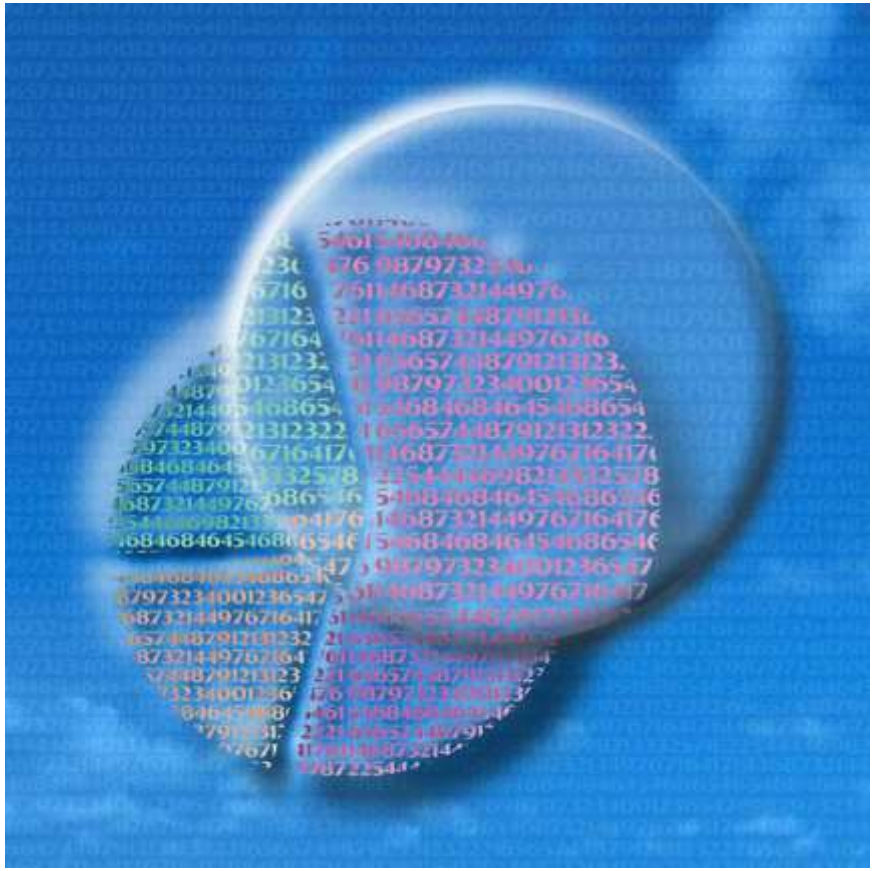


Ethics of quantification

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: Maintaining Scientific Integrity in Present Day Academic Reality

Utrecht, February 26, 2016

Where to find this talk: www.andreasaltelli.eu

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

= more material on my web site

= more material on Wikipedia

= discussion point

What you asked for

CONTRADICTION SCIENCE – TECHNOSCIENCE (I)

- “Can scientists deliver sound academic work and be active in a company at the same time? Integrity in public/private projects”

What you asked for

CONTRADICTION SCIENCE – TECHNOSCIENCE (II)

- “The link between scientific integrity and applicability of my research in society”
- “One can get caught up in their own discipline and consequently suffer from tunnel vision”

What you asked for

GRIM ACADEMY REALITIES (I)

- “I want to publish a paper and my supervisor specifically wants me to cite a lot of his papers, even though I don’t agree that these papers have a lot to do with, or add value to my own paper. What should I do?”

- “I want to publish a paper and my supervisor specifically wants me to add one of his good friends as a co-author, even though he did not contribute significantly at all. What should I do?”

What you asked for

GRIM ACADEMY REALITIES (II)

- “Self-citation. How to maintain scientific integrity when the pressure to publish is so high and dominant in the scientific community.”
- “I hope to learn a bit about academic politics, and how to deal with them in an honest way.”

What you asked for

GRIM ACADEMY REALITIES (III)

- “To which extent is it acceptable to [criticize] previous research?”
- “What must you do when you come across something that breaches integrity, either in someone else’s work or your own?”
- “How far can you go in twisting your research proposal (e.g., those with low applicability) to get funding”

What you asked for

INTEGRITY (I)

- “Is there consensus in the academic world about the meaning and importance of scientific integrity? How has scientific integrity evolved in the history of science?”

- “I would like to build my knowledge of conducting research in a way which is robust – and does not contain any ethical dilemmas”

What you asked for

INTEGRITY (II)

- “Why academics sometimes breach the rules of scientific integrity (i.e. What are their motivations and why do they think they can get away with it?)”
- “What are the root causes for people failing to abide by those rules”
- “Grey areas: when is it acceptable or unacceptable to leave out data you collected?”

What you asked for

STRIVING FOR QUALITY (I)

- “Increasing demand of the number of publications … larger number of publications or for fewer publications of better quality? How can we measure quality, only by the impact factor of the journal were our work is published?”
- “How you can resist the pressure of the scientific world and just to focus on doing your research properly”
- “Data sharing after publication: I experience that it is sometimes very difficult or impossible to get the underlying data or model code…”

What you asked for

STRIVING FOR QUALITY (II)

- "The fact that it is only possible to publish positive results (and not negative ones) introduces a bias against scientific integrity"
- "How to critically question the assumptions, and arguments that guide our research; looking for possible biases"

What you asked for

TAKING SIDE?

- “How to deal with scientific and social dilemmas”
- “The conflict between the theory drawn from practices in developed countries and the context of developing countries,… how to make the research focusing on developing countries understandable to scholars from developed countries”

- ➔ Contradictions we live by as scientists and their root causes
- ➔ Science and technoscience
- ➔ Publish or perish and perverse metrics
- ➔ Issues with trust
- ➔ Responsible quantifications and recipes
- ➔ Your wish list again

Demarcation: facts separate from values

On demarcation:

"the incoming commission must find better ways of separating evidence-gathering processes from the 'political imperative'", A. Glover, former Chief Science Adviser of President Barroso (Wildson, 2014).

Anne Glover

Wilsdon, J. 2014. Evidence-based Union? A new alliance for science advice in Europe. In The Guardian. Available at: http://www.theguardian.com/science/political-science/2014/jun/23/evidence-based-union-a-new-alliance-for-science-advice-in-europe

Evidence based policy – in the prevailing positivistic narrative – is predicated on a separation of facts from values, of scientists from their customers, on demarcation of roles.

‘Demarcation model’ of science’s input to policy

- Protecting science from the political interference…
- Preventing possible abuse of science…
- … and scientific information driven by agendas…
- Prescribes a clear demarcation between the institutions (and individuals) who provide the science, and those where it is used.

Funtowicz, S. 2006. What is Knowledge Assessment? In Guimarães Pereira, Â., Guedes Vaz, S. and Tognetti, S. (eds) Interfaces between Science and Society. Greenleaf Publishers, Sheffield.

Where did this separation originate?

Francis Bacon
(1561-1626)

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

Demarcation is part of the Cartesian dream of man as master and possessor of nature, of prediction and control, of Bacon's wonders of science and 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)

Francis Bacon (1561–1626)

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

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.

Francis Bacon
(1561-1626)

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

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

Considering the possibility of overpopulation leading to war due to scarcity of resources, he concludes that this would 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’

‘Condorcet method’, ‘Condorcet winner’, ‘Condorcet-Kemeny-Young-Levenglick (C-K-Y-L) ranking procedure’

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

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

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

Closer to our times Vannevar Bush's dream was couched in the 'Endless Frontier' metaphor (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)

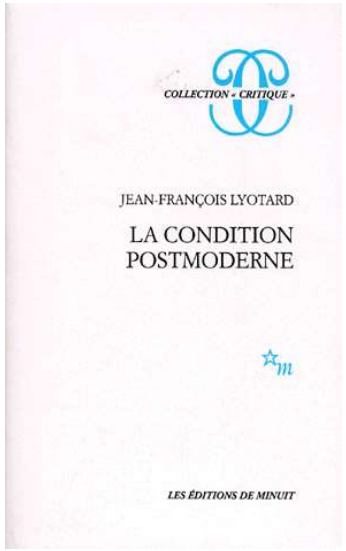
Science the Endless frontier (1945)

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

Where the facts/value demarcation was called into question

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

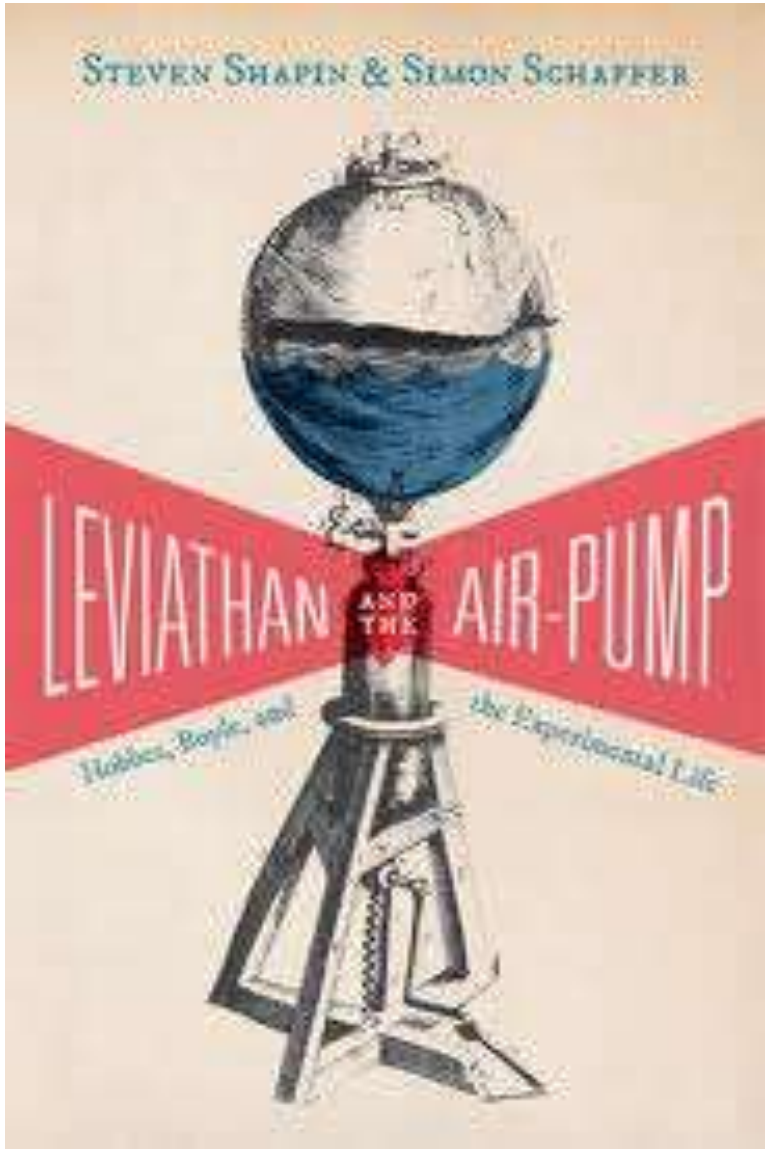
Lyotard, J.-F. 1979. La Condition postmoderne. Rapport sur le savoir, Paris : Minuit.



