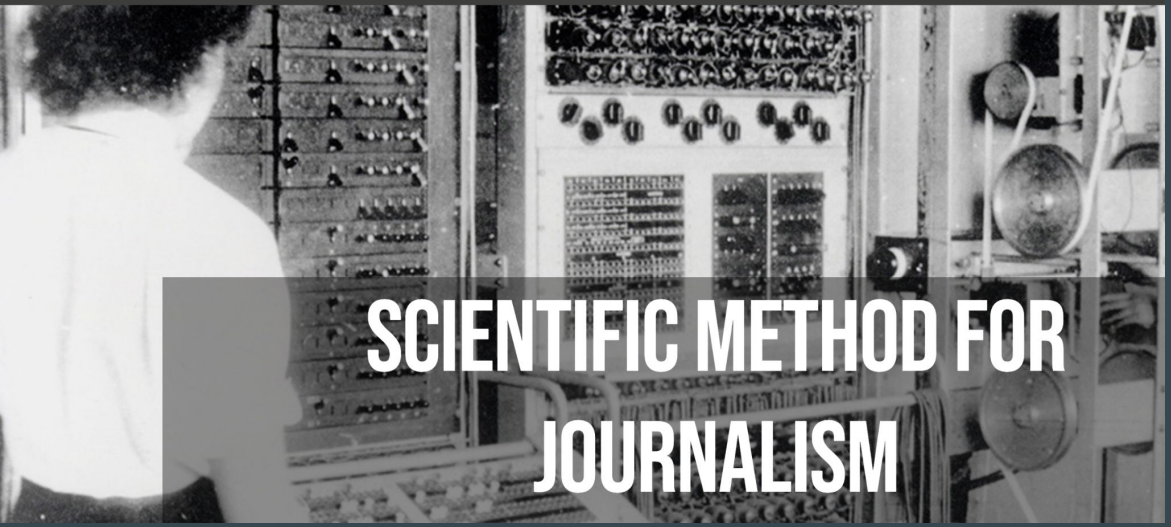
DEEP DIVE INTO THE SCIENTIFIC METHOD ...

Elisabetta Tola
eli@formicablu.it
facta.eu

THE SCIENTIFIC SYSTEM AS WE KNOW IT TODAY

FACTA

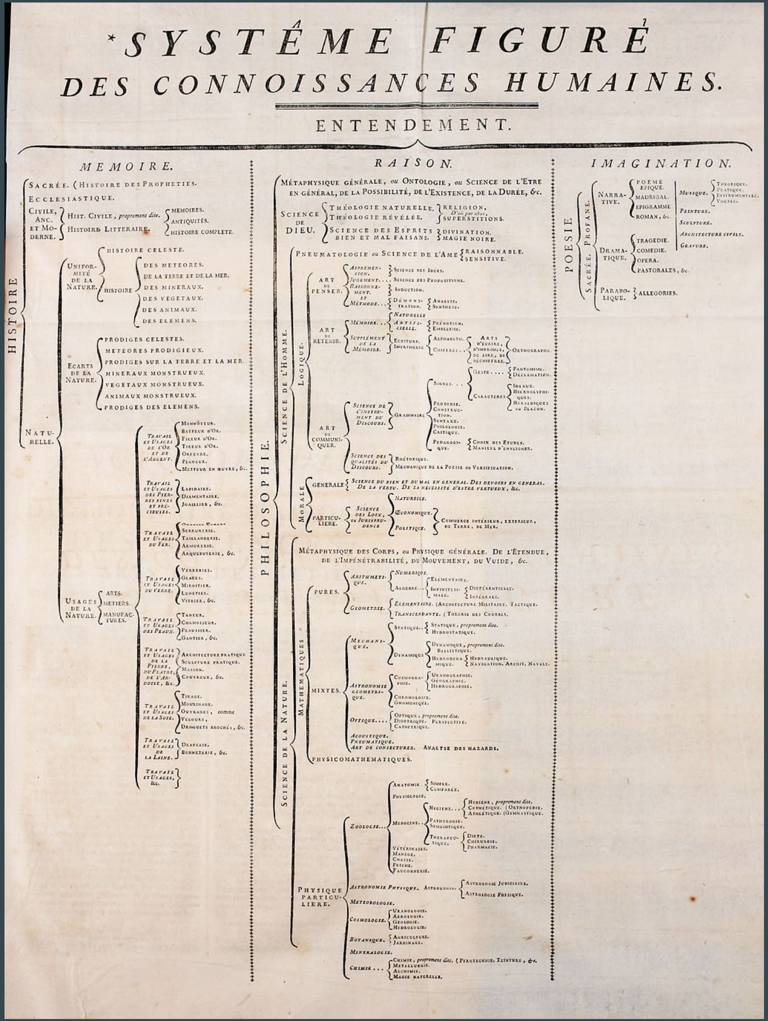
ABOUT

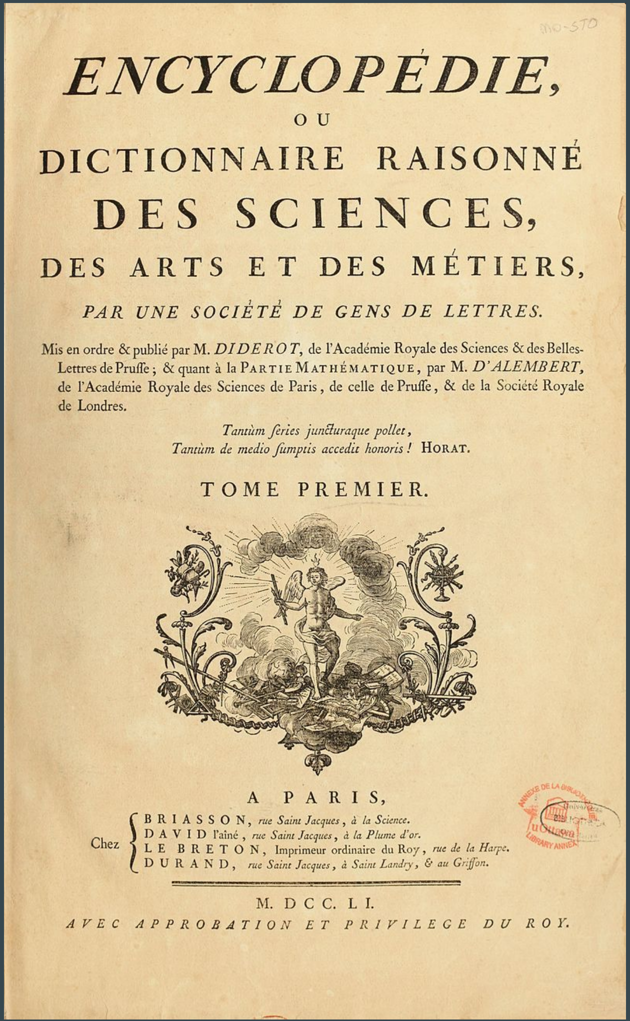


SCIENTIFIC METHOD FOR JOURNALISM

Radio3 scienza

IL BO LIVE
UNIVERSITÀ DI PADOVA





ENCYCLOPÉDIE,

OU

DICTIONNAIRE RAISONNÉ DES SCIENCES, DES ARTS ET DES MÉTIERS,

PAR UNE SOCIÉTÉ DE GENS DE LETTRES.

Mis en ordre & publié par M. *DIDEROT*, de l'Académie Royale des Sciences & des Belles-Lettres de Prusse; & quant à la PARTIE MATHÉMATIQUE, par M. *D'ALEMBERT*, de l'Académie Royale des Sciences de Paris, de celle de Prusse, & de la Société Royale de Londres.

Tantùm series juncturaque pollet,
Tantùm de medio sumptis accedit honoris! HORAT.

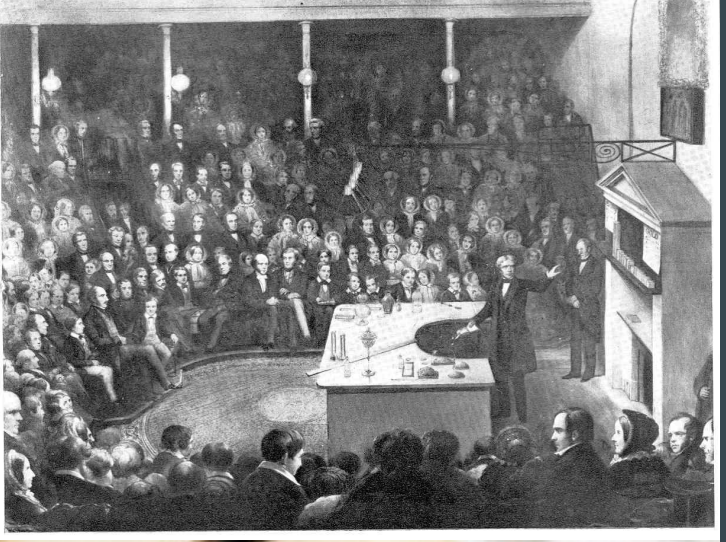
TOME PREMIER.

A PARIS,

Chez
BRIASSON, *rue Saint Jacques, à la Science.*
DAVID l'aîné, *rue Saint Jacques, à la Plume d'or.*
LE BRETON, Imprimeur ordinaire du Roy, *rue de la Harpe.*
DURAND, *rue Saint Jacques, à Saint Landry, & au Griffon.*

M. DCC. LI.

AVEC APPROBATION ET PRIVILEGE DU ROY.



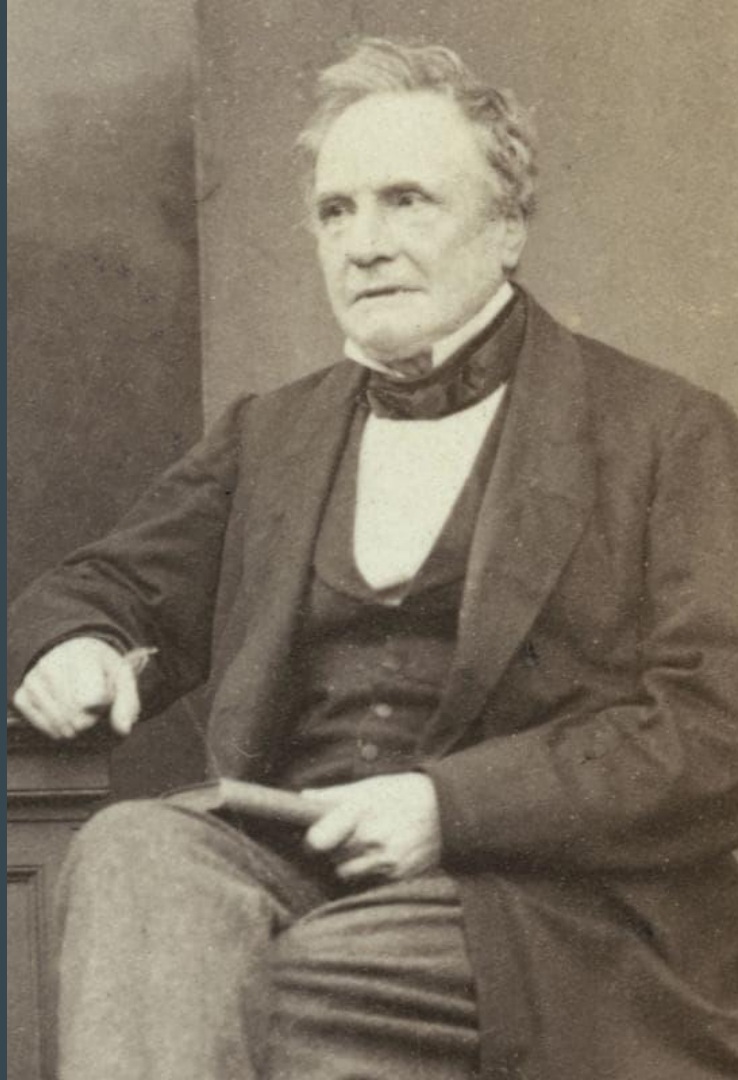
Michael Faraday, 1820
Charles Darwin, 1858

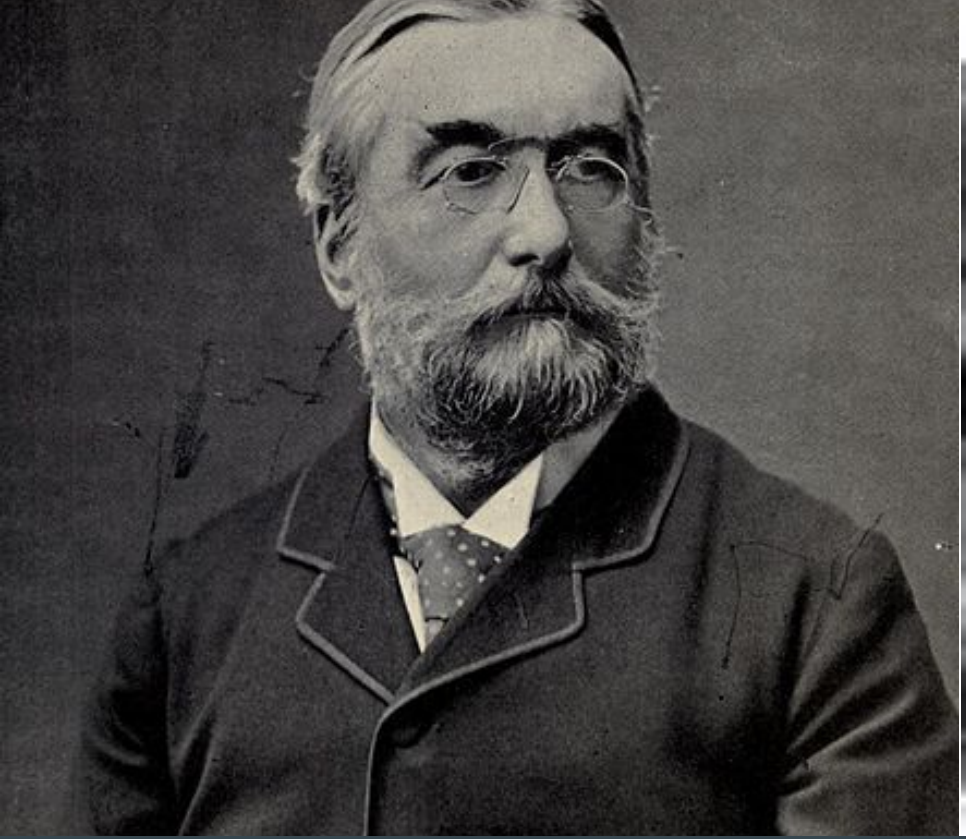
CHARLES BABBAGE AND THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCES

A decline of sciences in UK (1831):

Lack of identity and of funding

Scientists get organized as social and lobbying group on political institutions





Joseph Norman Lockyer, founder of Nature, 1869

John Michel,
With support by Thomas Edison and Alexander Graham Bell,
Science 1880

SCIENCE

AN ILLUSTRATED JOURNAL

PUBLISHED WEEKLY

VOLUME I

FEBRUARY—JUNE 1883

CAMBRIDGE MASS.
THE SCIENCE COMPANY
MOSES KING PUBLISHER
1883

Force	Statics	Mechanical Sciences.
Matter	Dynamics	
Inertia	Hydrostatics	
Fluid Pressure	Hydrodynamics	
	Physical Astronomy	
Outness		
Medium *of Sensation*	Acoustics	Secondary Mechanical Sciences. (Physics.)
Intensity *of Qualities*	Formal Optics	
Scales of Qualities	Physical Optics	
	Thermotics	
	Atmology	
Polarity	Electricity	Analytico-Mechanical Sciences. (Physics.)
	Magnetism	
	Galvanism	
Element (*Composition*)		
Chemical Affinity		
Substance (*Atoms*)	Chemistry	Analytical Science.
Symmetry	Crystallography	Analytico-Classificatory Sciences.
Likeness	Systematic Mineralogy	
Degrees of Likeness	Systematic Botany	Classificatory Sciences.
	Systematic Zoology	
Natural Affinity (*Vital Powers*)	Comparative Anatomy	
Assimilation		

William Whewell
1794 - 1866

XIX CENTURY:
SCIENCE COMMUNICATION CHANGES

Among peers, inside the community: share results, building a common knowledge among professionals as a continuation of Enlightenment ideals

To the entrepreneurs (stakeholders): science is an economic driver of the Industrial revolution

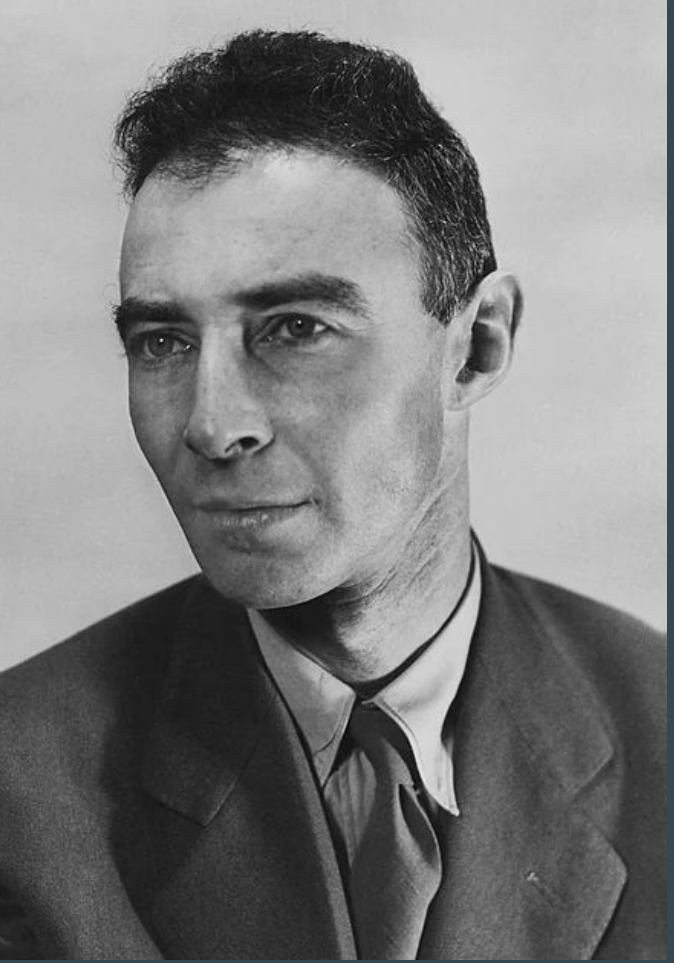
To general public: information, education, entertaining


SCIENCE AT WAR

Fritz Haber, Nobel 1918

Enrico Fermi, Nobel 1938

THE MANHATTAN PROJECT



J. Robert Oppenheimer

The opinions of **our scientific colleagues** on the initial use of these weapons are not unanimous: they range from the proposal of a purely technical demonstration to that of the military application best designed to induce surrender.

Those who advocate a purely technical demonstration would wish to outlaw the use of atomic weapons, and have feared that if we use the weapons now our position in future negotiations will be prejudiced.

Others emphasize the opportunity of saving American lives by immediate military use, and believe that such use will improve the international prospects, in that they are more concerned with the prevention of war than with the elimination of this specific weapon.

