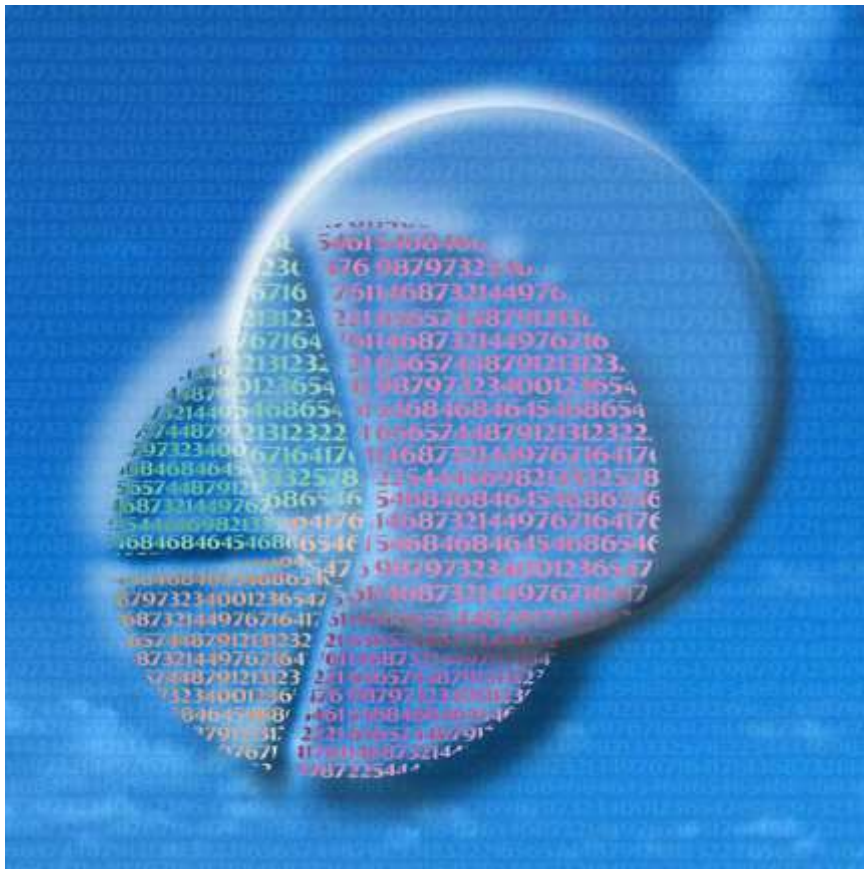


Ethics of quantification

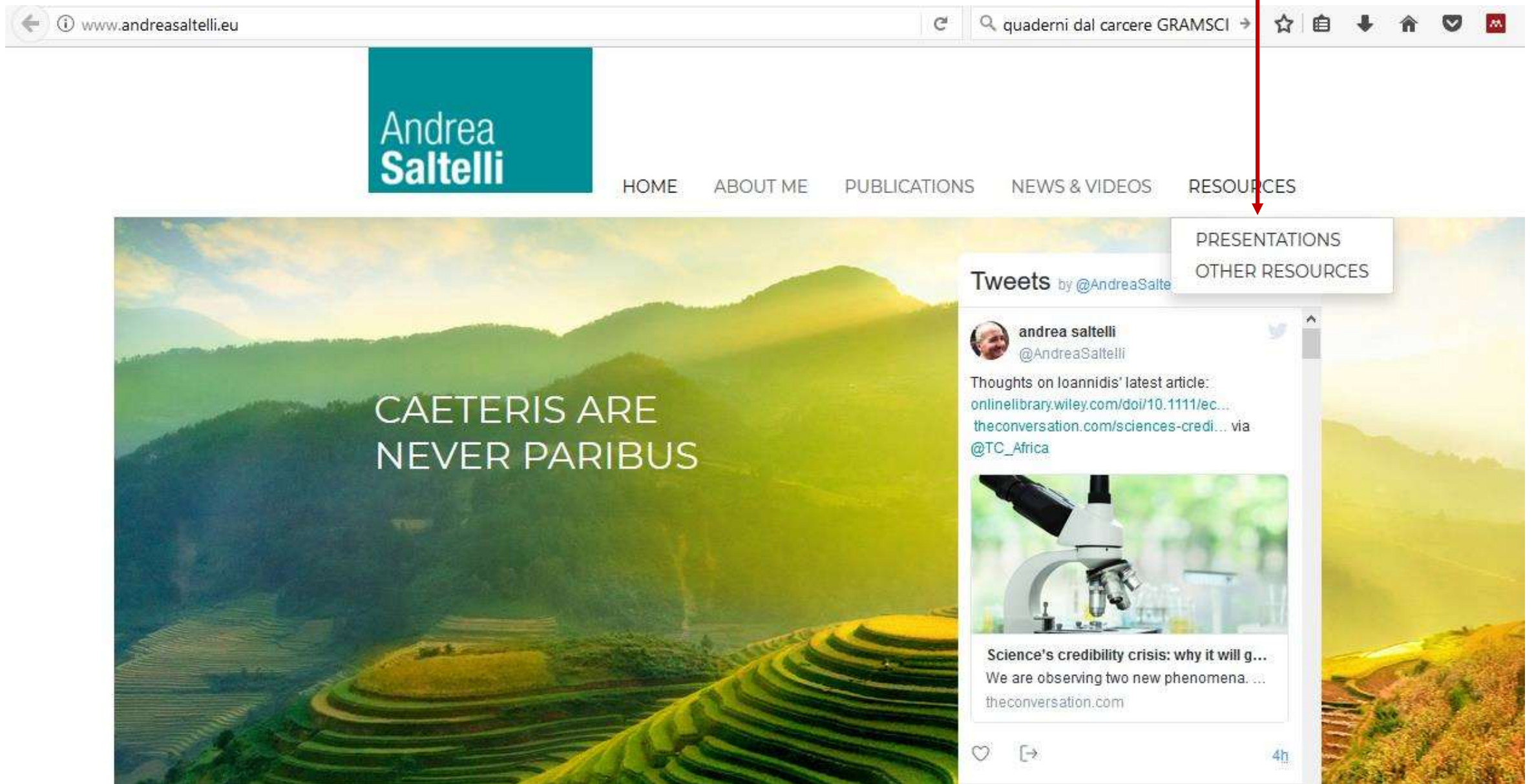
Andrea Saltelli

Centre for the Study of the Sciences and the Humanities, University of Bergen, and Open Evidence Research, Open University of Catalonia; August 27th–September 1st, 2018, Course Numbers for policy, Castelldefels (Barcelona)

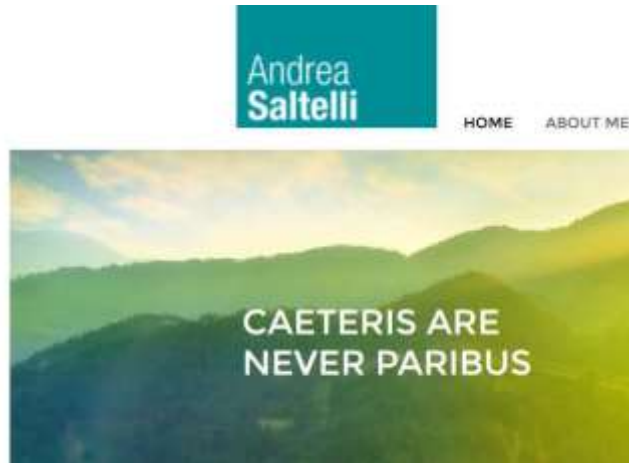


Universitat
Oberta
de Catalunya

Where to find this talk: www.andreasaltelli.eu



The screenshot shows the website www.andreasaltelli.eu in a web browser. The browser's address bar displays the URL. The website's header features a teal square logo with the text "Andrea Saltelli" in white. Below the logo is a navigation menu with links: HOME, ABOUT ME, PUBLICATIONS, NEWS & VIDEOS, and RESOURCES. A red arrow points from the "RESOURCES" link to a dropdown menu that contains two options: "PRESENTATIONS" and "OTHER RESOURCES". The main content area of the website has a background image of terraced rice fields in a valley. Overlaid on this image is the text "CAETERIS ARE NEVER PARIBUS" in white, all-caps font. On the right side of the page, there is a "Tweets" section by @AndreaSalte. The first tweet is from andrea saltelli (@AndreaSaltelli) and discusses thoughts on Ioannidis' latest article, including links to onlinelibrary.wiley.com/doi/10.1111/ec... and theconversation.com/sciences-credi... via @TC_Africa. The tweet includes an image of a microscope and the text "Science's credibility crisis: why it will g... We are observing two new phenomena... theconversation.com".



= more material on my web site

How did we get
here? The roots of
the Cartesian
dream



Francis Bacon
(1561–1626)

Magnalia Naturae, in
the New Atlantis
(1627), '*Wonders of
nature, in particular
with respect to human
use*'

We call Cartesian dream the idea
of man as master and possessor
of nature, of prediction and
control, of Bacon's wonders of
science and of Condorcet's
mathematique sociale...



René Descartes
(1596–1650)
Discourse on Method
(1637)



Nicolas de Caritat, marquis de
Condorcet
(1743– 1794)
'Sketch for a Historical Picture of
the Progress of the Human Spirit'



Francis Bacon
(1561–1626)

Magnalia Naturae, in the New Atlantis (1627),
‘Wonders of nature, in particular with respect to human use’

The prolongation of life; The restitution of youth in some degree; The retardation of age; The curing of diseases counted incurable; The mitigation of pain; More easy and less loathsome purgings; The increasing of strength and activity; The increasing of ability to suffer torture or pain; The altering of complexions, and fatness and leanness; The altering of statures; The altering of features; The increasing and exalting of the intellectual parts; Versions of bodies into other bodies; Making of new species; Transplanting of one species into another; Instruments of destruction, as of war and poison; Exhilaration of the spirits, and putting them in good disposition; Force of the imagination, either upon another body, or upon the body itself; Acceleration of time in maturations; Acceleration of time in clarifications; Acceleration of putrefaction; Acceleration of decoction; Acceleration of germination; Making rich composts for the earth; Impressions of the air, and raising of tempests; Great alteration; as in induration, emollition, &c; Turning crude and watery substances into oily and unctuous substances; Drawing of new foods out of substances not now in use; Making new threads for apparel ; and new stuffs, such as paper, glass, &c; Natural divinations; Deceptions of the senses; Greater pleasures of the senses; Artificial minerals and cements.



