake or low-quality studies on an industrial scale. And their output is rising fast, threatening the integrity of many fields.

"If these trends are not stopped, science is going to be destroyed," said Luís A. Nunes Amaral, a data scientist at Northwestern University and an author of the study, which was published in the Proceedings of the National Academy of Sciences on Monday.

Science has made huge advances over the past few centuries only because new generations of scientists could read about the accomplishments of previous ones. Each time a new paper is published, other scientists can explore the findings and think about how to make their own discoveries. "Science relies on trusting what others did, so you do not have to repeat everything," Dr. Amaral said.

By the 2010s, journal editors and watchdog organizations were warning that this trust was under threat. They flagged a growing number of papers with fabricated data and doctored images. In the years that followed, the factors driving this increase grew more intense.

As more graduate students were trained in labs, the competition for a limited number of research jobs sharpened. High-profile papers became essential for success, not just for landing a job, but also for getting promotions and grants.

Academic publishers have responded to the demand by opening thousands of new scientific journals every year. "All of the incentives are for publishers to publish more and more," said Dr. Ivan Oransky, the executive director of the Center for Scientific Integrity.

Organizations known as paper mills are now turning scientific fraud into a lucrative business. Scientists eager to pad out their resumes can pay hundreds to thousands of dollars to be named as an author of a paper that they had nothing to do with, according to Anna Abalkina, a social scientist at Free University of Berlin who studies paper mills.

The manuscript might be provided to the paper mill by a dishonest scientist for a price; in other cases, it might be generated in house. To ensure the papers get published, paper mills sometimes offer bribes to corrupt editors, according to an investigation by the Center for Scientific Integrity.

Dr. Abalkina said that such papers are typically riddled with fraud — everything from doctored images to plagiarized text. To avoid plagiarism detectors, paper mills often use artificial intelligence to alter the text they lift from other papers, sometimes introducing bizarre phrasing such as "bogus upside" instead of "false positive."

Even as paper mills have worked to keep their efforts hidden, Dr. Abalkina has traced the output of companies in Russia, Iran and other countries, and found thousands of their papers in print. "You learn to see the patterns," she said. (…)

Dr. Amaral and his colleagues warn that fraud is growing exponentially. In their new study, they calculated that the number of suspicious new papers appearing each year was doubling every 1.5 years. That's far faster than the increase of scientific papers overall, which is doubling every 15 years. "It's already a problem, and I foresee a crisis," Dr. Abalkina said.

Dr. Amaral and his colleagues found evidence that paper mills are selectively targeting certain fields to publish dubious papers. The team compared research on different versions of RNA, a molecule that has many roles in the cell. Papers on a form of RNA called microRNA and its role in cancer were much more likely to show signs of possible fraud than other RNA-related fields, such as the gene editing technology CRISPR.

But Dr. Amaral suspects that paper mills will eventually turn their attention to other fields as well. "The risk is for more and more areas of science to become poisoned, so that no respectable scientist will enter them because the field is so flooded with junk," Dr. Amaral said.

Artificial intelligence is likely to make things worse, Dr. Abalkina predicted. Instead of doctoring an existing image, paper mills can now use A.I. tools to create images on demand. (...)

Dr. Amaral suggested that scientists who commit misconduct be temporarily banned from publishing. That would include prominent scientists who put their names on shoddy papers that they had not checked carefully for errors. "Making authors fully responsible for the research published under their name would decrease the publication rate," he said. (745 words)

● To read the entire article and find out what statistical tools these sleuths have used go HERE

● See also : **La fraude aux publications scientifiques s'industrialise, alerte une étude américaine**

Dans un article publié lundi 4 août dans « PNAS », la revue de l'Académie nationale des sciences des Etats-Unis, des mathématiciens et des biologistes ont recensé des pratiques frauduleuses grandissantes dans les revues de recherche.

Le Monde, 10 août 2025

Text 10 - **Address science misinformation not by repeating the facts, but by building conversation and community**

The Conversation, February 12 2025 (extracts)

Anne Toomey, Associate Professor of Environmental Studies and Science, Pace University

Misinformation about scientific topics, including falsehoods such as vaccines cause autism and climate change being an entirely natural phenomenon, is an issue scientists have been discussing more and more. Widespread misinformation can lead to confusion about public health and environmental issues and can hinder those working to solve societal problems.

As an environmental social scientist who researches how science can have an impact on society, I seek effective ways to address misinformation.

There are many approaches that can work to some extent: for example, counteracting erroneous information with statements about scientific topics based on quality research that convey that the majority of experts agree, and "inoculating" people by preparing them to spot the fallacies in misinformation before they are first exposed to it.

But one of the most important ways to counteract misinformation is less about the facts and more about how those facts move within social networks and communities. In other words, it's not enough for science to be right – it has to be accepted within people's social circles to have any meaningful impact.

Can facts change minds?

Most people tend to assume that their knowledge and ideas are based on a rational, objective analysis of information. And that's sometimes the case – if it's snowing outside, people don't insist that it's sunny and warm, no matter how much they might like it to be.

Similarly, if a person comes across some novel fact in the news, such as the discovery of a new type of plant in the Amazon, they might just absorb that information and go about their day.

But rationality and the ability to embrace new information goes out the window when it comes up against ideas that challenge one's preexisting worldviews or social identities. Such information can feel like a personal attack, leading the body to release cortisol, a hormone associated with stress. So, certain facts can feel threatening or offensive.