Recommendations on the Immediate Use of Nuclear Weapons
(by the Scientific Panel of the Interim Committee, June 16, 1945)

http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/history/pre-cold-war/interim-committee/interim-committee-recommendations_1945-06-16.htm

AS WE MAY THINK

A TOP U. S. SCIENTIST FORESEES A POSSIBLE FUTURE WORLD IN WHICH MAN-MADE MACHINES WILL START TO THINK

by VANNEVAR BUSH

Condensed from the Atlantic Monthly, July 1945

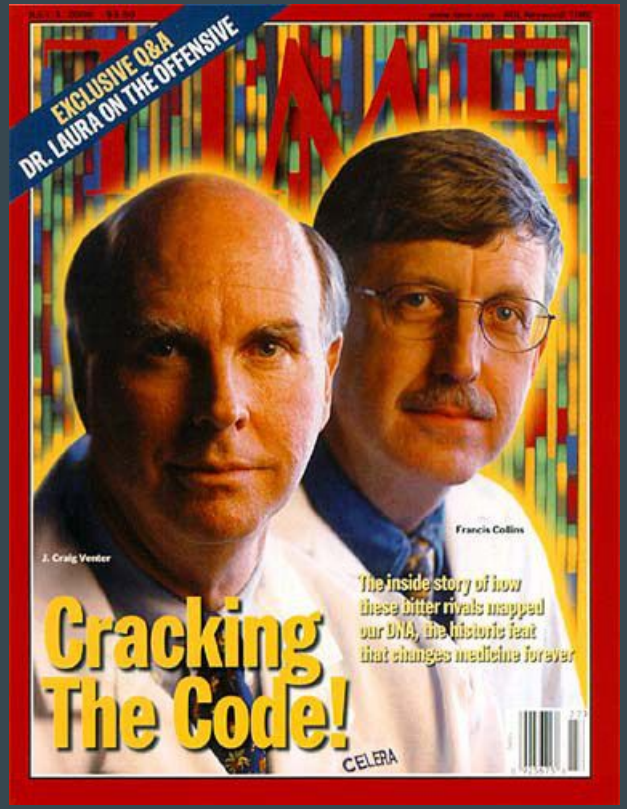
Vannevar Bush, 1945, As we may think

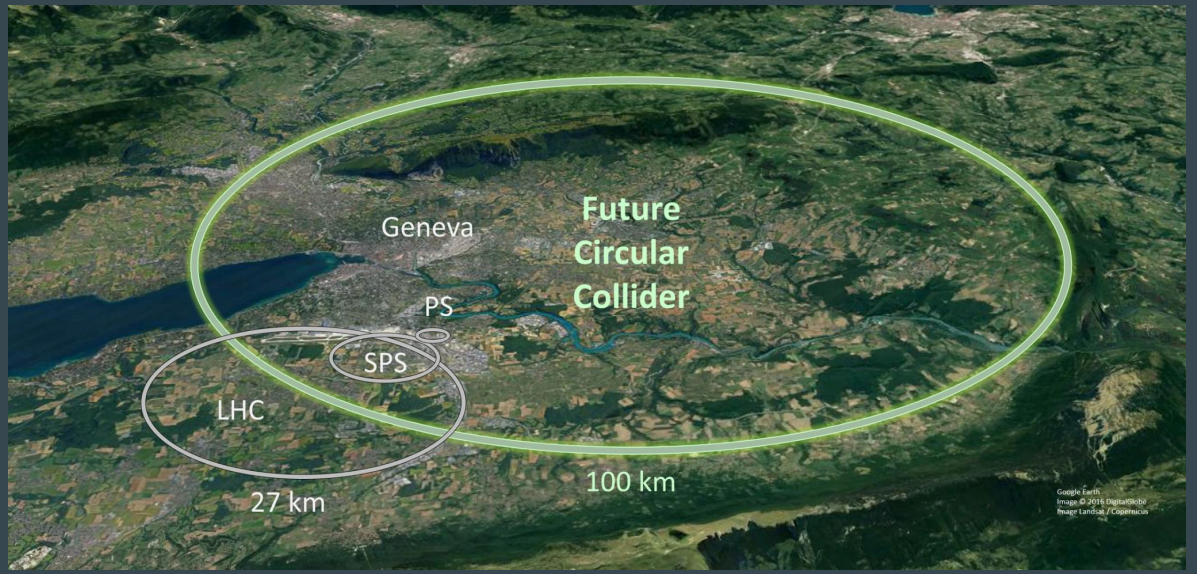
BIG SCIENCE

Werner Von Braun (1912 – 1977)

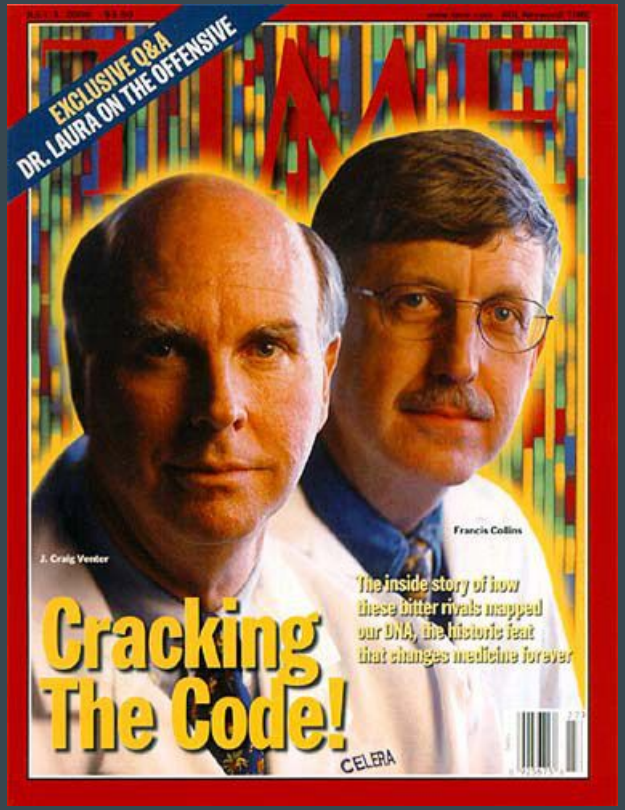
- V2 rockets on London WWII
- Saturn program (USA)

BIG SCIENCE


EXCLUSIVE Q&A
DR. LAURA ON THE OFFENSIVE
J. Craig Venter
Francis Collins
The inside story of how these bitter rivals mapped our DNA, the historic feat that changes medicine forever
Cracking The Code!
CELERA


Geneva
Future Circular Collider
PS
SPS
LHC
27 km
100 km
Google Earth
Image © 2016 DigitalGlobe
Image Landsat / Copernicus

BIG SCIENCE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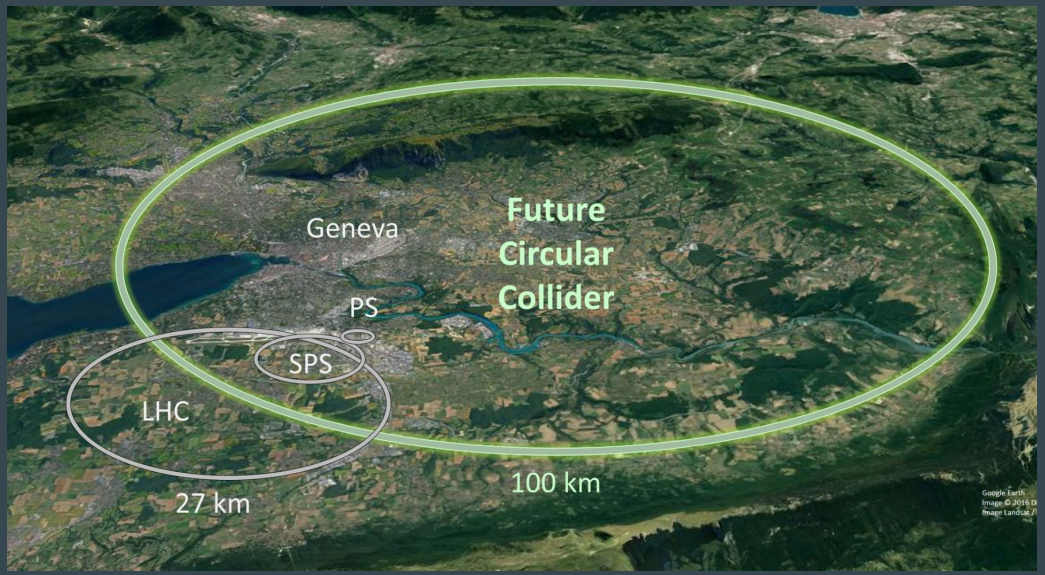

Geneva
Future Circular Collider
PS
SPS
LHC
27 km
100 km


Vaccine

JANUARY 2021

Scientific Integrity Codified in US Government

UCS has led the demand for independent, impartial science informing federal policies since 2004, when we coined the term "scientific integrity." A recently signed presidential memo now includes numerous UCS recommendations on restoring federal science.

I'm a Scientist. This is What I'll Fight For.

The War on Science is more than a skirmish over funding, censorship, and "alternative facts". It's a battle for the future, basic decency, and the people we love.

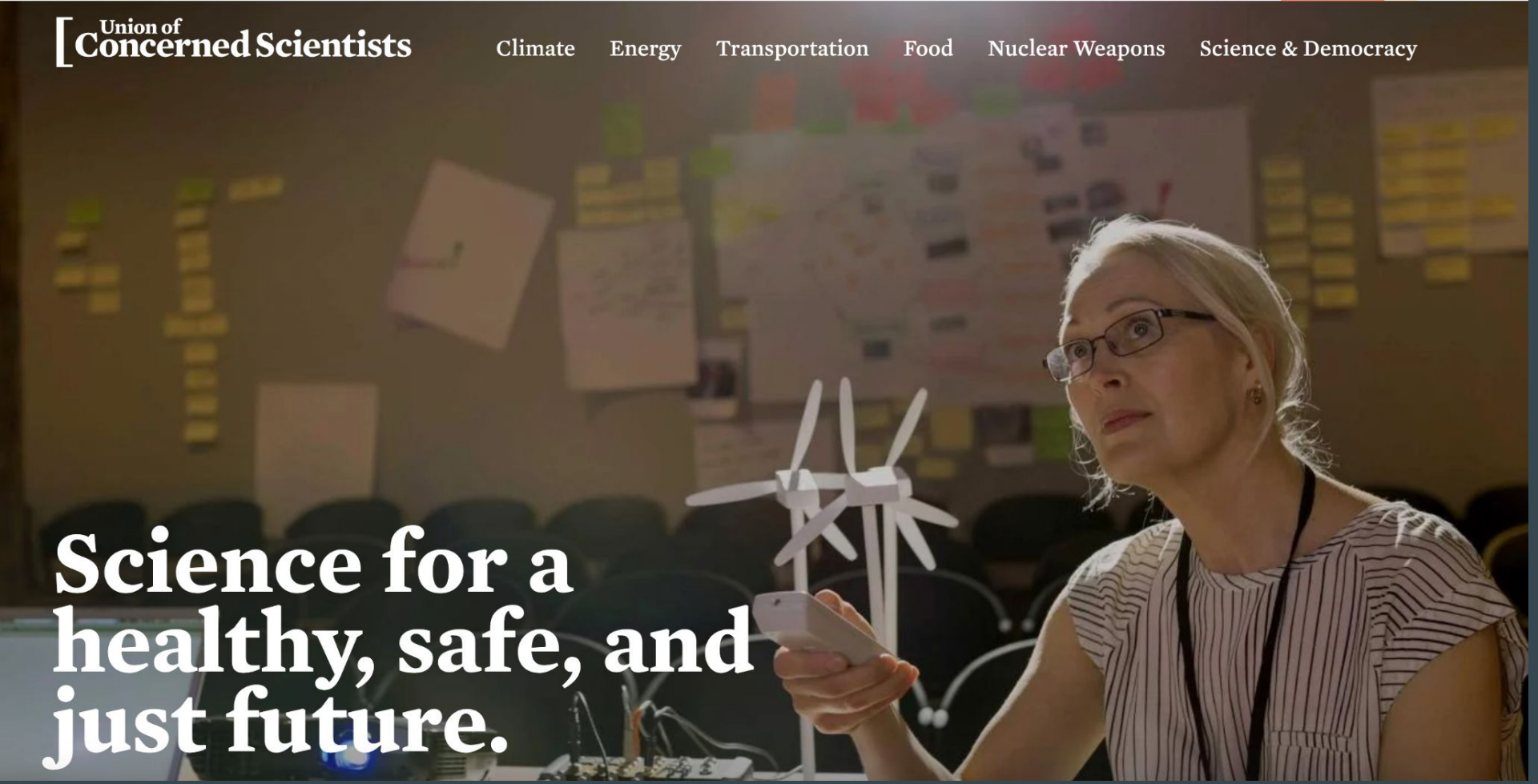
Jonathan Foley
Feb 12, 2017 · 6 min read

. . .

Make no mistake: There is a War on Science in America.

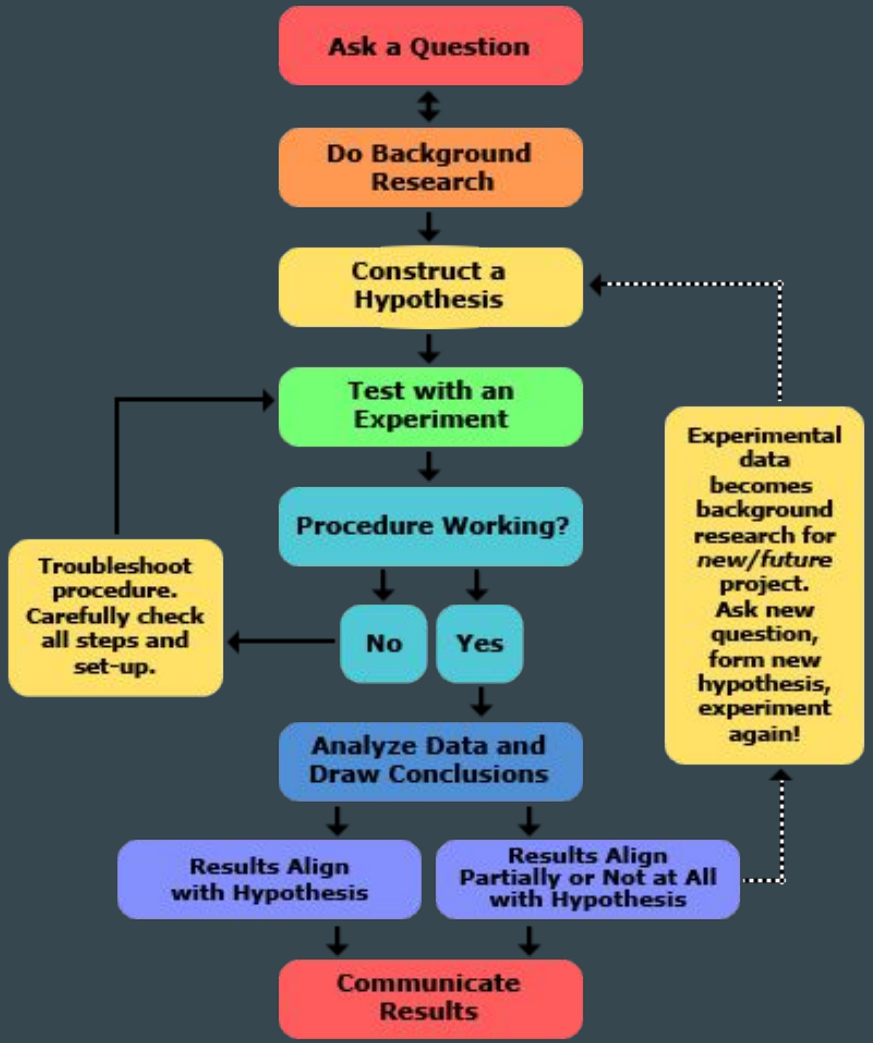
The White House not only denies obvious, empirical facts on a regular basis, but they have invented the Orwellian concept of "*alternative* facts". In the past, we simply called them "lies", but now they are used in the world's most powerful office. And that should scare all of us.

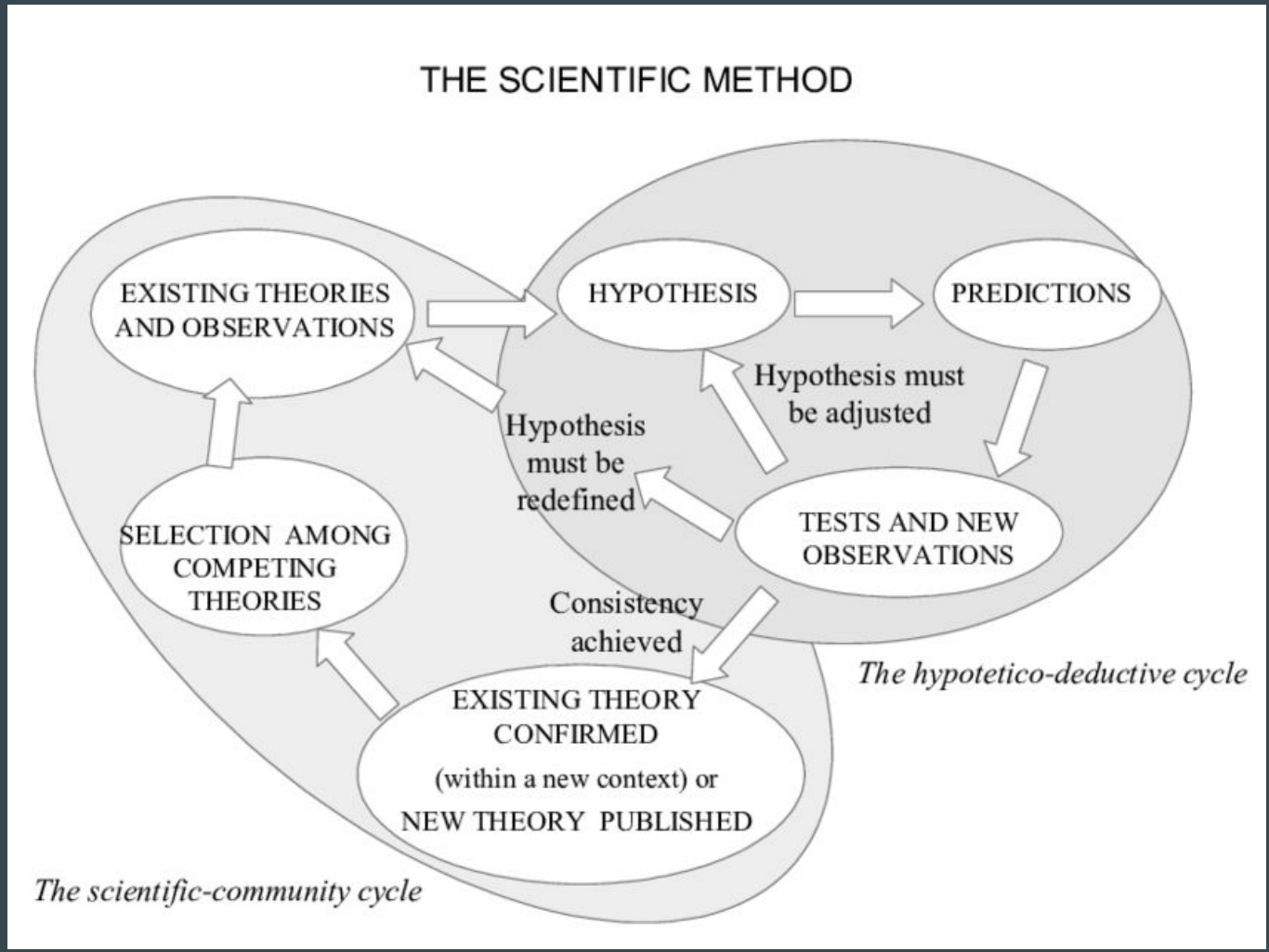
What's worse is that the White House and many members of Congress aren't just *anti-fact*, they are against the *pursuit* of facts, and have tried to place draconian restrictions on what federal scientists can research, publish, and even discuss. And god knows what will happen to our nation's long-standing investments in research and science education.

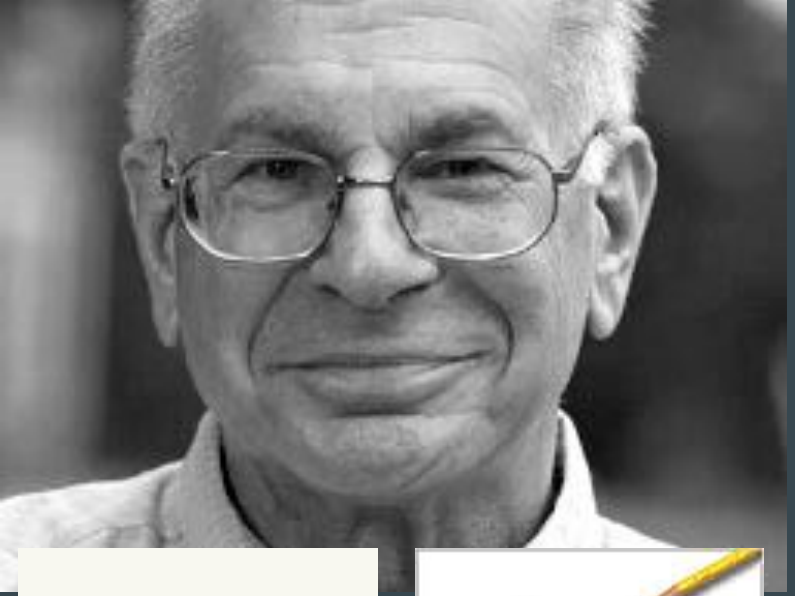


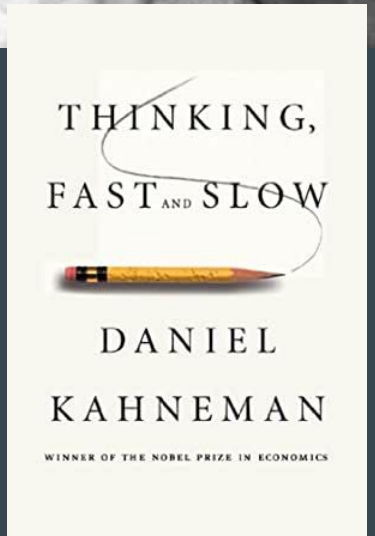
https://www.ucsusa.org/

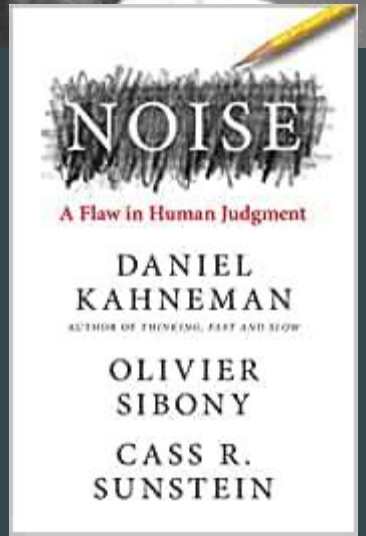
SCIENTIFIC PROCESS


Ask a Question
Do Background Research
Construct a Hypothesis
Test with an Experiment
Procedure Working?
No
Yes
Troubleshoot procedure. Carefully check all steps and set-up.
Analyze Data and Draw Conclusions
Results Align with Hypothesis
Results Align Partially or Not at All with Hypothesis
Communicate Results
Experimental data becomes background research for *new/future* project. Ask new question, form new hypothesis, experiment again!