Jean-François Lyotard

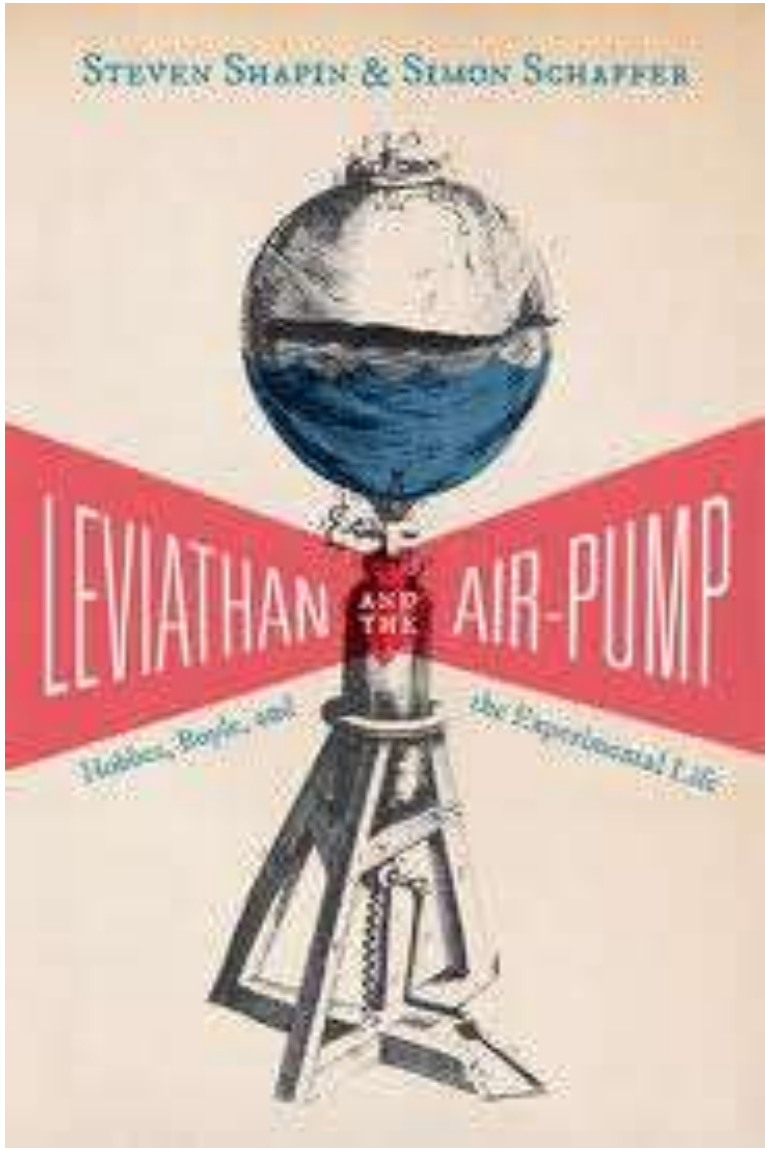
“Solutions to the problem of knowledge are solutions to the problem of social order.

[…] 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

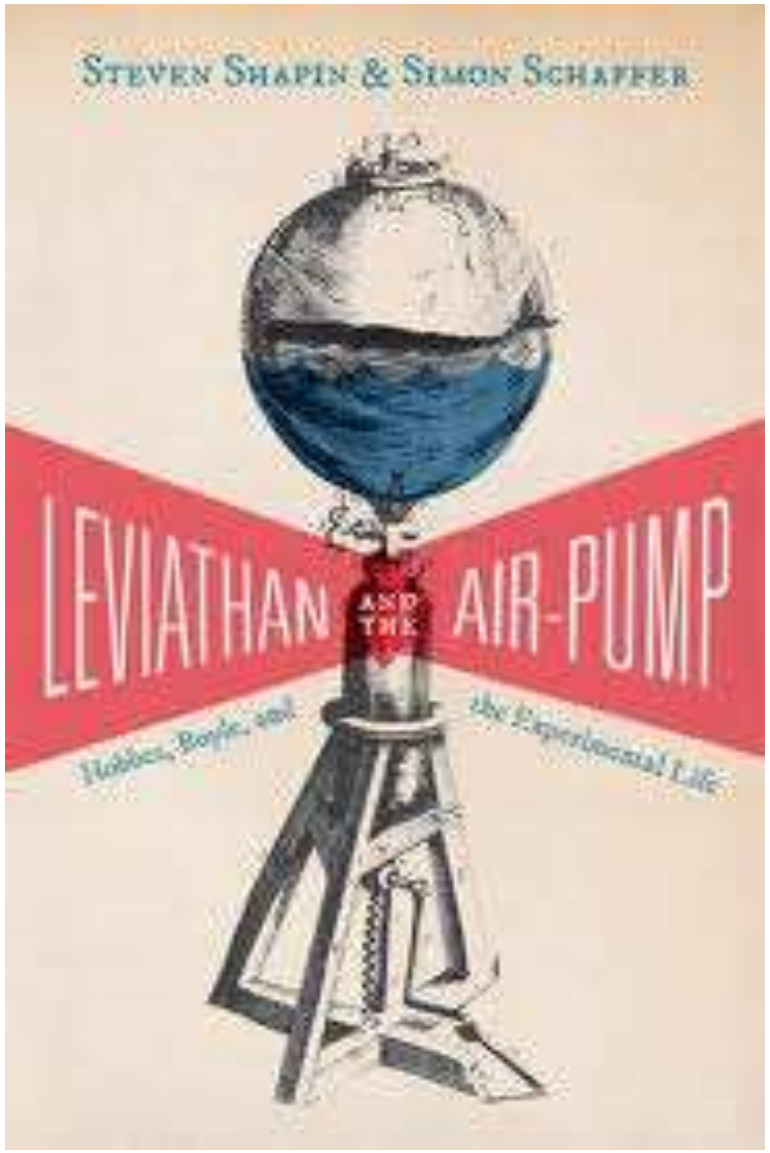
Establishing ‘matter of facts’ under controlled ‘laboratory’ experiments before witnesses as a way to subtract the discourse about knowledge from religious squabbles …



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.

Discussion points for the demarcation discussion:

The Cartesian dream has profound governance implications due to the centrality of science in the formulation, adjudication and legitimacy of policies. Would you agree with the following:

- I was nourished (and/or professionally trained) with the principles of the Cartesian dream?

- We should we move away from this dream

Crisis

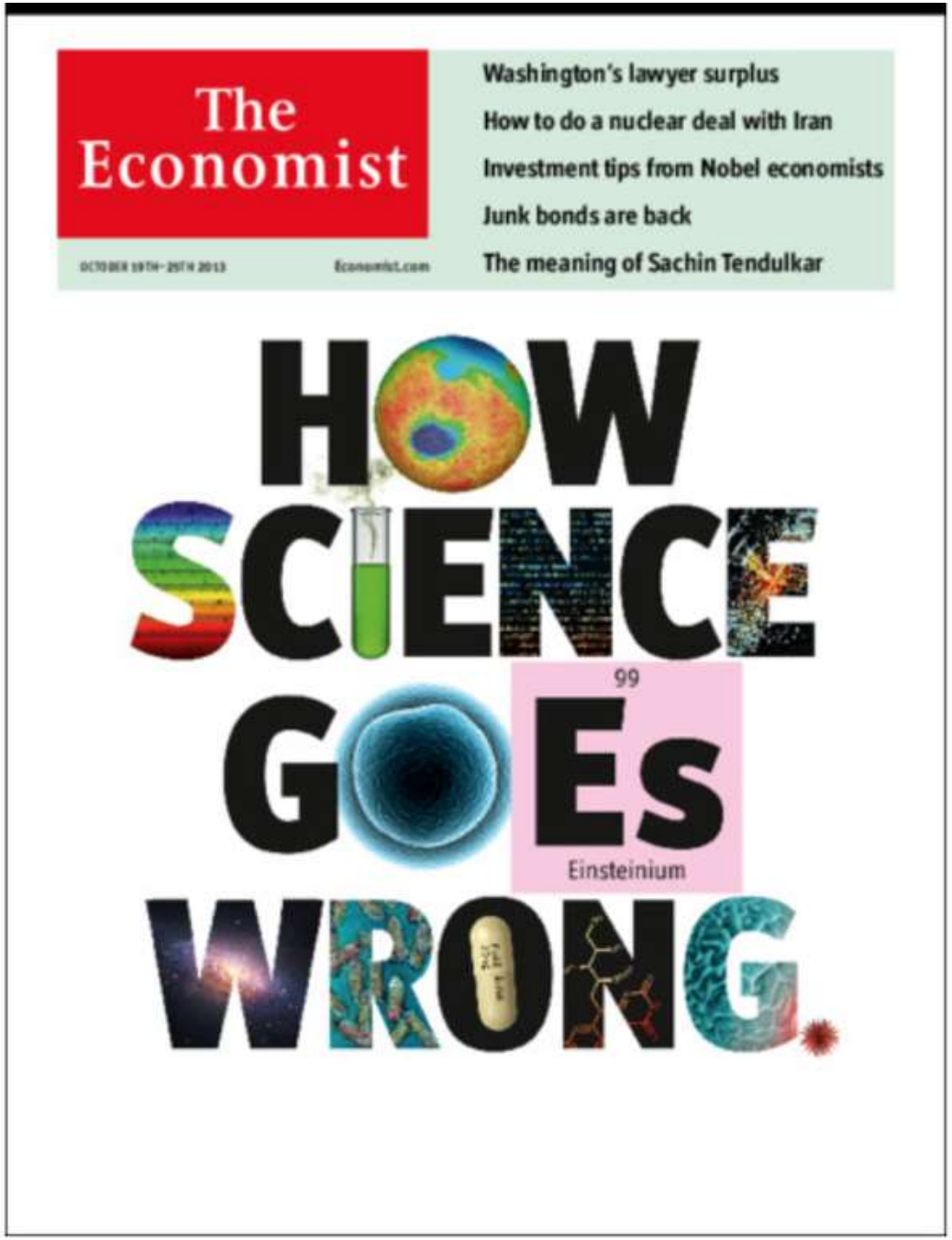
Issues with trust / quality in the scientific enterprise

Laboratory experiments cannot be trusted without independent verification (Sanderson 2013), rules are proposed to spot “suspected work [⋯in] the majority of preclinical cancer papers in top tier journals” (Begley 2013).

Begley CG 2013 Reproducibility: Six red flags for suspect work Nature 497 433-434.

Ioannidis J P A 2005 Why Most Published Research Findings Are False PLoS Medicine 2(8) 696-701.

Sanderson K 2013 Bloggers put chemical reactions through the replication mill Nature 21 January 2013.