Compounding what is happening in the brain is what's happening in people's communities. Humans are social animals who turn to others they trust to help them understand what's what. People are attuned to what is considered normal or acceptable in their social environments, so if their social group holds a particular belief, they are more likely to adopt that belief too.

These cultural identities explain why, for example, research finds that science-skeptical behaviors, such as vaccine hesitancy and climate denialism, tend to cluster in social and geographical pockets. In these pockets, people's skepticism is reinforced by others with similar beliefs in their social network. In such cases, providing more evidence on a certain topic won't help, and it may even result in people digging in their heels deeper to deny the evidence.

So if facts don't necessarily change minds, what will?

Leveraging community networks

Recent research provides a solution for scientists and agencies hoping to correct misinformation: Rather than fighting against humans' social nature, work with it. When people see trusted individuals within their social networks holding a certain belief, that belief becomes more credible and easier to adopt. Leveraging those community connections can allow new ideas to gain traction.

One great example of using social networks to fight misinformation is how polio was eradicated in India. In 2009, India was the polio epicenter of the world, home to half of the world's cases. These cases were largely clustered in vaccine-hesitant regions of the country. But by 2011, only two years later, India had only one case, and the country formally celebrated the eradication of polio in 2014.

How did India go from having half of the world's cases to just one case in under two years?

Public health agencies asked volunteers from within vaccine-resistant communities to go on a listening campaign and become ambassadors for the vaccine. The volunteers were trained in interpersonal communication skills and tasked with spending time with parents. They built trust and rapport through regular visits.

Because the volunteers were known within the communities, they were able to make headway where health workers from urban areas had not.

Over time, more and more parents decided to vaccinate their children, until there was a tipping point and vaccination became a social norm. Perhaps most notably, the campaign led to full routine immunization rates in some high-risk regions of the country.

The power of conversations

Another example of using the power of social networks to talk about controversial science topics comes from a method called deep canvassing. Deep canvassing is a unique communication method that involves going door to door to have conversations with members of the public. (…)

Canvassers are trained to ask questions to better understand the other person's experiences and perspectives on the issue, and then they share their own personal stories. This helps to create a human connection, where both parties feel heard and respected.

One notable example of deep canvassing in action is the work of Neighbours United, an environmental nonprofit in Canada. They used a deep-canvassing approach to engage people in conversations about climate change. (…)

These face-to-face interactions with experts can help people see them as kind, warm and professional, which can lead to trust. These examples show that creating support for attitudes and behaviors based on science requires more than just presenting facts. It requires creating meaningful dialogue between skeptical groups and scientific messengers. It's also a reminder that while social networks may serve to propagate misinformation, they can also be an important tool for addressing it. (903 words)

Document 11 – Video -· **TEDx Talks, "Rebuilding (or Building) Public Trust in Science | Caitlin Looby** |TEDxOshkosh", 11 December 2023.

Text 12 - **Ces « bibliothèques de l'ombre » où les scientifiques du monde entier partagent gratuitement des articles**

« Un monde de pirates » (2/5). Les sites sur lesquels les articles scientifiques sont mis à disposition, en toute illégalité, sont très populaires au sein de la communauté universitaire. Rapides, efficaces, ils incarnent l'utopie d'un savoir accessible à tous.

Par Lyssia Gingins , ***Le Monde***, 11 août 2025

Le message, posté sur le site Sci-Hub, est signé d'une dermatologue tunisienne : *« Je veux vous remercier de permettre aux médecins d'accéder à la recherche scientifique médicale gratuitement, surtout dans les pays en développement. » « L'aide que vous avez apportée aux autres est inestimable, je ne doute pas que vous ayez sauvé des vies »*, surenchérit une chirurgienne galloise. Un interne turc en orthopédie, lui, ne s'encombre pas de périphrases : *« Vous méritez un p***** de prix Nobel ! »*

La bénéficiaire de cette effusion de gratitude est une informaticienne kazakhe : Alexandra Elbakyan, fondatrice de Sci-Hub, un site de piratage scientifique ou, en termes plus policés, une « bibliothèque de l'ombre », qui met à disposition des millions d'articles scientifiques sans le moindre frais. D'où le surnom de la jeune femme : la « Robin des Bois de la science ».

Cet outil, Alexandra Elbakyan a commencé à l'élaborer pour son usage personnel, en 2011. Alors étudiante en neurosciences, elle bloque sur la rédaction de son mémoire, incapable de s'acquitter des 30 ou 40 dollars qu'exigent les revues pour donner accès à chacun de leurs articles. C'est l'acte de naissance de Sci-Hub, nouvelle planète dans une galaxie où orbitent alors déjà d'autres « bibliothèques », telles que les sites russes Z-Library et LibGen – plus variés, ces derniers diffusent aussi des copies, à l'identique, de livres scientifiques ou de fiction. L'économiste hongrois Balazs Bodo, chercheur à l'université d'Amsterdam, y voit l'héritage du samizdat soviétique, un système de diffusion clandestin d'ouvrages interdits ou introuvables, souvent rendu possible, déjà, par des universitaires grâce à leur accès privilégié aux textes.

Ces samizdats modernes s'épanouissent bien loin des frontières de l'ex-URSS. Leurs adresses s'échangent sur les campus américains comme s'échangeaient déjà les photocopies ou, par modem, les fichiers informatiques. Les étudiants – proverbialement fauchés – comme les chercheurs sont séduits par la gratuité de ces plateformes, entièrement financées par les dons des usagers les plus enthousiastes. *« C'était impossible de s'acheter autant de manuels »*, se souvient Jason (un nom d'emprunt car il souhaite demeurer anonyme), un utilisateur américain de ces bibliothèques depuis son master de sociologie, dans les années 2000. Au téléphone, ce quadragénaire souligne les prix prohibitifs des manuels aux Etats-Unis, où ils peuvent dépasser 100 dollars l'unité.

