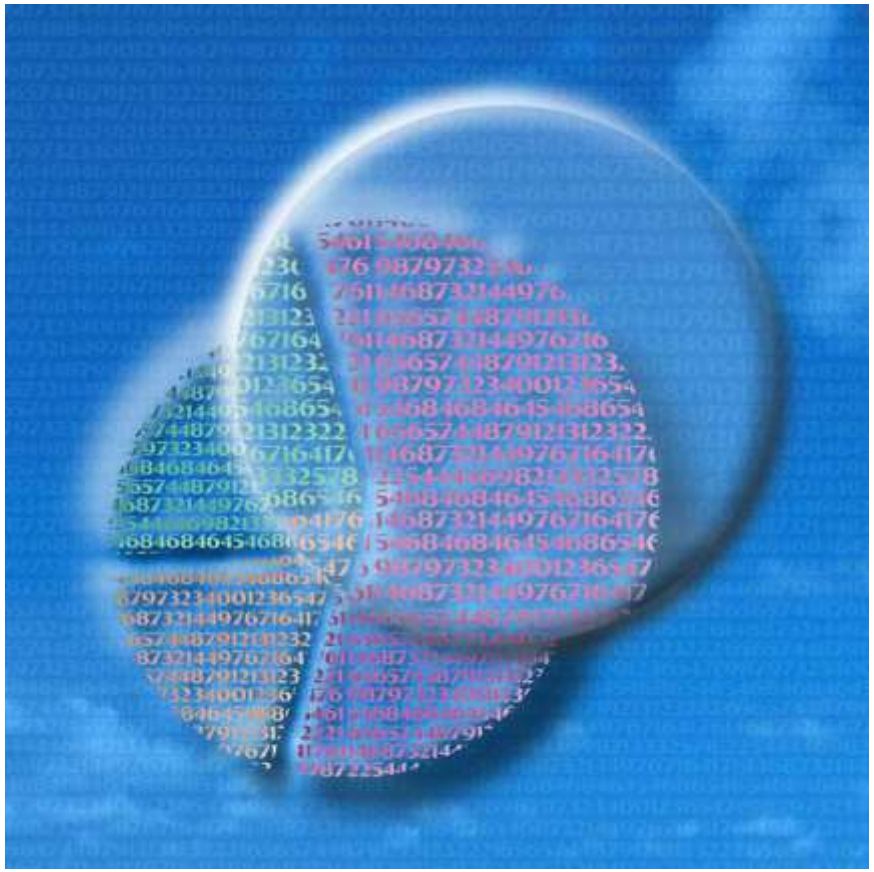


Ethics of quantification

Andrea Saltelli
Centre for the Study of the Sciences and the Humanities (SVT) – University of Bergen (UIB)
& visiting fellow at Open Evidence Research, Universitat Oberta de Catalunya (UOC), Barcelona.

Course:
Theory of Science and Ethics, for the PhD students from the Faculty of Science and Mathematics of Bergen University
February 2018

Where to find this talk: www.andreasaltelli.eu

= more material on my web site

= discussion point

The New York Review of Books

Damage Bigly

James Mann

JANUARY 18, 2018 ISSUE

http://www.nybooks.com/articles/2018/01/18/donald-trump-damage-bigly/

“Trump seems to reject the concepts of objective truth, rational discourse, and scientific expertise, the Enlightenment ideals on which this country was founded.”

➔The compact “objective truth, rational discourse, scientific expertise, the Enlightenment ideals” is in a crisis;

➔Why? How? Who is the responsible?

➔What are the contradictions & their root causes?

➔What quantification has to do with all this

One root of contradiction: Science's crisis

The Economist

HOW SCIENCE GOEs WRONG.

Essay

Why Most Published Research Findings Are False

John P. A. Ioannidis

2005

… for most study designs and settings, it is more likely for a research claim to be false than true …

John P. A. Ioannides

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

Snapshots of the crisis: a rich ecosystem

Failed replications, fraudulent peer reviews, predatory publishers, perverse metrics, misleading science advice, statistics on trial, post-truth, ...

The crisis is methodological, epistemological, ethical and metaphysical

(February 4, 2017)

Risk factor for bias:

small, early, highly cited studies; scientist's early-career status; isolation; lack of scientific integrity; done in the US

No effect:

scientific productivity; male vs female

REPRODUCIBILITY IN CANCER BIOLOGY

Making sense of replications

Abstract The first results from the Reproducibility Project: Cancer Biology suggest that there is scope for improving reproducibility in pre-clinical cancer research.