Unreliable research

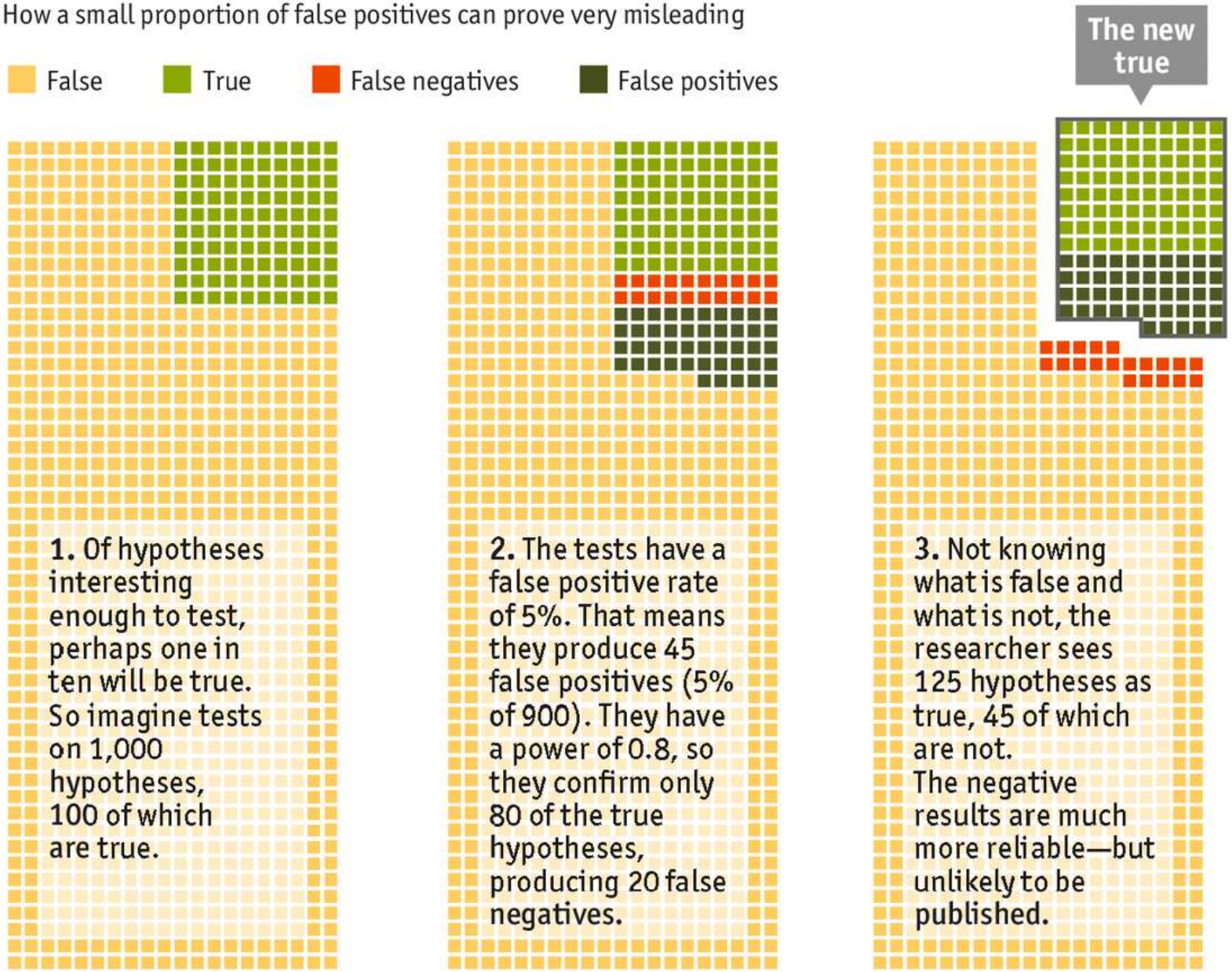
Trouble at the lab

Scientists like to think of science as self-correcting. To an alarming degree, it is not

Oct 19th 2013 | From the print edition

Unlikely results

How a small proportion of false positives can prove very misleading



Source: *The Economist*

The Economist

A statistical problem ?

Open access, freely available online

Essay

Why Most Published Research Findings Are False

John P. A. Ioannidis

J. P. A. Ioannidis, Why Most Published Research Findings Are False, PLoS Medicine, August 2005, 2(8), 696-701.

field. In this framework, a research finding is less likely to be true when the studies conducted in a field are smaller; when effect sizes are smaller; when there is a greater number and lesser preselection of tested relationships; where there is greater flexibility in designs, definitions, outcomes, and analytical modes; when there is greater financial and other interest and prejudice; and when more teams are involved in a scientific field in chase of statistical significance.

“A career structure which lays great stress on publishing copious papers exacerbates all these problems.”

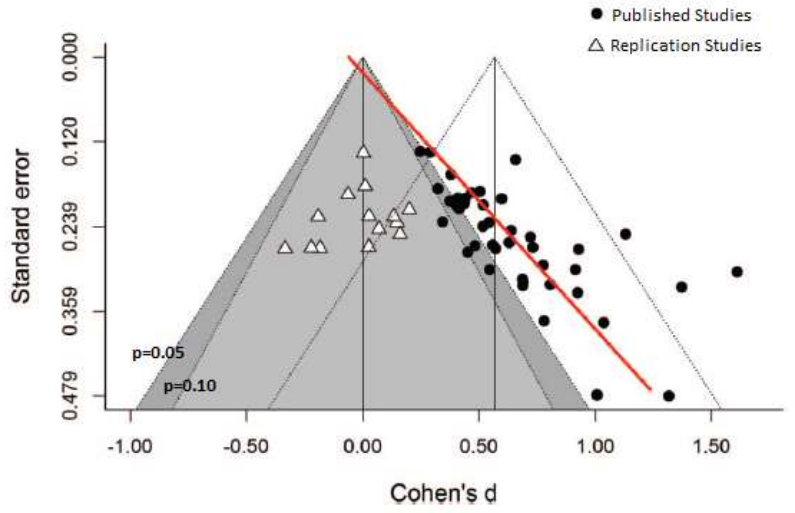
The Economist

“There is no cost to getting things wrong. The cost is not getting them published.” Brian Nosek, quoted by The Economist.

The Economist

“P-hacking” or publication bias?

The literature on ‘romantic primes’



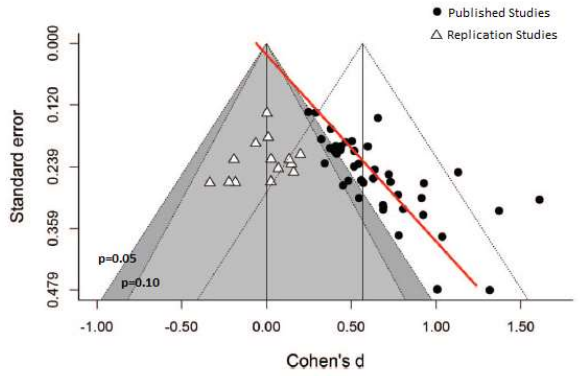
Shanks et al. (2015) JEP:General

Journal of Experimental Psychology: General, 144(6), Dec 2015, e142-e158. “Romance, Risk, and Replication: Can Consumer Choices and Risk-Taking Be Primed by Mating Motives?”, Shanks DR, Vadillo MA, Riedel B, Clymo A, Govind S, Hickin N, Tamman AJ, Puhlmann LM.

“[…]a meta-analysis of this literature reveals strong evidence of either publication bias or p-hacking (or both).

None of the studies, including one that was fully preregistered, was successful.

The results question the claim that romantic primes can influence risk-taking and other potentially harmful behaviors.”



Shanks et al. (2015) JEP:General

“Currently, many published research findings are false or exaggerated, and an estimated 85% of research resources are wasted”

For Lancet (2015) an estimated US$200 billion were wasted in the US in 2010.

Ioannidis, J. P. (2014). How to Make More Published Research True. PLoS medicine, 11(10), e1001747

Lancet, Editorial, 2015, Rewarding true inquiry and diligence in research, 385, p. 2121.

Issues with trust / quality in the scientific enterprise

Initiatives:
http://retractionwatch.wordpress.com
http://www.reproducibilityinitiative.org

Fixing the mess is not easy:
'Sluggish data sharing hampers reproducibility effort',
(Van Noorden, 2015).

Nature biotechnology. Further Confirmation Needed, Editorial, Nature Biotechnology 30, 2012, 806.

Van Noorden, R., Sluggish data sharing hampers reproducibility effort, Nature, News, June 3rd 2015.

Begley, C.G., Buchan A.M., and Dirnagl, U., 2015, Institutions must do their part for reproducibility, Nature, 525, p. 25-27.

Solutions from within:

Four international conferences have already been held on science integrity between 2007 and 2015 (May 31, 2015, about 600 delegates from over 50 countries and all continents, Rio de Janeiro)

San Francisco declaration, (2012), as of June 2015 signed by 12,000 individuals, and 570 organizations.

“Do not use journal-based metrics, such as Journal Impact Factor, as a surrogate measure of the quality of individual research articles to assess an individual scientist’s contributions, or in hiring, promotion, or funding decisions.”

Declaration: http://am.ascb.org/dora/ , drafted by publishers, with separate recommendations for institutions, publishers, organizations that supply metrics and researchers.
Lancet, Editorial, 2015, Rewarding true inquiry and diligence in research, 385, p. 2121.
Wilsdon, J., 2015, We need a measured approach to metrics, Nature, 523, 129.
Ioannidis, J. P. (2014). How to Make More Published Research True. PLoS medicine, 11(10), e1001747.

Solutions from within:

How to Make More Published Research True (Ioannides 2014)

John P. A. Ioannides

"[…] adoption of large-scale collaborative research; replication culture; registration; sharing; reproducibility practices; better statistical methods; […] and improvement in study design standards, peer review, reporting and dissemination of research, and training of the scientific workforce"

Ioannidis, J. P. (2014). How to Make More Published Research True. PLoS medicine, 11(10), e1001747.

Solutions from within – incentives & currencies

How to Make More Published Research True (Ioannides 2014)

John P. A. Ioannides

"Modifications [] in the reward system for science, affecting the exchange rates for currencies (e.g., publications and grants) and purchased academic goods (e.g., promotion and other academic or administrative power) and introducing currencies that are better aligned with translatable and reproducible research"

Ioannidis, J. P. (2014). How to Make More Published Research True. PLoS medicine, 11(10), e1001747.

Brave efforts from within:

Jeffrey Beall, librarian, University of Colorado, Denver. Monitors predatory open access publishers.

http://scholarlyoa.com/2015/01/02/bealls-list-of-predatory-publishers-2015/#more-4719.

"**Misleading metrics** list includes companies that "calculate" and publish counterfeit impact factors [...] The **Hijacked journals** list includes journals for which someone has created a counterfeit website, stealing the journal's identity and soliciting articles submissions using the author-pays model (gold open-access)"

“Springer and Université Joseph Fourier release SciDetect to discover fake scientific papers”

“The open source software discovers text that has been generated with the SCIgen computer program and other fake-paper generators like Mathgen and Physgen […]

SciDetect […] is a valuable building block for the future of academic publishing”

https://www.springer.com/gp/about-springer/media/press-releases/corporate/springer-and-universit%C3%A9-joseph-fourier-release-scidetect-to-discover-fake-scientific-papers--/54166

See Ravetz’s warning “If there were not a test of each paper …”

Brave efforts from within:

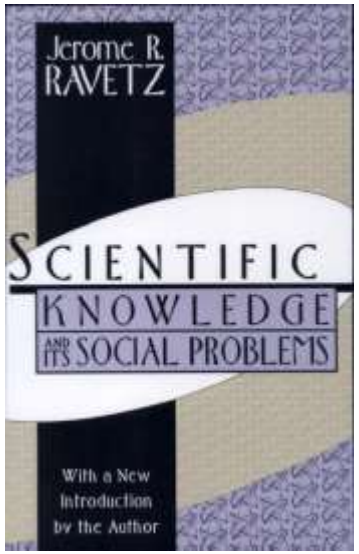
Timothy Gowers, mathematician, Fields medalist, boycott of Elsevier, slogans: ‘Academic Spring’, ‘Occupy Elsevier’.