Equipe de bénévoles

Soucieux de rendre une partie de l'aide qu'il a reçue de la communauté, Jason est devenu, pendant la pandémie de

Covid-19, le modérateur d'un forum où se coordonnent les bénévoles. Comme lui, ceux-ci ont été séduits par la dimension politique du projet – mais aussi par l'image romantique du « pirate du savoir », vent debout contre la privatisation de la science. Une mythologie flibustière qui motive étudiants et chercheurs à user de leurs accès privilégiés aux réseaux universitaires pour aider d'autres usagers en manque d'une référence.

Sur ce forum, Jason et les siens trient et approuvent les ouvrages numériques, quitte à retoquer les éventuels trolls qui soumettent de faux livres, derrière la couverture desquelles on ne trouve qu'une publicité incitant à acheter l'œuvre originale. Ils corrigent ensuite ce qui doit l'être. Titre, auteur, image de couverture : les articles et livres ont besoin d'une sorte de « mise en beauté » avant d'être mis à disposition du public. A leur manière, ces bénévoles férus d'informatique effectuent un travail de bibliothécaire : curation, étiquetage… *« Cela nécessite beaucoup de travail manuel et il n'y a jamais assez de bénévoles »*, confirme Jason. Il faut dire qu'il n'est pas évident, pour un aspirant « bibliothécaire de l'ombre », de savoir comment se rendre utile, les équipes responsables des sites ne brillant pas par leur transparence.

Car… chut ! Comme dans une authentique bibliothèque, on est prié de ne pas faire de bruit. Pas tant pour ne pas déranger les autres lecteurs que parce que le partage d'articles est illégal, et qu'il est risqué de s'impliquer dans la gestion du site. Les échanges informels sur les réseaux sociaux restent anonymes, quand ils n'ont pas plutôt lieu sur des groupes privés, fonctionnant par cooptation.

Ces précautions ne sont pas superflues. Depuis une dizaine d'années, la guerre est déclarée entre les « bibliothèques » et les puissants groupes d'édition scientifique, à commencer par les géants européens Elsevier et Springer. Propriétaires légaux des articles scientifiques, ils ont peu à peu obtenu le blocage des sites pirates dans plusieurs pays. Alexandra Elbakyan elle-même a été contrainte de prendre ses distances avec Sci-Hub : en 2021, en raison d'un procès l'opposant à Elsevier en Inde, elle a préféré geler le site, qui demeure accessible mais n'est plus alimenté. Visée par une enquête du FBI, elle vit dans la clandestinité, dans le nord de la Russie.

La Z-Library est logée à la même enseigne. Ses domaines ont été saisis par la justice américaine en 2022. Deux individus, russes, accusés d'être impliqués dans la création du site, ont été arrêtés en Argentine et se sont depuis évadés. Un événement qui a conduit la Z-Library à revoir les mesures de sécurité de son équipe composée, selon l'un de ses porte-parole sollicité par *Le Monde*, de *« dizaines de spécialistes »* en informatique.

Modèle asymétrique

Menaces, fermetures, condamnations… Dans le domaine des publications scientifiques, la lutte contre le piratage a ceci de particulier que les auteurs, qui pourraient légitimement se sentir lésés, ne se pressent pas pour se ranger du côté de la loi. Beaucoup d'entre eux estiment que le très profitable modèle économique des principaux éditeurs est particulièrement asymétrique, pour ne pas dire injuste : à leurs yeux, les éditeurs privatisent la science en exploitant le travail des chercheurs, qui ne sont pas rémunérés en retour pour leur publication ou évaluation d'études.

Dans ce contexte, les pirates suscitent plus souvent l'admiration que la réprobation. D'autant que leur histoire reste marquée par la mort brutale d'Aaron Swartz, militant révéré de l'open access (accès libre). Visé par des poursuites judiciaires du FBI pour avoir téléchargé des centaines de milliers d'articles scientifiques, cet Américain de 26 ans s'est suicidé en 2013. Dans son « manifeste de l'Open Access Guerilla », il incitait étudiants, bibliothécaires et chercheurs à partager leurs ressources, leurs mots de passe, leurs fichiers. *« Vous avez la possibilité de participer à ce banquet de la connaissance alors que le reste du monde en est exclu »*, insistait-il.

Pour l'heure, les fermetures de plateformes pirates sont rarement définitives. La bataille que leur livrent les éditeurs s'apparente davantage à un jeu du chat et de la souris, les sites bloqués ne tardant pas à refaire surface, à l'identique, à une autre adresse. La crainte de les voir disparaître pour de bon mobilise tout de même de nombreux internautes, à l'image de « Shrine », un universitaire qui ne donne ni son nom ni son âge, mais explique au *Monde* que, pour lui, ces bibliothèques sont des *« ONG de la piraterie »*.