DOI: 10.7554/eLife.23383.001

BRIAN A NOSEK AND TIMOTHY M ERRINGTON*

REPRODUCIBILITY PROJECT CANCER BIOLOGY

(January 19, 2017)

Reproducibility Project – Cancer Biology: “scope for improving reproducibility in pre-clinical cancer research”

nature
International journal of science

Comment

Drug development: Raise standards for preclinical cancer research

C. Glenn Begley & Lee M. Ellis

"scientific findings were confirmed in only 6 (11%) cases in preclinical research, this was a shocking result"
(29 March, 2012)

The 1st most cited journal in Psychology

frontiers in Human Neuroscience

Prestigious Science Journals Struggle to Reach Even Average Reliability

"…an accumulating body of evidence suggests that methodological quality & reliability of published research works in several fields may be decreasing with increasing journal rank" (20 February, 2018)

Björn Brembs*

Institute of Zoology—Neurogenetics, Universität Regensburg, Regensburg, Germany

PLOS | MEDICINE

Brow

OPEN ACCESS

ESSAY

June 21, 2017

Why Most Clinical Research Is Not Useful

John P. A. Ioannidis

Published: June 21, 2016 • https://doi.org/10.1371/journal.pmed.1002049

THE ECONOMIC JOURNAL

The Economic Journal, **127** (*October*), F236–F265. Doi: 10.1111/ecoj.12461 © 2017 Royal Economic Society. Published by John Wiley & Sons, 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA.

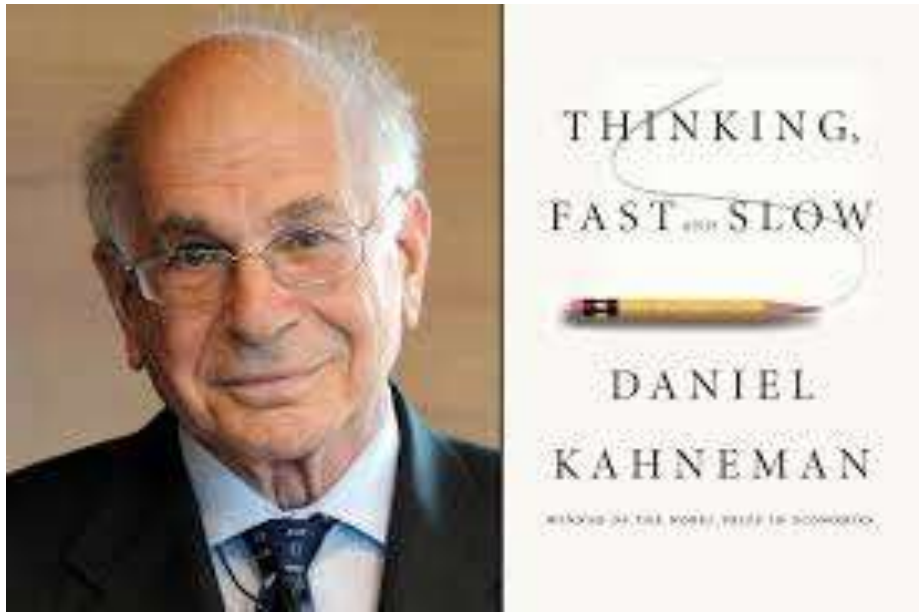
THE POWER OF BIAS IN ECONOMICS RESEARCH*

John P. A. Ioannidis, T. D. Stanley and Hristos Doucouliagos

October 27, 2017

Rather than isolated instances of corruptions now entire fields of research are found diseased

Reconstruction of a Train Wreck: How Priming Research Went off the Rails



"[…]questions have been raised about the robustness of priming results … your field is now the poster child for doubts about the integrity of psychological research…"

https://replicationindex.wordpress.com/2017/02/02/reconstruction-of-a-train-wreck-how-priming-research-went-of-the-rails/comment-page-1/

Retraction Watch

April 20, 2017

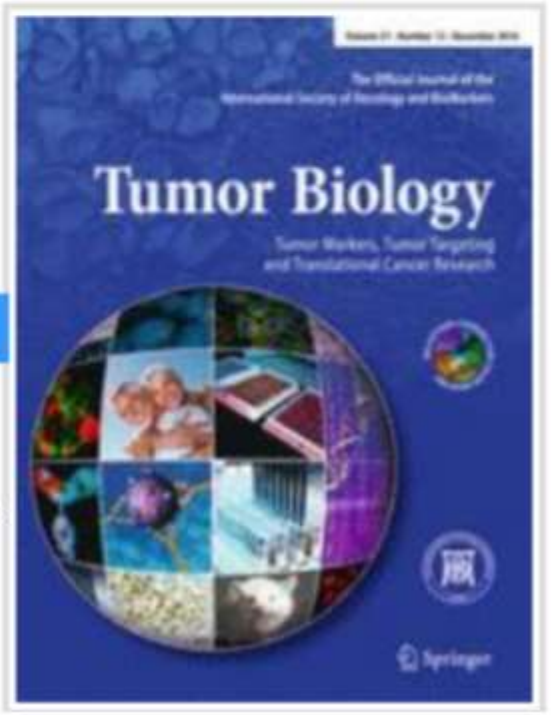
Tracking retractions as a

A new record: Major publisher retracting more than 100 studies from cancer journal over fake peer reviews

