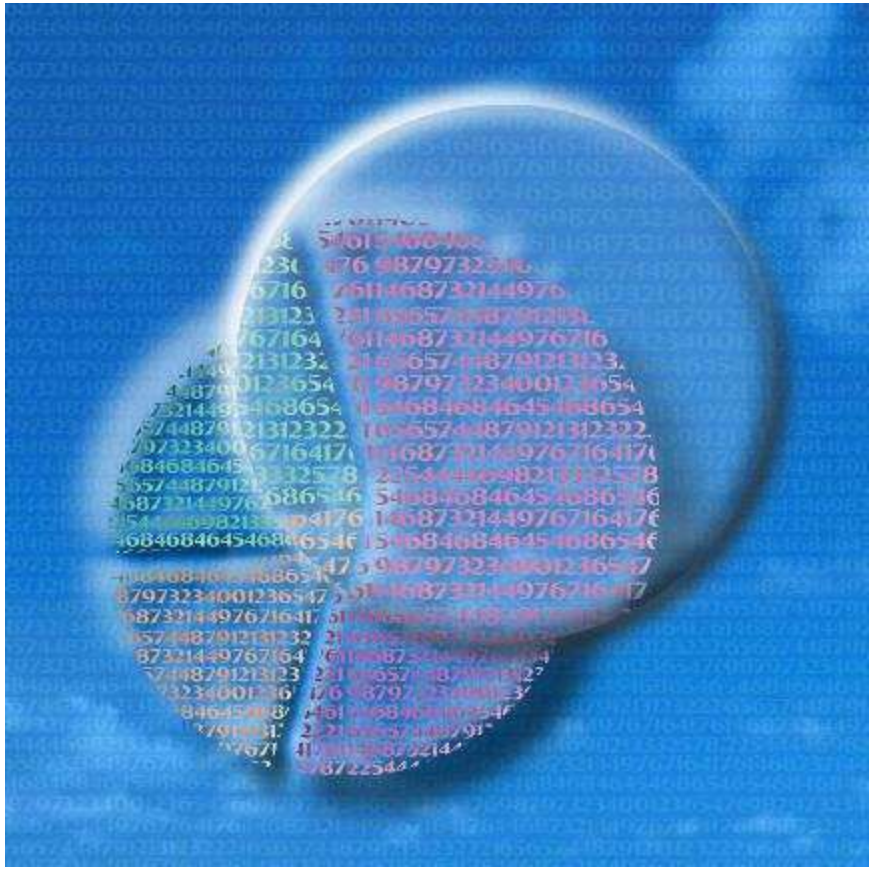


Constructive Wednesday

Andrea Saltelli
Centre for the Study of the Sciences and the Humanities (SVT) - University of Bergen (UIB)
Institut de Ciència i Tecnologia Ambientals (ICTA) -Universitat Autonoma de Barcelona (UAB)

PhD-course

Numbers for policy: Practical problems in quantification

Bergen, March 13-17, 2017

Where to find this talk: www.andreasaltelli.eu

sensitivity analysis, sensitivity auditing, science for policy, impact assessment

= more material on my web site

= discussion time

More on 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 the 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…

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

'Sketch for a Historical Picture of the Progress of the Human Spirit'

René
Descartes
(1596-1650)

Discourse on Method
(1637)

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; 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.

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;
[…]
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.

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)

http://www.bartleby.com/34/1/6.html

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'

http://oll.libertyfund.org/titles/1669

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’

http://oll.libertyfund.org/titles/1669

‘Mathématique sociale’:

We still use today terms such as ‘Condorcet method’, ‘Condorcet winner’, ‘Condorcet-ranking procedure’