En 2020, il lance un appel à l'aide sur Reddit, plateforme communautaire et plus gros forum en ligne du monde. Reprenant en préambule le mot d'ordre d'Aaron Swartz, il propose un projet d'hébergement « pair à pair », c'est-à-dire décentralisé, des sites comme Sci-Hub : dans la mesure où leur contenu sera désormais hébergé sur les ordinateurs de centaines de volontaires, il sera impossible de le supprimer en faisant simplement saisir, par la justice, quelques ordinateurs. « Shrine » affirme avoir alors vu se mettre en mouvement *« une colonie de fourmis : des gens du monde entier, décidés à protéger ces fichiers, malgré les risques encourus et sans en tirer le moindre profit ».*

Cette *« colonie »* a essaimé. Ainsi, un projet de mégabibliothèque baptisé « Anna's Archive » a pour objet, depuis 2022, de constituer une copie complète des collections numériques de ses homologues. Ses promoteurs – évidemment non identifiés – entendent ainsi éviter la disparition du contenu de ces plateformes si elles venaient à fermer. Résultat : 50 millions de livres et le double d'articles scientifiques sont conservés dans « Anna's Archive ».

Document 13 – **VIDEO – Why getting things wrong is good for science**

BBC Ideas –July 2021 - https://www.youtube.com/watch?v=eff7OOjOR3w&ab_channel=BBCIdeas
Annales X/ENS

See also: **Bad science: AI used to target kids with disinformation on YouTube**
BBC World Service, Sept 2023

PART THREE – Maintaining a diverse pool of scientists

Text 14 - **Trust the Science: DEI Is Dangerous**

By The Editors, ***The National Review***, November 29, 2024

We were told over and over again by leading institutions, high-profile figures, and the mainstream media that DEI fosters an "inclusive environment" and advances "equity" by eliminating biases and counteracting discrimination. A booming industry emerged: About $8 billion is spent each year on diversity trainings in the United States, and more than half of Americans report that their workplace has DEI trainings or meetings. Of course, DEI is not merely limited to programming at organizations, businesses, and universities. Now, it is entrenched in our laws. President Biden has issued executive orders to promote social justice, beginning on his very first day in the Oval Office.

While DEI was celebrated, its opponents realized that it is a dangerous ideology. Some supposedly "equitable" policies have been clear examples of illegal discrimination, while the efforts to be "inclusive" have had disastrous consequences, particularly for single-sex spaces. Yet some of DEI's terrible effects have more subtly eroded our social fabric: Most, if not all, DEI-themed trainings promote a victimhood mentality by organizing society into a hierarchy of "oppressor" and "oppressed" on the basis of immutable traits, then demonize anyone who is supposedly sitting comfortably atop the totem pole. Regrettably, anyone who expressed even mild objections to DEI could be branded as a reprehensible bigot who needed immediate reeducation, thereby creating a demand for even more progressive-indoctrination sessions.

Now, a compelling new study confirms that DEI fosters racial and group animosity, not tolerance.

The study released on Monday by Network Contagion Research Institute (NCRI) and Rutgers University Social Perception Lab has devastating but unsurprising results: Across the three experiments, the researchers found that participants exposed to DEI materials were more likely to perceive prejudice where none existed and were more willing to punish the perceived perpetrators. Even worse, the participants who read DEI materials focused on caste were more likely to agree with Hitler quotes that substituted "Jew" with "Brahmin," the top of the hierarchy group in the Indian caste system. The study found that "participants exposed to the DEI content were markedly more likely to endorse Hitler's demonization statements, agreeing that Brahmins are 'parasites' (+35.4%), 'viruses' (+33.8%), and 'the devil personified' (+27.1%)."

Since DEI programming is so widespread, the study's findings are obviously newsworthy. (…) As it happens, the study is strong, and the truth about DEI is getting out, no matter how uncomfortable it makes its reflexive supporters. (395 words)

Text 15 - **Donald Trump's 'war on woke' is fast becoming a war on science. That's incredibly dangerous**

Christina Pagel - ***The Guardian***, Wed 26 Mar 2025

Donald Trump's attacks on diversity, equality and inclusion (DEI) initiatives since his January inauguration have been intense, indiscriminate and escalating. A tragic plane crash was baselessly blamed on DEI. All DEI programmes within public bodies have been ended and private contractors face cancellation if they also don't comply. (…)

Science and academia have been particularly targeted. Universities are threatened with losing federal funding if they support DEI. Government reports and government-funded research are being held back if they include prohibited terms such as "gender", "pregnant person", "women", "elderly", or "disabled". Grants funded by the National Institutes of Health are being cancelled if they address diversity, equality or inclusion in any form.

What is more, this total "war on woke" (more accurately: "fight against fairness") is happening in the UK as well as the US. Already, British companies and British watchdogs are abandoning their diversity drives. Tory leader Kemi Badenoch has described diversity initiatives as a "poison".

These attacks are rooted in wilful distortions of what DEI is all about. There are two big lies that need to be nailed. The first is that diversity and inclusion initiatives compromise the quality of employees by selecting incompetent candidates because of their minority group membership. The second is that DEI is a distraction that holds back success. Let's consider each in turn, using the field of science itself as an example.

The notion that DEI involves putting group membership before ability and leads to the appointment of incompetent candidates is a misrepresentation of what DEI initiatives are all about. Scientific ability is not restricted to one sex, ethnicity or religion, or to the able-bodied. Embracing diversity has the simple advantage of widening the pool of talent from which scientists are drawn. DEI initiatives are about ensuring that less competent members of the most privileged groups are not advantaged over more competent members of less privileged groups.