Magnalia Naturae, in the New Atlantis (1627),
‘Wonders of nature, in particular with respect to human use’

Francis Bacon (1561–1626)

The prolongation of life; The restitution of youth in some degree; The retardation of age; The curing of diseases counted incurable; The mitigation of pain;

[...]

Drawing of new foods out of substances not now in use; Making new threads for apparel; and new stuffs, such as paper, glass, etc.; Natural divinations; Deceptions of the senses; Greater pleasures of the senses; Artificial minerals and cements.

The study of letters leading to “doubts and errors”;

Comparing “disquisitions of the ancient moralists to very towering and magnificent palaces with no better foundation than sand and mud”;

Condemnation of humanities and exaltation of mathematics.



René
Descartes
(1596–1650)

Discourse on
Method (1637)

“I perceived it to be possible to arrive at knowledge highly useful in life; and in room of the Speculative Philosophy [...], to discover a Practical, by means of which, knowing the force and action of fire, water, air, the stars, the heavens, and all the other bodies that surround us, [...]we might also apply them [...], and thus render ourselves the lords and possessors of nature.”



René
Descartes
(1596–1650)

Discourse on
Method (1637)

In the formulation of Condorcet: “All the errors in politics and in morals are founded upon philosophical mistakes, which, themselves, are connected with physical errors” (Ninth Epoch)



Nicolas de Caritat, marquis de
Condorcet
(1743– 1794)

‘Sketch for a Historical Picture of
the Progress of the Human Spirit’

Overpopulation? War due to scarcity of resources? Will not happen because technical progress and ethical progress will go hand in hand. Man will understand that his duty “will consist not in the question of giving existence to a greater number of beings, but happiness.” (Tenth Epoch)



Nicolas de Caritat, marquis de Condorcet
(1743– 1794)

‘Sketch for a Historical Picture of the
Progress of the Human Spirit’

‘Mathématique sociale’: We still use today terms such as ‘Condorcet method’, ‘Condorcet winner’, ‘Condorcet–ranking procedure’



Nicolas de Caritat,
marquis de Condorcet
(1743– 1794)
,

Feldman, J., 2005, Condorcet et la mathématique sociale: enthousiasmes et bemols, Mathematics and Social Sciences, 172(4), 7–41, <http://www.ehess.fr/revue-msh/pdf/N172R955.pdf>

Munda G. (2007) – Social multi-criteria evaluation, Springer–Verlag, Heidelberg, New York, Economics Series



Condorcet's
algorithms and
Descartes'
Geometry: the
dream always had a
quantification
agenda



Closer to our times the dream was couched in the 'Endless Frontier' metaphor by Vannevar Bush, 1945:

Vannevar Bush
(1890–1974)

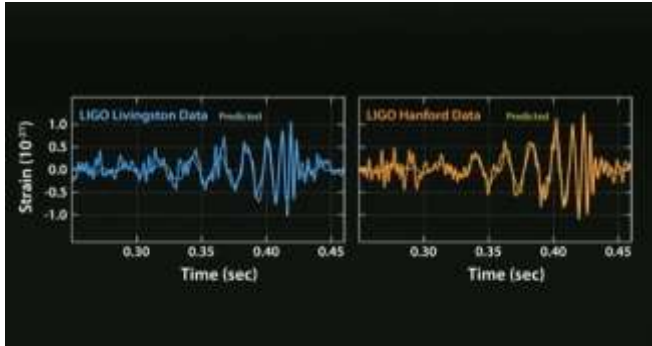


“One of our hopes is that after the war there will be full employment. [...] To create more jobs we must make new and better and cheaper products [...] founded on [...] basic scientific research. [...]the] Government [...] opened the seas to clipper ships and furnished land for pioneers. Although these frontiers have more or less disappeared, the frontier of science remains.”

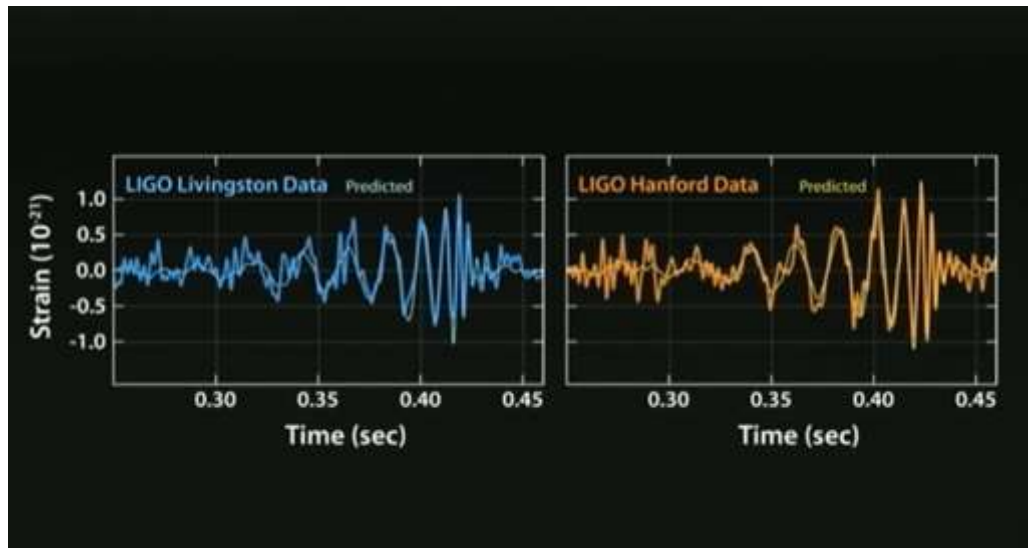
Bush, V. (1945) Science: the endless frontier, United States Office of Scientific Research and Development, U.S. Govt. print office.

The success of the
Cartesian dream

The keeping of the promise: Gravitational waves, from J. Weber's cylinder to LIGO



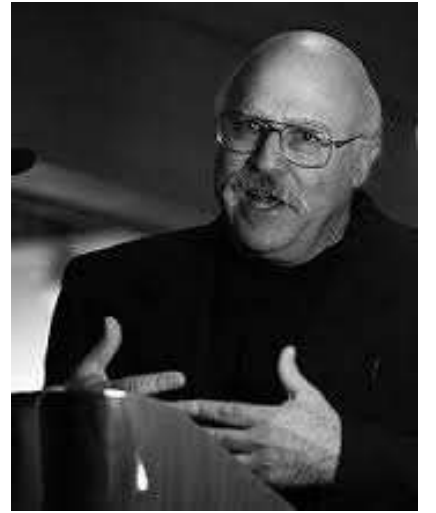
A Madman Dreams of Tuning Machines: The Story of Joseph Weber, the Tragic Hero of Science Who Followed Einstein's Vision and Pioneered the Sound of Space-Time, By Maria Popova, <https://www.brainpickings.org/2016/04/25/black-hole-blues-janna-levin-joseph-weber/>



<https://www.brainpickings.org/2016/04/25/black-hole-blues-janna-levin-joseph-weber/>

If you are a natural scientists you were
nourished and trained in the Cartesian dream,
(S. Toulmin: 'The hidden agenda of
modernity')

The dream was spectacularly successful, in
all fields of endeavor, leading to what Steven
Shapin calls 'invisible science'



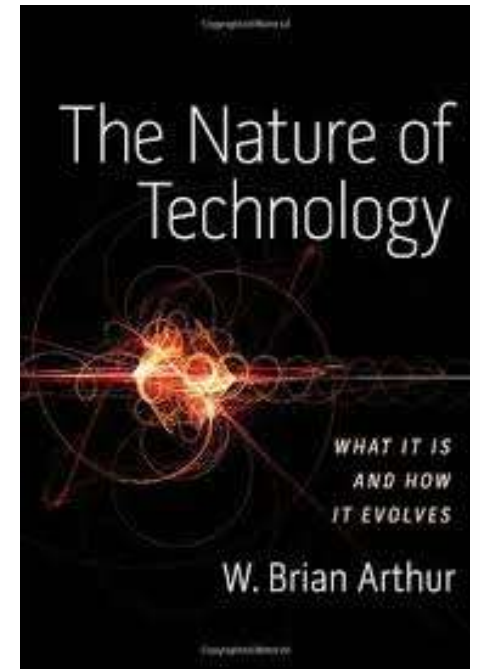
Steven Shapin

Steven Shapin, 2016, Invisible Science, The Hedgehog Review: Vol. 18 No. 3 (Fall 2016)
W.B. Arthur, The nature of technology, Free Press, New York, 2009.

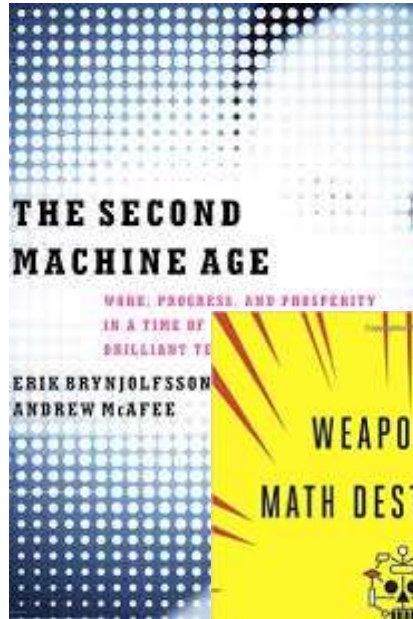
The critique of the Cartesian dream

It also lead to techno-science, to technology
'creating itself from itself',...

Steven Shapin, 2016, Invisible Science, The Hedgehog Review: Vol. 18 No. 3 (Fall 2016)
W.B. Arthur, The nature of technology, Free Press, New York, 2009.