THE SCIENTIFIC METHOD
EXISTING THEORIES AND OBSERVATIONS
HYPOTHESIS
PREDICTIONS
Hypothesis must be adjusted
Hypothesis must be redefined
SELECTION AMONG COMPETING THEORIES
TESTS AND NEW OBSERVATIONS
Consistency achieved
EXISTING THEORY CONFIRMED
(within a new context) or
NEW THEORY PUBLISHED
The hypotetico-deductive cycle
The scientific-community cycle







DANIEL KAHNEMAN

"...insights on human judgment and decision-making under uncertainty"

NAOMI ORESKES

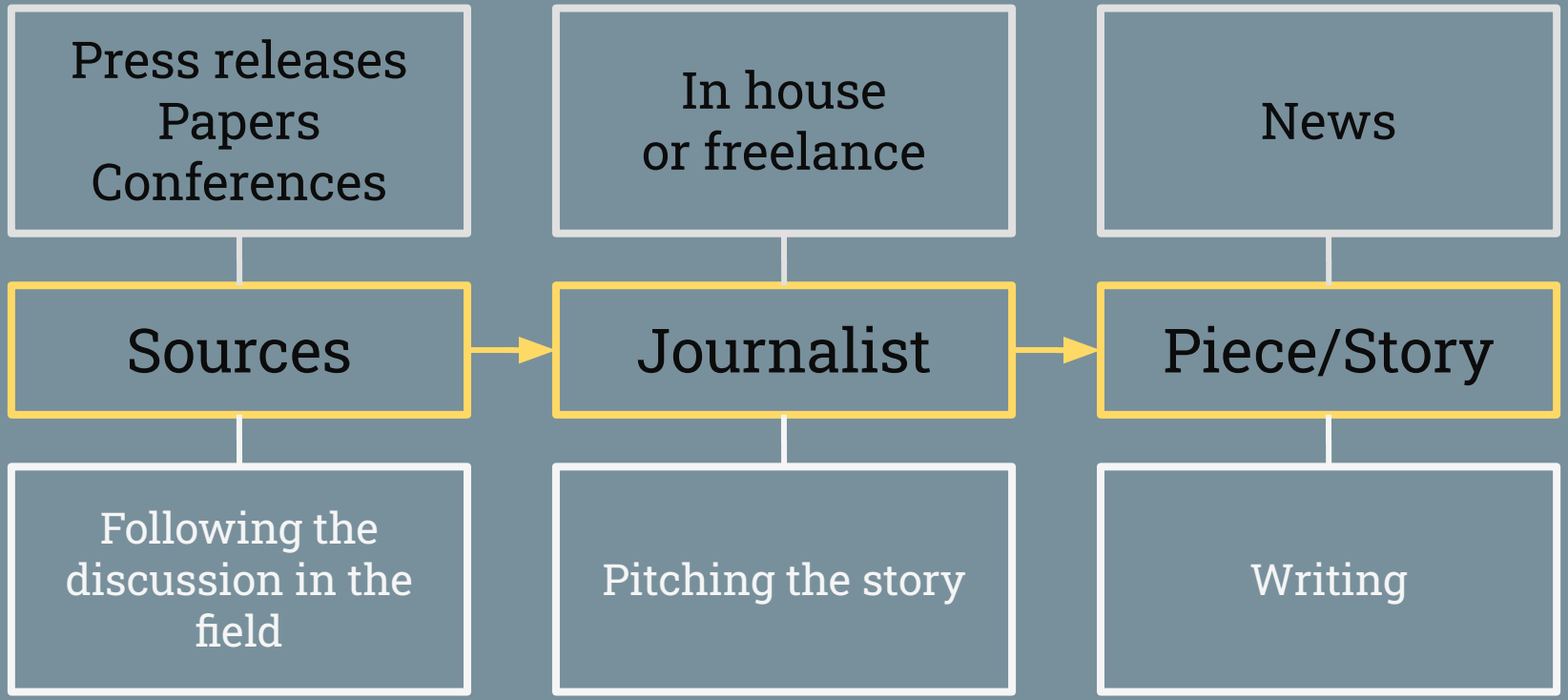
WHY TRUST SCIENCE ?

NAOMI ORESKES

AN ARTICLE VS. AN ARTICLE

News vs. paper

THE PROCESS


Press releases
Papers
Conferences
In house
or freelance
News
Sources
Journalist
Piece/Story
Following the discussion in the field
Pitching the story
Writing

BEFORE THE PAPER

FUNDING

PI proposes a project to a funder

Different sources of money:

- University/Government (Public Funds for Research)
- Calls from funding entities (National Research Councils, European Commission, ...)
- Private: Industries, Foundations, Investors, VCs,...

BIG SCIENCE - requires BIG MONEY too

FUNDING - THE EU MONEY

Project databases

List of databases of EU-funded research and innovation projects

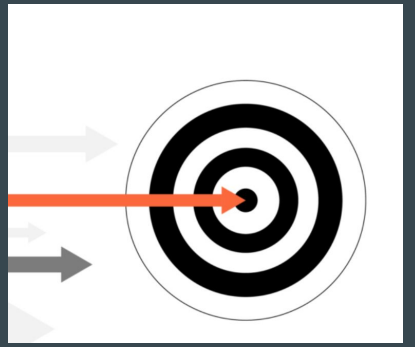
- Commission database of EU-funded reseach and innovation projects (CORDIS)
- EU Health programmes project database
- Financial transparency system
- European Innovation Ecosystems datahub
- InfoRegio data on major projects
- Intelligent Energy Europe project database
- LIFE programme project database
- Public-public partnerships (Archived website)
- TRIMIS (Transport Research and Innovation Monitoring and Information System project database)

RESEARCH

"Lab phase (*wet bench*)" + "experiments"

- Duration is limited/driven by the fundings (2-5 years)
- Dissemination of partial results → scientific discussion
  - Conferences
  - Seminars
  - Pre-print*

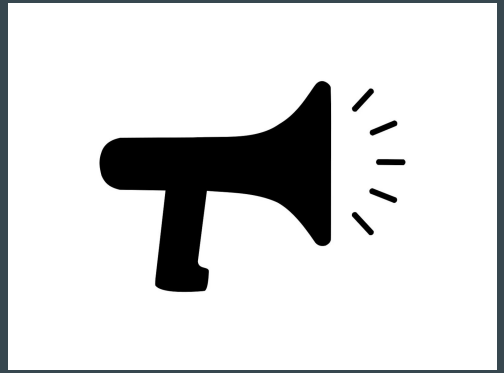
EVALUATING THE RESULTS



- Positive or negative
- They have to be shared with the community, foundation of science/scientific method → VALIDATION
- *Evaluation of careers and research → prestige*

COMMUNICATING THE RESULTS

- Scientific conferences and congresses
- Papers -> journals
- Pre-print*, databases, repository, libraries



The peer review process

Scientists study something.

Scientists write about their results.

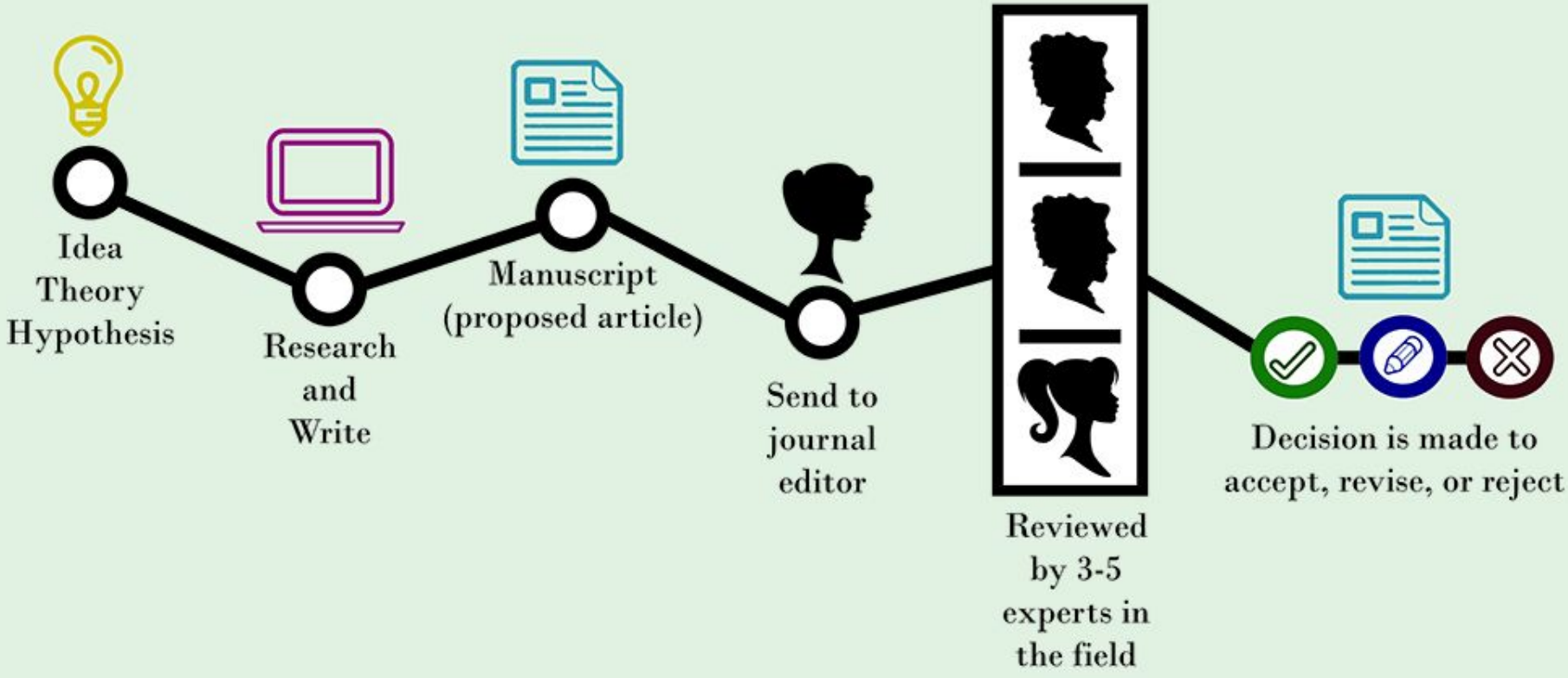
Journal editor receives an article and sends it out for peer review.

Peer reviewers read the article and provide feedback to the editor.

Editor may send reviewer comments to the scientists who may then revise and resubmit the article for further review. If an article does not maintain sufficiently high scientific standards, it may be rejected at this point.

If an article finally meets editorial and peer standards it is published in a journal.

The Peer Review Process

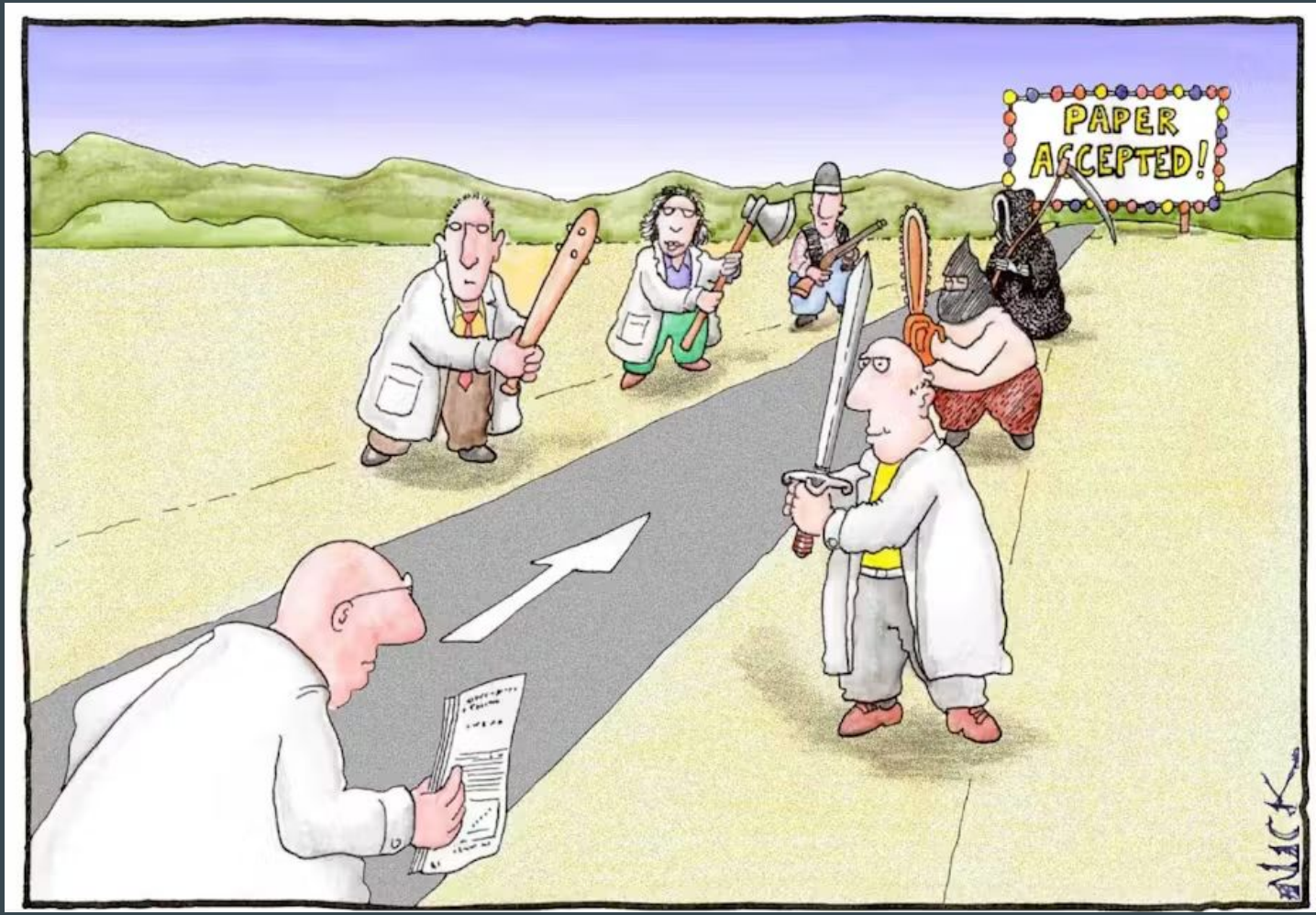


PEER REVIEW

Procedure of evaluation carried out by peer experts to verify their suitability for publication (or funding). It can be:

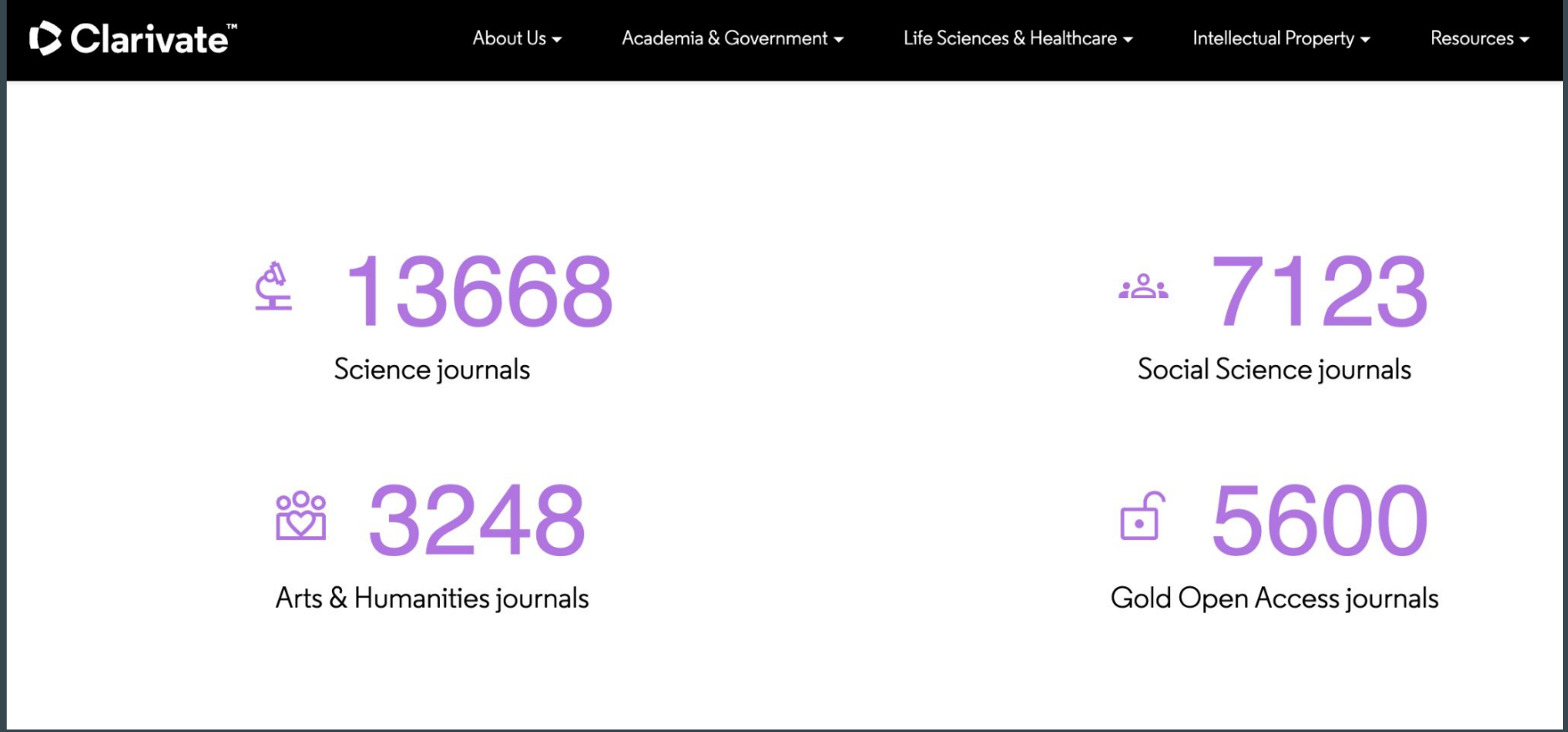
- **single-blind**: the authors of the study do not know the referees (protected by influences);
- **double-blind**: the authors do not know the reviewers and vice versa;
- **open**: the names of authors and referees are not hidden, but public → very open debate - often in rounds;

PUBLISH OR PERISH



IF AND H-INDEX

- **Impact Factor** (IF) a bibliometric index developed by the Institute for Scientific Information (ISI) in 1961. Managed by publisher Clarivate - applicable to **scientific journals**, not to researchers
- Used to evaluate the **prestige** of a publication: the higher it is, the more it means that it is cited
- **Researchers** are evaluated with the **h factor** based on their publications and citations (Impact Factor) - available on Scopus - career evaluation (and further funding)