Whitfield, J., 2012, Elsevier boycott gathers pace: Rebel academics ponder how to break free of commercial publishers, Nature, doi:10.1038/nature.2012.10010

Larivière V, Haustein S, Mongeon P (2015) The Oligopoly of Academic Publishers in the Digital Era. PLoS ONE 10(6): e0127502, http://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0127502

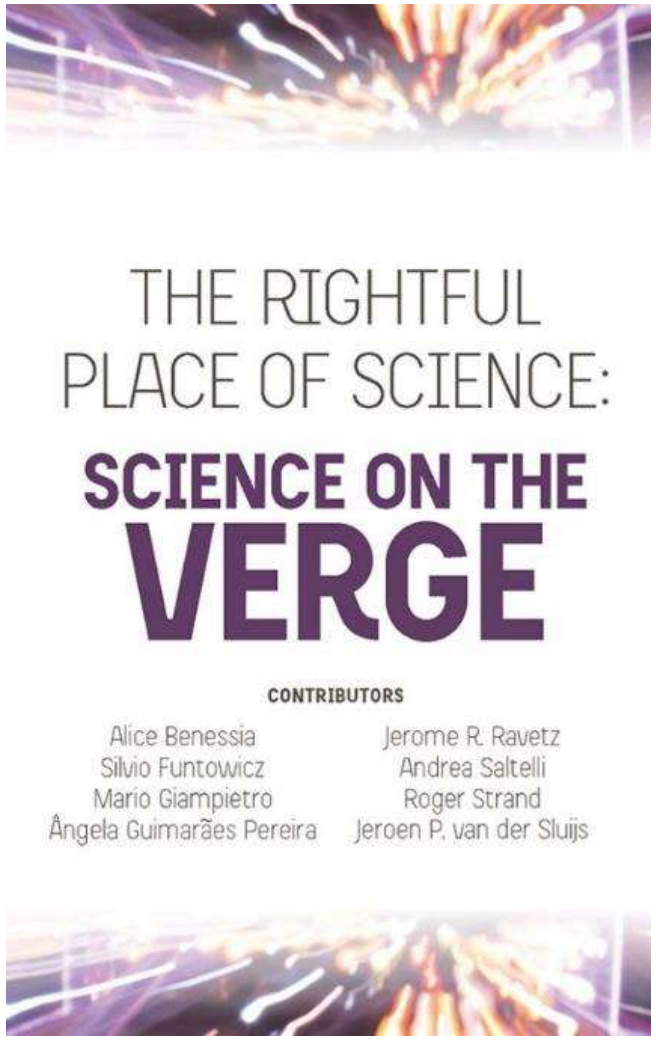
p. 22-23: “Two separate factors are necessary for the achievement of worthwhile scientific results: a community of scholars with a shared knowledge of the standards of quality appropriate for their work and a shared commitment to enforce those standards by the informal sanctions the community possesses; and individuals whose personal integrity sets standards at least as high as those required by their community…”

Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press, p.22.



Jerome R. Ravetz

Sources 1:



The Rightful Place of Science: Science on the Verge

Paperback – 20 Feb 2016

by Andrea Saltelli (Author), Alice Benessia (Author), & 7 more

1 customer review

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Every day? http://www.nature.com/news/macchiarini-scandal-is-a-valuable-lesson-for-the-karolinska-institute-1.20539

Sources 2:

THE CONVERSATION

Academic rigour, journalistic flair

Arts + Culture | Business + Economy | Education | Environment + Energy | Health + Medicine | Politics + Society | Science + Technology

Science in crisis: from the sugar scam to Brexit, our faith in experts is fading

September 27, 2016 4.43pm AEST

https://theconversation.com/science-in-crisis-from-the-sugar-scam-to-brexit-our-faith-in-experts-is-fading-65016

Discussion points of the discussion on the crisis:

Would you agree that there is a crisis in the science's own quality control mechanism?

In a quest for a solution what to believe: 'Better incentives' or 'shared commitment'?

Did this discussion meet some of your 'wish-list' entries?

Publish or perish

Metrics

theguardian

How peer reviewers might hold the key to making science more transparent

A new initiative published this week outlines how scientists can make a change to open science practices at an individual level

Pete Etchells

Pete Etchells is the Guardian's science blog network coordinator. You can find him on Twitter: @PeteEtchells

Friday 15 January 2016 12.30 GMT

https://www.theguardian.com/science/head-quarters/2016/jan/15/pro-initiative-peer-reviewers-might-hold-the-key-to-making-science-more-transparent

The Peer Reviewers' Openness (PRO) Initiative is, at its core, a simple pledge: scientists who sign up to the initiative agree that, from January 1 2017, will not offer to comprehensively review, or recommend the publication of, any scientific research papers for which the data, materials and analysis code are not publicly available, or for which there is no clear reason as to why these things are not available. To date, over 200 scientists have signed the pledge.

How peer reviewers might hold the key to making science more transparent

A new initiative published this week outlines how scientists can make a change to open science practices at an individual level

ROYAL SOCIETY OPEN SCIENCE

rsos.royalsocietypublishing.org

Opinion piece

Cite this article: Morey RD *et al*. 2016 The Peer Reviewers' Openness Initiative: incentivizing open research practices through peer review. *R. Soc. open sci*. **3**: 150547. http://dx.doi.org/10.1098/rsos.150547

Received: 10 October 2015
Accepted: 1 December 2015

The Peer Reviewers' Openness Initiative: incentivizing open research practices through peer review

Richard D. Morey[1], Christopher D. Chambers[1], Peter J. Etchells[2], Christine R. Harris[3], Rink Hoekstra[4], Daniël Lakens[5], Stephan Lewandowsky[6,7], Candice Coker Morey[8], Daniel P. Newman[9], Felix D. Schönbrodt[10], Wolf Vanpaemel[11], Eric-Jan Wagenmakers[12] and Rolf A. Zwaan[13]

How peer reviewers might hold the key to making science more transparent

A new initiative published this week outlines how scientists can make a change to open science practices at an individual level

Peer review's crisis:

Schroter, S., Black, N. Evans, S, Godlee, F., Osorio, L. Smith, R., 2008, What errors do peer reviewers detect, and does training improve their ability to detect them?, Journal of the Royal Society of Medicine, 101: 507–514.

Your question: "To which extent is it acceptable to [criticize] previous research?"

Scrutinising science

The watchers on the Web

A court case may define the limits of anonymous scientific criticism

Nov 5th 2016 | From the print edition

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Berkeley Initiative for
Transparency in the Social Sciences

Science is “show me,” not “trust me”

December 31, 2015

Guest post by Philip B. Stark, Associate Dean of the Division of Mathematical and Physical Sciences, UC Berkeley Professor of Statistics, and winner of one of BITSS' Leamer-Rosenthal Prizes for Open Social Science.

http://www.bitss.org/2015/12/31/science-is-show-me-not-trust-me/

“Reproducibility and open science are about providing evidence that you are right, not just claiming that you are right. Here’s an attempt to distill the principles and practices.

Shortest: Show your work.
Next shortest: Show your work. All your work.
[…]

Checklist

If you relied on Microsoft Excel for computations, fail.
[…]
If you published in a journal with a paywall and no open-access policy, fail.”

http://www.bitss.org/2015/12/31/science-is-show-me-not-trust-me/

“Pledge

I think reproducibility and open science would make huge strides if everyone pledged:

A. I will not referee any article that does not contain enough information to tell whether it is correct.”

[…]

http://www.bitss.org/2015/12/31/science-is-show-me-not-trust-me/

A recent conference:

Gaming Metrics: Innovation & Surveillance in Academic Misconduct

ICIS/CSIS Event

When	Feb 04, 2016 09:00 AM to Feb 05, 2016 03:30 PM
Where	Vanderhoef Studio Theatre / Kalmanovitz Appellate Courtroom
Contact Name	Alexandra Lippman
Add event to calendar	vCal iCal

GAMING METRICS: INNOVATION & SURVEILLANCE IN ACADEMIC MISCONDUCT

UC Davis, February 4-5, 2016

Organized by the Innovating Communication in Scholarship Project (ICIS) with support from the Center for Science and Innovation Studies (CSIS)

Misconduct has traditionally been tied to the pressures of “publish or perish”[…] Have we moved from "publish or perish" to "impact or perish"? If so, are metrics of evaluation now creating new incentives for misconduct? And can we still reliably draw a clear separation between gaming the metrics game and engaging in misconduct? […]In sum, are new metrics-based forms of misconduct asking us to rethink and redefine misconduct?

Metrics: a review for the UK government

WORLD VIEW *A personal take on events*

JAMES WILSDON

We need a measured approach to metrics

Quantitative indicators of research output can inform decisions but must be supported by robust analysis, argues **James Wilsdon**.

9 JULY 2015 | VOL 523 | NATURE | 129

Metrics:

“[…] only a minority of the scientists we consulted supported the increased use of metrics. […] the description, production and consumption of metrics remains contested and open to misunderstanding.

[…] but there is legitimate concern that some quantitative indicators can be gamed, or lead to unintended consequences.”

http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/Independentresearch/2015/The,Metric,Tide/2015_metric_tide.pdf

Note: this is part of Research Excellence Framework (REF)

Against Excellence

Universities are currently agonising about the Research Excellence Framework. **Jack Stilgoe** doesn't have a problem with research assessment. He thinks that the real trouble lies with the word 'excellence'.