... to a host of other issues and fears



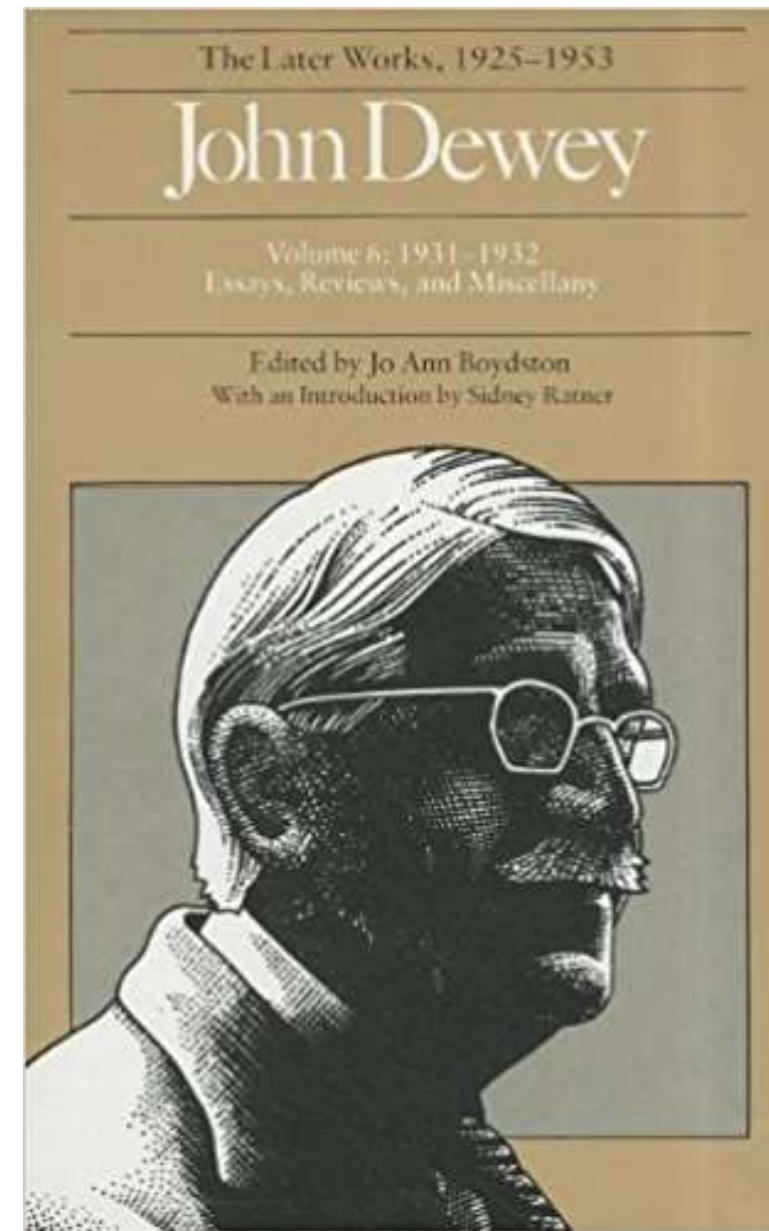
Irreversible loss of jobs?

Weaponization of big data?

Technology disempowering the individual?

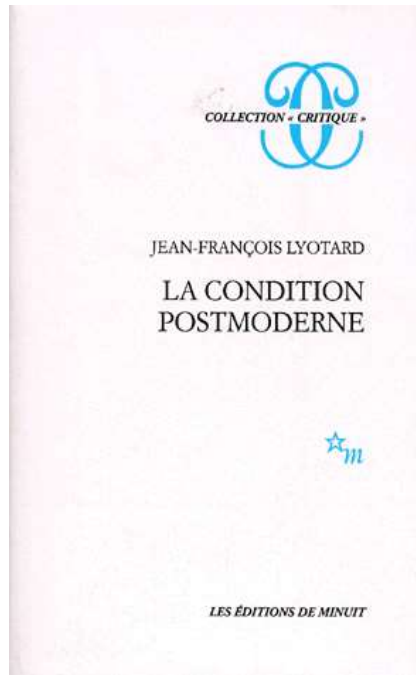
Here lies the heart of our present social problem. Science has hardly been used to modify men's fundamental acts and attitudes in social matters. It has been used to extend enormously the scope and power of interests and values which anteceded its rise. Here is the contradiction in our civilization. The potentiality of science as the most powerful instrument of control which has ever existed puts to mankind its one outstanding present challenge.

From J. Dewey 'Science and Society' in John Dewey: The Later Works, 1925-1953: 1931-1932, Vol. 6-ExLibrary



John Dewey 1859-1952

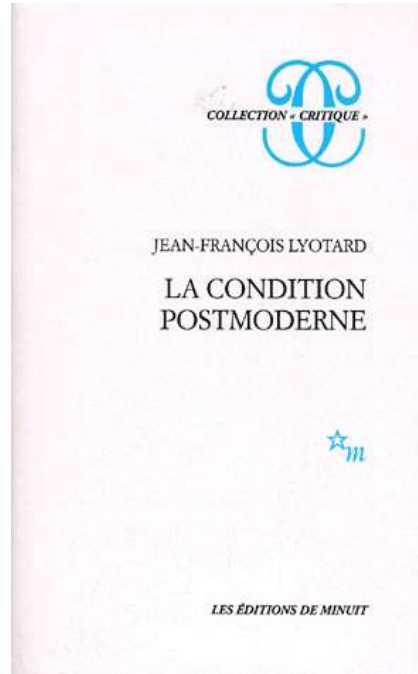
“The question of the legitimacy of science has been indissociably linked to that of the legitimation of the legislator since the time of Plato.”



Jean-François Lyotard

Lyotard, J.-F. 1979. La Condition postmoderne. Rapport sur le savoir, Paris : Minuit.

“From this point of view, the right to decide what is true is not independent of the right to decide what is just, [...] there is a strict interlinkage between the kind of language called science and the kind called ethics and politics ...”

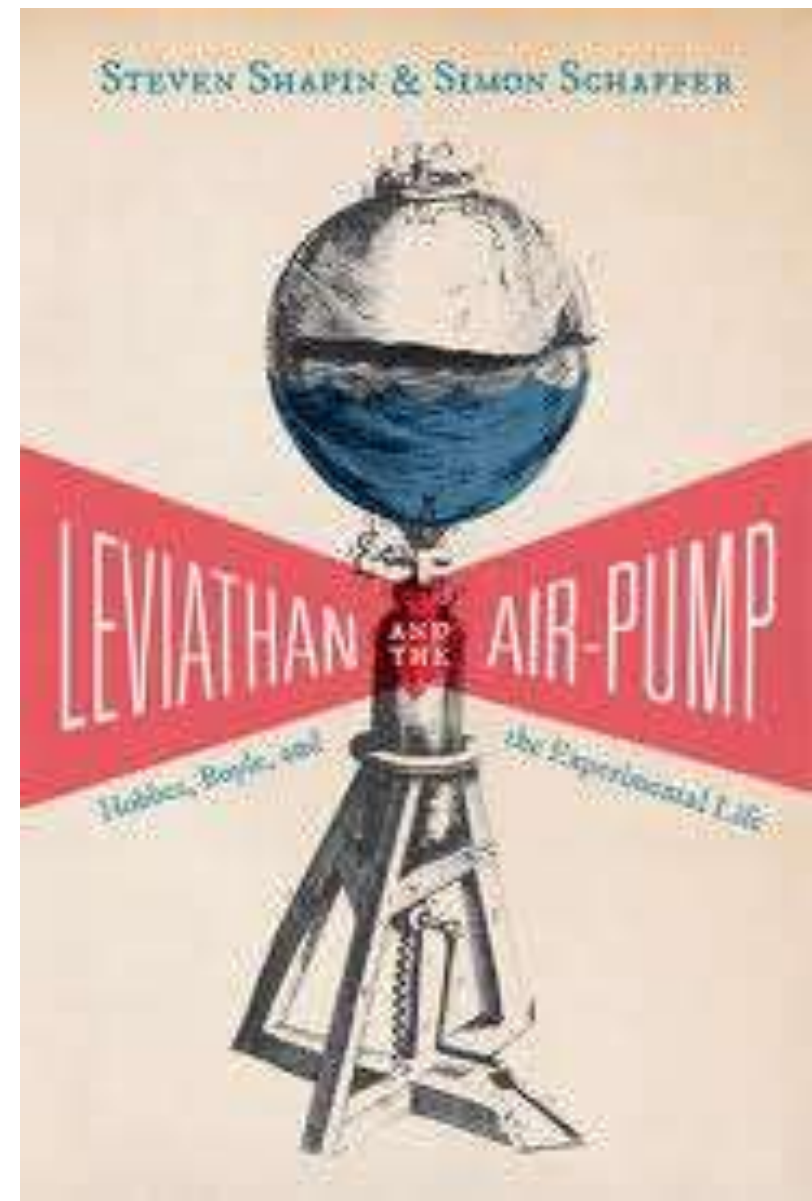


Jean-François Lyotard

Lyotard, J.-F. 1979. La Condition postmoderne. Rapport sur le savoir, Paris : Minuit.