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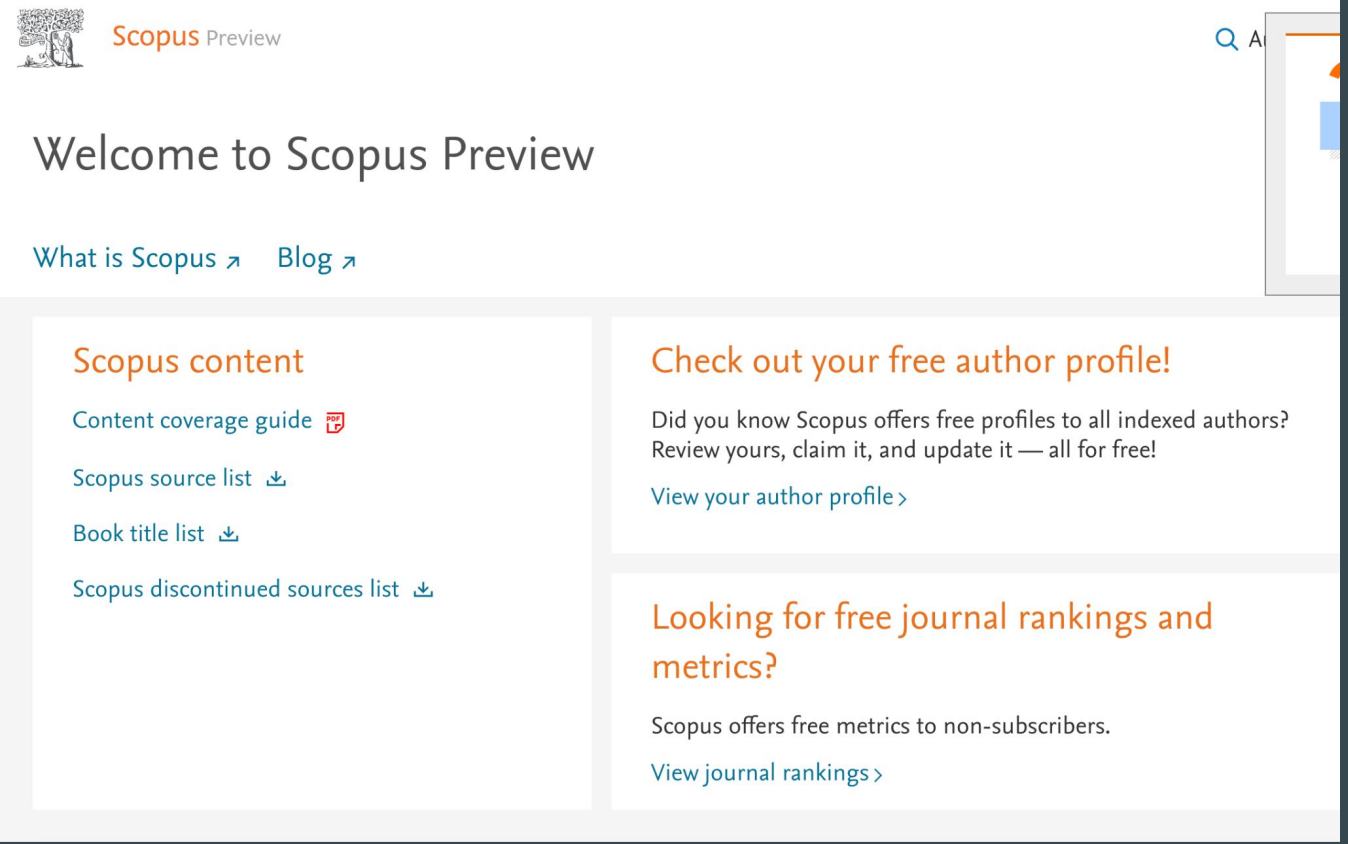
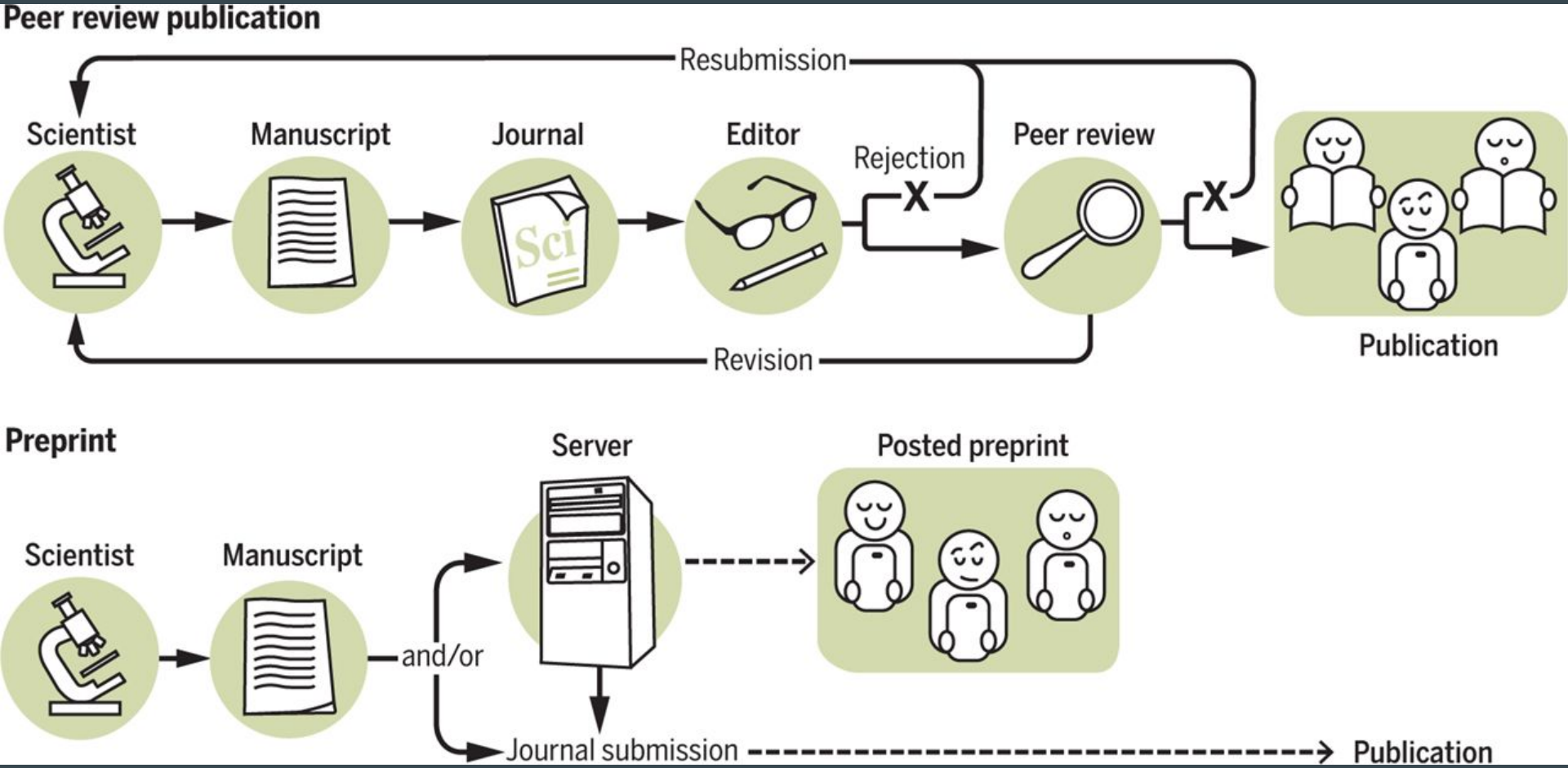


https://www.scopus.com/home.uri?zone=header&origin=AuthorNamesList


Peer review publication
Resubmission
Scientist
Manuscript
Journal
Editor
Rejection
Peer review
Publication
Revision
Preprint
Server
Posted preprint
Scientist
Manuscript
and/or
Journal submission
Publication

TYPE OF SCIENTIFIC PUBLICATIONS

Original Paper

- New research findings
- Detailed description of the study's methodology, data, results, and conclusions
- Usually peer-reviewed before publication.

Review

- Summary and synthesis of the published research on a particular topic
- Analysys of multiple studies, highlighting trends, agreements and discrepancies
- Identification of gaps in the current knowledge + future research directions

TYPE OF SCIENTIFIC PUBLICATIONS

Meta-Analysis

- A specific type of review that statistically combines the results of multiple studies on the same topic.
- Use of quantitative methods to integrate data from various studies, providing a more precise estimate of effects or associations. Meta-analyses often follow systematic reviews.

TYPE OF SCIENTIFIC PUBLICATIONS

Preprint

- **A** version of a research paper preceeding formal peer review and publication in a scientific journal
- It allows researchers to share their findings with the community quickly and receive feedback before official publication.
- Freely accessible online
- arXiv.org - medRxiv -

arXiv.org

Login

Search... All fields Search

Help | Advanced Search

arXiv is a free distribution service and an open-access archive for 1,702,849 scholarly articles in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics. Materials on this site are not peer-reviewed by arXiv.

Subject search and browse: Physics Search Form Interface Catchup

COVID-19 Quick Links

See COVID-19 SARS-CoV-2 preprints from

- arXiv
- medRxiv and bioRxiv

30 Mar 2020: arXiv announces new COVID-19 quick search
12 Mar 2020: arXiv responds to COVID-19 uncertainties

Important: e-prints posted on arXiv are not peer-reviewed by arXiv; they should not be relied upon without context to guide clinical practice or health-related behavior and should not be reported in news media as established information without consulting multiple experts in the field.

See cumulative "What's New" pages. Read robots beware before attempting any automated download

What is an unrefereed preprint?

Before formal publication in a scholarly journal, scientific and medical articles are traditionally certified by "peer review." In this process, the journal's editors take advice from various experts—called "referees"—who have assessed the paper and may identify weaknesses in its assumptions, methods, and conclusions. Typically a journal will only publish an article once the editors are satisfied that the authors have addressed referees' concerns and that the data presented support the conclusions drawn in the paper.

Because this process can be lengthy, authors use the medRxiv service to make their manuscripts available as "preprints" *before* certification by peer review, allowing other scientists to see, discuss, and comment on the findings immediately. Readers should therefore be aware that articles on medRxiv have not been finalized by authors, might contain errors, and report information that has not yet been accepted or endorsed in any way by the scientific or medical community.

We also urge journalists and other individuals who report on medical research to the general public to consider this when discussing work that appears on medRxiv preprints and emphasize it has yet to be evaluated by the medical community and the information presented may be erroneous.

PEER REVIEW IS STILL VALID BUT WITH IMPROVEMENTS

- https://docs.google.com/document/d/1owP9RpeXcSBz6836nvfEIULGaixn8DdbCFI_OOWz_Mo/edit?usp=sharing

OPEN SCIENCE


Scientific publications
Open research data
Open educational resources
Open source software and source code
Open hardware
Open scientific knowledge
Indigenous peoples
Marginalised scholars
Local communities
Open dialogue with other knowledge systems
OPEN SCIENCE
Open science infrastructures
Virtual
Physical
Open engagement of societal actors
Crowdfunding
Crowdsourcing
Scientific volunteering
Citizen and participatory science

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Enter the world of disambiguation and see the instrumental role OpenOrgs plays in curating research organisation affiliations.

Access guides, support, statistics, and more and learn about how you can become a curator yourself!

Check it out

Featured communities

Biodiversity Literature Repository

Browse

A community to share publications related to bio-systematics.

Recent uploads

May 29, 2024 (v1) Dataset Open

Grounding line remote operated vehicle (GROV) exploration of the ice shelf cavity of Petermann Glacier, Greenland

Rignot, Eric

The melting of ice by ocean waters along the periphery of ice sheets is a major physical process driving their evolution in a warming climate. Using the fiber-optic-tethered Grounding line Remote Operated Vehicle (GROV), we explored the ice shelf cavity of Petermann Glacier, in Northwestern Greenland, in May 2023, using a novel interferometric...

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- **Trusted** — built and operated by CERN and OpenAIRE to ensure that everyone can join in Open Science.
- **Citeable** — every upload is assigned a Digital Object Identifier (DOI), to make them citable

European Commission

The European Research Area

What is the European Research Area?

A single, borderless market for research, innovation and technology across the EU...

...where countries come together and improve their research policies and systems...

...and where there is free movement of researchers, knowledge and innovation.

ERA-Milestones

2000 Initially only a theoretical concept dating back to 1973, the European Research Area (ERA) becomes a political project adressing the fragmentation of the EU's research and innovation system.

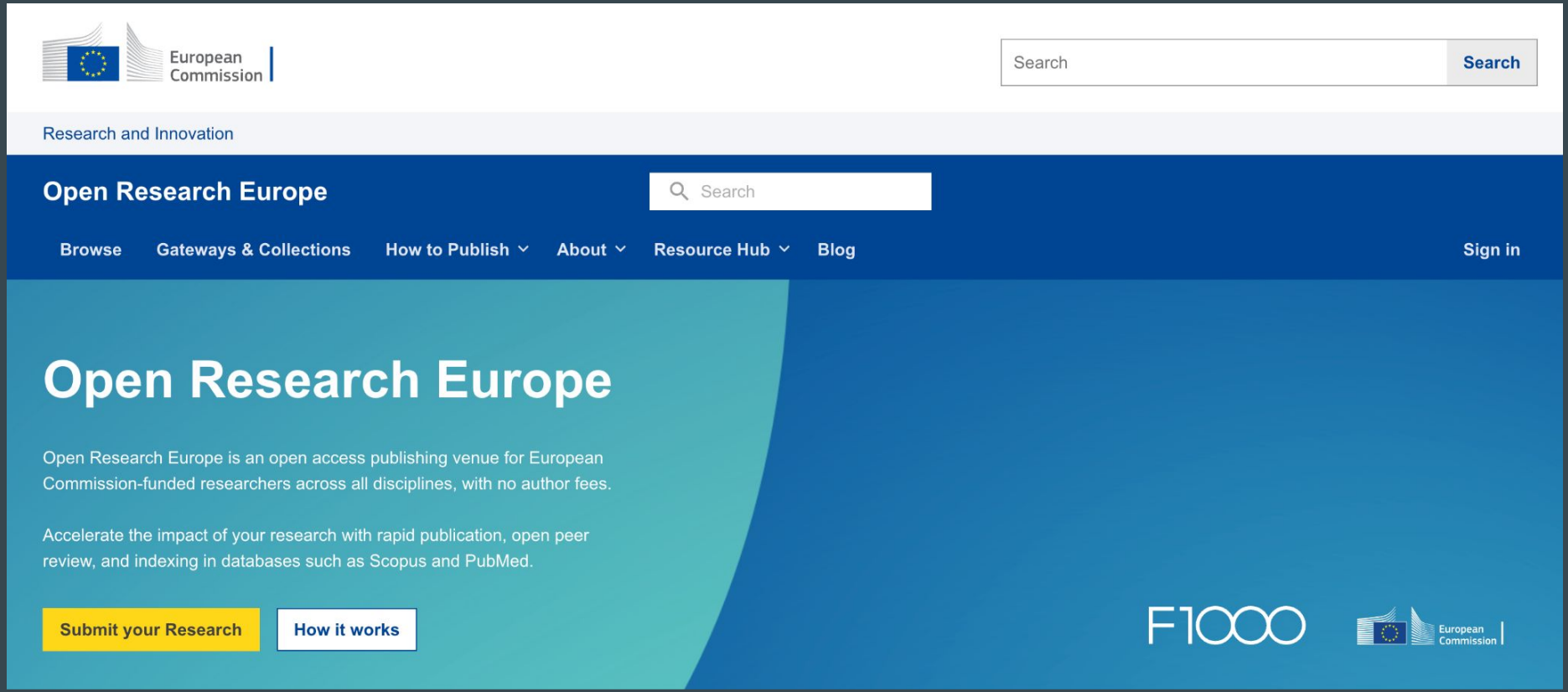
2007 The ERA is recognized through Article 179 of the Lisbon Treaty, which sets out the free circulation of researchers, scientific knowledge and technology.

2009 The Lisbon Treaty enters into force. Besides Article 179, Article 182 (5) gives the European legislator a broad legislative competence for establishing measures necessary for the implementation of the ERA.

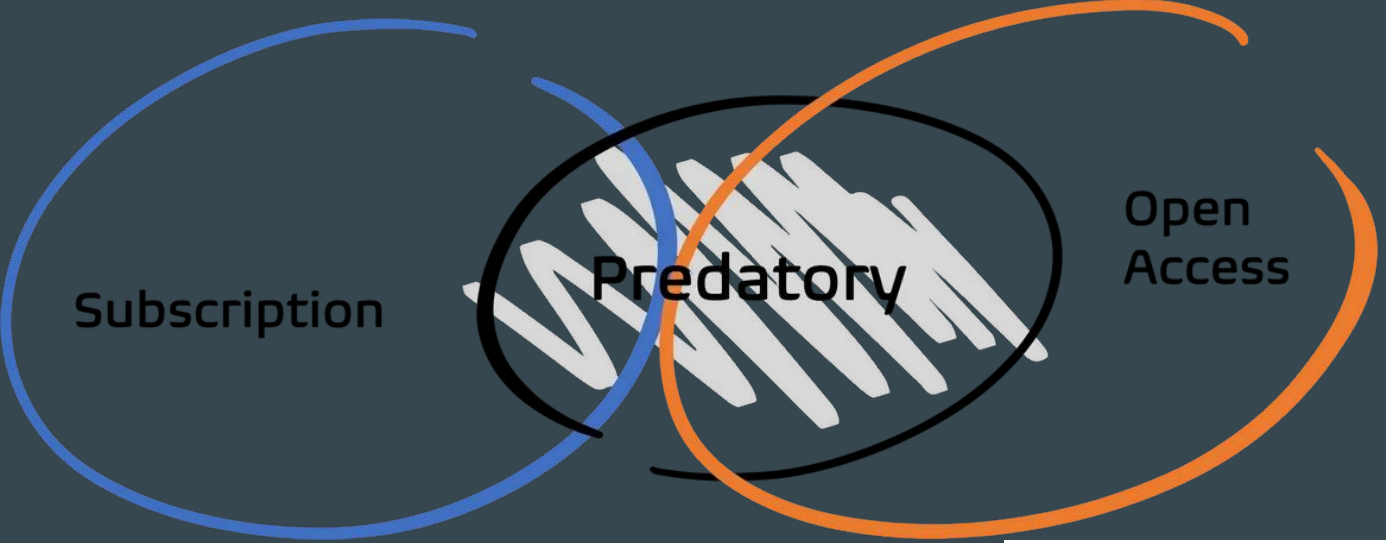
2012-2020 The focus lies on transnational cooperation, gender mainstreaming and the optimal circulation of scientific knowledge; Some achievements include the ERA Roadmap 2015 and National ERA Action Plans 2015-2020, as well as a governance through ERAC and its sub-groups.

2019 Together with the Member States, the European Commission initiates a process to renew the ERA. With its new objectives, the revamped ERA governance responds to new challenges, such as the green and digital transitions.

2021 The new ERA is launched through the adoption of the Pact for Research and Innovation in Europe and the Council conclusions on the future governance of ERA by the Council of the EU, to which the first ERA Policy Agenda 2022-25 is annexed.



https://open-research-europe.ec.europa.eu/



PREDATORY JOURNALS

BEALL'S LIST
OF POTENTIAL PREDATORY JOURNALS AND PUBLISHERS

PUBLISHERS · STANDALONE JOURNALS · VANITY PRESS · CONTACT · OTHER

Search for publishers (name or URL)

Potential predatory scholarly open-access publishers

Instructions: first, find the journal's publisher – it is usually written at the bottom of the journal's webpage or in the "About" section. Then simply enter the publisher's name or its URL in the search box above. If the journal does not have a publisher use the Standalone Journals list.
All journals published by a predatory publisher are potentially predatory unless stated otherwise.

Original list

GO TO UPDATE

This is an archived version of the Beall's list – a list of potential predatory publishers created by a librarian Jeffrey Beall. We will only update links and add notes to this list.