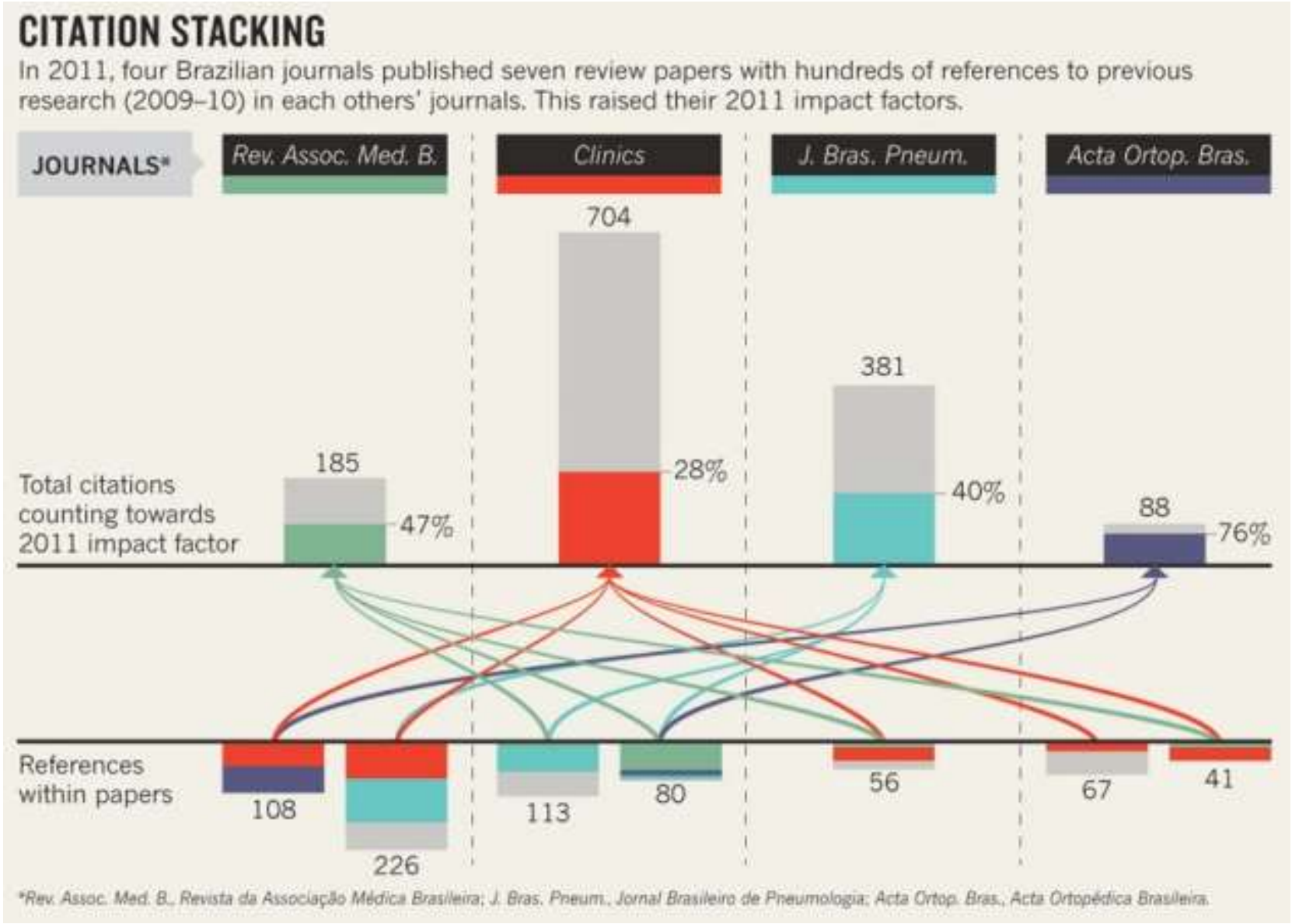
with 11 comments

Springer is retracting 107 papers from one journal after discovering they had been accepted with fake peer reviews. Yes, 107.