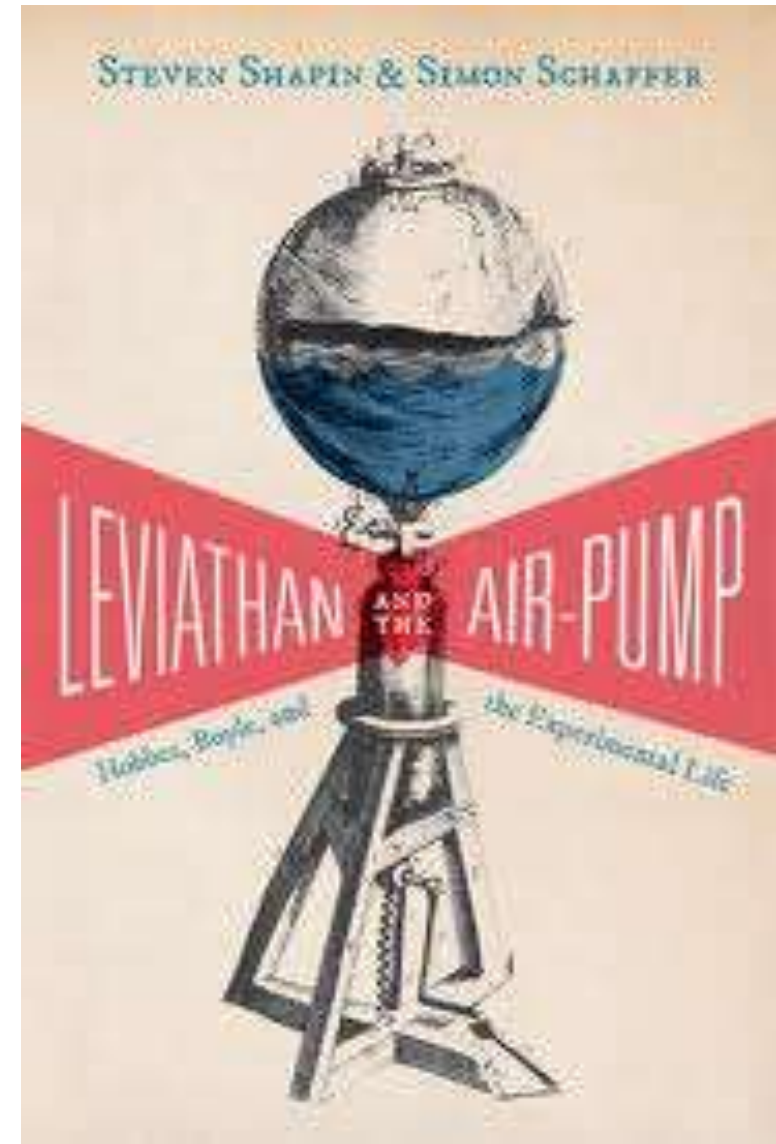
“Solutions to the problem of knowledge are solutions to the problem of social order.

[...] Trust in Science and trust in the prevailing social order are linked.”



Shapin, S., Schaffer, S., 1985, Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life, Princeton, 2011 Edition

Establishing ‘matter of facts’
under controlled ‘laboratory’
experiments before
witnesses as a way to
subtract the discourse about
knowledge from religious
squabbles ...

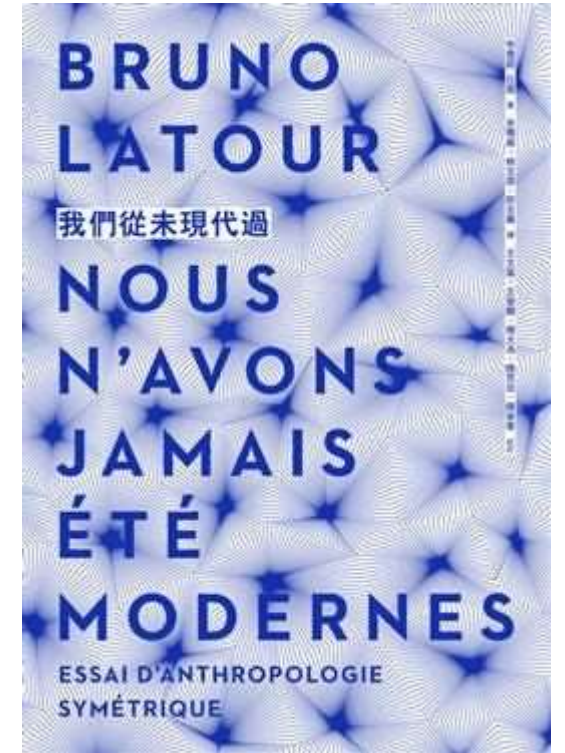


Shapin, S., Schaffer, S., 1985, Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life, Princeton, 2011 Edition

Shapin and Schaffer's book inspired Bruno Latour's 'Nous n'avons jamais été modernes', 1991, and was 'hot' during the 'science wars'.



Bruno Latour

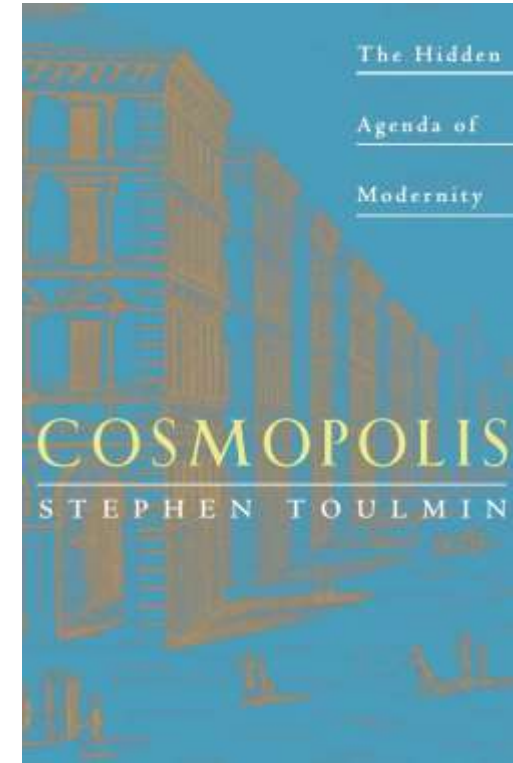


Latour, B., 1991, Nous n'avons jamais été modernes, Editions La découverte, 1993; We Have Never Been Modern. Cambridge, Harvard UP.

Stephen Toulmin: Modernity as a counter-Renaissance; Descartes versus Montaigne; the delusion of a Newtonian view of society

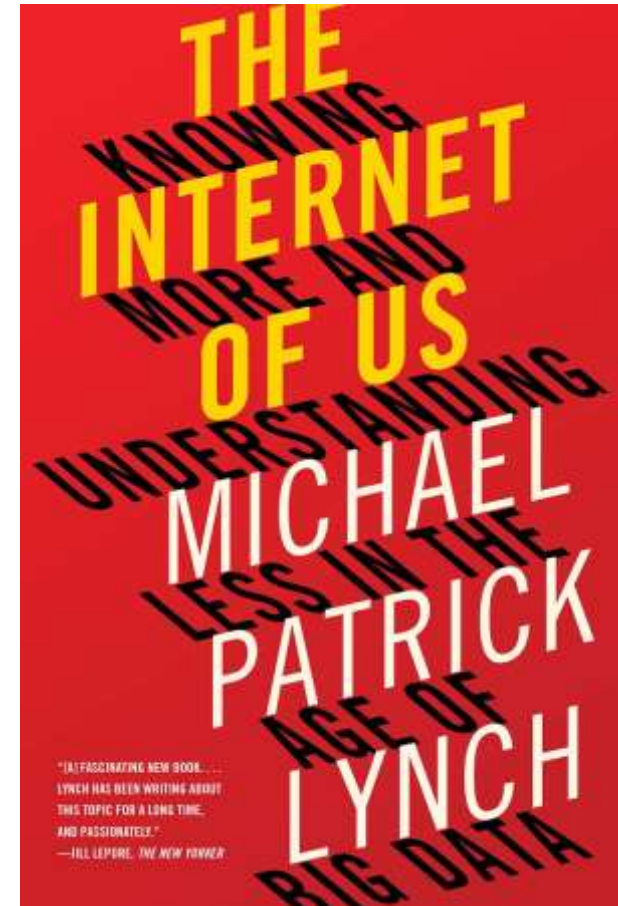
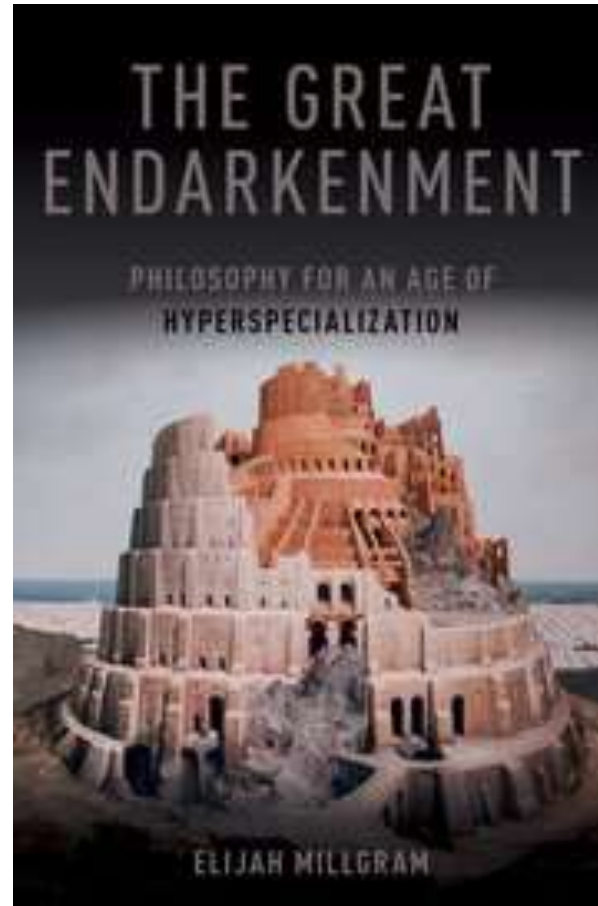
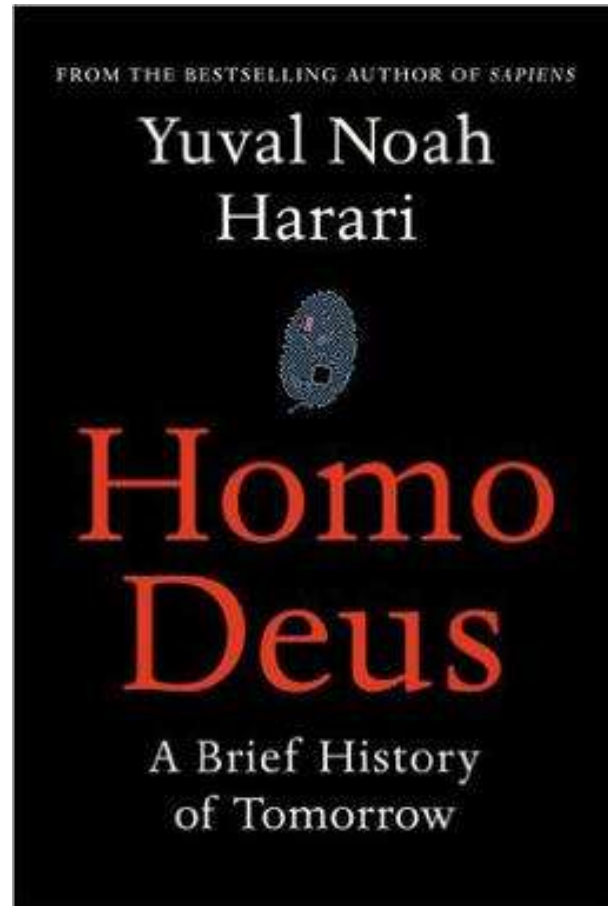