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

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

Condorcet’s algorithms and Descartes’ Geometry

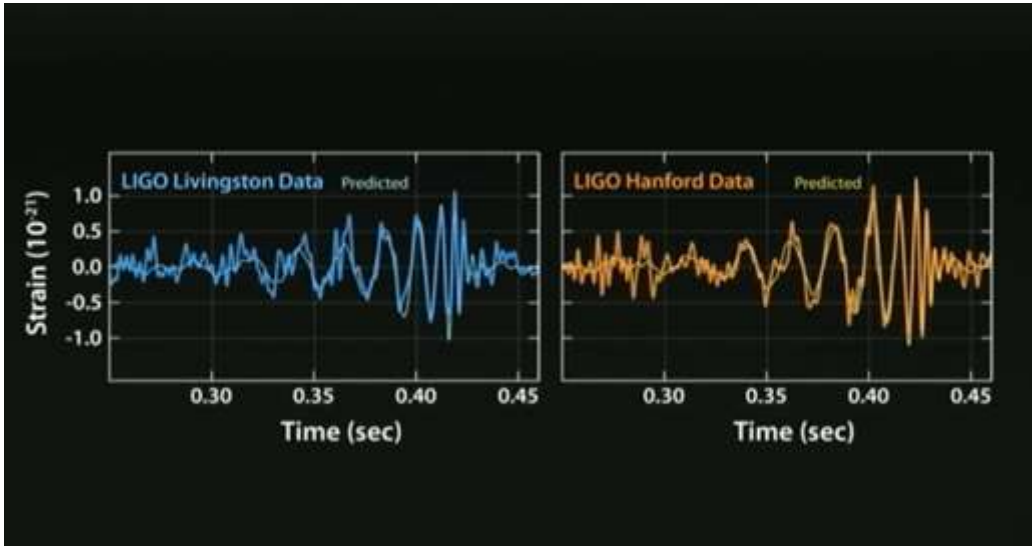
Feldman, J., 2005, Condorcet et la mathematique sociale: enthousiasmes et bemols, Mathematics and Social Sciences, 172(4), 7-41, http://www.ehess.fr/revue-msh/pdf/N172R955.pdf
Munda G. (2007) - Social multi-criteria evaluation, Springer-Verlag, Heidelberg, New York, Economics Series

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

Auguste Comte and the hierarchy of science

Daniele Fanelli's work: "Positive" Results Increase Down the Hierarchy of the Sciences

PLoS ONE, 2010, 5,(4) e10068



Making the dream true: Gravitational waves; from J. Weber's cylinder to LIGO

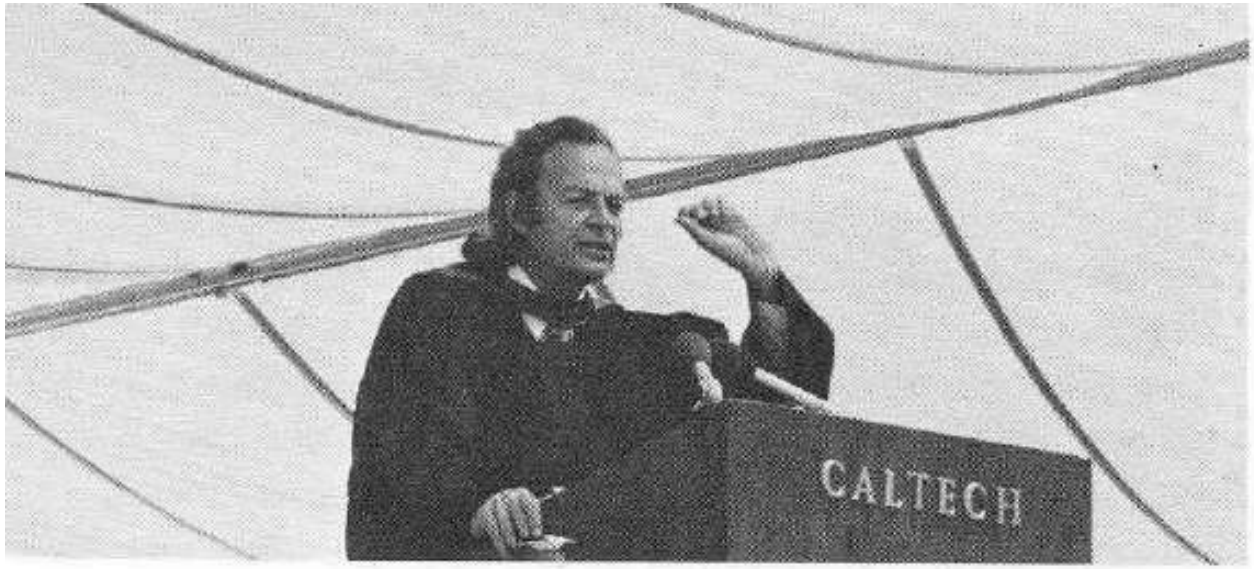
A Madman Dreams of Tuning Machines: The Story of Joseph Weber, the Tragic Hero of Science Who Followed Einstein's Vision and Pioneered the Sound of Space-Time, By Maria Popova, https://www.brainpickings.org/2016/04/25/black-hole-blues-janna-levin-joseph-weber/

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

"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."