Jack Stilgoe

"Excellence is judged by peers and backed up by numbers such as h-indexes and journal impact factors, all of which reinforces disciplinary boundaries and focuses scientists' attention inwards rather than on the problems of the outside world

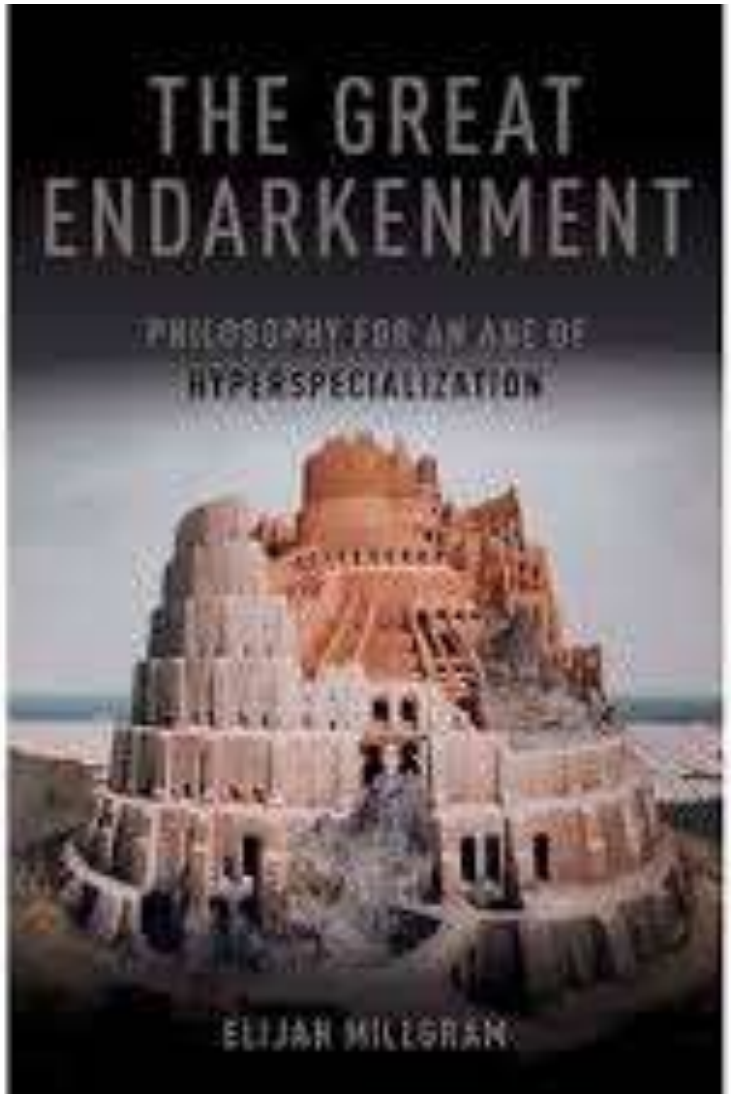
[…] journal rankings discourage interdisciplinarity by systematically evaluating disciplinary research more highly."

https://www.theguardian.com/science/political-science/2014/dec/19/against-excellence

Your question: "One can get caught up in their own discipline and consequently suffer from tunnel vision"

Is science is bringing about the end of Enlightenment by creating a world impossible to make sense of?

Serial hyper-specializers and methodological aliens



Discussion points of the discussion on publishing, peer reviewing, metrics:

Did this discussion meet some of your ‘wish-list’ entries?

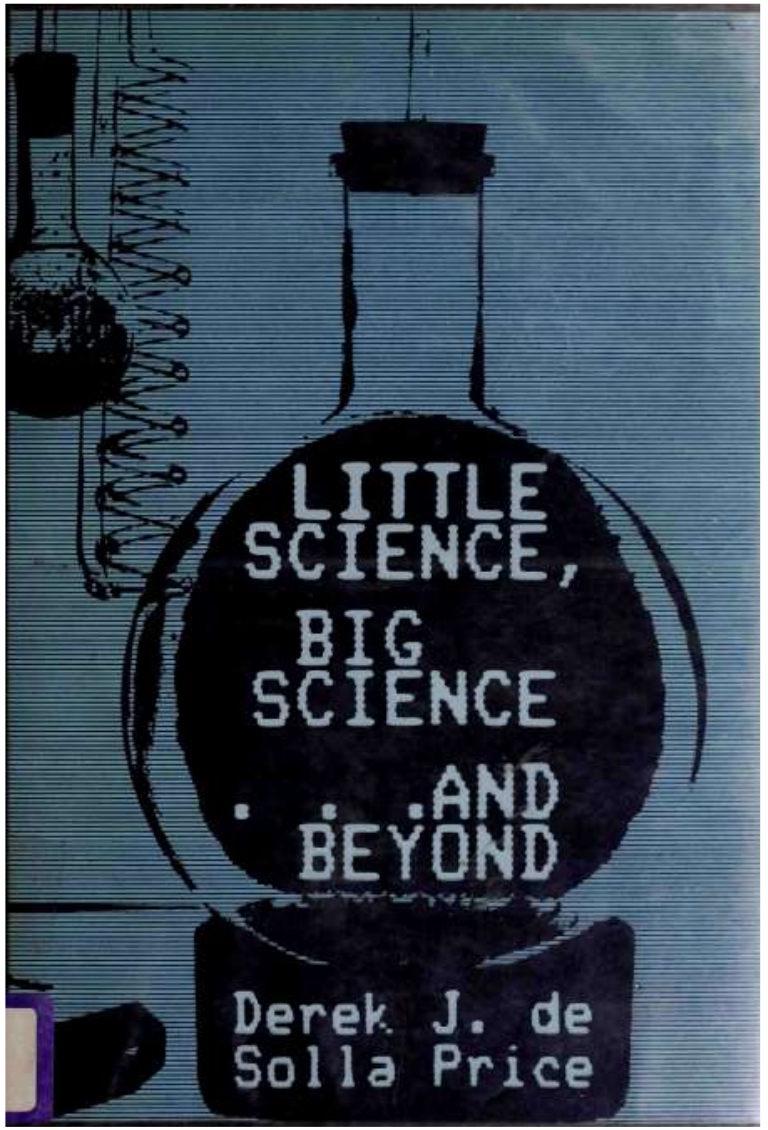
Would you subscribe to pledges such as e.g. not to review certain papers or not to publish in certain journals?

Contradictions between integrity and publish or perish?

Science or technoscience ?

A perspective from science and technology studies

In 1963 Derek J. de Solla Price prophesized that Science would reach saturation (and in the worst case senility) under its own weight, victim of its own success and exponential growth (pp 1-32).



Derek J. de Solla Price

de Solla Price, D.J., 1963, Little science big science, Columbia University Press.

Science/knowledge degenerates when it becomes a commodity for Ravetz (1971), Lyotard (1979) and Mirowski (2011).

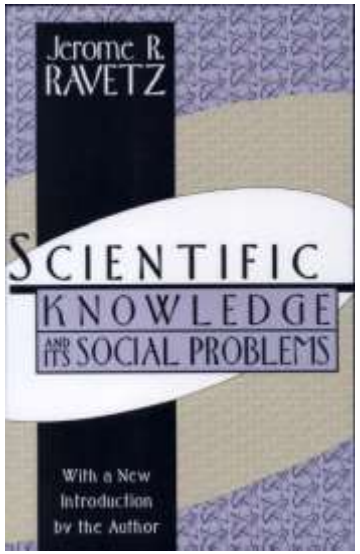
Jerome R. Ravetz

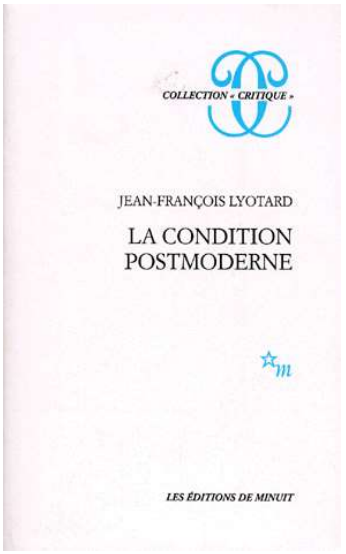
Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press, p. 22.

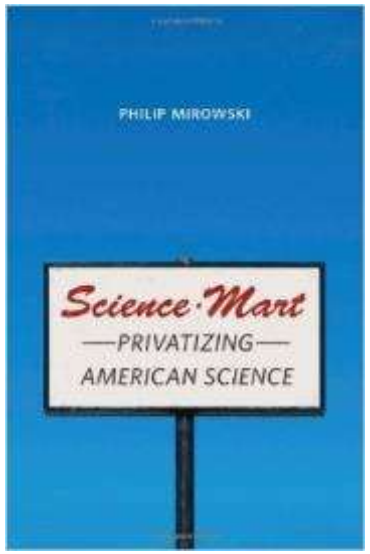
Lyotard, J.-F. 1979. La Condition postmoderne. Rapport sur le savoir, Paris : Minuit, Chapter 10.

Mirowski, P. 2011. Science-Mart: Privatizing American Science, Harvard University Press.

Jean-François Lyotard



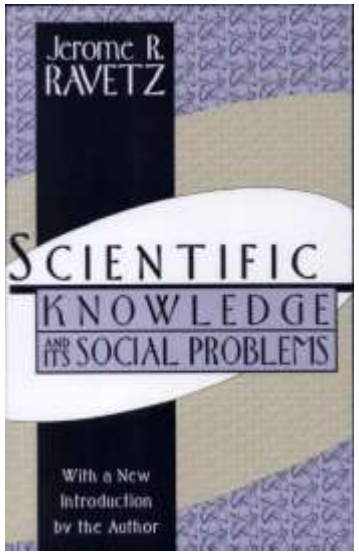




Philip Mirowski

p.22: “with the industrialization of science, certain changes have occurred which weaken the operation of the traditional mechanism of quality control and direction at the highest level. […] The problem of quality control in science is thus at the centre of the social problems of the industrialized science of the present period. If it fails to resolve this problem […] then the immediate consequences for morale and recruitment will be serious; and those for the survival of science itself, grave”

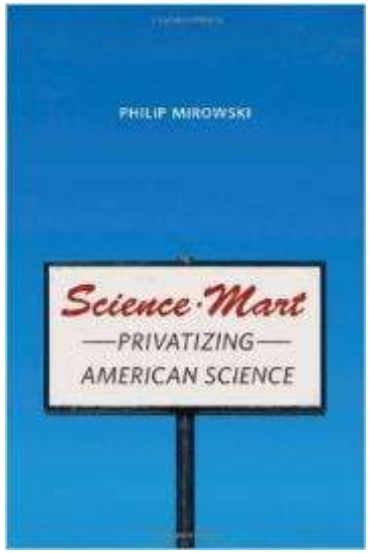
Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press, p.22.



Jerome R. Ravetz

After the eighties neoliberal ideologies succeeded in decreasing state intervention in the funding of science, which became increasingly privatized … Knowledge as a monetized commodity replaces knowledge as public good…

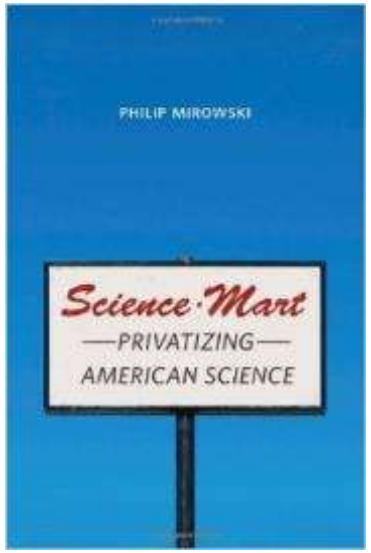
Mirowski, P. 2011. Science-Mart: Privatizing American Science, Harvard University Press.



Philip Mirowski

In house science labs of major corporation were closed and research outsourced to universities which … became more and more looking as profit seeking organization (technology transfer offices in every campus) … then research ended up outsourced again to contract-based research organizations (CRO's)…

Mirowski, P. 2011. Science-Mart: Privatizing American Science, Harvard University Press.



Philip Mirowski

Take home points from the lesson from science and technoscience:

Did this discussion meet some of your ‘wish-list’ entries?

Can science’s ethos survive under technoscience conditions?

Problematic quantifications

Those aspect of science most used in policy (mathematical and statistical modelling) are also those more problematic.

Leek J.T., and Peng, R.D., 2015, P values are just the tip of the iceberg, Nature, 520, p. 612.