Stephen Toulmin

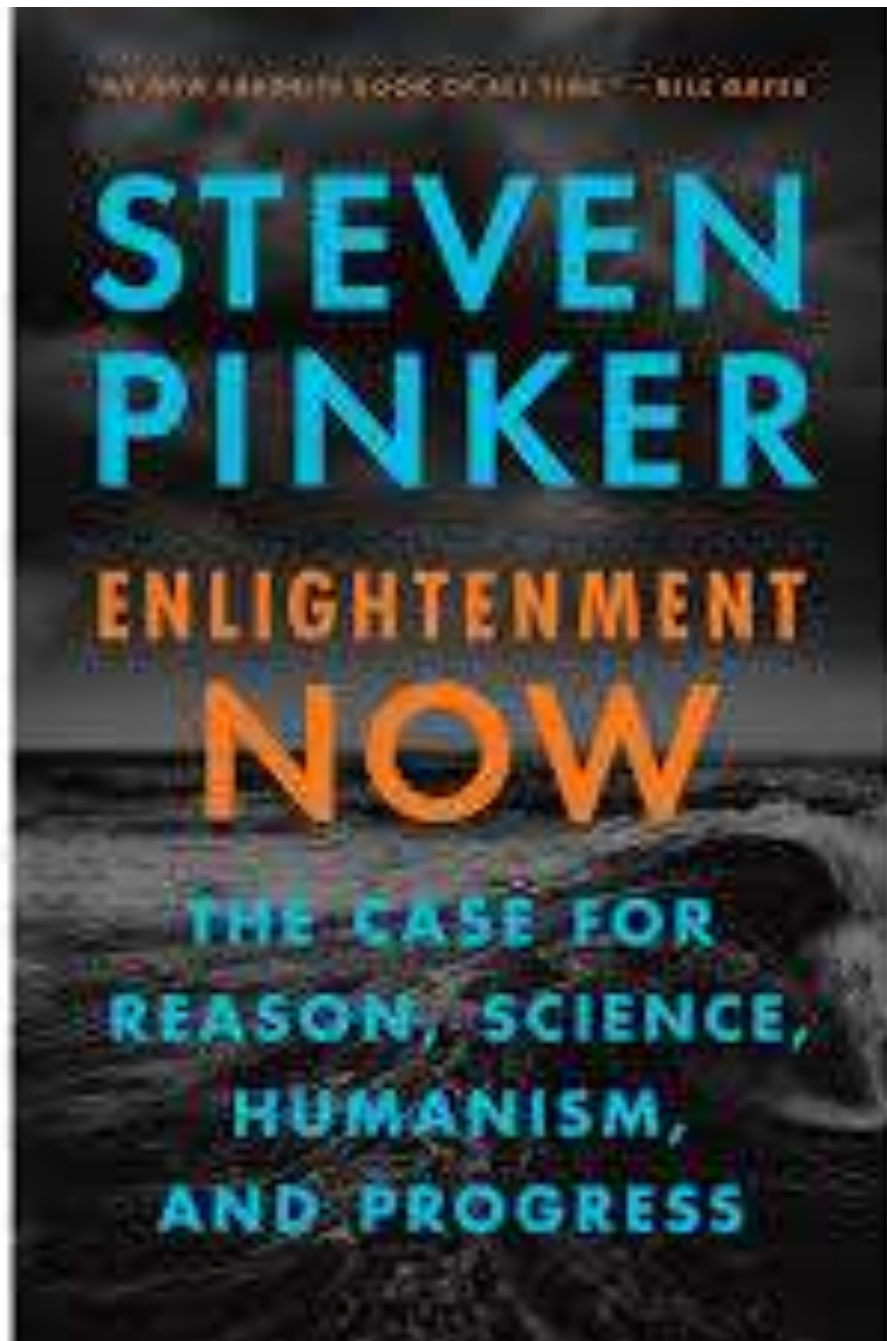


Stephen Toulmin, 1990, *Cosmopolis: The Hidden Agenda of Modernity*, The University of Chicago Press.

Making sense without science, innovation and technology?



The discussion on the
legacy of Enlightenment
goes on

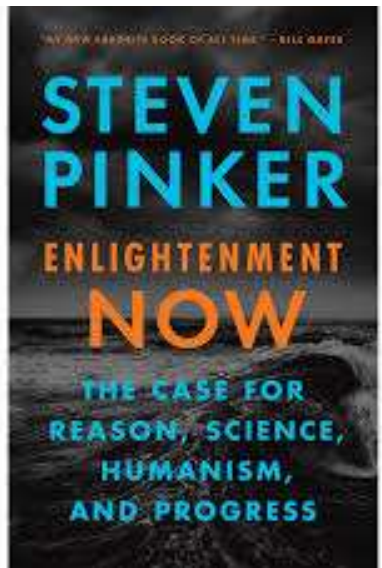


Steven Pinker



Jeremy Lent





“A future perfect. Steven Pinker’s case for optimism; “Enlightenment Now” explains why the doom-mongers are wrong”, The Economist

“Steven Pinker Wants You to Know Humanity Is Doing Fine. Just Don’t Ask About Individual Humans” (Jennifer Szalai, The New York Times)

“a monumental apologia for a currently fashionable version of Enlightenment thinking” ((John Gray, New Stateman)



The history of western history's two powerful metaphors: “man as master and possessor of nature” and “nature as a machine”

From the dualism of Greek and Christian philosophies to our days

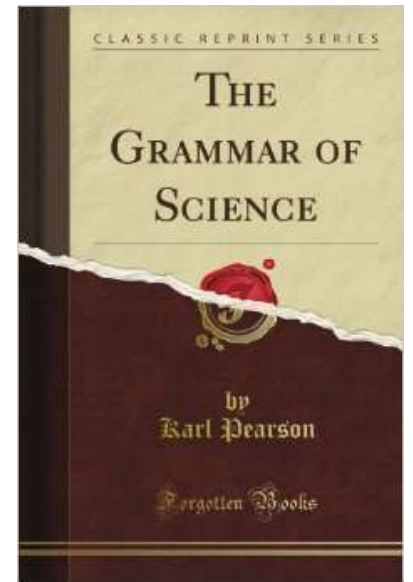
Contrasted with alternative metaphors, such as nature as a system of systems

How are we taught
our science?

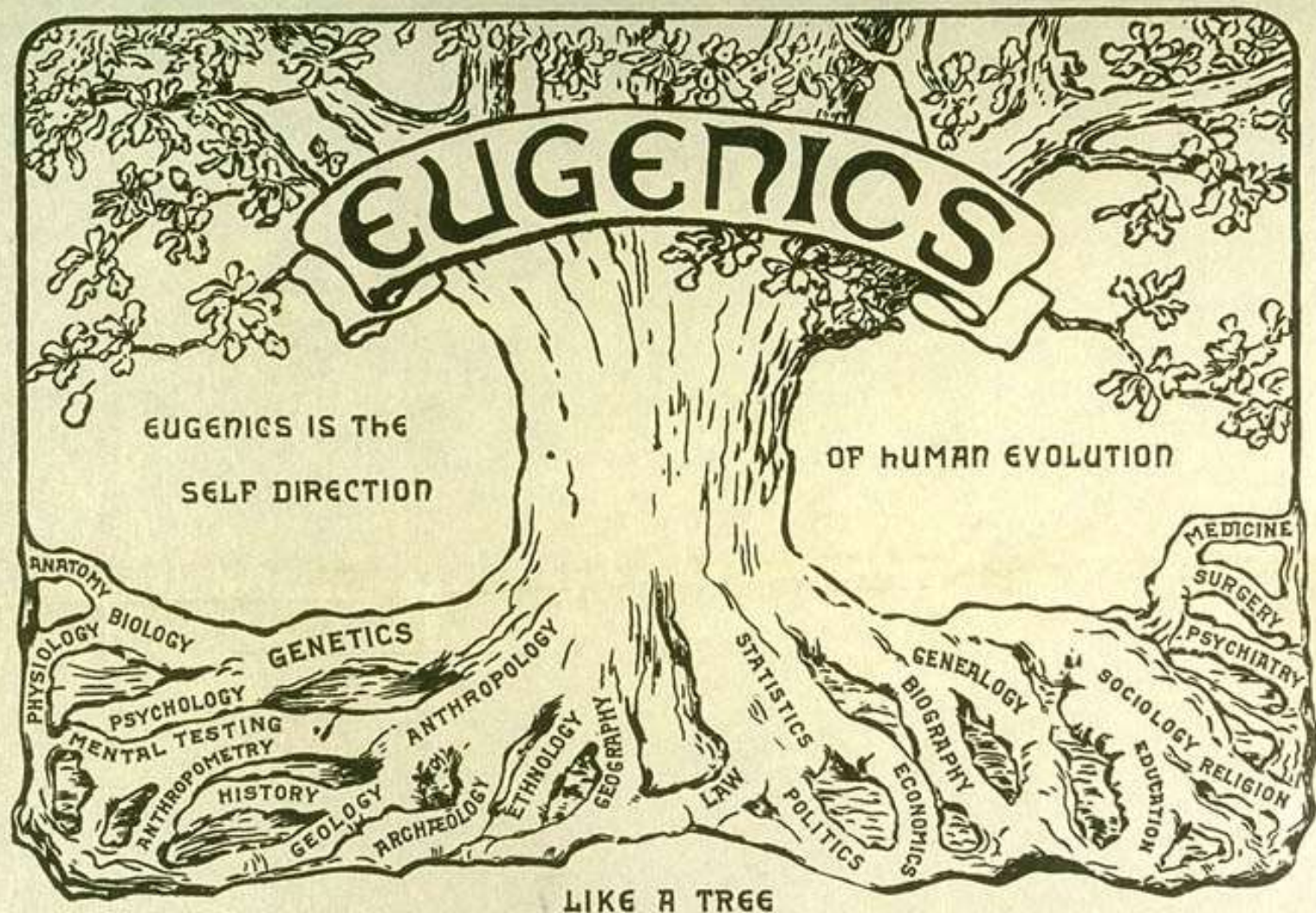
Karl Pearson (a social Darwinist) suggests not wasting resources on social programs as:

“No degenerate and feeble stock will ever be converted into healthy and sound stock by the accumulated effects of education, good laws, and sanitary surroundings”

Karl Pearson

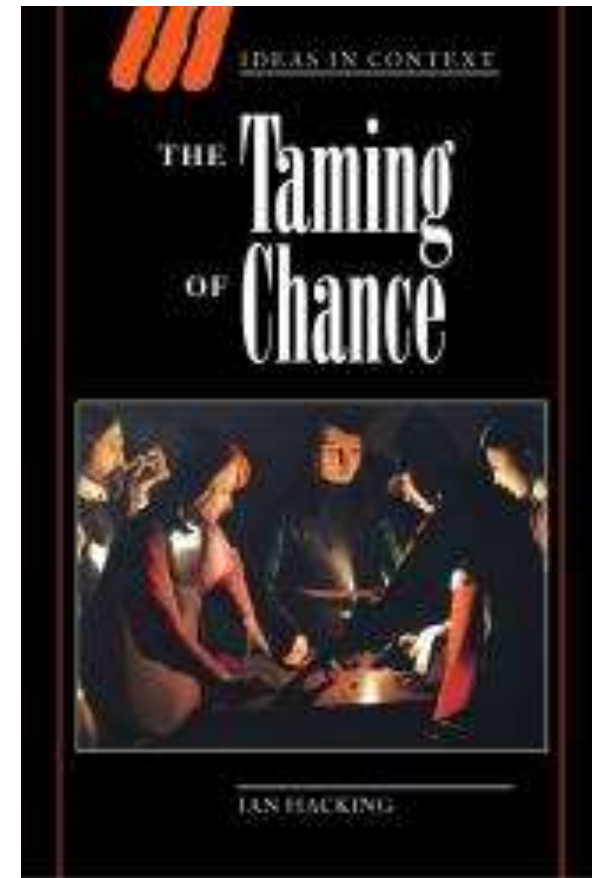
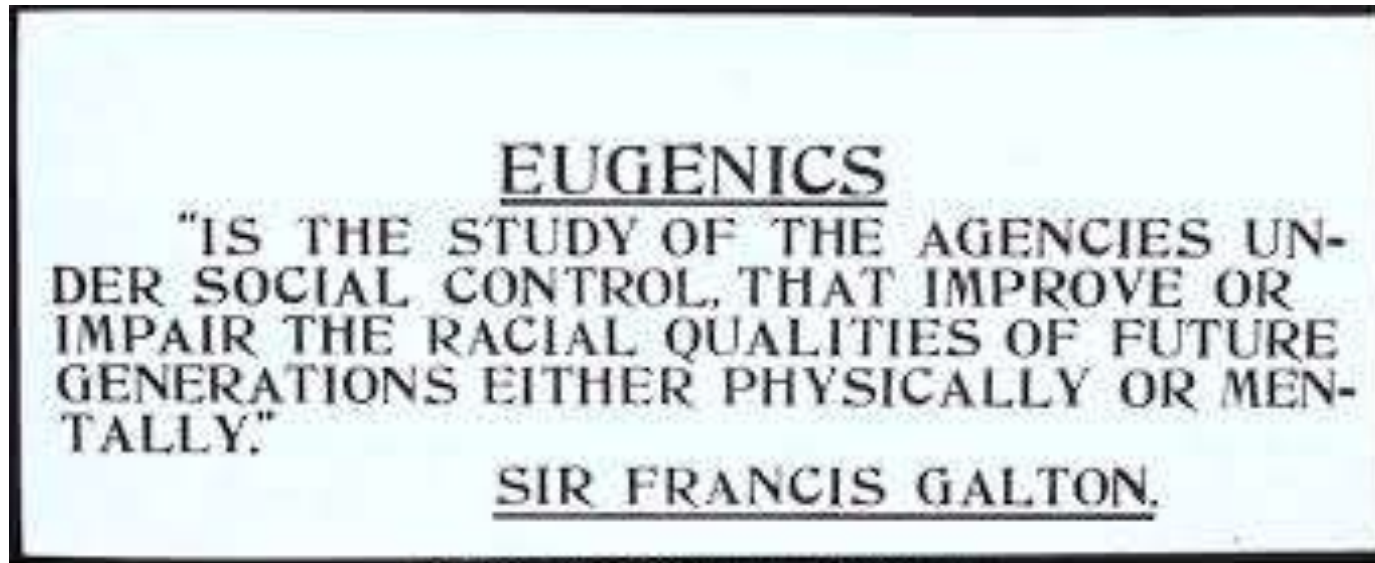


Pearson, K., 1892, The Grammar of Science, Walter Scott Publisher, London, p.32.

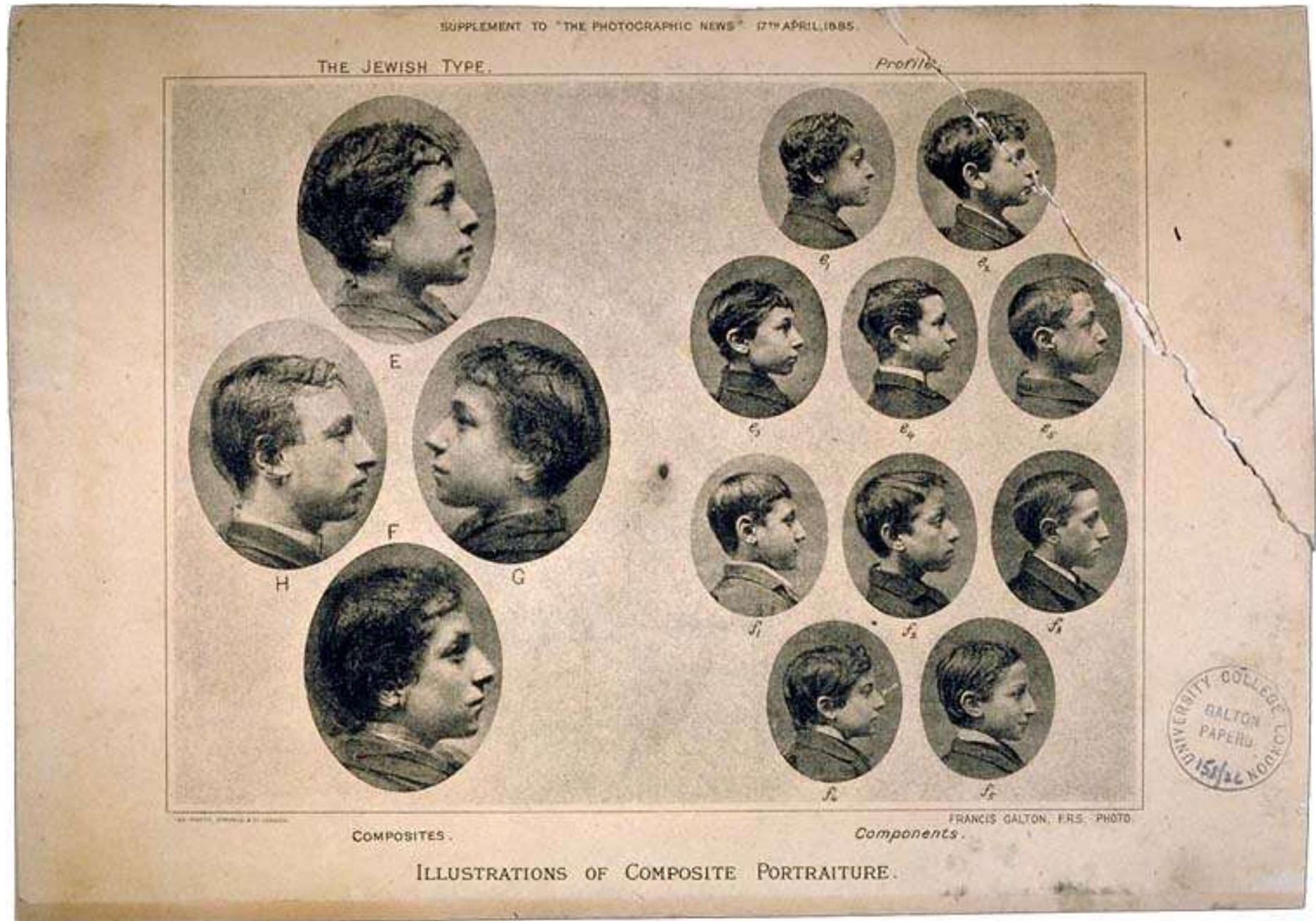


LIKE A TREE
EUGENICS DRAWS ITS MATERIALS FROM MANY SOURCES AND ORGANIZES
THEM INTO AN HARMONIOUS ENTITY.

Francis Galton and Karl Pearson (the one of chi-squared); laboratory of biometrics; distinguishing army officers from private soldiers from criminals convicted of murder from non-violent felons from Jews ...



The Jewish type ...



EUGENICS

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"Eugenics is the study of all of the agencies under social control which may improve or remedy the inheritable qualities of future generations of man, either physically or mentally."

—Francis Galton



VOLUME II

AUGUST 1929

NUMBER 3

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IN PRACTICE

Young statistician,
you shall live in
adventurous times



The so-called "crisis in science" presents challenges for statisticians starting out in their career. But there are strategies for survival, says **Andrea Saltelli**

SIGNIFICANCE

ROYAL
STATISTICAL
SOCIETY
DATA | EVIDENCE | DECISION

ASA
AMERICAN STATISTICAL ASSOCIATION
Promoting the Practice and Profession of Statistics

A discussion of the challenges facing young statisticians

<https://rss.onlinelibrary.wiley.com/doi/10.1111/j.1740-9713.2016.00983.x>

The first R&D Statistics ever, by Francis Galton
(1822–1911)

Measuring the numbers of sons and daughters of
‘great men of science’ will tell us whether a
society degenerates toward stupidity (Benoît
Godin, 2010)

Godin, B., From Science to Innovation, INRS, Montreal, Canada,
Communication presented to the Government–University–Industry Research
Roundtable (GUIRR) US National Academy of Sciences, Washington, May 21,
2010.