Bias starts at school, particularly in the physical sciences, where both girls and boys consider these "boy subjects" by the time they are teenagers. Even once you start your academic career, bias affects grant funding decisions and publication rates. Women and minorities face additional barriers to career progression: for instance, both female and ethnic minority scientists receive less credit for their work than male or white scientists respectively. Institutions that tackle the many workplace barriers for women and ethnic minorities (child-unfriendly working hours, tolerance of harassment, culturally insensitive socialisation practices) have higher retention rates among women and minority researchers. Diverse workplaces attract more diverse staff to apply for jobs – creating a positive feedback loop. And we know that scientific research teams and institutions that prioritise diversity perform better.

As for the second myth that DEI is a barrier to success, diversity actually improves the quality of science. Evidence shows that scientific papers produced by ethnically diverse teams are more impactful than those written by homogeneous teams. Similarly, studies show that diverse teams consider more alternatives and make better decisions.

Scientists from diverse backgrounds raise new research questions and priorities – especially questions that affect minoritised communities. The lack of women in the higher echelons of biomedical science has led to a comparative lack of research into menstrual and reproductive health problems [for instance]. (…)

Medical sciences and social sciences have long suffered from a lack of diversity in research design, leading to worse medicine because findings do not apply to all populations. For example, clinical trials have tended to test treatments mainly on men and on white people, leading to poorer health outcomes for women or minorities. A diverse group of researchers makes members of minorities more willing to volunteer for trials and helps ensure diverse participant recruitment. This improves scientific validity. (…)

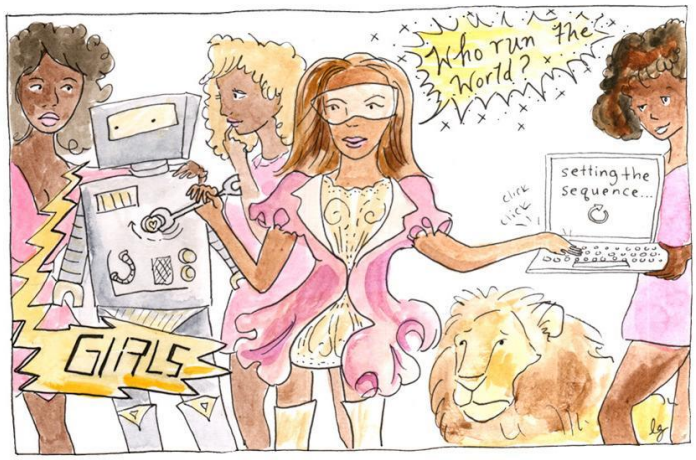
All in all, ensuring diversity and equality and inclusion among scientists makes for better scientists and better science. While our examples are drawn from science, they are true much more broadly. DEI initiatives are about ensuring that we always select the best irrespective of group membership, not about selecting by group membership irrespective of who is best. (672 words)

Christina Pagel is a professor of operational research within UCL's clinical operational research unit. She is also a member of Independent Sage and vice president and EDI lead for the UK Operational Research Society

●**See also** https://discoverwildscience.com/what-happens-when-marginalized-scientists-lead-research-1-339873/
(Note: I have a strong suspicion this article could have been party AI-generated…But the arguments stand nevertheless)

Text 16 - **High school girl to college recruiters: Don't make everything pink!**

The World.org, July 15, 2015
By Abigail Wheat



Editor's Note: Last year, Virginia high school junior Abby Wheat decided she'd had enough of colleges and universities trying to "feminize" STEM programs (Science, Technology, Engineering and Mathematics) in their recruitment materials. So she decided to write about it. Her essay, originally published on Western Albemarle High School's new site, was selected as runner-up out of nearly 5,000 entries in last year's New York Times' Teen Editorial Competition.
With thousands of recently graduated high school seniors like Abby getting ready to start college in the fall, we're featuring Abby's essay as a shout-out to all the girls planning to continue in STEM fields, no "pinkification" necessary.

As a high school junior interested in engineering, I am bombarded with emails and letters asking me to consider various STEM programs simply because I am female. Obviously, I am glad that so many colleges that are looking to increase the number of women enrolled in science and math related majors. However, I am somewhat alarmed by some of the tactics that some of these places use to attract potential female students.

It appears that in order to make the STEM fields more attractive to girls, marketing directors feel the need to "feminize" these areas of study. To me, this is just plain offensive. Is it assumed that I will only be interested in rebuilding the infrastructure of this nation via civil engineering if there is some sort of glittery pink aspect involved? Do people really think that the only way you will ever get a girl to write coding for innovative software is to stick a butterfly somewhere in there? These questions may seem far-fetched, but I have received far too many "lady-centric" emails in Curlz MT font from prospective colleges for that to be true.

And it isn't just colleges and universities that use these flawed tactics. Even toys targeted towards making little girls interested in engineering are feeling the need to "girlify" in order to make these activities appropriate for females. For instance, the famous LEGO company has started manufacturing kits for girls featuring beach houses and farmers' markets — things you certainly would not find in a regular, non-feminized LEGO kit.

And I am not against toys meant to spark girls' interest in the STEM fields. What I am against is the seemingly ever-present stigmatization that the only way to create excitement in girls about traditionally male-dominated things is to bedazzle them with all things "female."

Women have always been interested in science and math, and this is proven by the presence of historical figures such as Marie Curie and Ada Lovelace. So why are only a quarter of STEM jobs occupied by women? It's because for centuries, women were not welcomed into technical fields.

However, painting rainbows onto fields of study such as engineering and computer science isn't going to magically make that statistic larger. What will attract more women to technical jobs is welcoming them with open arms and recognizing that their abilities are completely equal to those of men.