To submit a fake review, someone (often the author of a paper) either makes up an outside expert to review the paper, or suggests a real researcher — and in both cases, provides a fake email address that comes back to someone who will invariably give the paper a glowing review. In this case, Springer, the publisher of *Tumor Biology* through 2016, told us that an investigation produced "clear evidence" the reviews were submitted under the names of real researchers with faked emails. Some of the authors may have used a third-party editing service, which may have supplied the reviews. The journal is now published by SAGE.



Use and abuse of metrics: from self-citation to citation cartels to citation stacking



Richard Van Noorden, 2017, Brazilian citation scheme outed. Thomson Reuters suspends journals from its rankings for 'citation stacking'. Nature, 27 August 2013

Contents lists available at ScienceDirect

Futures

journal homepage: www.elsevier.com/locate/futures

Original research article

What is wrong with evidence based policy, and how can it be improved?

Andrea Saltelli[a,b,c,*], Mario Giampietro[a,c,d]

Futures 91 (2017) 62–71

Journal of Clinical Epidemiology 73 (2016) 82–86

Evidence-based medicine has been hijacked: a report to David Sackett

John P.A. Ioannidis[a,b,c,d,*]

Power asymmetries in the framing of issues: those who have the deepest pockets marshal the best evidence; Instrumental use of quantification to obfuscate; (Saltelli and Giampietro, 2017)

Evidence based medicine hijacked to serve corporate agendas. “Under market pressure, clinical medicine has been transformed to finance-based medicine” (Ioannidis, 2016)

Futures

Available online 7 February 2017

In Press, Corrected Proof

Original research article

What is wrong with evidence based policy, and how can it be improved?

Andrea Saltelli [a, b, c], Mario Giampietro [a, c, d]

- There is a crisis of science's governance forcing to reconsider evidence based policy as it is being practiced at present.
- The closure of any issue in a pre-established frame used for quantification may correspond to normative and political stances.

Futures

Available online 7 February 2017

In Press, Corrected Proof

Original research article

What is wrong with evidence based policy, and how can it be improved?

Andrea Saltelli [a, b, c], Mario Giampietro [a, c, d]

- The use of mathematical modelling and indicators conveys a spurious impression of precision, prediction and control.
- Better styles of evidence based policy should flag the existence of 'uncomfortable knowledge' usually avoided in policy discussions.
- We suggest a strategy – Quantitative storytelling – to opening the space of possible narratives and control their quality .

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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

Old and new heroes, while history repeats itself (Love canal, Flint…)

Lois Gibbs

Marc Edwards

http://www.andreasaltelli.eu/file/repository/LOVE_CANAL.pdf
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

Fixing science?

John and Laura Arnold

Brian Nosek, the Reproducibility Project.

John Ioannidis, Meta-research innovation centre at Stanford

Ben Goldacre, alltrials.net

Gary Taubes, The case against sugar

https://www.wired.com/2017/01/john-arnold-waging-war-on-bad-science/

Different cultures, different reactions

Yoshiki Sasai 1962 – 2014

http://www.nature.com/news/stem-cell-pioneer-blamed-media-bashing-in-suicide-note-1.15715

Different cultures, different reactions

Aaron Swartz, 1986 - 2013

https://www.rollingstone.com/culture/news/the-brilliant-life-and-tragic-death-of-aaron-swartz-20130215

Denial, diversion & displacement: a science war against trump, against post truth,

January 27, 2017

To tackle the post-truth world, science must reform itself

Andrea Saltelli, *University of Bergen* and Silvio Oscar Funtowicz, *University of Bergen*

Scientists must bear some responsibility for the post-truth era and the current crisis in democracy.

November 16, 2016

Science wars in the age of Donald Trump

Andrea Saltelli, *University of Bergen* and Silvio Oscar Funtowicz, *University of Bergen*

Is the election of Donald Trump going to reignite a futile war between science and anti-science?

… marches for science and persistent scientism.

May 12, 2017

Forcing consensus is bad for science and society

Andrea Saltelli, *University of Bergen*; Mario Giampietro, *Universitat Autònoma de Barcelona*, and Tiziano Gomiero, *Masaryk University*

Insisting that science has a monopoly on the truth invalidates dissent and undermines what should be an open dialogue between science and society.