Vannevar Bush
(1890-1974)

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



Cargo Cult Science

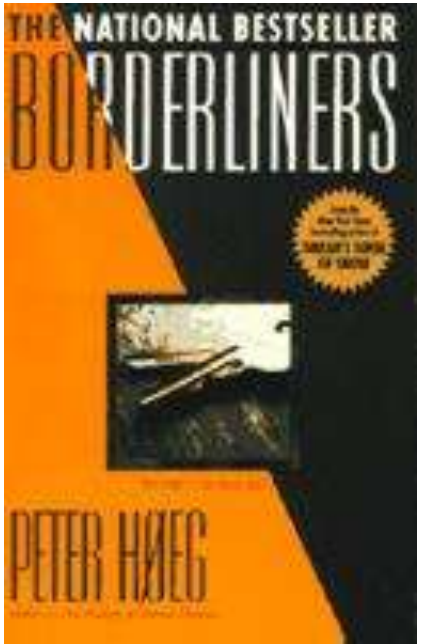
by RICHARD P. FEYNMAN

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.”

Peter Høeg, a Danish novelist, in Borderliners (Høeg, 1995)



“That is what we meant by science. That both question and answer are tied up with uncertainty, and that they are painful. But that there is no way around them. And that you hide nothing; instead, everything is brought out into the open.”

Robert K. Merton, sociologist of science, 1910-2003, the father of Science and Technology Studies

CUDOS

Communalism - the common ownership of scientific discoveries, according to which scientists give up intellectual property rights in exchange for recognition and esteem …

Universalism - according to which claims to truth are evaluated in terms of universal or impersonal criteria, and not on the basis of race, class, gender, religion, or nationality;

Disinterestedness - according to which scientists are rewarded for acting in ways that outwardly appear to be selfless;

Organized Scepticism - all ideas must be tested and are subject to rigorous, structured community scrutiny.

The same R.K. Merton realized later in life that norms have corresponding counter norms … see Mitroff, I. I. 1974, *Am. Soc. Rev.* 39, 579-595.

[We must] consider, first, how potentially contradictory norms develop in every social institution; next, how in the institution of science conflicting norms generate marked ambivalence in the lives of scientists; and finally, how this ambivalence affects the actual, as distinct from the supposed, relations between men of science (Merton, 1963a:80).

- Solitariness (secrecy, miserism) is often used to keep findings secret in order to be able to claim patent rights, …
- Particularism […] a real issue, particularly when you consider the ratio of researchers in rich countries compared with those in poor countries […]
- Interestedness arises because scientists have genuine interests at stake in the reception of their research. […]
- Dogmatism because careers are built upon a particular premise (theory) being true ...