Of course, it is important to note that there is absolutely nothing wrong with a feminine engineer. But women aren't becoming scientists because the job application smelled like lavender.

Many women are pursuing and will continue to pursue STEM careers because those are the topics that genuinely interest them.

The article featured in the Centrale TSI 2025 Synthèse.

DOCUMENTS POUR LE DM n°1 - Type Centrale

Type Centrale

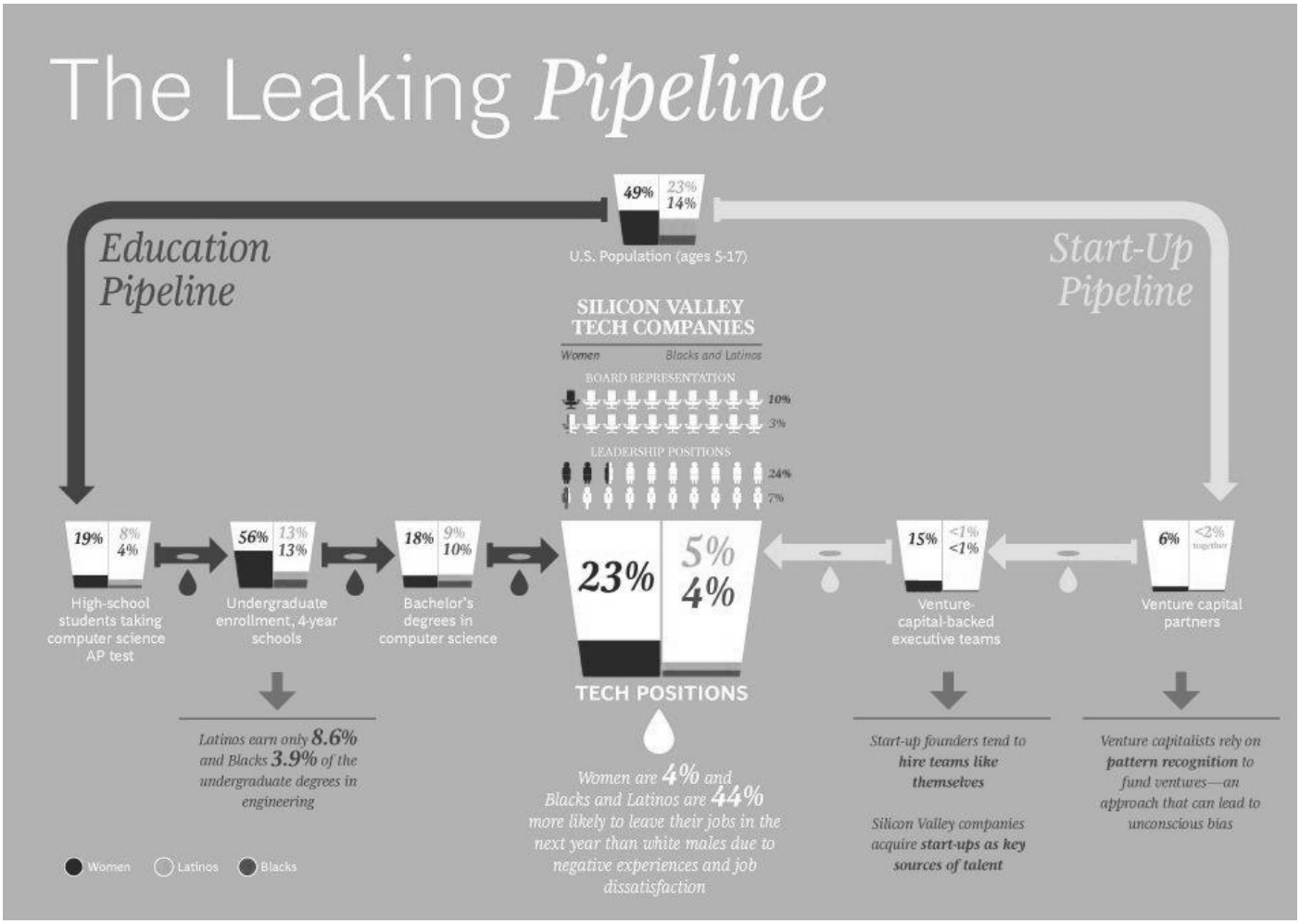
Rédiger en anglais et en 500 mots une synthèse des documents proposés, qui devra obligatoirement comporter un titre. Indiquer avec précision, à la fin du travail, le nombre de mots utilisés (titre inclus), un écart de 10% en plus ou en moins sera accepté.

Ce sujet comporte les 4 documents suivants :

— Un graphique illustrant un article du cabinet de conseil Boston Consulting Group publié en 2015
— Une tribune d'une contributrice au journal de l'université de Stanford, The Stanford Daily, parue en janvier 2022
— un essai publie dans *The Economist*, paru en mars 2023
— un article publié par The Diplomatic Courier en février 2023

L'ordre dans lequel se présentent les documents est arbitraire et ne revêt aucune signification particulière.

DOCUMENT 1



Closing the Diversity Gap in Silicon Valley, Boston Consulting Group, 2015

DOCUMENT 2

I never forget my gender as a woman in STEM: Industry

Opinion by Rebecca Wang, *The Standford Daily,* Jan. 26, 2022

Rebecca Wang is a graduate student studying aeronautical & astronautical engineering

a graduate student studying in STEM fields, the gender disparity in STEM is not new to me. Even as an undergraduate, I had been used to seeing more men in a room than women. The undergraduate class of engineers in my major started out with approximately 18% female enrollment, and at the end of four years reported 21.2% female graduates. In graduate school, my incoming engineering major class was 20% female. Even so, I still found myself seemingly able to cope and overcome the difficulties of this gender imbalance within the classroom.