March 8, 2017

A scientists' march on Washington is a bad idea – here's why

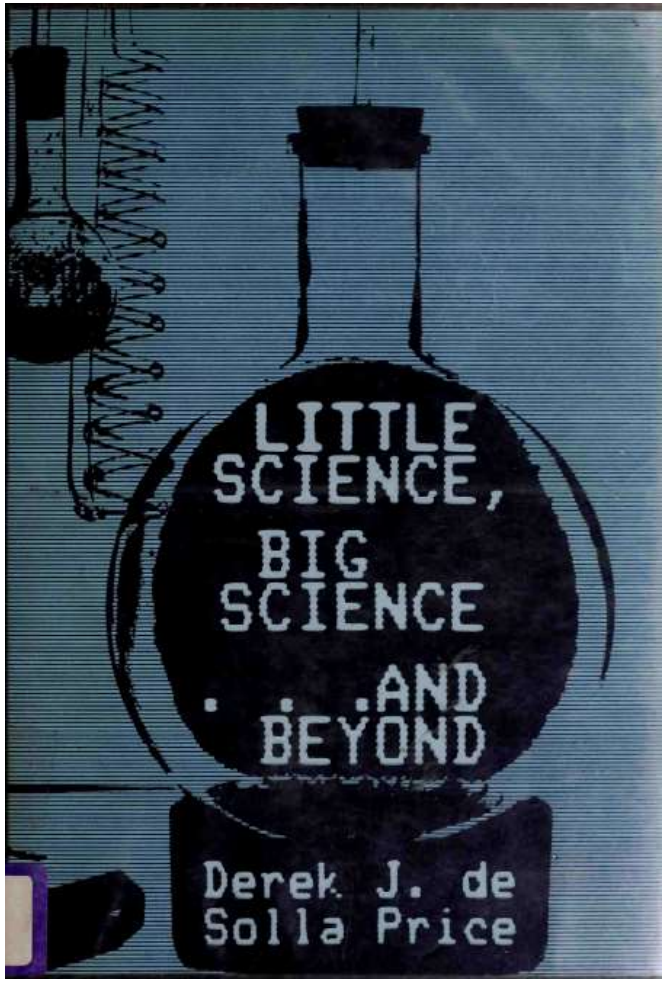
Andrea Saltelli, *University of Bergen*

Trump is not science's biggest problem.

Scholars who
saw it coming
...

and how they
were vindicated

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.

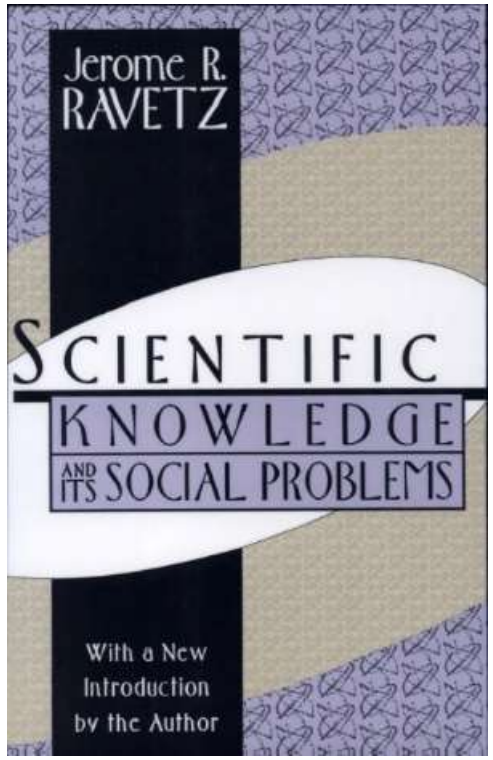
~1.5 million articles a year (2009) over ~30,000 journals

https://www.researchgate.net/publication/229062236_Article_50_million_An_estimate_of_the_number_of_scholarly_articles_in_existence

http://blogs.nature.com/news/2014/05/global-scientific-output-doubles-every-nine-years.html

p.22: [...] The problem of quality control in science is thus at the centre of the social problems of the industrialized science of the present period."

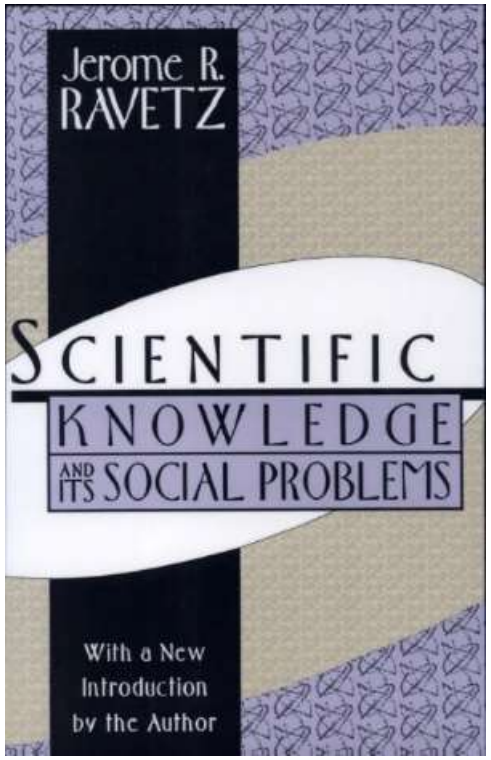
Ravetz, J., **1971**, Scientific Knowledge and its Social Problems, Oxford University Press.