IN FOCUS NEWS

REPRODUCIBILITY

Statisticians issue warning on *P* values

Statement aims to halt missteps in the quest for certainty.

"Misuse of the P value — a common test for judging the strength of scientific evidence — is contributing to the number of research findings that cannot be reproduced"

Baker, M., 2016, Statisticians issue warning on P values, Nature, 531, 151.

… and twenty 'dissenting' commentaries

Wasserstein, R.L. and Lazar, N.A., 2016. 'The ASA's statement on p-values: context, process, and purpose', The American Statistician, DOI:10.1080/00031305.2016.1154108.

More stringent quality criteria are needed for models used at the science-policy interface […] current modeling practices […] are a significant threat to the legitimacy and the utility of science in contested policy environments […]

ISSUES
IN SCIENCE AND TECHNOLOGY

Table of Contents

Volume XXX Issue 2, Winter 2014

When All Models Are Wrong

by Andrea Saltelli, Silvio Funtowicz

Available online:
http://issues.org/30-2/andrea/

The myth of scientific quantification via risk or cost benefit analyses, including of the impact of new technologies, has been at the hearth of the critique of the ecological moment (e.g. Schumacher, 1973; Winner, 1986; Funtowicz and Ravetz, 1994)

E. F. Schumacher, 1973, Small Is Beautiful. Economics as if People Mattered, Penguin Perennial.

Winner, L., 1986. The Whale and the Reactor: a Search for Limits in an Age of High Technology. The University of Chicago Press, 1989 edition.

Funtowicz, S.O. and Ravetz, J.R. (1994). The worth of a songbird: Ecological economics as a post-normal science. Ecological Economics 10(3), 197-207.

[…] quality is much more difficult to 'handle' than quantity, just as the exercise of judgment is a higher function than the ability to count and calculate. Quantitative differences can be more easily grasped and certainly more essay defined than qualitative differences: their concreteness is beguiling and gives them the appearance of scientific precision, even when this precision has been purchased by the suppression of vital differences of quality.

Ernst Friedrich "Fritz" Schumacher

E. F. Schumacher, 1973, Small Is Beautiful. Economics as if People Mattered, Penguin Perennial,

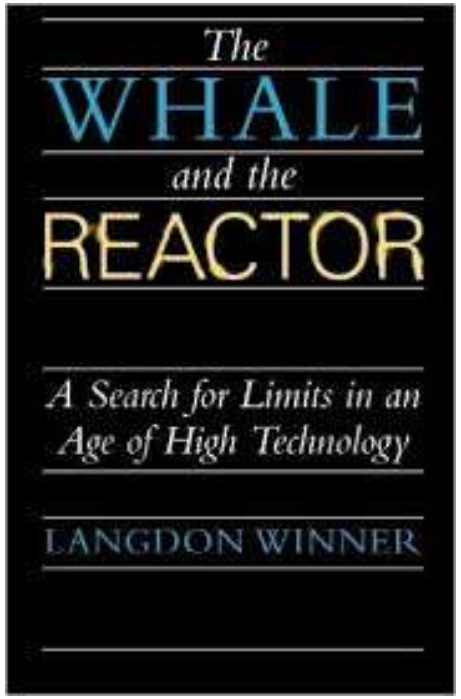
Frames

Most analyses offered as input to policy are framed as cost benefit analysis or risk analyses.

Langdon Winner

8

ON NOT HITTING THE TAR-BABY



Winner, L., 1986. The Whale and the Reactor: a Search for Limits in an Age of High Technology. The University of Chicago Press, 1989 edition.

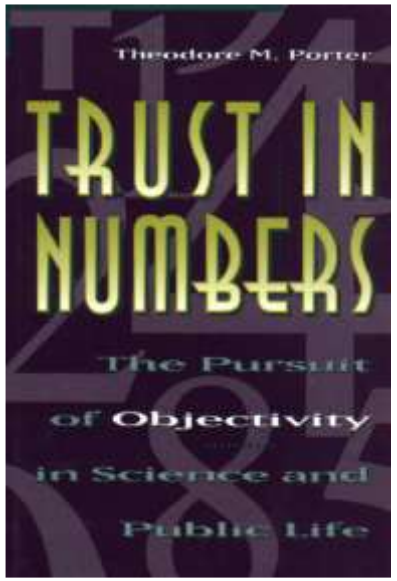
The development of Post-Normal Science can be seen as a reaction to the hyper precision of cost benefit and risk analysis as applied to solve ecological problems: “How much is a songbird worth?”

Example: deconstruction of the economics of climate change.

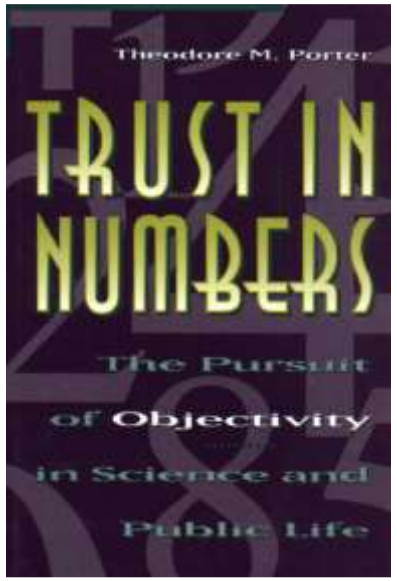
Funtowicz, S.O. and Ravetz, J.R. (1994). The worth of a songbird: Ecological economics as a post-normal science. Ecological Economics 10(3), 197-207.

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.”

Theodor M. Porter



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



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

ECOLE NATIONALE
DES PONTS ET CHAUSSEES

US Army Corps of Engineers®

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

Quantification as an instrument of hypocognition = radical simplifications, linearization and compressions of understandings ➔ Socially constructed ignorance

Ravetz, J. R., 1987. “Usable Knowledge, Usable Ignorance, Incomplete Science with Policy Implications, Knowledge, Creation, Diffusion, Utilization, 9(1): 87–116.

Rayner, S., 2012. “Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourses”, Economy and Society, 41(1): 107–125.

Saltelli, A., Giampietro, M., 2015, The fallacy of evidence based policy, Verge book ➔

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

Discussion points on problematic quantifications

Did this discussion meet some of your ‘wish-list’ entries?

Do you agree that mathematical and statistical modelling are particularly prone to abuse? Do you have direct experience of this?

What would you do if ‘forced’ to quantify?

Trust

“In economics, medicine, energy and a host of other subjects, there are fears that financial conflicts of interest give the impression that academic findings are up for sale.”

Matthews, D., 2015, Is industry funding undermining trust in science?, Times Higher Education, https://www.timeshighereducation.com/features/is-industry-funding-undermining-trust-in-science

Film ‘Inside Job’. Interview with Frederic Mishkin, a banking professor at Columbia University, praising Iceland’s “strong” banking regulation system two year before it went bust. Mishkin had been paid $124,000 by the Icelandic Chamber of Commerce to write the paper. The story of the work’s title exposed by the film.

Cambridge Journal of Economics 2012, **36**, 43–63
doi:10.1093/cje/ber036

Dangerous interconnectedness: economists’ conflicts of interest, ideology and financial crisis

Jessica Carrick-Hagenbarth and Gerald A. Epstein*

Matthews, D., 2015, Is industry funding undermining trust in science?, Times Higher Education, https://www.timeshighereducation.com/features/is-industry-funding-undermining-trust-in-science

Campaign for Accountability's ("CfA") new report, **Academic Deception**, reveals how a payday lending industry trade association paid for and edited a controversial academic paper claiming that payday loans do not leave consumers trapped in cycles of debt.

"Internal Arkansas Tech University documents reveal a close working relationship between the payday lending industry and the author of a key academic paper. The Consumer Credit Research Foundation (CCRF), an industry trade group, paid a professor at the Arkansas Tech University College of Business, nearly $40,000 to produce the study, and CCRF's chairman edited the study and directed the professor to remove negative information. Unsurprisingly, the paper concluded payday loans are not responsible for a "cycle of debt," an important industry talking point."

https://www.scribd.com/doc/288230891/Academic-Deception

“medical paradigms found, then lost, then regained, then placed in a kind of scientific limbo occur in the field of nutrition”

- dietary cholesterol and
- trans-fats
- caffeine
- wine
- sugar
- gluten…

Barash, D.P., 2015, Paradigm Lost, AEON, http://aeon.co/magazine/science/why-scientific-paradigms-keep-changing/

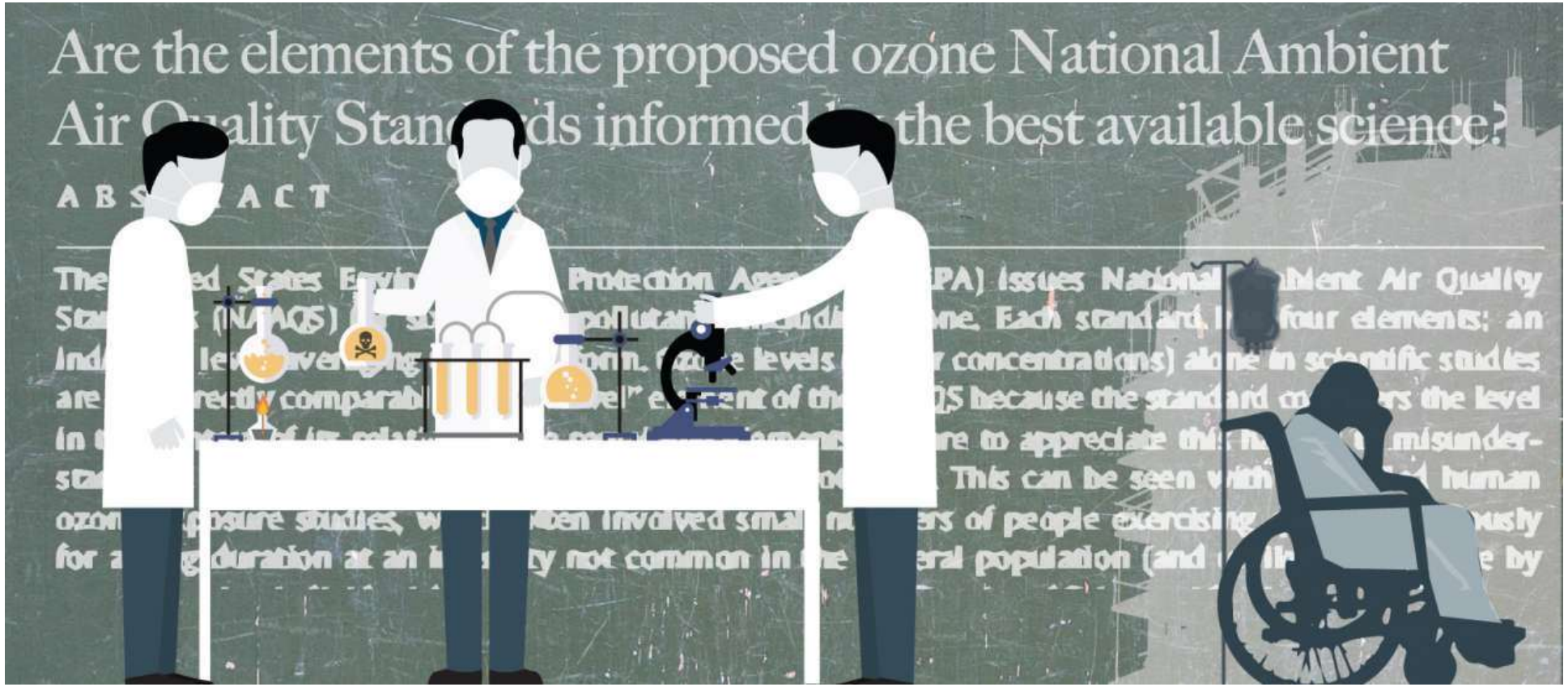
See also https://www.theguardian.com/society/2016/apr/07/the-sugar-conspiracy-robert-lustig-john-yudkin, and the story of US President Dwight Eisenhower heart attack,…