- 1088 Email Press
- 2425 Publishers

Useful pages

List of journals falsely claiming to be indexed by DOAJ

DOAJ: Journals added and removed

Nonrecommended medical periodicals

Retraction Watch

Flaky Academic Journals Blog

List of scholarly publishing stings

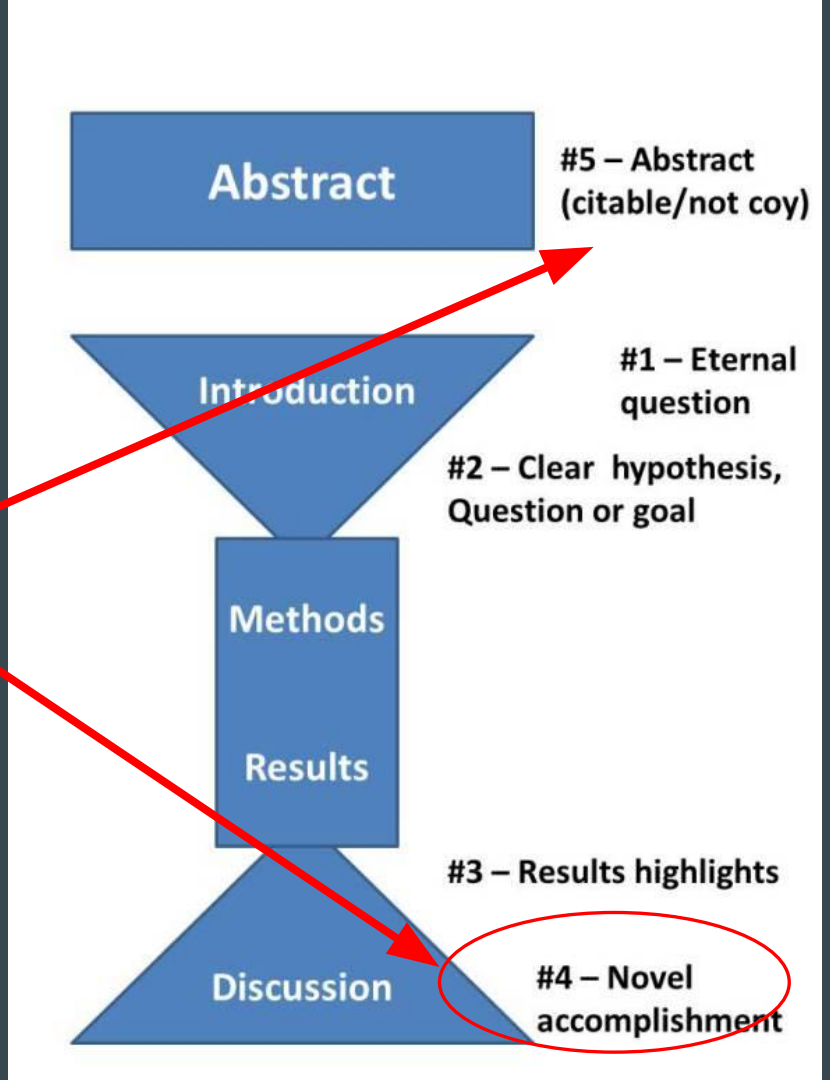
HOW TO READ A SCIENTIFIC PAPER

AN ARTICLE VS. AN ARTICLE

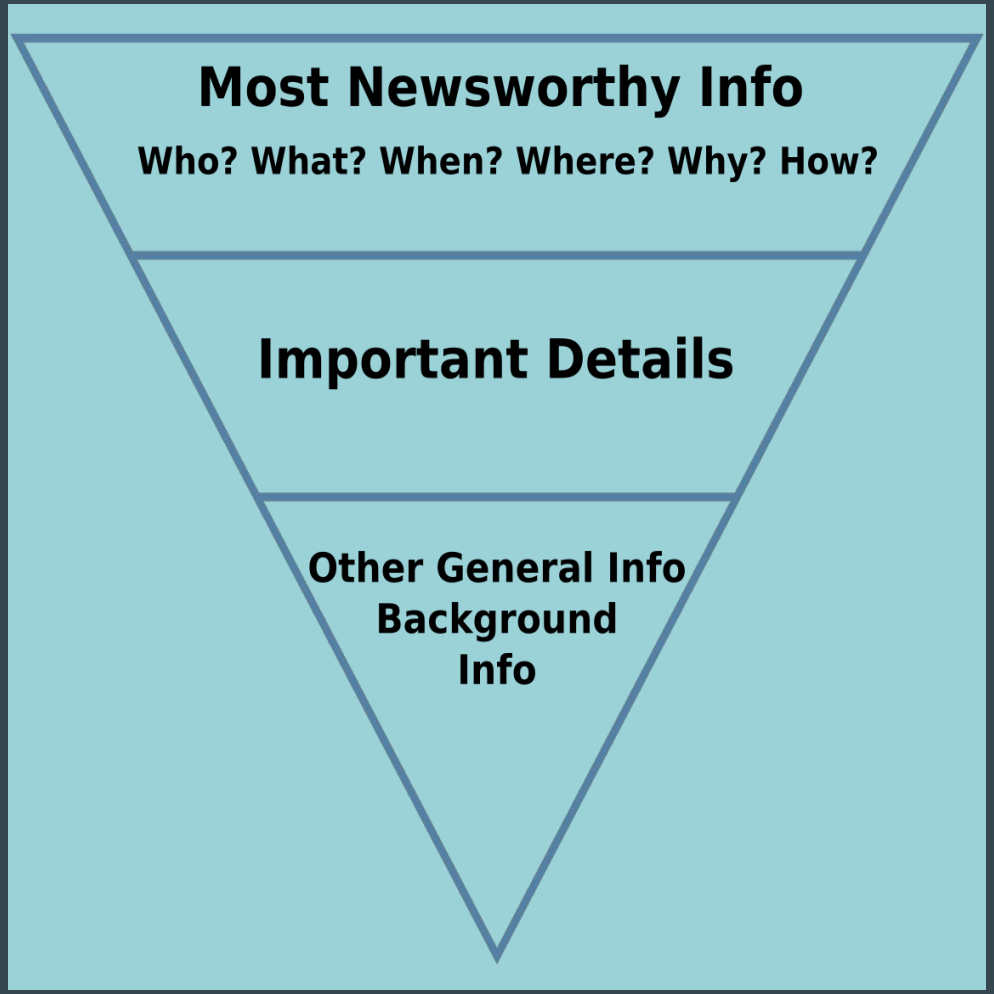
News vs. paper

PAPER STRUCTURE

Main parts of interest for the journalists



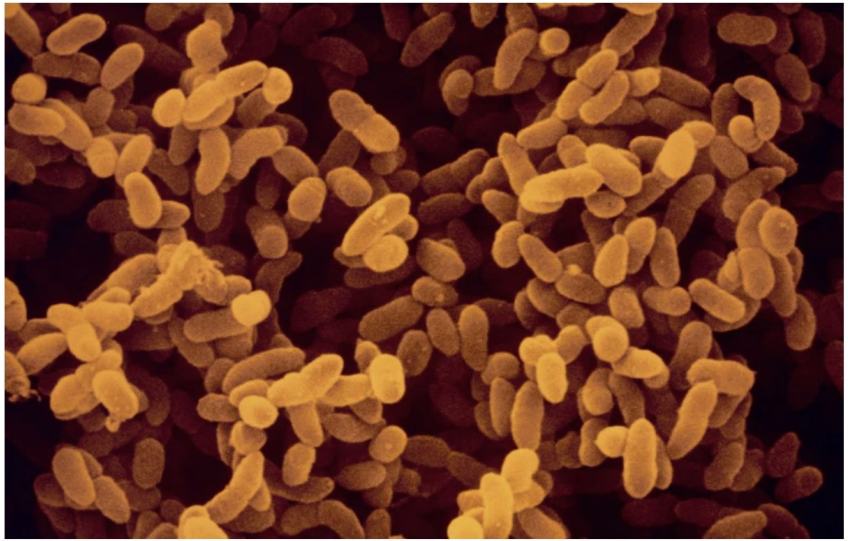
NEWS ARTICLE STRUCTURE



‘Smart’ antibiotic can kill deadly bacteria while sparing the microbiome

Compound called lolamicin targets a group of harmful microbes but does not disturb those that live peacefully in the gut.

By Fred Schwaller



nature

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nature > articles > article

Article | Published: 29 May 2024

A Gram-negative-selective antibiotic that spares the gut microbiome

Kristen A. Muñoz, Rebecca J. Ulrich, Archit K. Vasan, Matt Sinclair, Po-Chao Wen, Jessica R. Holmes, Hyang Yeon Lee, Chien-Che Hung, Christopher J. Fields, Emad Tajkhorshid, Gee W. Lau & Paul J. Hergenrother

Nature (2024) | Cite this article

Metrics

Abstract

Infections caused by Gram-negative pathogens are increasingly prevalent and are typically treated with broad-spectrum antibiotics, resulting in disruption of the gut microbiome and susceptibility to secondary infections[1,2,3]. There is a critical need for antibiotics that are selective both for Gram-negative bacteria over Gram-positive bacteria, as well as for pathogenic bacteria over commensal bacteria. Here we report the design and discovery of lolamicin, a Gram-negative-specific antibiotic targeting the lipoprotein transport system. Lolamicin has activity against a panel of more than 130 multidrug-resistant clinical isolates, shows efficacy in multiple mouse models of acute pneumonia and septicaemia infection, and spares the gut microbiome in mice, preventing secondary infection with *Clostridioides difficile*. The selective killing of pathogenic Gram-negative bacteria by lolamicin is a consequence of low sequence homology for the target in pathogenic bacteria versus commensals; this doubly selective strategy can be a blueprint for the development of other microbiome-sparing antibiotics.

SOURCES OF INFORMATION

TRENDING NEWS RELEASES

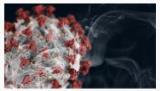
Mussel reefs heighten risk of microplastic exposure and consumption
UNIVERSITY OF PLYMOUTH

New study records dual hand use in early human relative
UNIVERSITY OF KENT

Mars: Where mud flows like lava
CNRS

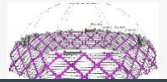
Even biodiverse coral reefs still vulnerable to climate change and invasive species
LANCASTER UNIVERSITY

Smoking increases SARS-CoV-2 receptors in the lung
COLD SPRING HARBOR LABORATORY



Climate change threatens progress in cancer control
AMERICAN CANCER SOCIETY

Double helix of masonry -- Researchers discover the secret of Italian renaissance domes



LATEST NEWS RELEASES

Modified clinical trial protocol created in response to urgency of COVID-19 pandemic
AMERICAN THORACIC SOCIETY — 22m

How to improve the pneumococcus vaccine
AMERICAN SOCIETY FOR MICROBIOLOGY — 2h

How the mouse conquered the house
CNRS — 3h

Cord blood study provides insights on benefits, limitations for autism treatment
DUKE UNIVERSITY MEDICAL CENTER — 8h

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Sali sulle spalle dei giganti

AlphaGalileo

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AlphaGalileo's new site is coming

Whilst we transfer to our new software, our Service will be offline from Friday 6 April at 19.00 GMT until Monday 9 April at 08.00 GMT. We apologise for any problems that this may cause. Content sent to our email upload address will be held securely and managed once we are back online.

Latest news releases

more news releases

Optimism remains in chickens in enriched environments despite 06/04/2018

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April 6, 2018

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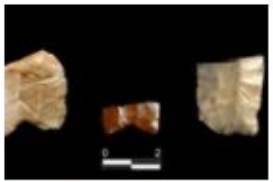
Thousands of Black Holes in Milky Way Center



Spear Points Show Early Peoples Liked to Travel

Apr. 5, 2018 — In a detailed genetic kinship study, an international team is the first to reveal that just like human societies, beluga

› Dolphins and Whales

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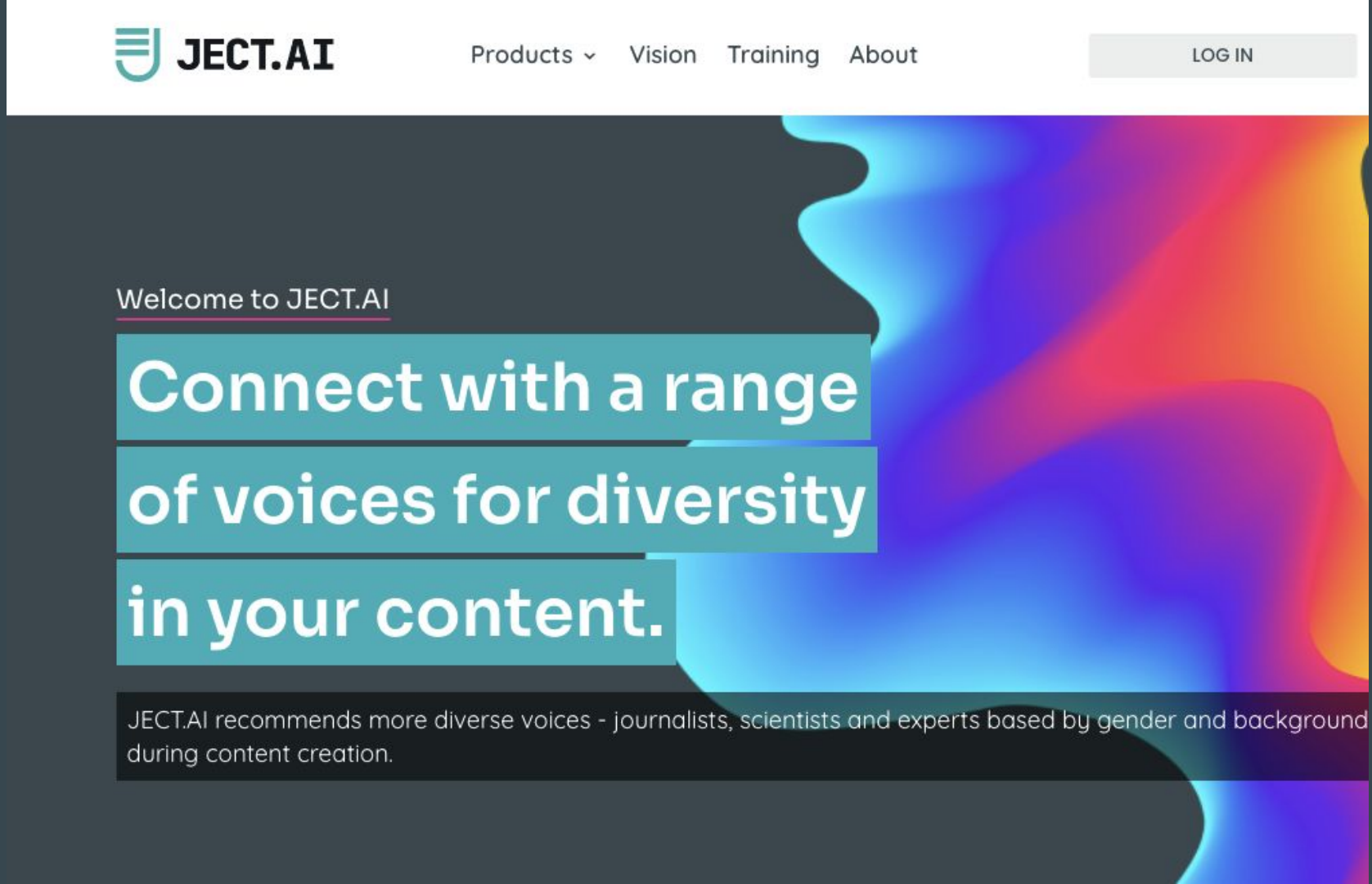
HEALTH

Dietary Supplement Shows Promise for Reversing Cardiovascular Aging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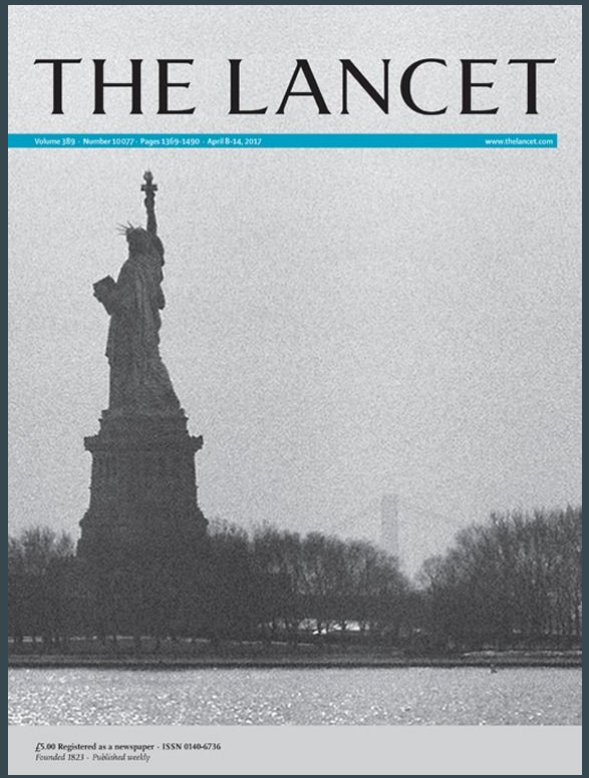
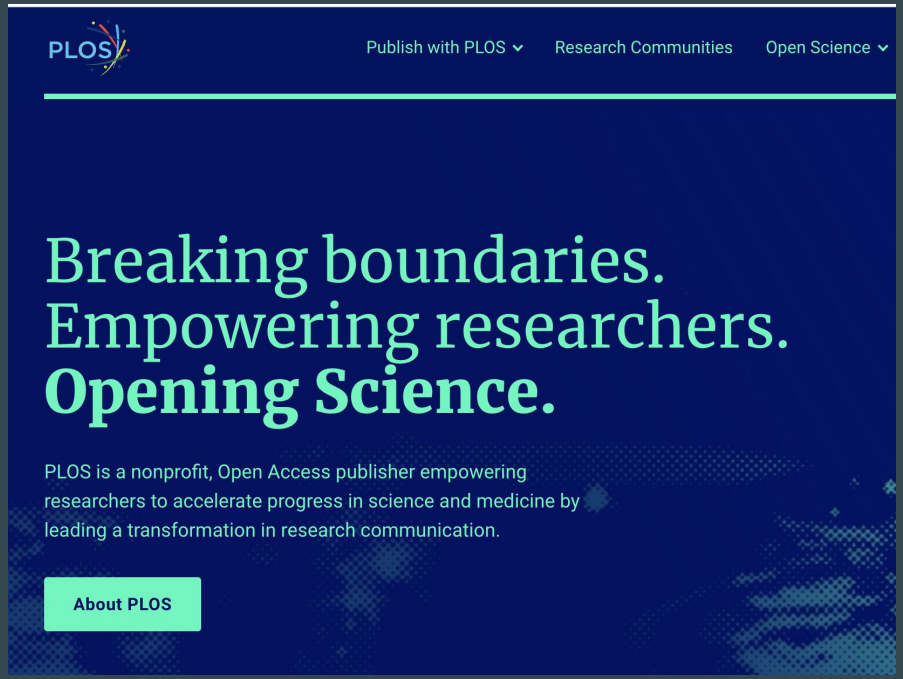
SCIENTIFIC MEDICAL JOURNALS