Kuhn said that the “educational initiation that prepares and licenses the student for professional practice... is both rigorous and rigid”

and “It is a narrow and rigid education [in physics/science], probably more so than any other except perhaps in orthodox theology”



Thomas Kuhn, *The structure of scientific revolution*, 192, Chapters I and XIII

and “the member of a mature scientific community is, like the typical character of Orwell’s 1984, the victim of a history rewritten by the powers that be.”



Thomas Kuhn, The structure of scientific revolution, 192, Chapter XIII

Thus disciplinary advancements are presented in textbooks as the “perception of the obvious” made by one-eyed men in the kingdom of the blinds (Ravetz, 1971).

Can statisticians ignore their role in Eugenics, can chemists ignore what is phlogiston, or geologists how Alfred Lothar Wegener 1915 theory of Continental Drift was met with skepticism ...

Evidence based policy

PETRUCHIO: I say it is the moon.

KATHERINE: I know it is the moon.

PETRUCHIO: Nay, then you lie. It is
the blessèd sun.

KATHERINE: Then God be blessed, it is the
blessèd sun.

But sun it is not, when you say it is not,
And the moon changes even as your mind.

...



W. Shakespeare,
the Taming of the
Shrew, Act IV.

‘Policy based evidence’ has entered the public discourse.

Warring parties accuse one another of the sin.

“Greenpeace [...] wants is policy based evidence making not evidence based policy making”
(Sanderson, 2015) ...

Wilkes, G., 2015, Free Lunch: Policy-based evidence-making, Financial Times, July 3.
Sanderson, A.B., 3 Feb 2015, Breitbart, see
<http://www.breitbart.com/london/2015/02/03/academic-attacks-greenpeace-for-ignoring-the-evidence-on-gm-crops/>; the politician is UKIP Energy Spokesman Roger Helmer MEP.

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS
GIANDOMENICO
MAJONE

The pretended distinction
between facts and value is used
instrumentally

In the policy process fact and
values cannot be separated in
the making of an argument

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS
GIANDOMENICO
MAJONE

“When science, technology, and public policy intersect, different attitudes, perspectives, and rules of argument come into sharp conflict. Scientific criteria of truth clash with legal standards of evidence and with political notions of what constitutes sufficient ground for action”

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS
GIANDOMENICO
MAJONE

“Factual conclusions are not easily separable from considerations having to do with the plausibility of the opponent's assumptions and his selection of the evidence or choice of the methodology”

EVIDENCE,
ARGUMENT, &
PERSUASION IN
THE POLICY
PROCESS

GIANDOMENICO
MAJONE

“When mathematicians acknowledge that mathematics is not the antithesis of rhetoric and that mathematics may sometimes be rhetorical just as rhetoric may sometimes be mathematical ... it should not be left to policy analysts to fight the last battles of positivism”

Evidence based medicine hijacked to
serve corporate agendas. “Under market
pressure, clinical medicine has been
transformed to finance-based medicine”
(David Sackett interviewed by J.P.A. Ioannidis)

J. P. A. Ioannidis, “Evidence-based medicine has been hijacked: a report to David Sackett,”
J. Clin. Epidemiol., vol. 73, pp. 82–86, May 2016.

Power asymmetries in the framing of issues:
those who have the deepest pockets marshal
the best evidence → Instrumental use of
quantification to obfuscate

A. Saltelli and M. Giampietro, “What is wrong with evidence based policy, and how can it be improved?,” *Futures*, vol. 91, pp. 62–71, Feb. 2017.

A. Saltelli and S. Funtowicz, “What is science’s crisis really about?,” *Futures*, vol. 91, pp. 5–11, 2017.

JAMA Internal Medicine

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Online First >

Special Communication | September 12, 2016

Sugar Industry and Coronary Heart Disease Research

A Historical Analysis of Internal Industry Documents FREE

ONLINE FIRST

Cristin E. Kearns, DDS, MBA^{1,2}; Laura A. Schmidt, PhD, MSW, MPH^{1,3,4}; Stanton A. Glantz, PhD^{1,5,6,7,8}

[+] Author Affiliations

JAMA Intern Med. Published online September 12, 2016. doi:10.1001/jamainternmed.2016.5394

Text Size: A A A

September 12, 2016

See also <https://www.theguardian.com/society/2016/apr/07/the-sugar-conspiracy-robert-lustig-john-yudkin>, and the story of US President Dwight Eisenhower heart attack,...

“our findings suggest the industry sponsored a research program in the 1960s and 1970s that successfully cast doubt about the hazards of sucrose while promoting fat as the dietary culprit in CHD [coronary hearth disease]”

<http://archinte.jamanetwork.com/article.aspx?articleid=2548255>



The screenshot shows the JAMA Internal Medicine website. At the top is a dark navigation bar with links: The JAMA Network, Journals >, Collections, Store, Physician Jobs, and About Mobile. Below this is the JAMA Internal Medicine logo. A secondary navigation bar contains links: Home, Current Issue, All Issues, Online First, Collections, CME, and Multimedia. The main content area features a sidebar with social media icons (Twitter, Facebook, LinkedIn, Google+, and a plus sign) and the text 'Online First >'. The article title is 'Sugar Industry and Coronary Heart Disease Research', with a subtitle 'A Historical Analysis of Internal Industry Documents' and a 'FREE' badge. The authors listed are Cristin E. Kearns, DDS, MBA^{1,2}; Laura A. Schmidt, PhD, MSW, MPH^{1,3,4}; Stanton A. Glantz, PhD^{1,5,6,7,8}. There is a link for '[+] Author Affiliations'. At the bottom, it states 'JAMA Intern Med. Published online September 12, 2016. doi:10.1001/jamainternmed.2016.5394' and includes a 'Text Size' option with three icons (A, A, A).

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Special Communication | September 12, 2016

Sugar Industry and Coronary Heart Disease Research

A Historical Analysis of Internal Industry Documents FREE

ONLINE FIRST

Cristin E. Kearns, DDS, MBA^{1,2}; Laura A. Schmidt, PhD, MSW, MPH^{1,3,4}; Stanton A. Glantz, PhD^{1,5,6,7,8}

[+] Author Affiliations

JAMA Intern Med. Published online September 12, 2016. doi:10.1001/jamainternmed.2016.5394

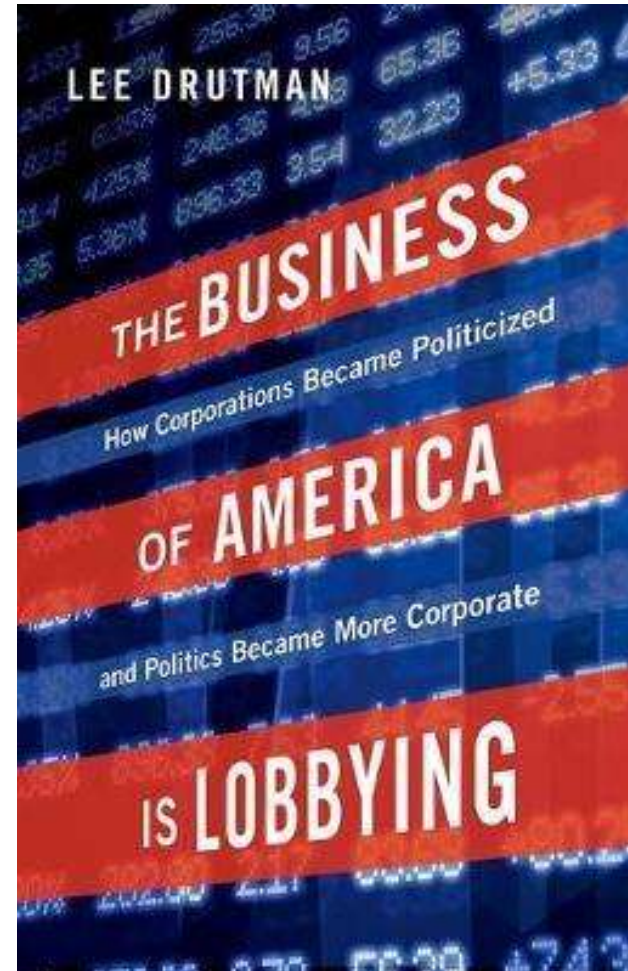
Text Size: A A A

Science and lobbying

(US) corporate interest can spend on lobbying
\$34 for each dollar spent by diffuse interest
and unions combined



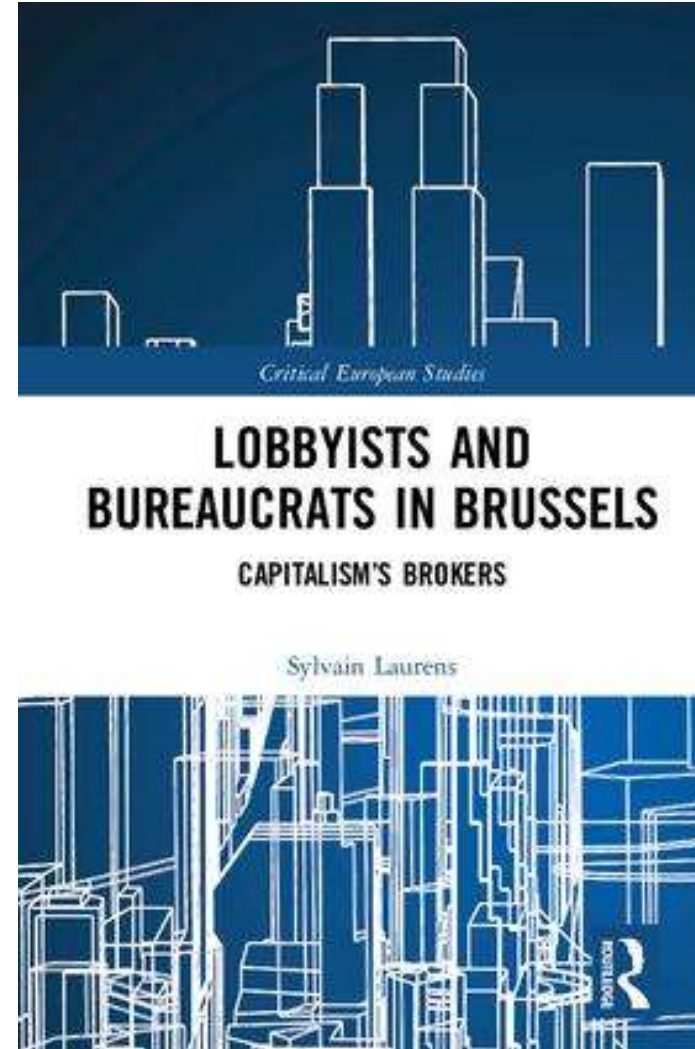
Lee Drutman



(EU) the Brussels concentration effect



Sylvain Laurens



For both scholars a salient aspect of this power is lobbyists' access to more and better disseminated science

➔ Urgent a remedial action to give citizens and political staffers some structured mechanism of access to independent scientific evidence (L. Drutman)

See discussion on OTA in Adam Keiper, 2004, Science and Congress, The New Atlantis, <https://www.thenewatlantis.com/publications/science-and-congress>



"HIS MASTER'S VOICE"

REG. U.S. PAT. OFF.