Jerome R. Ravetz

“If [science] 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.

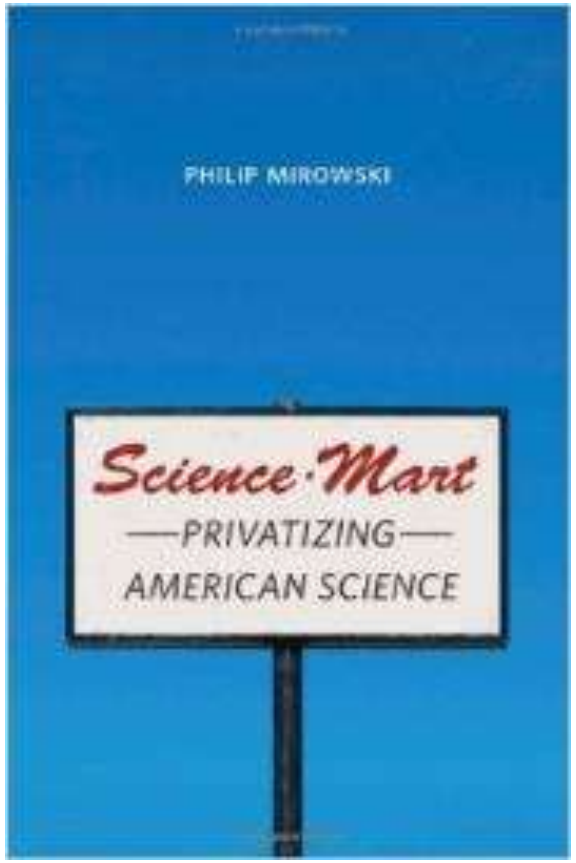


Jerome R. Ravetz

… neoliberal ideologies decreasing state funding of science, which becomes privatized … knowledge as a monetized commodity replaces knowledge as public good … collapse of quality

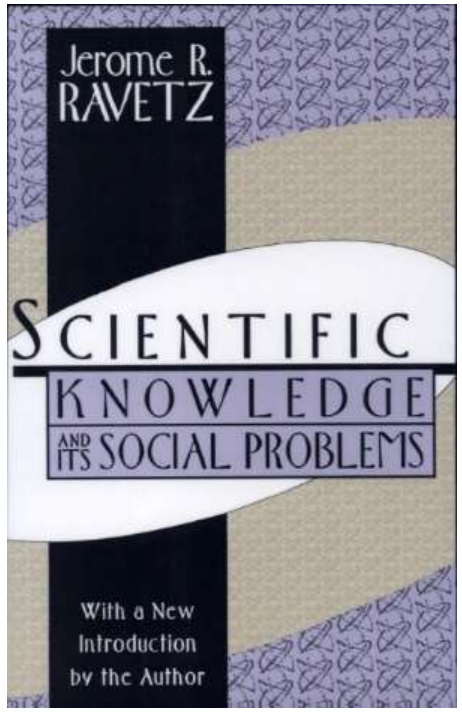
Philip Mirowski

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



p. 179. For it is possible for a field to be diseased […] reforming a diseased field is a task of great delicacy […] not even an apparatus of institutional structures, can do anything to maintain or restore the health of a field in the absence of an essential ethical element operating through the interpersonal channel of communication.

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



Jerome R. Ravetz

ROYAL SOCIETY OPEN SCIENCE

rsos.royalsocietypublishing.org

Research

Cite this article: Smaldino PE, McElreath R. 2016 The natural selection of bad science. *R. Soc. open sci.* **3**: 160384.
http://dx.doi.org/10.1098/rsos.160384

Received: 1 June 2016
Accepted: 17 August 2016

The natural selection of bad science

Paul E. Smaldino[1] and Richard McElreath[2]

[1]Cognitive and Information Sciences, University of California, Merced, CA 95343, USA
[2]Department of Human Behavior, Ecology, and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

PES, 0000-0002-7133-5620; RME, 0000-0002-0387-5377

Poor research design and data analysis encourage false-positive findings. Such poor methods persist despite perennial calls for improvement, suggesting that they result from something more than just misunderstanding. The persistence of poor methods results partly from incentives that favour them, leading to the natural selection of bad science. This dynamic requires no conscious strategizing—no deliberate cheating nor loafing—by scientists, only that publication is a principal factor for

The persistence of poor methods results partly from incentives that favour them, leading to the natural selection of bad science. This dynamic requires no conscious strategizing—no deliberate cheating nor loafing—by scientists, only that publication is a principal factor for career advancement.