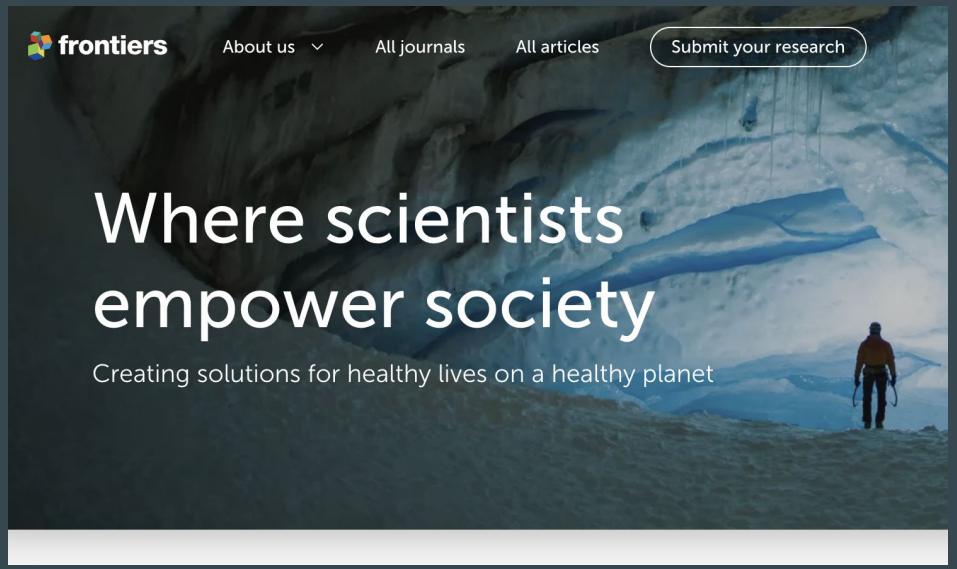


SCIENTIFIC MAGAZINES - NOT SCIENTIFIC PAPERS

- SCIENTIFIC AMERICAN
- NEW SCIENTIST
- SINC
- THE CONVERSATION
- UNDARK
- CARBON BRIEF
- GRIST
- CLEW

LEGIT OPEN SCIENTIFIC JOURNALS

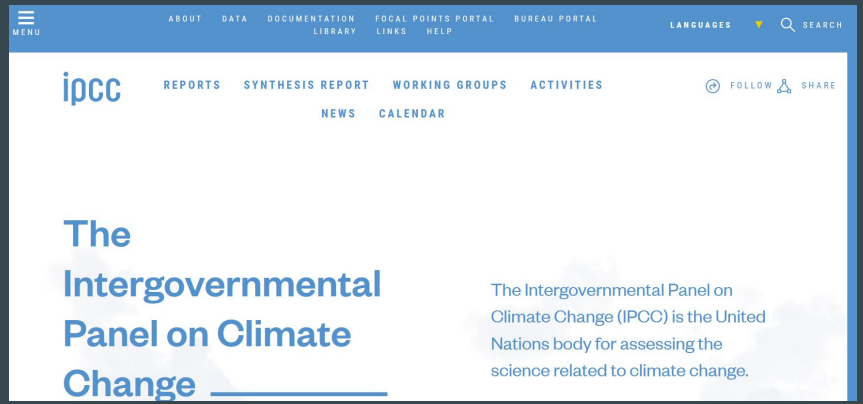




PUBLIC INSTITUTIONS AND INTERNATIONAL ORGANISATIONS

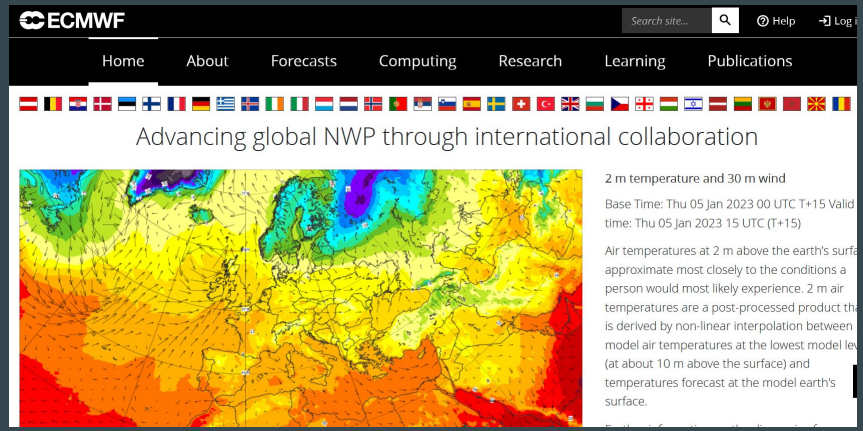
CDC

CENTERS FOR DISEASE CONTROL AND PREVENTION

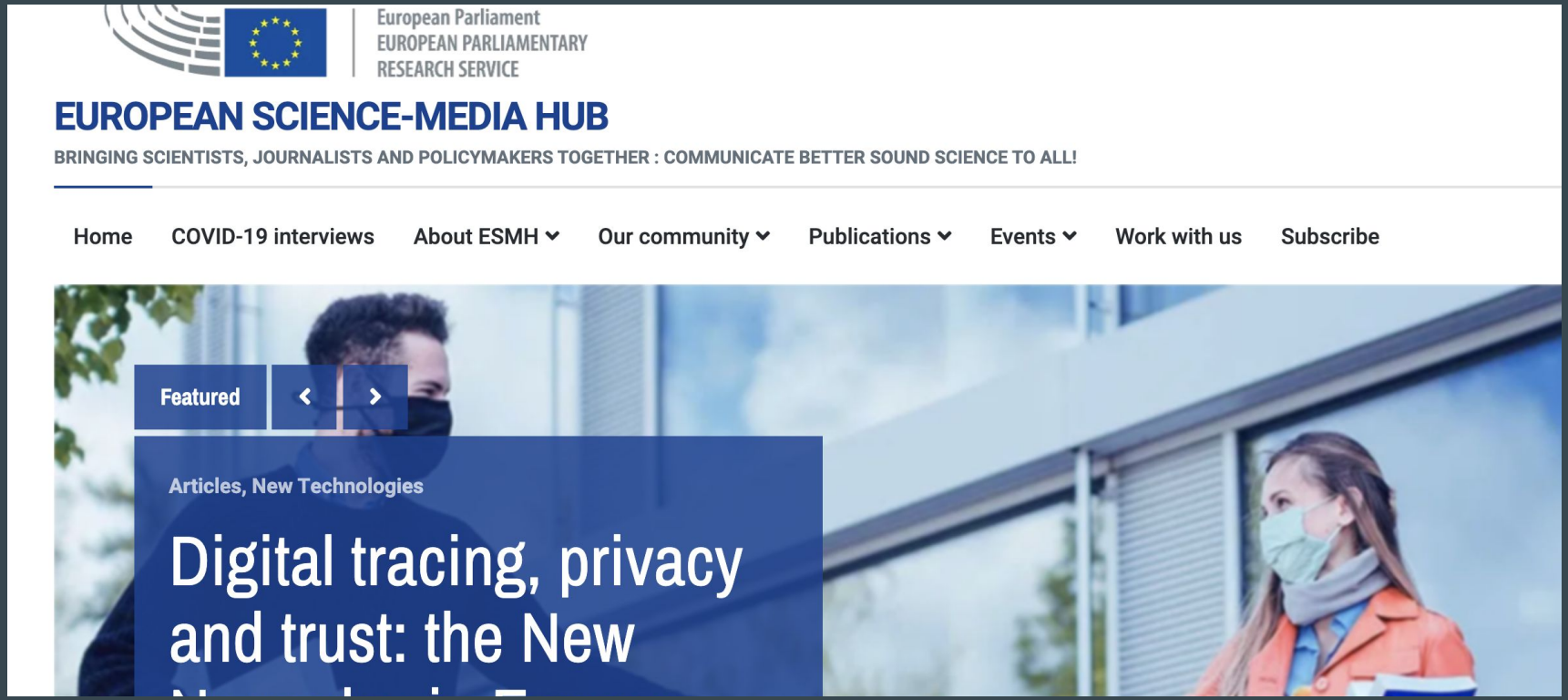


ecdc

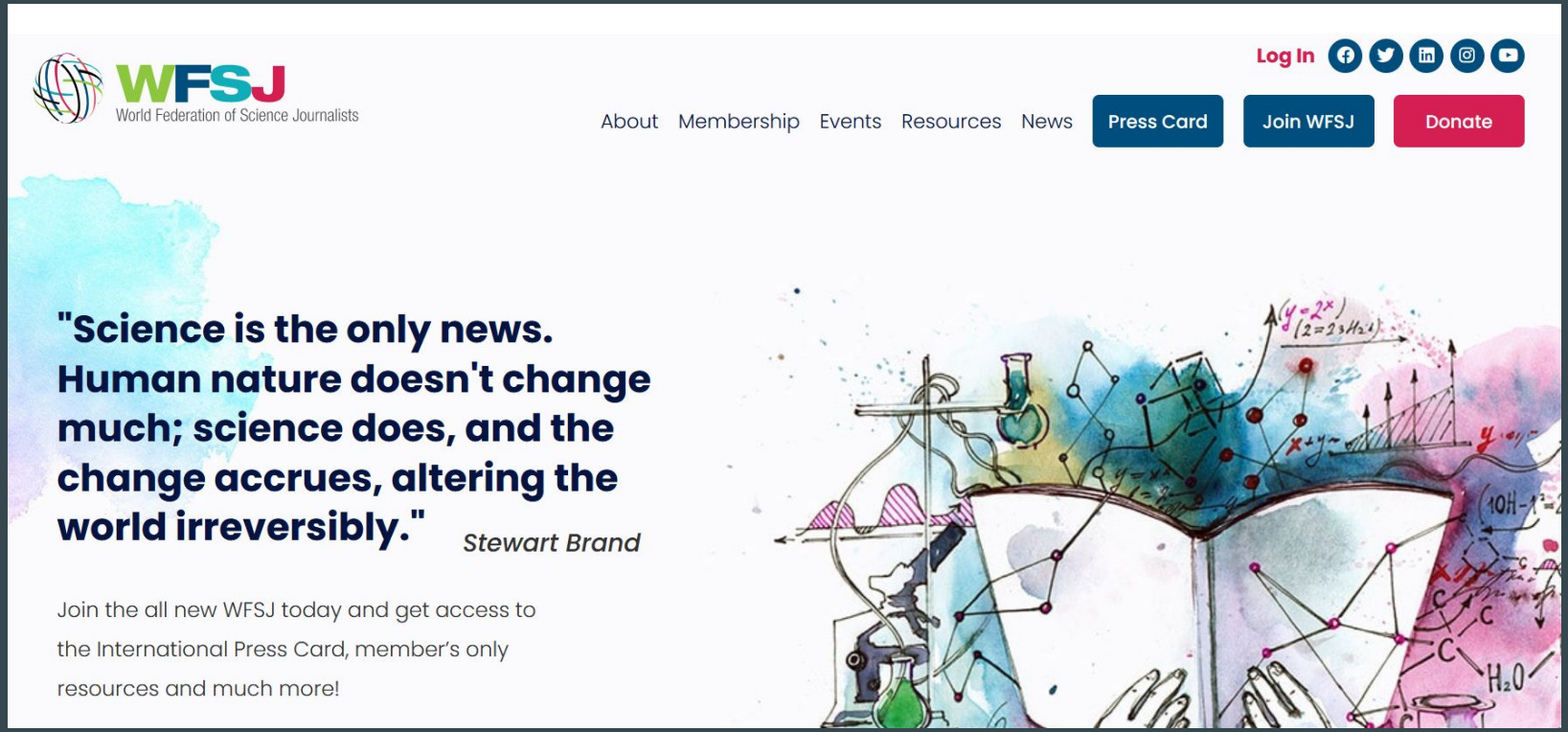
EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL



ESMH - EURO SCIENCE MEDIA HUB



WORLD FEDERATION OF SCIENCE JOURNALISTS



EUSJA

European Union of Science Journalists' Associations

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An open letter from Russian scientists and science journalists against the war with Ukraine

The board of the European Union of Science Journalists' Associations (EUSJA) endorses this open letter written by

ECSJ Conference Report

Conference Report

ECSJ2017 Opening Ceremony at the DR Concert Hall. Photo credit: Yifan Liu

ASSOCIATION OF HEALTH CARE JOURNALISTS

FELLOWSHIP DEADLINE

Learn more about the Health Care Performance fellowship, and pursue a significant project related to the U.S. health care system. Included with the fellowship is a $4,000 project allowance and a $2,500 award. Apply now.

CAREER DEVELOPMENT

Freelancers' directory
AHCJ members who are independent journalists are welcome to post their bios and specialties. Viewing the information is free to assigning editors.

Journalist offers tips for investigating private equity firms

BY MARY CHRIS JAKLEVIC | JANUARY 3, 2023

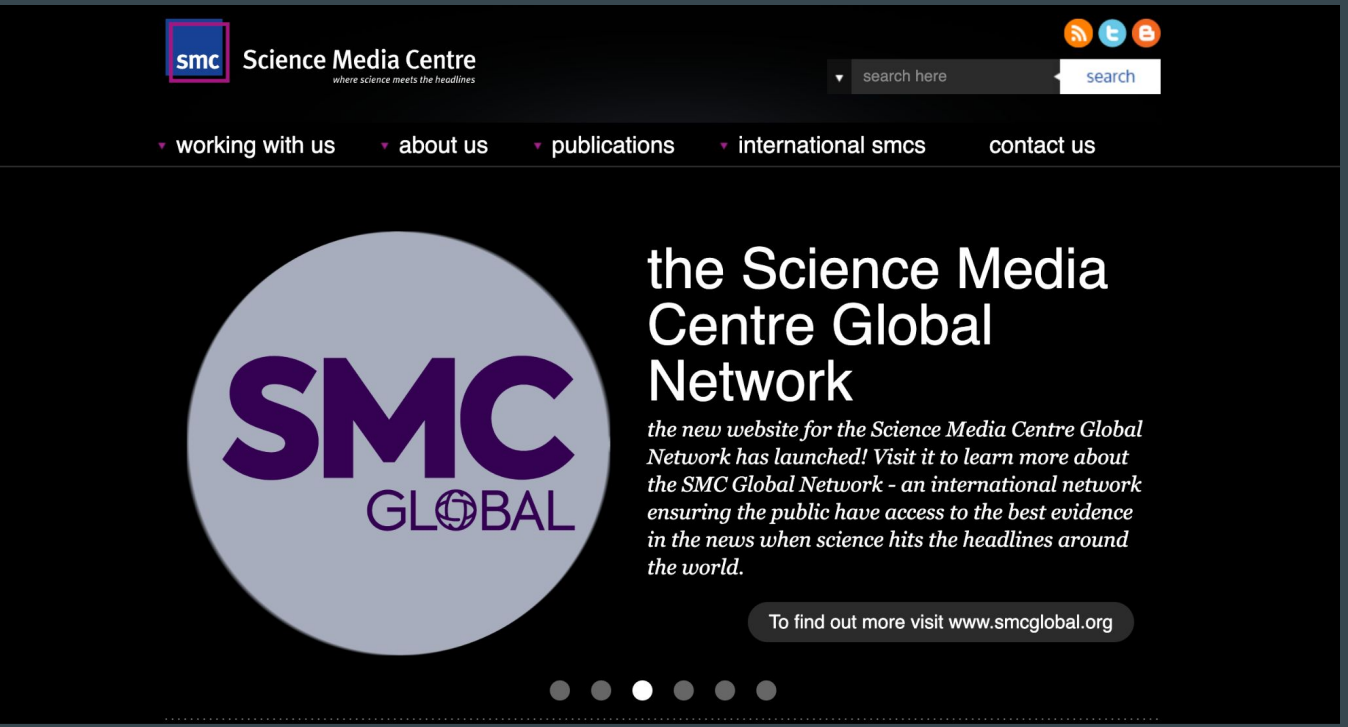
Fred Schulte

Editor's note: This is the second of two posts on covering private equity.

Register today for early-bird discount

WEBCASTS

THE SCIENCE MEDIA CENTERS

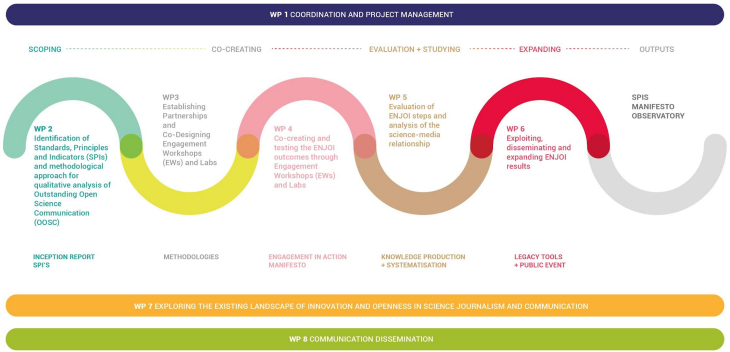


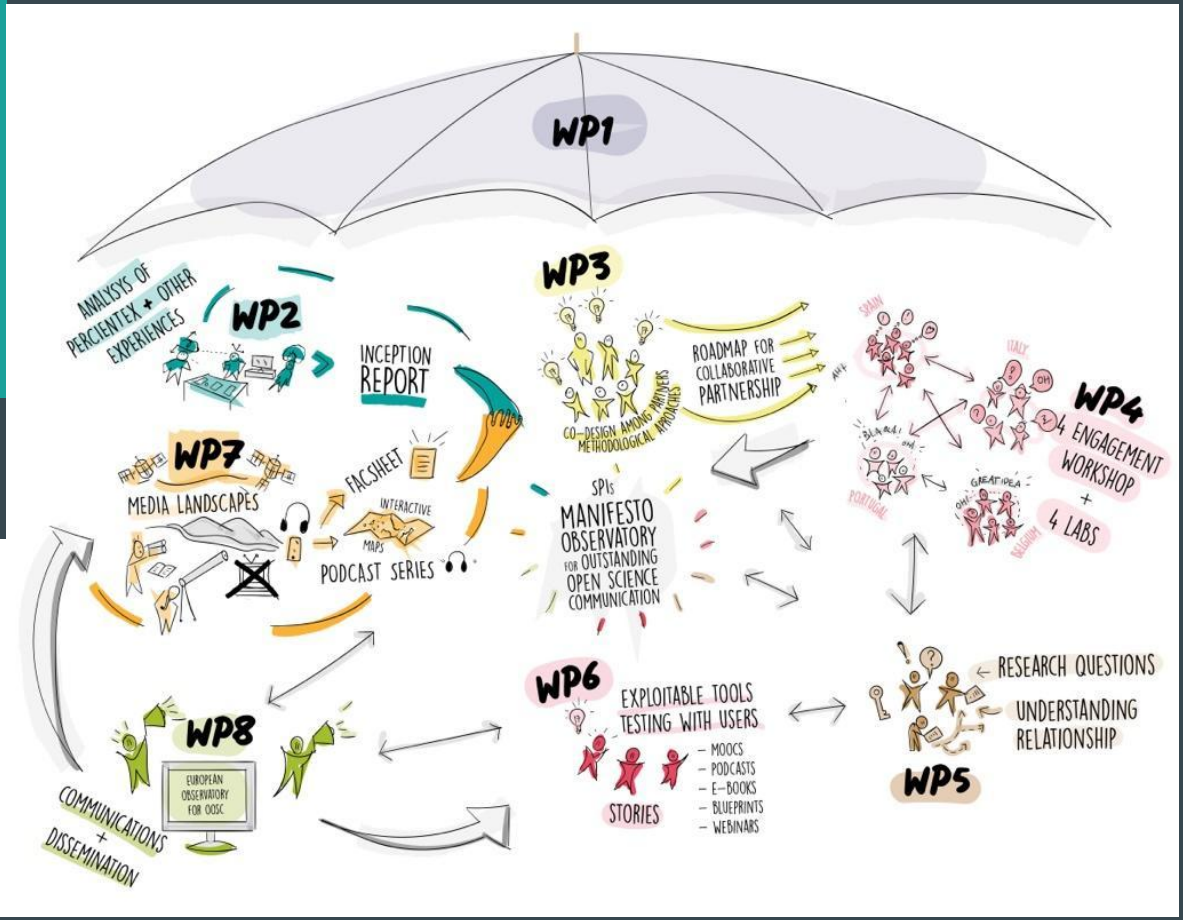
https://www.smcglobal.org/

SPI AND TOOLS

ENJOI

ENgagement and JOurnalism Innovation for Outstanding Open Science Communication





ENJOI SPIS

ENJOI

ENJOI - ENgagement and JOurnalism Innovation for Outstanding Open Science Communication This project received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement n°101006407

PRINCIPLES, STANDARDS AND INDICATORS (SPIS) FOR AN OUTSTANDING OPEN SCIENCE COMMUNICATION

"Principles, standards and indicators (SPIs) should be at the core of a solid ethical and deontological approach to science communication and journalism."

ENJOI

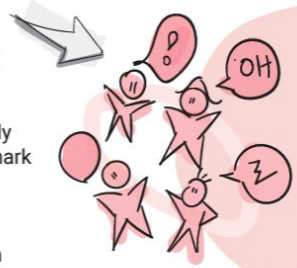
WHAT ARE THE ENJOI SPIs ?

PRINCIPLES

Concepts that serve as foundations and guide the attitude and the conduct of science communicators and journalists. Principles shape the entire communication working framework and ecosystem.

STANDARDS

Reference models that are recognised and used as general rules to measure quality, extent and value in science communication. They need to be widely recognised and accepted as a benchmark or reference point, representing a set of criteria to ensure consistency and reliability in a certain field. There are technical and behavioural standards in communication as in other sectors.



INDICATORS

Indicators: measurable or observable factors, quantitative or qualitative, that help monitor the road towards the application of the principles and standards.

ENJOI

ENJOI'S PRINCIPLES

ETHICS AND DEONTOLOGY

INTEGRITY

Science journalism and communication must be factual, transparent, and respectful of the public. Journalists and their sources should act utterly independent from any external pressure, political or institutional. Communicators should always be transparent if they act on behalf of an institution or any other entity. Conflicts of interest should always be declared. Complete transparency can be fostered by publishing a code of ethics and transparency on the media's website or public profile.

RIGOUR AND COMPLEXITY

Rigour, accuracy, complexity, and uncertainty are innate features of science. They should also be fundamental characteristics of science communication. This applies to any output, from the quick post on social media to the more articulate long-form article or interactive cross-media. To support the development of scientific literacy and nurture critical thinking, science communication should focus more on the process of science-making and not only on the results. Scientific results should never be presented as abiding pieces of truth nor exploited to raise false hopes or expectations. The use of open data and open science allows for cross-verification by an enlarged community, facilitates the understanding of the scientific method and contributes to building trust.

RELEVANCE

The priority of science communication and journalism is to respond to the audience's needs and enable users to incorporate their scientific citizenship rights fully. This can range from cultivating knowledge and enjoying basic science research and its results in looking for solutions, alternatives, and possible applications to face small and big everyday challenges. The first goal of science communication should be to enable citizens to discern among alternatives and make informed choices, particularly on topics that have a substantial impact on their lives as individuals or communities, such as the environmental and global health crises or technological developments and impacts.

ENJOI

ENJOI'S PRINCIPLES

METHODOLOGY AND PRACTICE

ENGAGEMENT
Engagement should not merely be limited to collecting feedback and appreciation for marketing reasons. On the contrary, earnest engagement can play a role in the whole life cycle of information, informing and improving it. It can even become part of new sustainability models in independent science communication and journalism. Various methodologies and practices enable communicators and journalists to connect with people's information needs at the global and local levels and including non-western and indigenous perspectives and voices. Such a deep engagement can help to build a genuine collaborative framework with the public and influence the information agenda. At the same time, engagement should never become a justification for bending science communication to populism and oversimplification.

SOURCES
Science journalism always requires multiple independent and diverse sources, clearly stated and traceable. Particularly on controversial topics, the multiplicity of sources is needed for the communication to be in the public interest. Choosing different experts and voices is functional to reduce the echo chamber and filter bubble effects, where confirmation bias can negatively impact the value of information and hamper critical thinking. Sources should always be protected if and when in a situation of risk.

DIVERSITY AND INCLUSION
Diversity is the best peaceful weapon against polarisation and discrimination. Science communication and journalism should thrive to include voices, perspectives and contributions from different demographics, cultures, and psychographics, with special care to gender and diversity. The digital environment brings new opportunities, but algorithms, AI tools, and metrics can also be associated with biases and amplify discrepancies and inequalities. Responsible communication considers the social, philosophical and legal aspects entwined with these innovations, not just the technological ones. Adopting the lens of intersectionality helps to understand the combination of causes that might create concrete obstacles for people to access science in different contexts. The contemporary science communication challenge, even within the European region, requires recognising the influence of our colonial past on the current structure and dynamics of the scientific ecosystem and valorising non-Western only stories, voices, and perspectives, with particular attention to avoiding post-colonial narratives and attitudes.

ENJOI'S PRINCIPLES

IN THE PUBLIC INTEREST

KNOW YOUR AUDIENCE
There is no general public in the contemporary globalised and digitalised society anymore. Audiences are diverse, fragmented, and connected by different interests, political views, education, needs, ages, languages and purposes. Mapping the niches, listening to and cultivating audiences through diverse tools and methodologies is a crucial asset for journalists and science communicators. Understanding public concerns is pivotal to building trust with readers and users.

ACCESSIBILITY
Science communication should not solely target science enthusiasts and people with previous science knowledge. On the contrary, science information is even more crucial for citizens who, despite not having any science education, are called to partake in health, environmental, and technological decisions. Special care should then be given to ensuring that scientific information is fully accessible to individuals from less science-educated, hesitant or disadvantaged groups.

IMPACT
Science communication and journalism are relevant and valuable if and when they significantly impact the public at different levels. The impact can result in various outcomes, from raising a basic level of awareness to fostering a more complex and proactive level of actions, individual or collective, promoting beneficial behaviours, changes and societal transformations.