“Regulatory policy is increasingly made with the participation of experts, especially academics. A regulated firm or industry should be prepared whenever possible to co-opt these experts. This is most effectively done by identifying the leading expert in each relevant field and hiring them as consultants or advisors or giving them research grant or the like”

Owen, B. M., & Braeutigam, R., 1978 The regulation game, :
Strategic Use of the Administrative Process, Ballinger
Press

“This activity requires a modicum of finesse; it must not be too blatant, for the experts themselves must not recognize that they have lost their objectivity and freedom of action”

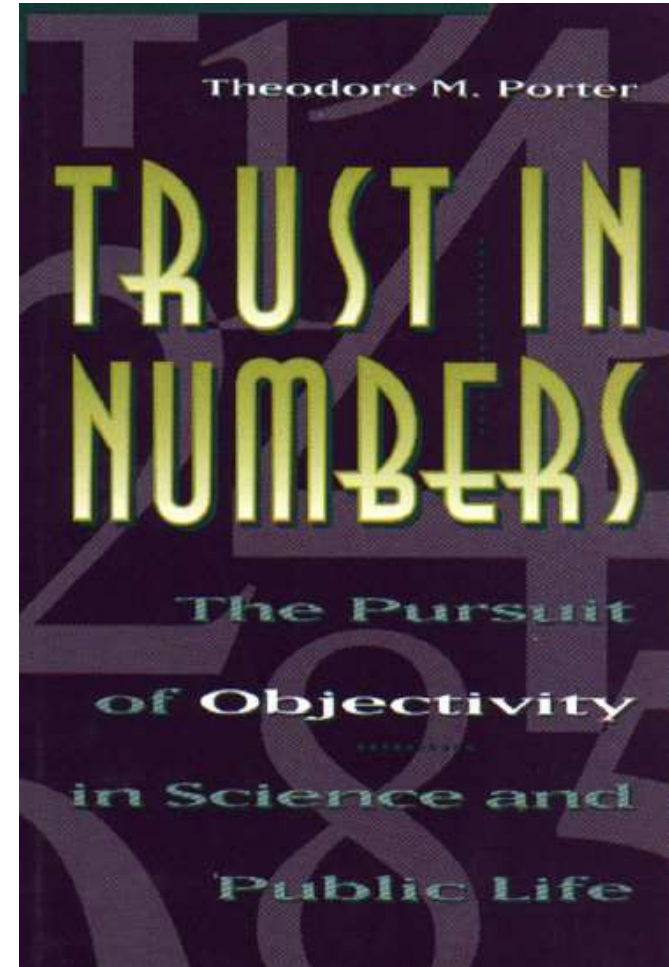
Thanks to Erik Millstone

Owen, B. M., & Braeutigam, R., 1978 The regulation game, : Strategic Use of the Administrative Process, Ballinger Press

Numbers and trust

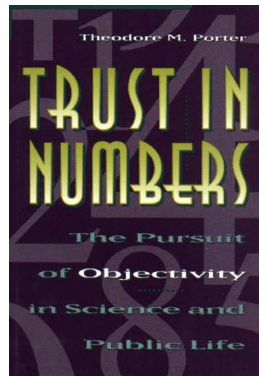


Theodor
M. Porter



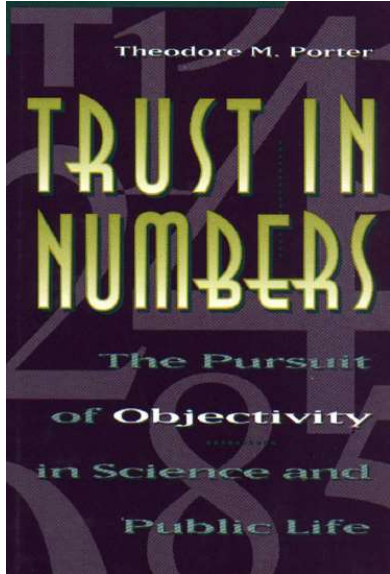
Theodore M. Porter, *Trust in Numbers,
The Pursuit of Objectivity in Science and Public Life*, Princeton 1995

p. 8: “The appeal of numbers is especially compelling to bureaucratic officials who lack the mandate of a popular election, or divine right.



Arbitrariness and bias are the most usual grounds upon which such officials are criticized.

A decision made by the numbers (or by explicit rules of some other sort) has at least the appearance of being fair and impersonal.”

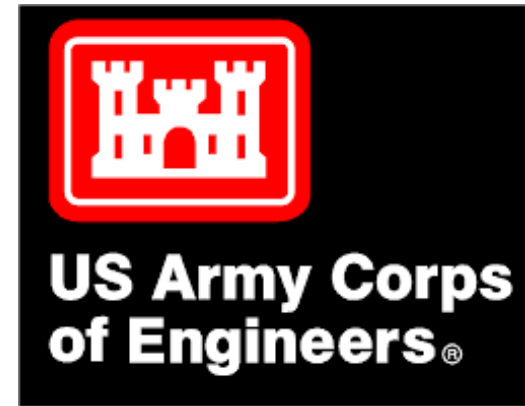


p. 8: “Scientific objectivity thus provides an answer to a moral demand for impartiality and fairness.

Quantification is a way of making decisions without seeming to decide.

Objectivity lends authority to officials who have very little of their own.”

Trust, authority and styles of quantification: two different stories



Porter's story: Quantification needs judgment which in turn needs trust ...without trust quantification becomes mechanical, a system, and 'systems can be played'.





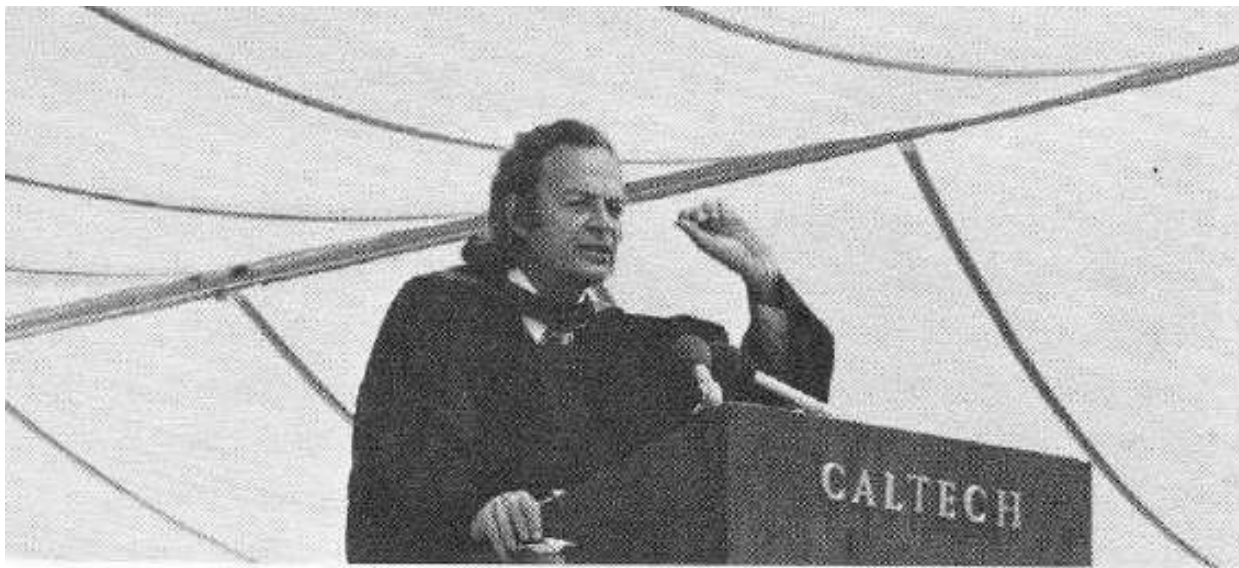
Charles Goodhart

p. 44 “Any ... measures necessarily involve a loss of information ... [and distorts behavior]” (Porter, 1995)

This is what we normally call Goodhart’s law, from Charles Goodhart. "When a measure becomes a target, it ceases to be a good measure."

http://cyberlibris.typepad.com/blog/files/Goodharts_Law.pdf

A lesson from a
recent past



Cargo Cult Science

by RICHARD P. FEYNMAN

**Some remarks on science, pseudoscience,
and learning how to not fool yourself.
Caltech's 1974 commencement address.**



“[...] there is one feature I notice that is generally missing in cargo cult science. That is the idea that we all hope you have learned in studying science in school [...] .



It's a kind of scientific integrity, a principle of scientific thought that corresponds to a kind of utter honesty--a kind of leaning over backwards. [...] Details that could throw doubt on your interpretation must be given, if you know them. [...] give all of the information to help others to judge the value of your contribution."

The End



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