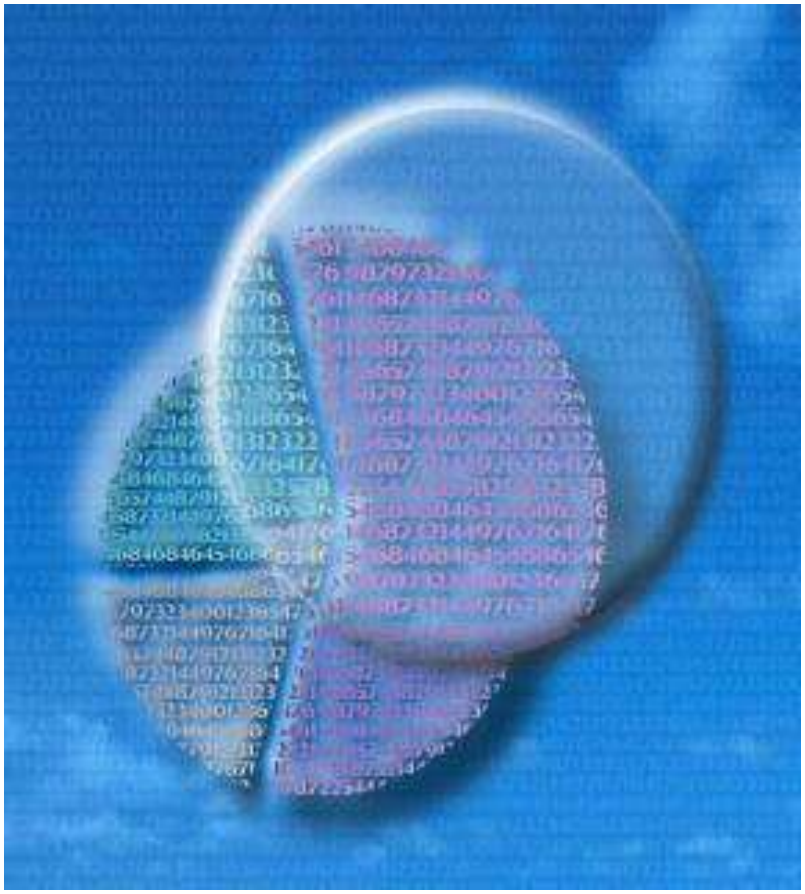
The Republic of Science: Its Political and Economic Theory
Michael Polanyi

[This article originally appeared in *Minerva* 1:54-74, 1962 and is put on WWW with kind permission from Kluwer Academic Publishers (http://www.wkap.nl) and John C. Polanyi.]

Science as a market driven by higher priciples

Which feeds society's thirst for self improvement

Science as a community of practice



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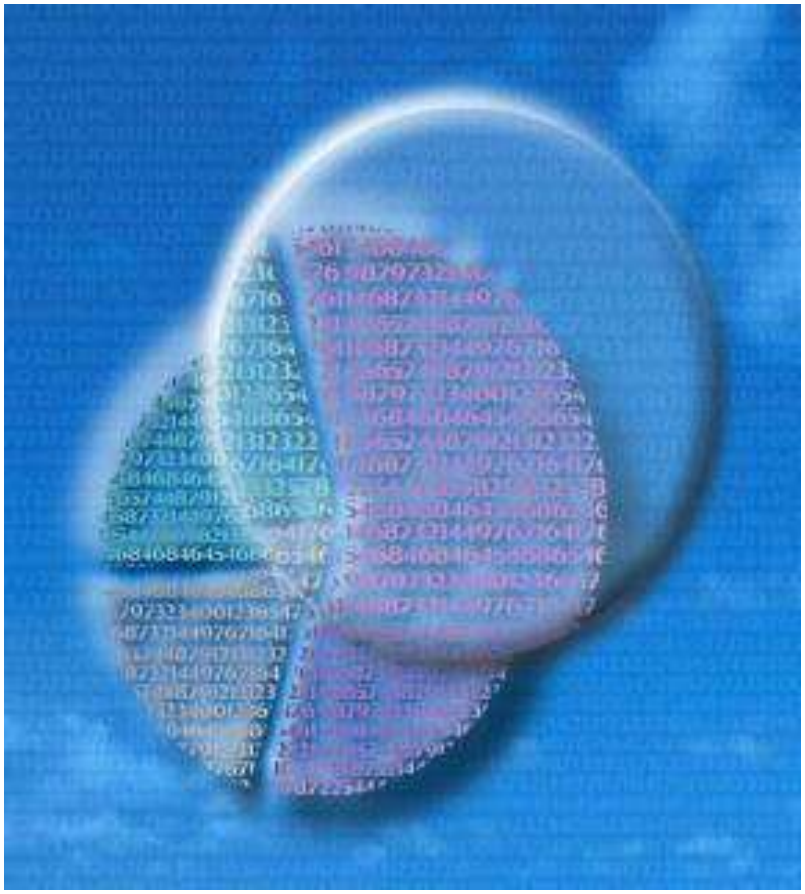

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