ENJOI'S STANDARDS

ETHICS AND DEONTOLOGY

- To become familiar with the way the science ecosystem works produces and the knowledge
- To nurture and adopt a critical and sceptical attitude towards all sources, inclu primary ones, verifying independently any piece of information - i.e., to be critic science and not cheerleaders
- To foster collaboration and not competitiveness with the potential sources
- To avoid partisan coverage or false balance
- To be representative of the current debate on controversial issues in terms of and weights of the diverse positions within the scientific community
- To embrace complexity and uncertainty and incorporate them into the final pr
- To foster objectivity, when feasible, but even more transparency, mainly when controversial issues or dealing with risk communication
- To describe the historical, political, social and economic framework in a transp trustworthy fashion to connect science with society
- To detail and make available the methodology used to validate the reported da information and to craft the communication output

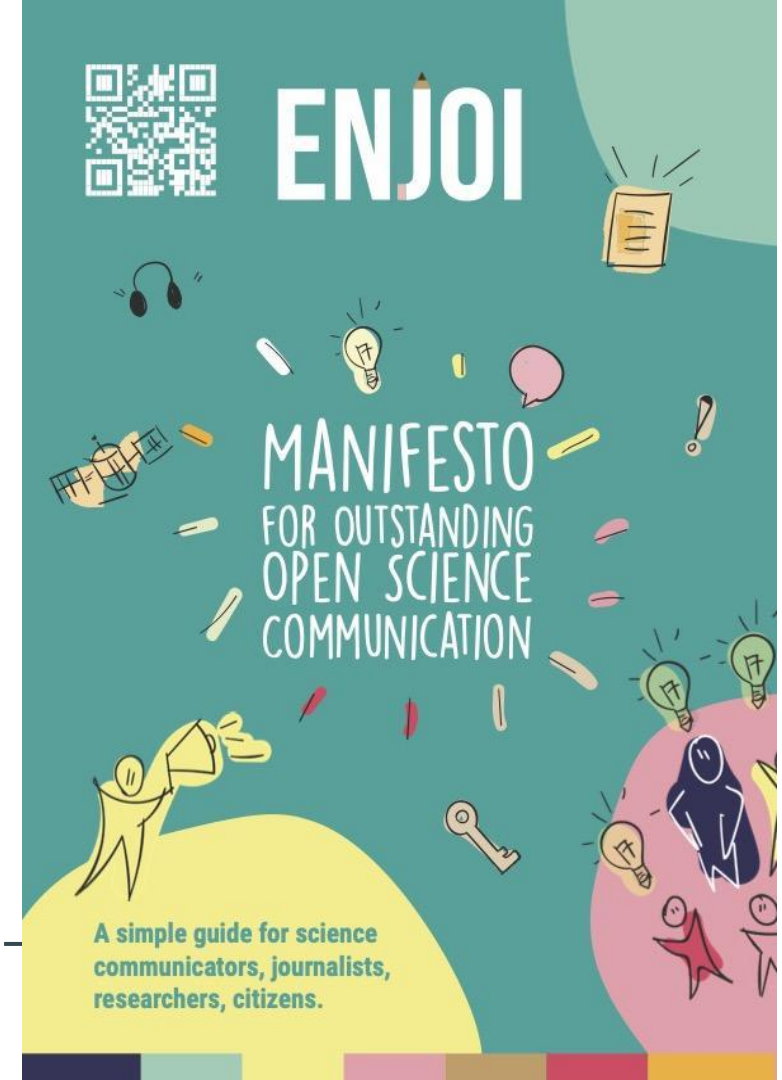
METHODOLOGY AND PRACTICE

- To create conditions for collaborative efforts between scientists, citizen scientists journalists and communicators from the inception of a reporting project or communic strategy
- To give voice to stakeholders close to the treated issue who can offer a close and dir perspective
- To know your beat: journalists and communicators gain familiarity with the topic they are covering, particularly when complex and/or controversial, to avoid misinforming, b misled or even manipulated
- To choose diverse sources (in terms of age, sex, gender, origin, status and career sta giving the appropriate recognition to young and less famous protagonists
- To involve independent fact-checkers and/or qualified experts in the validation proce the collected information, avoiding always resolving to the usual ones
- To foster a two-way dialogue to establish a loyal community around the reporting/ communication project, adopting a range of tools to maintain a regular, periodical, cor conversation
- To verify every piece of information and source, making them re-traceable while appl all security measures for sources at risk
- To declare any potential conflict of interest of the sources
- To use preferentially open sources and open science to enable access to the original information

IN THE PUBLIC INTEREST

- To select and use tools to better segment the audience, describing the personas detailing their information needs
- To involve a diverse multidisciplinary and multi-expertise team in the design and production process
- To make science communication more reflective of the current emergent society rather than the traditional, patriarchal one that has shaped science and its communication for decades
- To craft stories that are representative and related to the target audience, to enhance cognitive and emotional engagement
- To avoid jargon as well as oversimplification, particularly when discussing technical issues and data or when discussing complex or risk-related topics
- To use formats, language and layouts, as well as any narrative expedient, adjusted to the selected type of audience
- To include links or other clear indications to allow access to data, sources or any other critical piece of information
- To take special care when using data visualisations to make sure they are appropriately designed to facilitate comprehension and to avoid merely esthetical use of data
- To reduce digital oblivion, facilitating online permanence and access to relevant content also in the long term

ENJOI MANIFESTO



DEEPENING THE ROOTS

The future growth of science communication depends on the strength of its roots, especially in contexts where they are challenged by the fragility of the media ecosystem. Independence, honesty, integrity, transparency, rigour, and the use of independent and diverse sources are basic principles of high-quality communication that remain essential and non-negotiable.

On top of that, good science communication needs to convey the full complexity of science.
This implies focusing not only on scientific results, but also on the process behind them, and unravelling the connection of science with society. Ultimately, science communication should respond to the rights and needs of citizens, and not to other interests.
Citizenship is fragmented into a variety of niches.

It is crucial to understand these niches and tailor communication through a variety of strategies suitable to each one of them. It is especially important to make science accessible to audiences unfamiliar with it and to disadvantaged groups.

Citizens are not mere receivers of information. Real engagement goes beyond sporadic feedback. It requires building a true collaborative framework, and ultimately, a community that takes part in a two-way dialogue.

Science communication is relevant if it generates an impact, which can range from awareness to action. Tools to gauge and improve this impact are increasingly important in the craft.

BEARING NEW FRUITS

ENJOI envisions a set of trends that are likely to shape the future of science communication. These trends open up new spaces and require a critical stand, because they pose both challenges and opportunities.
Science communication happens increasingly in digital platforms, especially in social media. The enormous opportunities of this digital agora are balanced by the challenges posed by algorithms, artificial intelligence, virality, and metrics. Responsible innovation takes into account social, philosophical, ethical, and legal aspects, and not only technological ones.
Engagement is becoming ever deeper. Rather than being a single step, it plays a role in the whole life cycle of information. This is already affecting the information agenda and the way communication is designed. Engagement provides the opportunity of meaningful two-way dialogue, but should avoid the risk of bending science communication to populism. Rampant polarisation is affecting science communication. Partisanship and false balance are two risks of this situation. Science communication has the opportunity to shape its messages in such a way as to bridge the gaps between opposing factions. But this should not result in self-censorship to avoid backlashes.

Inclusion is cutting through all aspects of science communication. In sharp contrast with the past homogeneity, diversity is set to become a guiding principle, not just in formal and linguistic terms, but at deeper levels, from the choice of sources to the ways contents are distributed.
The urgency of health and environmental crises is pushing science communication to focus on solutions. Beyond portraying facts, science communication is likely to explore more often the possible courses of action.

The spirit of open science is impregnating science communication too, not only with special attention to open access sources, but also with a broader commitment towards making science communication itself open.

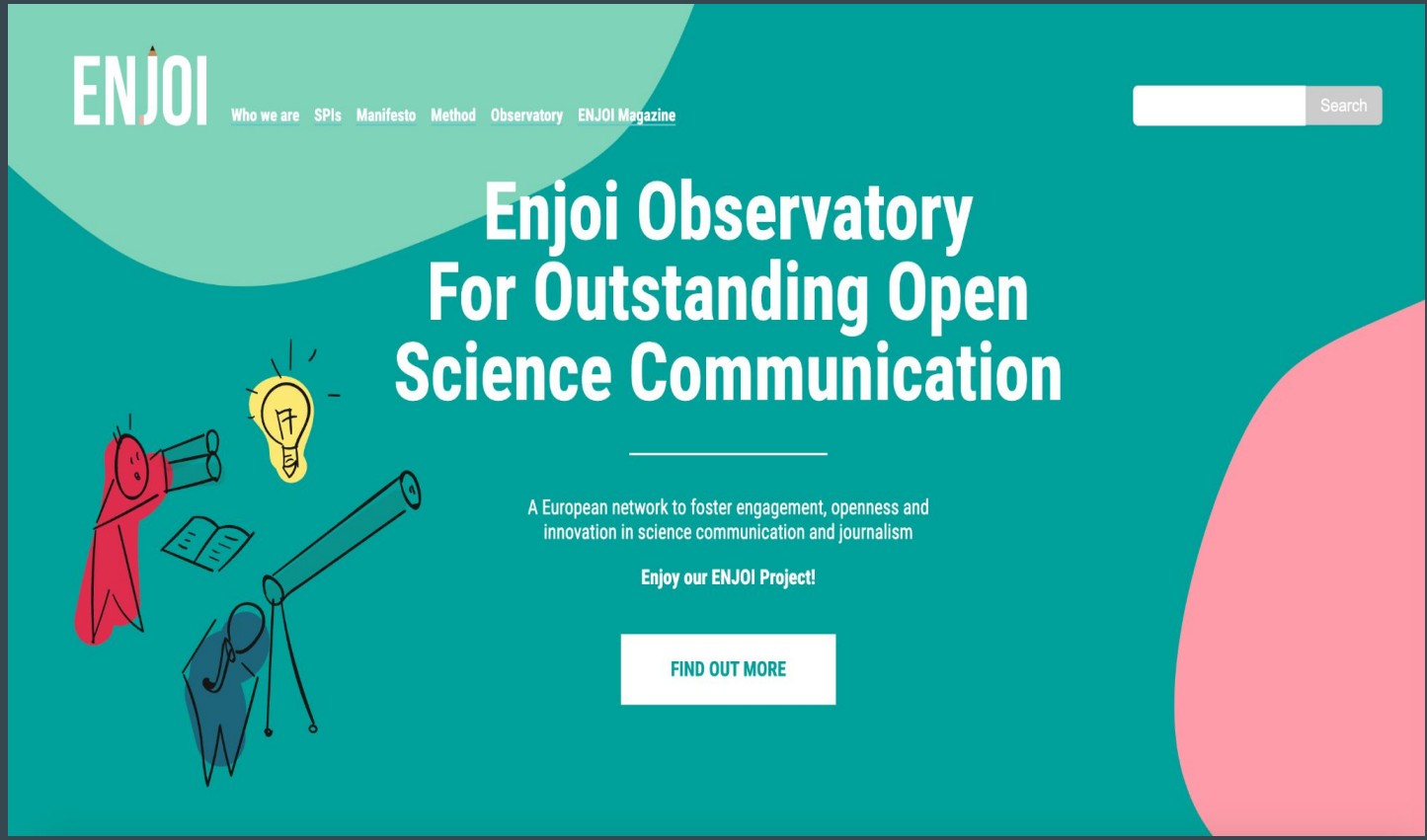
A LIVING DOCUMENT

The ideas outlined in this manifesto are expanded into ENJOI's SPIs and reports and represent the foundations of the future ENJOI Observatory.
These tools are aimed at applying the concepts of the manifesto in the teaching, research, and practice of science communication.

The manifesto is not written in stone: it is an open-ended, living document that will be tested with our advisory board, experts, and engaged communities.

We hope this text will provide a solid and fertile ground for the growth of the scienc communication of the future.

ENJOI OBSERVATORY



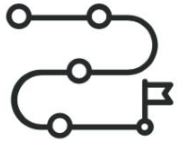
COALESCE

coalesceproject.eu

THE PLATFORM

Which resources, tools, services will be accessible?

Centralized virtual platform and national, regional and local hubs Co-creation, Mutual Learning and networking opportunities



Rapid mobilization of scicomm in times of crisis whilst fighting misinformation and enge

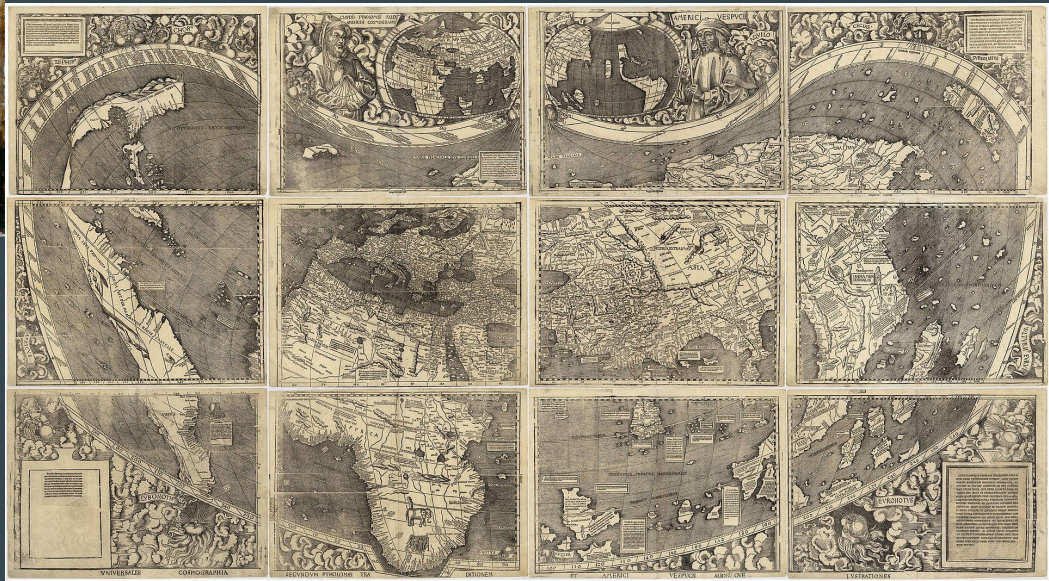
Policy recommendations, guidelines, and strategies to influence scicomm policy agendas at the EU level

COALESCE SciComm Academy offers certified training opportunities and capacity building to R&I actors across the ERA

Accessible library of critical resources, toolkits, handbooks and **matchmaking tool** between scientists, scicomm professionals and journalists

DECOLONISING SCIENCE

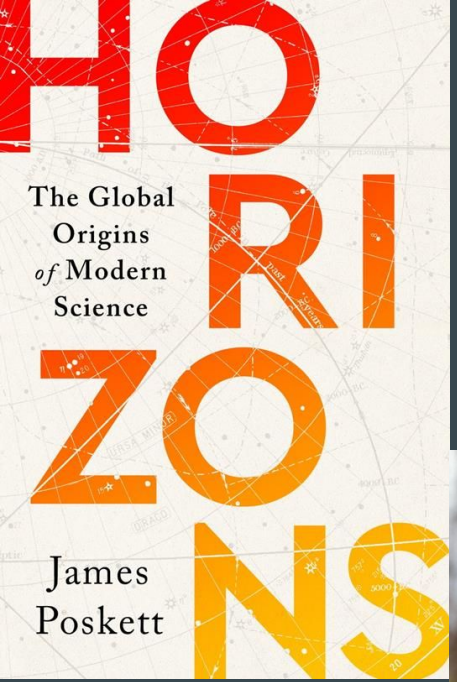
THE AGE OF DISCOVERIES

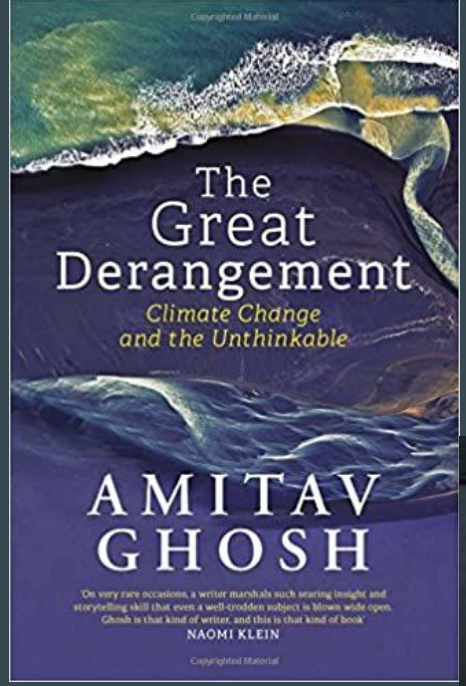


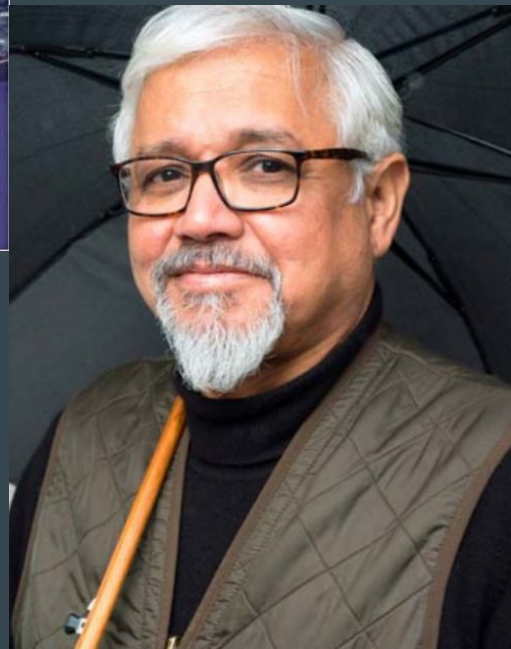
THE CONVERSATION
Academic rigour, journalistic flair

Director of science at Kew: it's time to decolonise botanical collections

Published: June 19, 2020 3.11pm CEST


HORIZONS
The Global Origins of Modern Science
James Poskett


The Great Derangement
Climate Change and the Unthinkable
AMITAV GHOSH
'On very rare occasions, a writer marshals such searing insight and storytelling skill that even a well-trodden subject is blown wide open. Ghosh is that kind of writer, and this is that kind of book'
NAOMI KLEIN

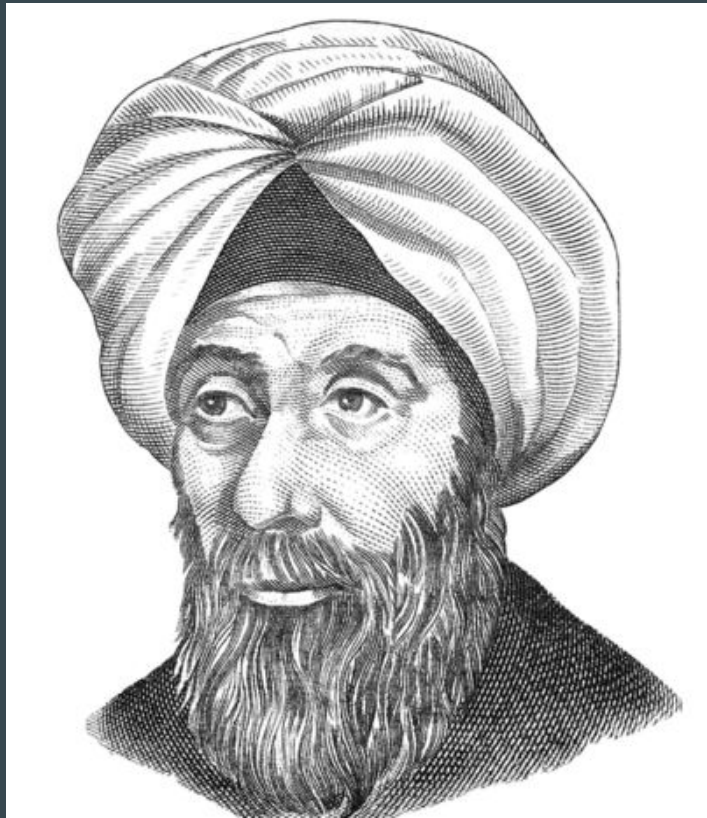


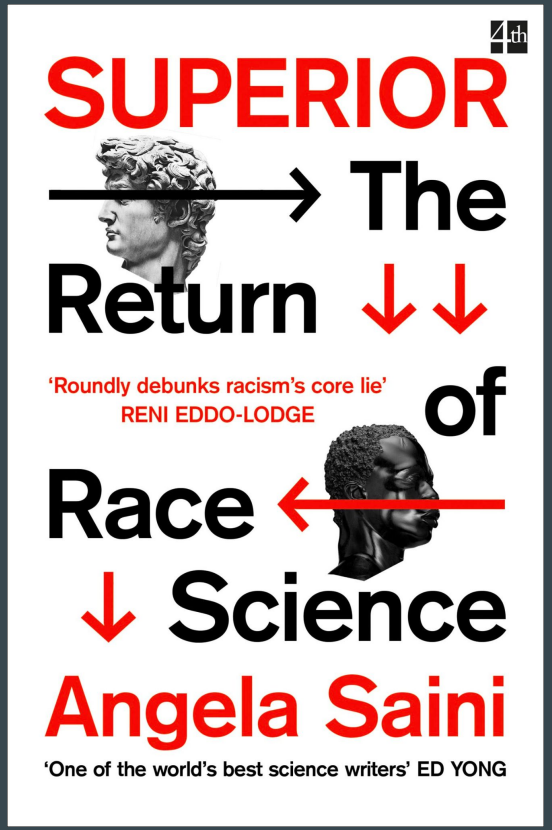
HELIOCENTRISM: FROM THE ISLAMIC WORLD

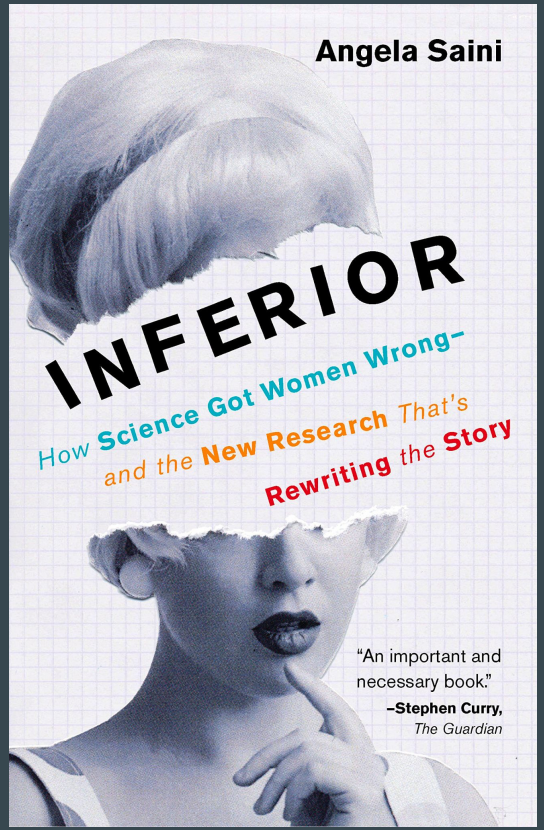
Important cities for astronomy during the so-called Middle Ages: Cairo, Basra, Samarcanda, Timbuctù, Granada

1028: **Ibn al-Haytham** (Alhazen) at Cairo writes a book *Doubts Concerning Ptolemy*

Importance of commercial routes (caravan)




4th
SUPERIOR
The
Return
of
Race
Science
'Roundly debunks racism's core lie'
RENI EDDO-LODGE
Angela Saini
'One of the world's best science writers' ED YONG


Angela Saini
INFERIOR
How Science Got Women Wrong–
and the New Research That's
Rewriting the Story
"An important and
necessary book."
–Stephen Curry,
The Guardian

JCOM

RESPONSIBLE SCIENCE COMMUNICATION ACROSS THE GLOBE

Responsible science communication in Africa: rethinking drivers of policy, Afrocentricity and public engagement

ELIZABETH RASEKOALA

(President, African Gong)

WOMEN AND SCIENCE: THE MATILDA EFFECT

...

THE MATTHEW EFFECT

Parable of the Talents

“For to everyone who has will more be given, and he will have abundance; but from him who has not, even what he has will be taken away”.