Smaldino PE, McElreath R., 2016 The natural selection of bad science. R. Soc. open sci. 3: 160384. http://dx.doi.org/10.1098/rsos.160384

As in the real world, successful labs produce more 'progeny,' such that their methods are more often copied and their students are more likely to start labs of their own. Selection for high output leads to poorer methods and increasingly high false discovery rates.

Improving the quality of research requires change at the institutional level.

Smaldino PE, McElreath R., 2016 The natural selection of bad science. R. Soc. open sci. 3: 160384. http://dx.doi.org/10.1098/rsos.160384

Discussion point of the discussion on the crisis:

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

Predatory Publishers

Predatory publishers

Jeffrey Beall, librarian, University of Colorado, Denver.
Monitored predatory open access publishers https://beallslist.weebly.com/

Misleading metrics list includes companies that "calculate" and publish counterfeit impact factors

[…] The hijacked journals list includes journals … stealing another journal's identity and soliciting articles submissions using the author-pays model (gold open-access)

The OMICS Group, based in Hyderabad, India, have threatened to sue

Last year, the US Federal Trade Commission itself sued OMICS for deceiving researchers and hiding publication fees

See
http://www.biochemia-medica.com/system/files/27_2_J.Beall__What%20I%20learned%20from%20predatory%20publishers.pdf

https://www.nature.com/news/controversial-website-that-lists-predatory-publishers-shuts-down-1.21328

Statistics under trial

AMERICAN STATISTICAL ASSOCIATION RELEASES STATEMENT ON STATISTICAL SIGNIFICANCE AND *P*-VALUES

Provides Principles to Improve the Conduct and Interpretation of Quantitative Science

March 7, 2016

+ 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.

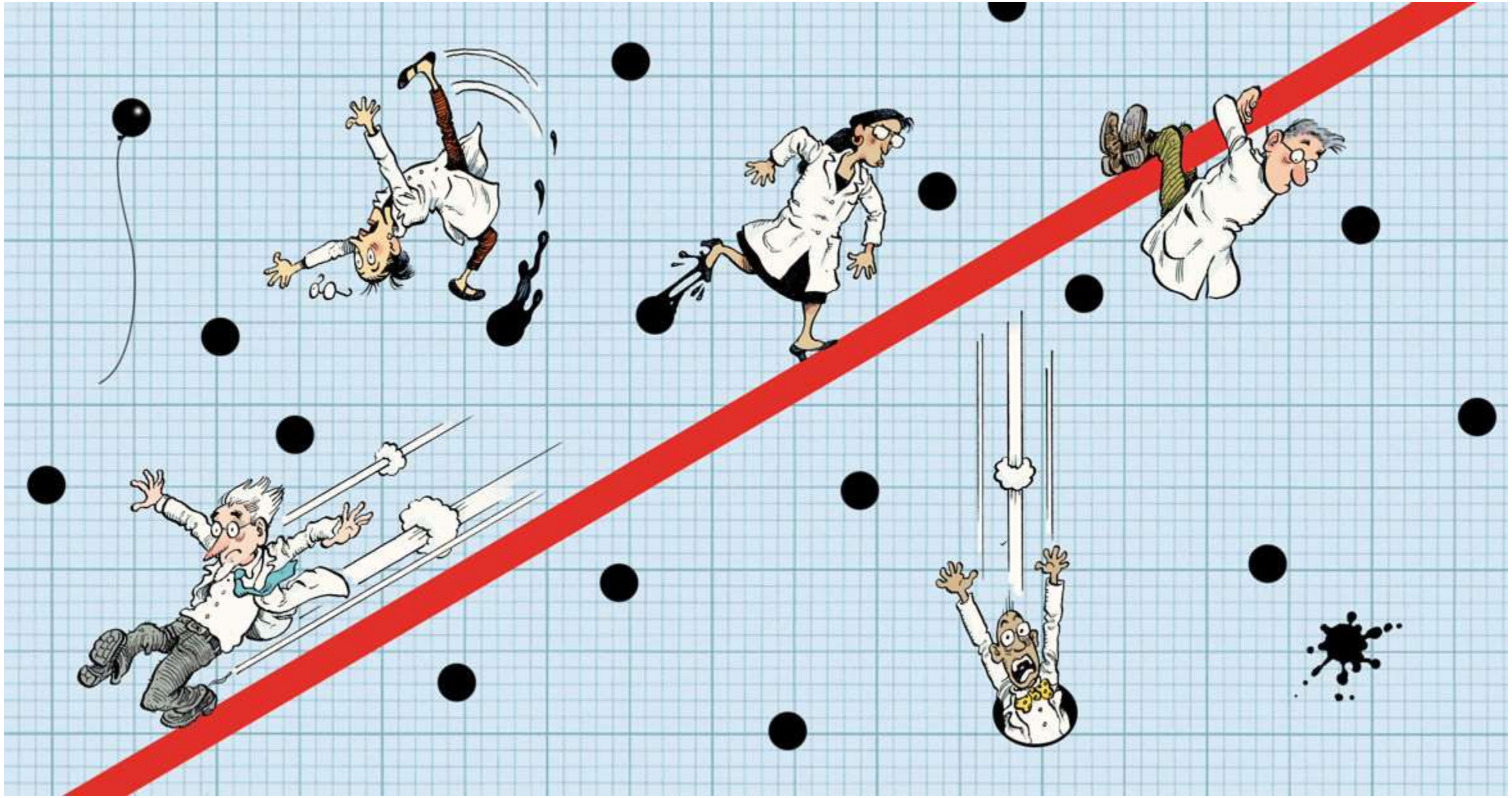
See also Christie Aschwanden at http://fivethirtyeight.com/features/not-even-scientists-can-easily-explain-p-values/