Unfortunately, my immunity was short-lived. During an engineering internship at a space technology company last summer, at the first staff meeting of my team, I was the only woman in the room (out of roughly 27 engineers). With a single-digit percentage of women, such a clear gender imbalance left me feeling as though I didn't belong. This feeling only worsened as the internship continued. In the first few days of the internship, I sat in the main building where I saw a handful more women. But over the next week and month, as I was moved to the production floor and, eventually, to the new office built to house roughly 100 engineers, I could count all the full-time female engineers there on one hand. (…)

But where do the women go? What experiences do we all collectively face, as an already scant group, in our transition from academia to industry? After all, our training in school ultimately aims to prepare us for the workplace. Is it our own choice, or external factors influencing this choice, that leads women to disappear? Is our choice really even *our* choice?

In 2015, a study out of the University of Vermont reiterated that, although some suggest women choose not to pursue careers in STEM because of a lack of interest, extensive evidence indicates that women are socialized away from STEM; in other words, sexism makes it difficult for women to pursue their careers of interest. Lower salaries compared to those of men in similar roles, fewer advancement prospects and family matters are common reasons — but with the lack of representation and its impact on the treatment of women, women increasingly choose to exit their STEM careers, while some join non-STEM fields from the beginning.

I wasn't surprised by the conclusions of these studies. In school, being different was solvable; at work, being different was paralyzing. In addition to worse gender statistics in the workplace, an added factor was that success in the classroom usually meant a good letter grade, produced from (mostly) objective evaluation — homework, quizzes, exams — and was relatively low stakes. As you get older, however, your academic successes hold much less influence over your professional successes. This is not the case at work, when factors affecting your livelihood are muddied by subjectivity and the biases of how your managers view your potential.

The production floor at my internship was relatively gender-homogeneous, and I often felt out of character. And for the first time in my life, this subjective, "out of place" feeling had the potential to influence my performance, my success and my livelihood. When I joined in on my male desk-mates' banter — a subtle currency that afforded you better seats in the professional hierarchy at the workplace — I was entirely confused about how I was supposed to be treated there: Should I have accepted different treatment because I was fundamentally different, even if it was to my benefit? Or should I have demanded indifference, and strived to get any credit by establishing that I could do a "man's job"? (…)

After experiencing firsthand the sheer amount of male domination in industry, I couldn't help but feel a desire to leave the field. In my second year of graduate school, I still needed more senior and successful female STEM professional role models. To stay and battle centuries' worth of disadvantages seemed a dismal prospect from the standpoint of my novice career. To exit STEM and be considered as "adding to the problem", or to stay and suffer the unequal treatment — there was no choice I could make to win. Such a quandary begs the question: What can our society do to effectively increase the number of women in STEM fields, despite statistics that continue to reflect the problem of unequal representation, even as companies and institutions modify internal policies? We need the answer now more than ever. 738 words

DOCUMENT 3

By invitation - Ginni Rometty on how to ensure more women work in tech

The Economist, Mar 8th 2023

WOMEN CONTINUE to suffer from economic and employment inequalities. Globally, they make just 77 cents on average for every dollar earned by men and hold only two in every ten science, engineering and communication-technology jobs. Gender pay gaps and the dearth of women in higher-paying jobs in these fast-growing industries reduce women's financial stability. This makes it harder for them either to support themselves and their families, and to save for the future.

Such problems can be alleviated if more women have access to high-paying occupations in science, technology, engineering and mathematics (STEM). Ensuring more women get these jobs means not only paying women fairly, but also changing current notions about how we prepare people for the modern workforce and how companies recruit employees.

I know how both an education and a career in technology and engineering can advance a woman's prospects. I grew up in a family of little financial means. As a student I enjoyed mathematics and was the first in my family to complete a four-year college degree. I chose to study engineering—often as the only woman in my classes—because it taught me how to solve problems with logic and ingenuity. It also earned me a scholarship from General Motors, the carmaker. My bachelor's degree in computer sciences helped me get an entry-level job as a systems engineer at IBM in 1981. In 2012 I became the company's first female chief executive.

My experiences showed me practical steps that educators and employers can take to increase women's access to the best jobs in some of the most exciting and lucrative fields. These ideas are not all gender-specific, but increasing opportunities for all underrepresented people will inevitably benefit women.

A quick way employers can expand economic opportunity for women is to drop four-year degree requirements for some entry-level positions and instead evaluate candidates' skills and aptitude. According to the National Centre of Education Statistics, just one-third or so of students graduating in STEM subjects in America in 2020 were women. Many of today's tech roles require skills that can be acquired without a university degree, but some employers still demand the academic credential. This "degree inflation" trend, prevalent over the past two decades in America in particular, puts up false barriers to employment in most developed countries for the 60% of people who do not have four-year degrees. Hiring for skills instead opens the workforce to marginalised workers, including women, and allows open positions to be filled more quickly. (…)

In 2012 IBM couldn't find enough applicants to fill cyber-security roles and we realised that our degree requirements filtered out some qualified candidates. At the time less than 10% of all IBM jobs were open to those without degrees. Our recruiters rewrote many cyber-security job descriptions to outline the skills needed for each position, including proficiency in different coding languages, as well as creativity and project management. We also stopped requiring a degree.