—Matthew 25:29

Popular say:

"the rich get richer and the poor get poorer"

THE MATTHEW EFFECT

In sociology:

Eminent scientists will often get more credit than a comparatively unknown researcher, even if their work is similar; credit will usually be given to researchers who are already famous.

Based on the research of Robert K. Merton in the 1960s

FROM MATTHEW TO MATILDA

«The 'Matthew Effect' as coined by Merton in 1968, applied chiefly to and applauded the first half of Matthew 13:12 - the over-recognition of the already prominent or prominently-placed. Yet the phenomenon described in the second half of the parable has (as befits its message) received less attention, though it is a fairly common occurrence, especially in women's long historic existence in science. Rather than denying that this is the case, as has been the sociologists' practice to date, the sexist nature of much of the women's systematic under-recognition should be acknowledged, noted and even highlighted in the sociology of knowledge or science, as in a named 'effect'.»

Margaret W. Rossiter - The Matthew Matilda Effect in Science
Social Studies of Science, Vol. 23, No. 2 (May, 1993), pp. 325-341

The Matilda Effect

The Matilda Effect is a bias against acknowledging the achievements of women scientists whose work is attributed to their male colleagues.

The Matilda Effect

Matilda Joslyn Gage

(24 march 1826 – 18 march 1898)

1870: Book: *Woman as Inventor*

Emmy Noether (1882 - 1935)

Noether's Theorem

→ it solves a fundamental question in the theory of general relativity.

Emmy Noether (1882 - 1935)

“It really impresses me that someone can understand issues like this from such a general point of view. It wouldn't have been bad to send the old guard of Göttingen to school with Fräulein Noether. She certainly knows her job well”

(Albert Einstein on Noether)

Emmy Noether (1882 - 1935)

Noether **cannot go to university** until the beginning of the twentieth century in Germany (and not only) and for a special dispensation.

She managed to complete her PhD only in 1907, but no university offered her a job because she was a woman: it was not expected.

David Hilbert continues to refer to Noether as HE

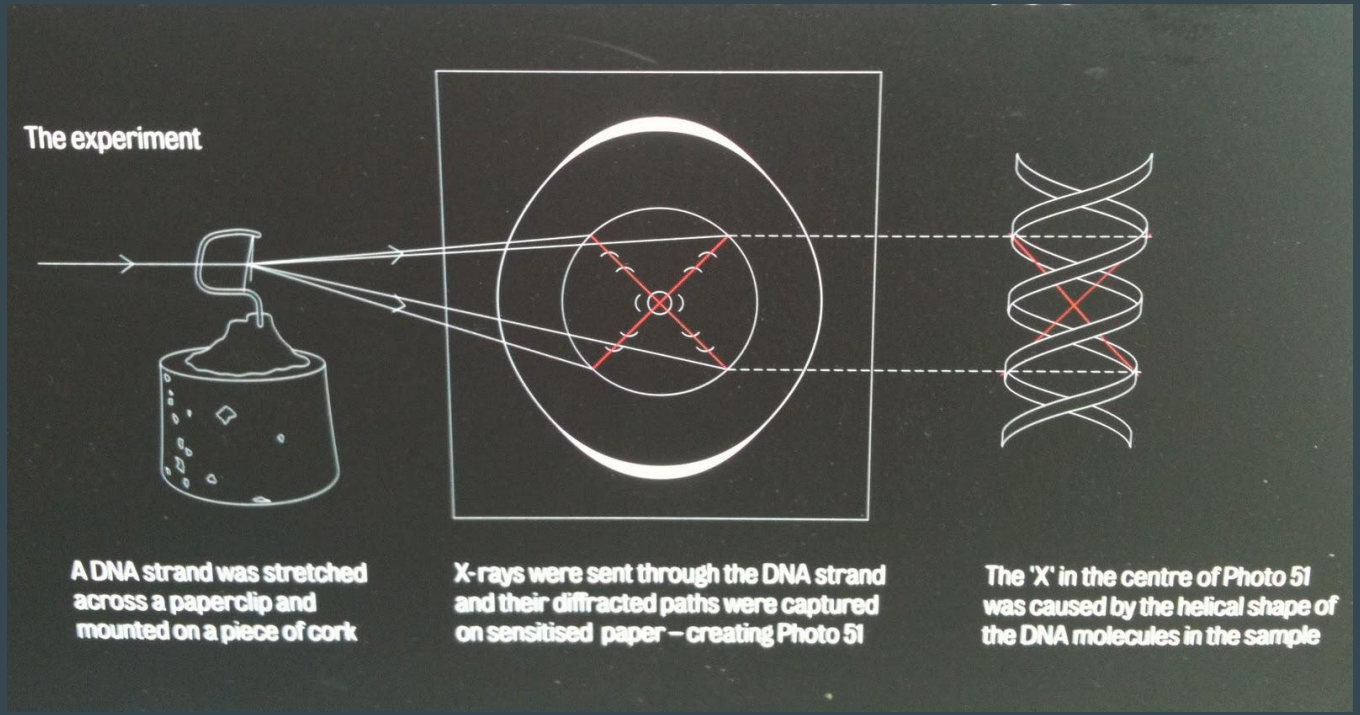
Emmy Noether (1882 - 1935)

- Double discrimination (intersectional?): She was of Jewish origin
- In the US she struggles to fit in
- She died shortly after emigration

Rosalind Franklin (1920 - 1954)

Photograph 51

Photograph 51



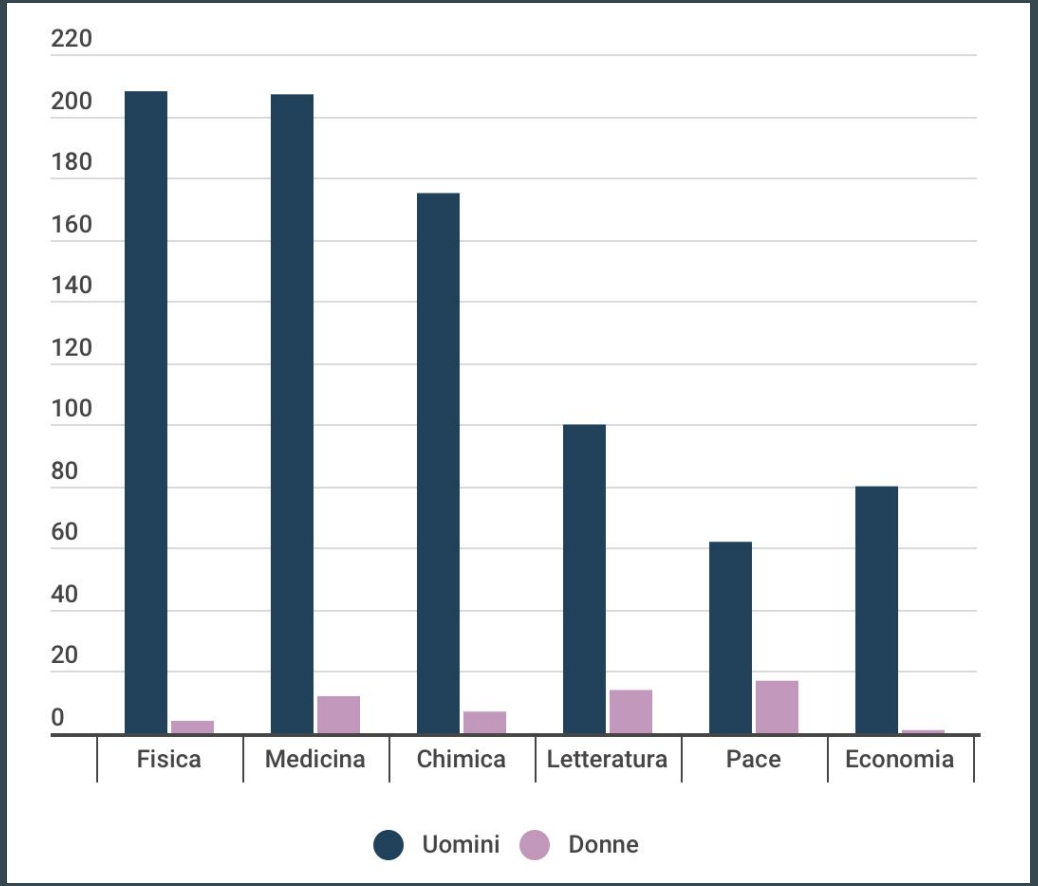
Rosalind Franklin (1920 - 1954)

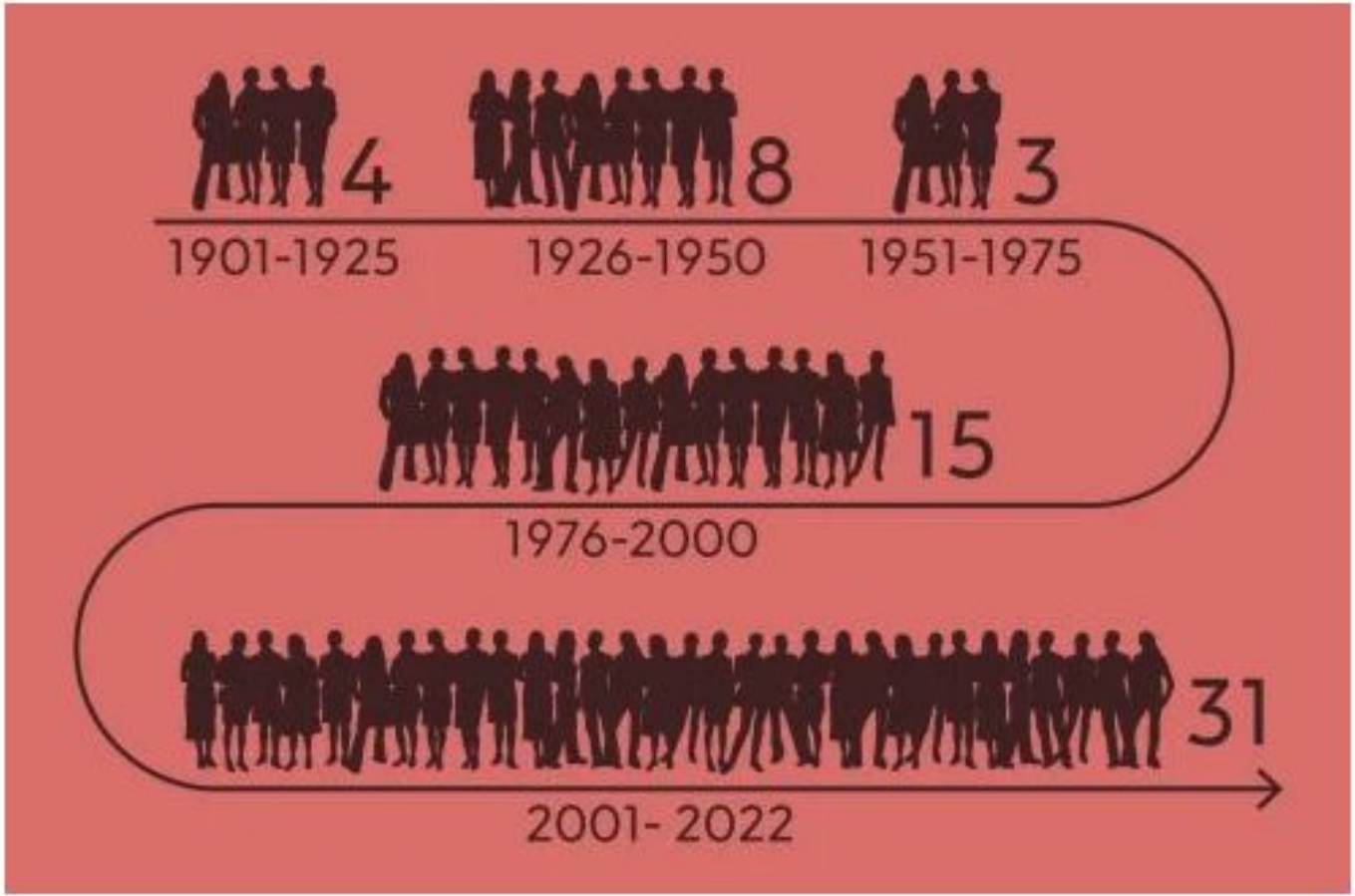
James Watson calls her "Rosy", in a derogatory sense: he believes her to be incapable of fully understanding diffraction and its physical laws, and therefore she would not have been intelligent enough to understand the structure of DNA.

Photo of the 1962 Nobel Prize collection ceremony. From left: ***Maurice Wilkins*** *, Max Perutz,* ***Francis Crick****, John Steinbeck,* ***James Watson*** *and John Kendrew*

Nobel Prize winners

(updated to 2022)





Nobel Prize awarded women 1901-2022. Ill. Niklas Elmehed. © Nobel Prize Outreach

Ben Barres (1954 - 2017)

«Ben Barres gave a great seminar today, but his work is much better than that of his sister Barbara»

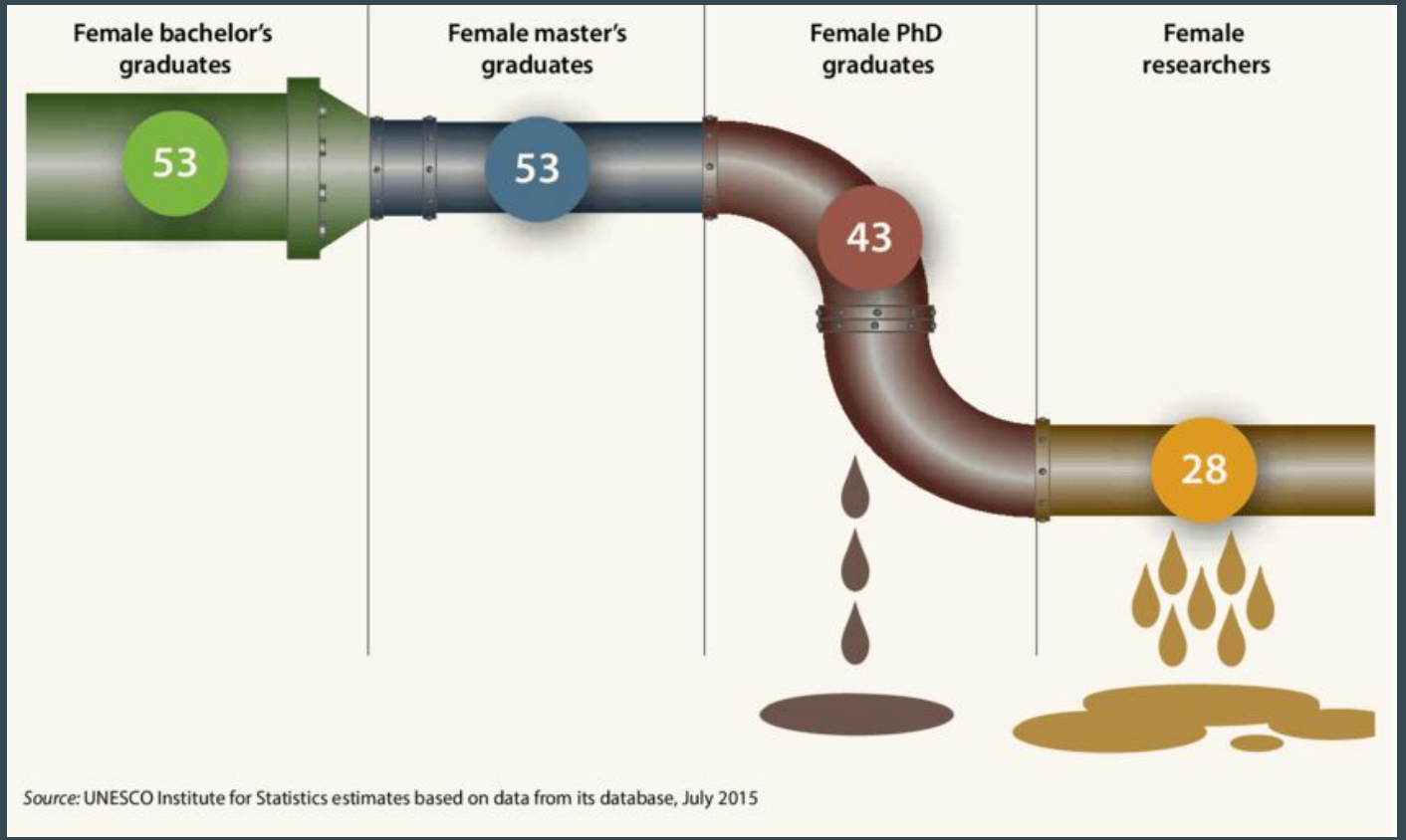
After a 1997 Barres seminar

Autumn Kent

I have had firsthand experience of how men behave when women are not around and how their behavior changes when a woman arrives. I've been told sexist, homophobic, and transphobic jokes, and I'm acutely aware that these jokes are (mostly) hidden from me now that I'm out. I went from hearing about sexual harassment to being the object of it

Glass ceiling

Leaking Pipeline



The Stereotype Threat

Negative stereotypes about the abilities of girls and women in mathematics and science persist despite a significant increase in the presence of girls and women in these areas in recent decades. Two stereotypes prevail: girls are not as good as boys at mathematics and scientific work is more suitable for boys and men.

Why So Few? Women in Science, Technology, Engineering, and Mathematics

Hill, Catherine; Corbett, Christianne; St. Rose, Andresse

American Association of University Women

ELSEVIER

Journal of Experimental Social Psychology

Volume 35, Issue 1, January 1999, Pages 4-28

Regular Article

Stereotype Threat and Women's Math Performance ☆, ☆☆, ★

Steven J. Spencer [a], Claude M. Steele [b], Diane M. Quinn [c]

Show more

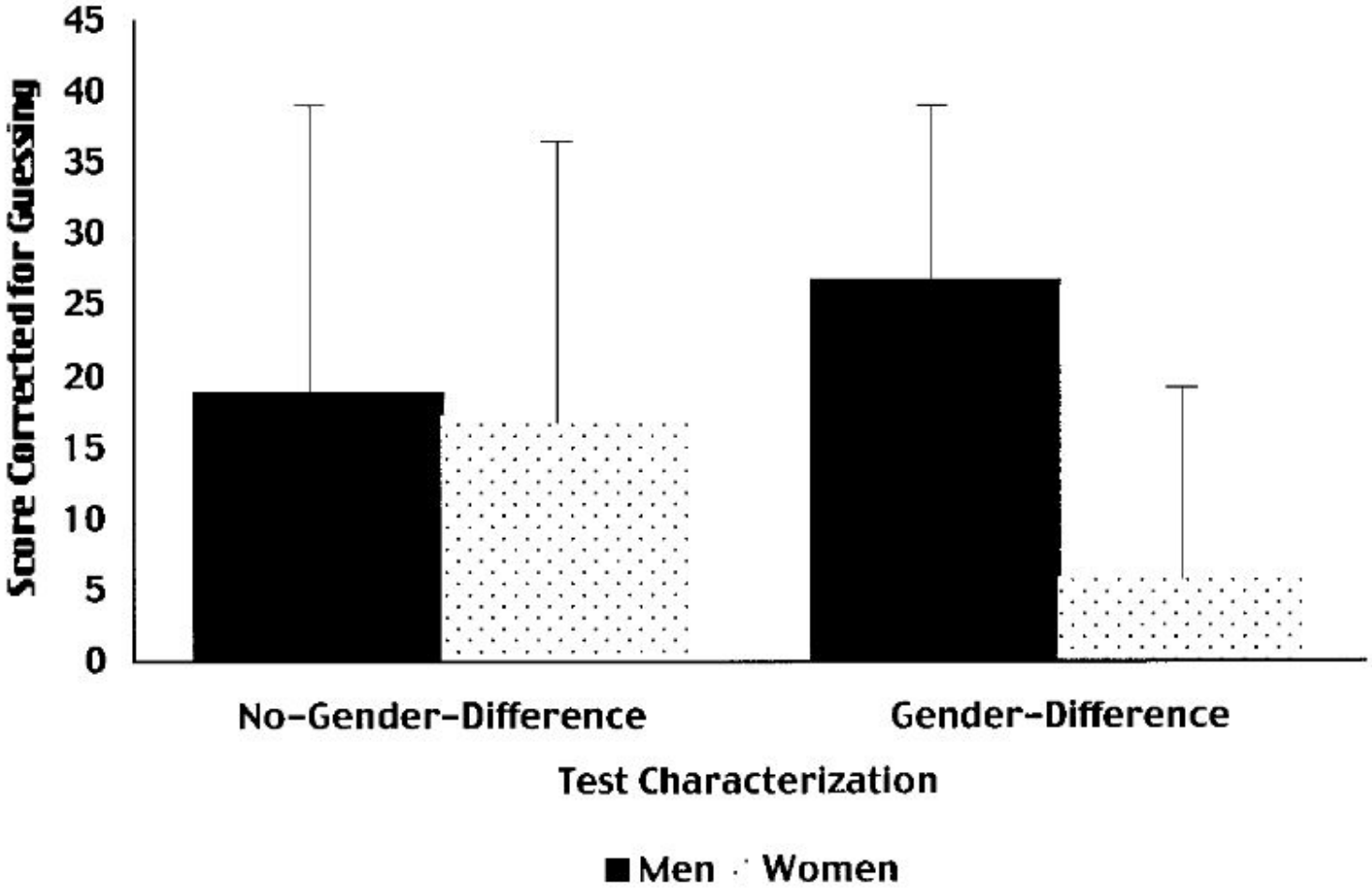


FIG. 2. Performance on a difficult math test as a function of sex of subject and test characterization

https://bit.ly/DH2024science

THANKS