“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]”

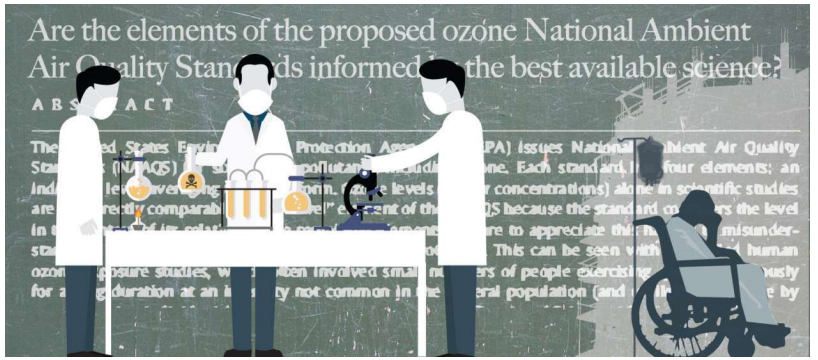
http://archinte.jamanetwork.com/article.aspx?articleid=2548255

Meet the ‘rented white coats’ who defend toxic chemicals – How corporate-funded research is corrupting America’s courts and regulatory agencies, by David Heath

http://www.publicintegrity.org/2016/02/08/19223/meet-rented-white-coats-who-defend-toxic-chemicals



Some horror stories about litigations where law companies enrolled by defendants in turn enroll scientists to defend their clients … asbestos, clean air act, …



http://www.publicintegrity.org/2016/02/08/19223/meet-rented-white-coats-who-defend-toxic-chemicals

“Nearly half of Gradient’s articles that are peer-reviewed are published in two journals with strong ties to industry, Critical Reviews in Toxicology and Regulatory Toxicology and Pharmacology, the Center’s analysis found.” [Gradient is the research services company enrolled by law firms]

http://www.publicintegrity.org/2016/02/08/19223/meet-rented-white-coats-who-defend-toxic-chemicals

"Belinda Phipps, who took over at the Science Council last year, accused the sector of complacency and said the public trusted scientists only because they did not understand their work."

Whipple, T., The Times, February 22, 2016

THE TIMES

Science

News | Opinion | Business | Money | Sport | Life | Arts | Puzzles | Papers | Irish news

Welcome to your preview of The Times

Scientists 'should take ethics oath like doctors'

Tom Whipple Science Editor
Published at 12:01AM, February 22 2016

Scientists need their own version of the Hippocratic oath and a regulation system similar to doctors to avoid a big scandal, the head of their standards body has said.

Studies suggest that a significant proportion of scientific papers are not repeatable
Monty Rakusen/Corbis

Post a comment

"What struck me, coming into this sector is just how unregulated it is compared to the medical profession," Ms Phipps said. "Think what damage a scientist could do if he or she behaved badly or fraudulently. The potential damage is enormous, yet there is almost no regulation."

Whipple, T., The Times, February 22, 2016

THE TIMES

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Monty Rakusen/Corbis

Post a comment

Institutions charged with science advice choose to ignore the severity of the crisis

OECDpublishing

Please cite this paper as:

OECD (2015), "Scientific Advice for Policy Making: The Role and Responsibility of Expert Bodies and Individual Scientists", *OECD Science, Technology and Industry Policy Papers*, No. 21, OECD Publishing, Paris.
http://dx.doi.org/10.1787/5js33l1jcpwb-en

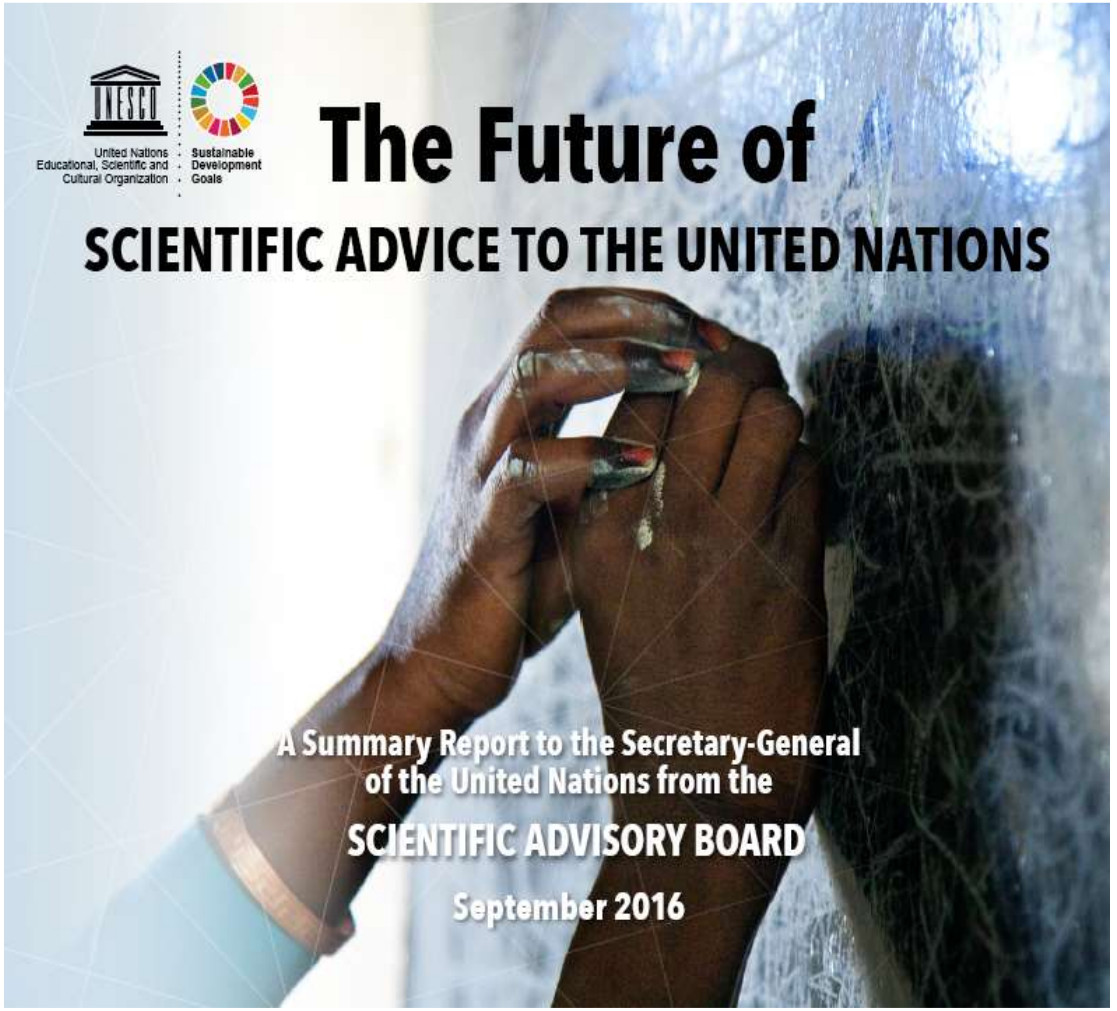
OECD Science, Technology and Industry Policy Papers No. 21

Scientific Advice for Policy Making

THE ROLE AND RESPONSIBILITY OF EXPERT BODIES AND INDIVIDUAL SCIENTISTS

OECD

2015

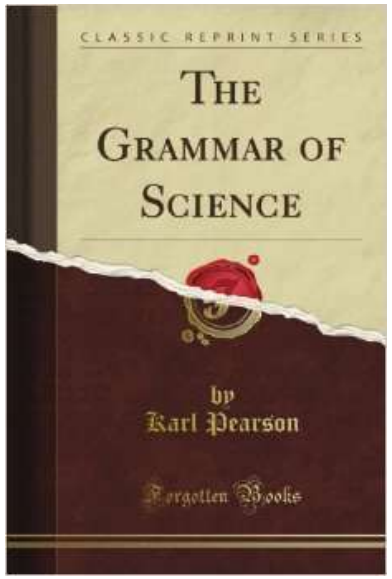


2016

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

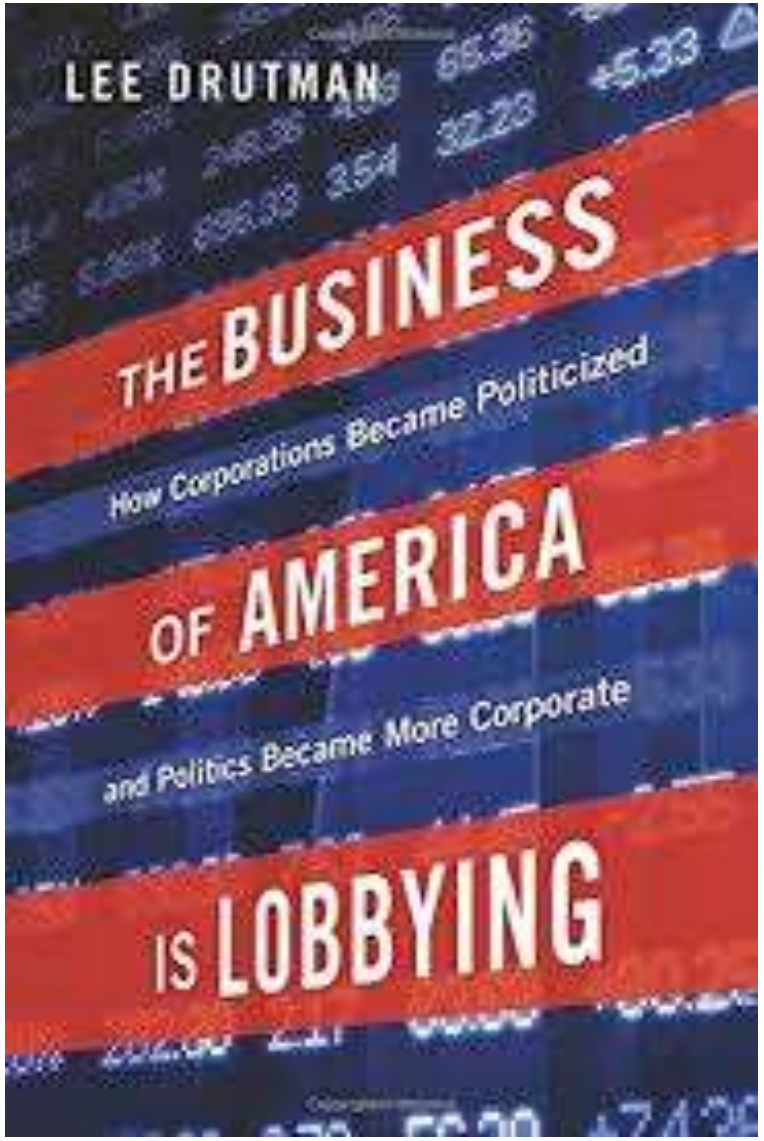
"No degenerate and feeble stock will ever be converted into healthy and sound stock by the accumulated effects of education, good laws, and sanitary surroundings"