The revisions were so effective that we expanded them to other roles and began recruiting more people who had never attended college—including many women. By 2019, IBM saw a 63% increase in candidates from underrepresented groups applying for positions that no longer required a degree. That year about 15% of all our American hires did not have a four-year degree. Now IBM has removed bachelor's degrees from job postings altogether unless the role absolutely requires it.

As firms place more emphasis in hiring on skills rather than academic credentials, young people will require more options than a four-year university degree to develop the capabilities that employers need. We developed one such option during my tenure at IBM by co-founding a new programme to teach tech skills to high-school students. The Pathways in Technology Early College High School (P-TECH) lets them earn a high-school diploma and an associate degree in applied science in six years. It began in New York in 2011 and has since expanded globally. (…)

The third way to make tech education and careers more accessible is through apprenticeships. America has lagged behind European countries, particularly Germany and Switzerland, in adopting apprenticeships for non-trade jobs, partly because of the country's misplaced bias towards college as the best path for economic mobility. (…)

During my time at IBM, our P-TECH programme and changes to our recruitment process brought more diversity, including more women, into our workforce. Other companies should follow suit (…). Giving everyone equal access to education and employment opportunities also promotes women's economic security and so will

help societies flourish. When it comes to science and tech careers, women must not be discouraged, overlooked or derailed. They must also be paid equally. Teaching, hiring and advancing women benefits us all. ■ (782 words)

Ginni Rometty was the CEO of IBM between 2012 and 2020. She is the co-founder of OneTen, a network that aims to advance career opportunities for black Americans, and the author of "Good Power: Leading Positive Change in Our Lives, Work, and World" (2023).

DOCUMENT 4

Women Are Shunning STEM, That Has to Change

BY Lara Zwittlinger, Amy Kardel and Horacio Alejandro Reyes Leon
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After decades of disadvantaged access to education, women today typically outperform men in educational outcomes. Girls get better grades in equally demanding classes and are even more likely to complete tertiary education. Despite the trends, the phenomenon of horizontal gender segregation—the tendency of women and men to sort themselves into different occupational areas by gender—persists. The underrepresentation of women in science, technology, engineering, and mathematics (STEM) remains particularly striking.

In 2020, the average share of women enrolling in STEM undergraduate degrees was only about 31% across OECD countries, while the share of female enrollment in information, communication, and technology programs (ICT) was even lower, at around 20%. Until the early 2000s, was been wrongfully argued that by nature, women possess less mathematical ability, thus rarely pursue math-intensive careers. Yet gender differences in mathematical performance and standardized test scores have narrowed or even disappeared in many countries, making this assumption untrue. This calls for reflection on the socio-psychological traits for the persisting gender gap in STEM. In fact, it could be argued that math skills are not even necessary for many ICT roles.

Why should we care about that? Horizontal gender segregation impacts the gender pay gap—which is aggravated when women are underrepresented in high-paying STEM jobs. According to Bureau of Labor Statistics' earnings data, 63% and 61% of all tech jobs pay above median salaries for men and women, respectively.

The pay gap is exacerbated by lower retention rates for women. Without addressing the retention issue to ensure under-represented workers progress to senior management-level positions this will persist. A further rationale is the already short supply of STEM professionals, with this shortage continuing to grow in the tech-hungry post-industrial world. Attracting traditionally underrepresented groups—such as women—for STEM careers is crucial to meet the needs of the labor market. In addition, reducing gender gaps in STEM careers stimulates economic growth and higher employment rates.

Perhaps most importantly, the lack of diversity in STEM limits the quality of innovations due to lack of different perspectives. Many products (including medicine and hardware) have been exclusively developed by and tested on men, which makes them less useful or safe to use for women.

Depictions usually associated with people in STEM, are far from what most teenage girls would like to be compared with, especially if our society demands a feminine, glamorous, and fashionable woman as a cultural standard. Science and mathematics seem to be culturally associated with masculinity, thus it is no surprise that adolescent girls often think they do not have what it takes to pursue a STEM career. Furthermore, evidence shows that holding stereotypical beliefs about women in math is associated with perceiving other females with high math scores to be less feminine, less attractive, and less likable. (…)

A further strand of research found that these gender-math stereotypes impair females' performance and performance-related beliefs by activating the fear of potentially confirming these negative stereotypes. (….)

Finally, given the influence of these societal norms, it is not surprising that girls focus their efforts and interests on subjects where their participation is more valued and encouraged, such as languages and humanities. Consequently, females show a relative strength, i.e., better performance compared to their own performance in

other subjects, in reading and language subjects, while male students show a relative strength in math and science in most countries. Since students might choose their career based on their own relative, not their absolute strengths, this may explain why less females end up choosing STEM careers.

Having reviewed some of the existing explanations for females' underrepresentation in STEM, we purpose the following actions:

- **Challenge the gender-math stereotype**: Connecting STEM to positive encouragement, female roles, and real-world examples cultivates a healthy curiosity of the field for girls. It's not necessarily about making tech "cool," but we must acknowledge there are negative perceptions of working in tech.
- **Create safe spaces for girls**: Mentoring and supportive learning environments both at home and at school are crucial to encourage more girls for a career in STEM. Certain gender-specific initiatives, such as gender-separate STEM classes or extracurricular activities such as girls' STEM clubs are worth considering.
- **Challenge the idea of the trade-off between language and STEM skills**: Combining language and STEM education may raise girls' interest in STEM while also challenging the idea that STEM jobs exclusively require numerical abilities and do not allow room for creativity. 731 words

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