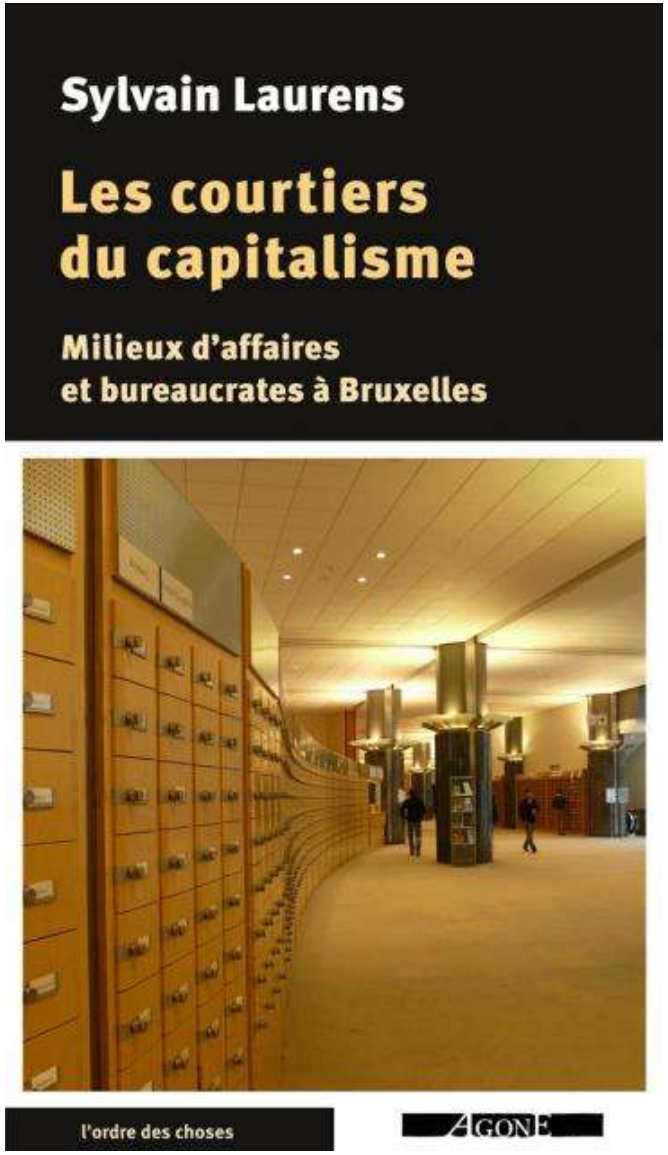
Karl Pearson



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

Evidence as the currency of lobbies





Lee Drutman

Sylvain Laurens

Some quick read:
http://www.nybooks.com/articles/2016/04/07/how-lobbyists-win-in-washington/
http://www.contretemps.eu/lectures/lire-extrait-courtiers-capitalisme-sylvain-laurens

"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 lake. 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."

Owen B. M. and Braeutigam, R., Regulation Game: Strategic Use of the Administrative Process, page 7, Harper Business (1978)

Discussion point of the discussion of trust

Did this discussion meet some of your ‘wish-list’ entries?

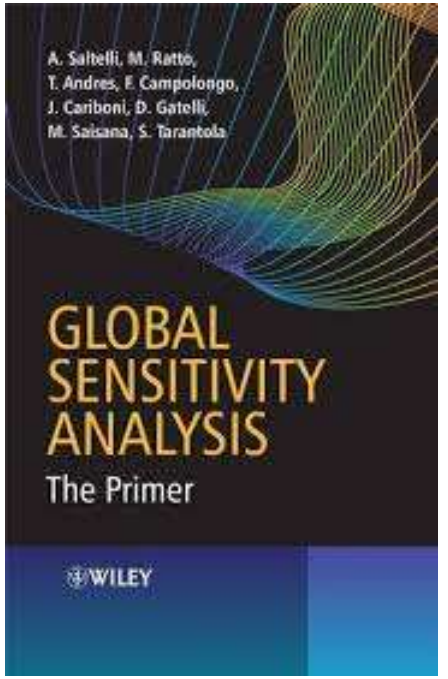
Can I trust science on being right most of the time?

When in a science carrier is there a contradiction between integrity and survival?

Recipes for diligent quantification

Some recipes from sensitivity analysis and sensitivity auditing

Sensitivity analysis



Saltelli, A., Annoni P., 2010, How to avoid a perfunctory sensitivity analysis, Environmental Modeling and Software, 25, 1508-1517.

Saltelli, A., M. Ratto, S. Tarantola and F. Campolongo, 2012 (Perennial Review of the 2005 paper), Sensitivity Analysis for Chemical Models, Chemical Reviews, 112 (5), pp PR1-PR21.

First secret: The most important question is the question.

Corollary 1: Sensitivity analysis is not “run” on a model but on a model once applied to a question.

First secret: The most important question is the question.

Corollary 2: The best setting for a sensitivity analysis is one when one wants to prove that a question cannot be answered given the model

It is better to be in a setting of falsification than in one of confirmation (Oreskes et al., 1994).

[Normally the opposite is the case]

Verification, Validation, and Confirmation of Numerical Models in the Earth Sciences, Naomi Oreskes, Kristin Shrader-Frechette, Kenneth Belitz, Science, New Series, Vol. 263, No. 5147 (Feb. 4, 1994), pp. 641-646.

Second secret: Sensitivity analysis should not be used to hide assumptions [it often is]

Third secret: If sensitivity analysis shows that a question cannot be answered by the model one should find another question/model which can be treated meaningfully.

[Often the love for the model prevails]

Badly kept secret:

There is always one more bug!

(Lubarsky's Law of Cybernetic Entomology)

Personal note: I never run a
SA without finding more bugs

And of course please don't …

… run a sensitivity analysis where each factors has a 5% uncertainty

Discussion point

- Why should I not run a sensitivity analysis where each factors has a 5% uncertainty
- Why doing a sensitivity analysis if it can undermine an laborious quantification exercise?
- What do I do if this happens to be the case?

Sensitivity auditing

Saltelli, A., Guimarães Pereira, Â., Van der Sluijs, J.P. and Funtowicz, S., 2013, What do I make of your latinorum? Sensitivity auditing of mathematical modelling, Int. J. Foresight and Innovation Policy, 9, 2/3/4, 213–234.

Saltelli, A., Funtowicz, S., When all models are wrong: More stringent quality criteria are needed for models used at the science-policy interface, Issues in Science and Technology, Winter 2014, 79-85.http://issues.org/30-2/andrea/

RULE ONE: Check against rhetorical use of mathematical modelling

The instrumental use of mathematical modelling to advance one's agenda can be termed rhetorical, or strategic, like the use of Latin by the elites and the clergy in the classic age.

RULE ONE: Check against rhetorical use of mathematical modelling

The problem of legitimization – quantitative analysis as a rhetorical or ritual device – the story of Nobel prize laureate Kenneth Arrow:

"The commanding general is well aware that the forecasts are no good. However, he needs them for planning purposes".

RULE TWO: Adopt an ‘assumption hunting’ attitude;

John Kay, London School Economics, Columnist Financial Times

What was ‘assumed out’? What are the tacit, pre-analytic, possibly normative assumptions underlying the analysis?

E.g. in ‘Bogus Quantification: Uses and Abuses of Models’ John Kay uncovers that the UK transport WebTAG model (the standard for transport policy simulation) needs as input ‘Annual Percentage Change in Car Occupancy up to 2036.’

Discussion point of the discussion on Recipes for diligent quantification

Did this discussion meet some of your ‘wish-list’ entries?

Do you see any use for this in your line of work?

What is missing?

Back to your wishlist

...

Taking side?

“How to deal with scientific and social dilemmas”

Different ways of taking sides

Endorsing pledges or creating new ones
Joining the fray … But how?

- … In the sense of actively engaging with problems, occasionally exposing fraudulent institutions

Jeffrey Beall

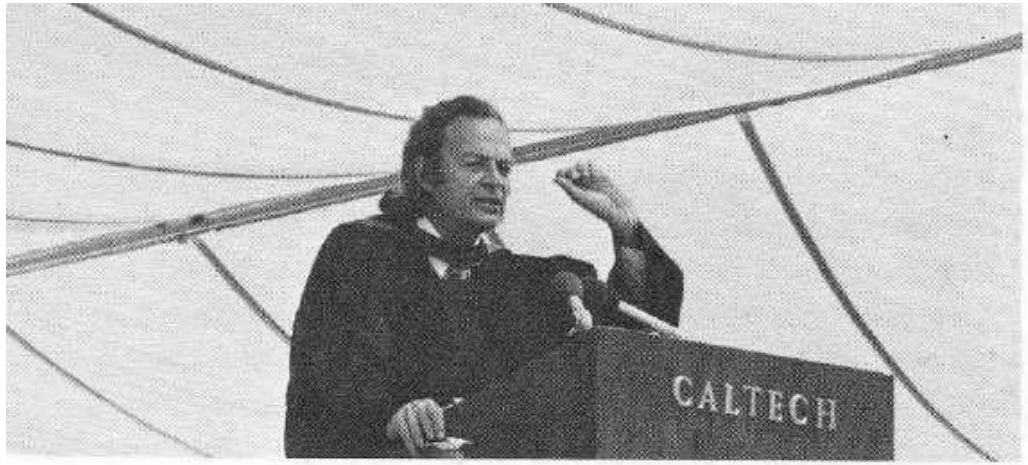
Lois Gibbs

Timothy Gowers

Marc Edwards

http://scholarlyoa.com/2015/01/02/bealls-list-of-predatory-publishers-2015/#more-4719
https://www.bu.edu/lovecanal/canal/ http://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0127502
https://en.wikipedia.org/wiki/Flint_water_crisis; http://flintwaterstudy.org/;
http://www.nytimes.com/2016/08/21/magazine/flints-water-crisis-and-the-troublemaker-scientist.html

- Feynman's 'bend backward' to give others a chance to prove that you are wrong.
  Suggested read: Feynman's Cargo Cult Lecture;



Cargo Cult Science

by RICHARD P. FEYNMAN

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

Discussion point of the discussion on taking side

Did this discussion meet some of your ‘wish-list’ entries?

Does this make any sense at all?

Epilogue: a smile on our grim academic realities

- I want to publish a paper and my supervisor specifically wants me to cite a lot of his papers, even though I don't agree that these papers have a lot to do with, or add value to my own paper. What should I do?
- I want to publish a paper and my supervisor specifically wants me to add one of his good friends as a co-author, even though he did not contribute significantly at all. What should I do?
- How to maintain scientific integrity when the pressure to publish is so high and dominant in the scientific community.
- I hope to learn a bit about academic politics, and how to deal with them in an honest way.