P-hacking (fishing for favourable p-values) and **HARKing** (formulating the research **H**ypothesis **A**fter the **R**esults are **K**nown);

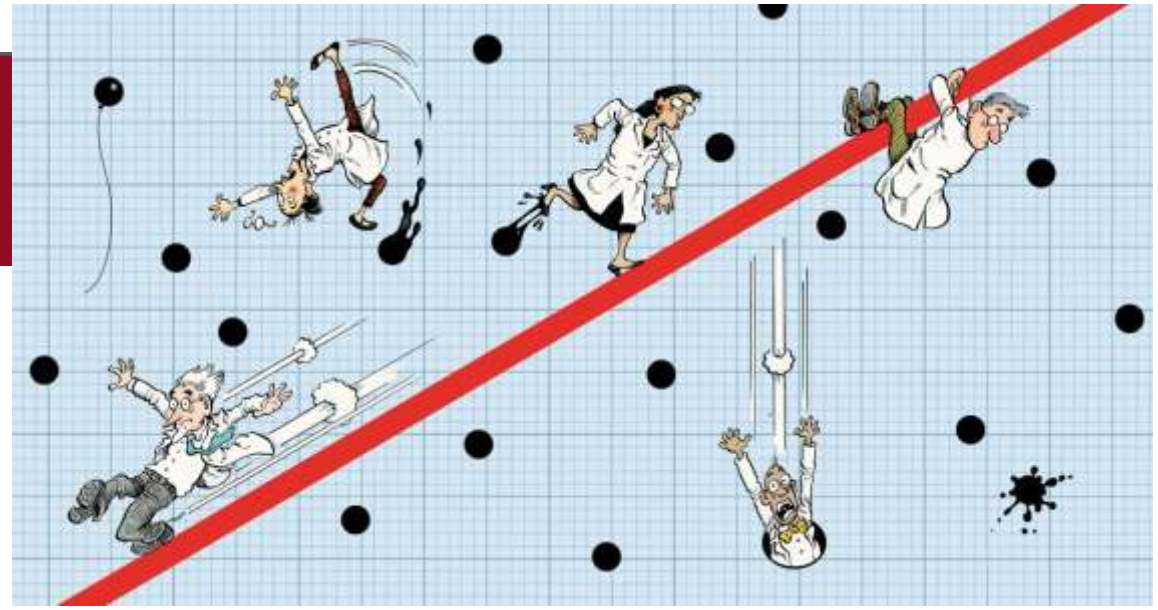
Desire to achieve a sought for – or simply publishable – result leads to fiddling with the data points, the modelling assumptions, or the research hypotheses themselves

Leamer, E. E. Tantalus on the Road to Asymptopia. J. Econ. Perspect. 24, 31–46 (2010).

Kerr, N. L. HARKing: Hypothesizing After the Results are Known. Personal. Soc. Psychol. Rev. 2, 196–217 (1998).



nature
International journal of science



COMMENT · 28 NOVEMBER 2017

Five ways to fix statistics

As debate rumbles on about how and how much poor statistics is to blame for poor reproducibility, Nature asked influential statisticians to recommend one change to improve science. The common theme? The problem is not our maths, but ourselves.

Jeff Leek ✉, Blakeley B. McShane, Andrew Gelman ✉, David Colquhoun ✉, Michèle B. Nuijten ✉ & Steven N. Goodman ✉

nature
International journal of science

CORRESPONDENCE · 16 JANUARY 2018

Fixing statistics is more than a technical issue

Andrea Saltelli ✉ & Philip Stark

https://www.nature.com/articles/d41586-018-00647-9

nature
International journal of science

CORRESPONDENCE · 16 JANUARY 2018

Integrity must underpin quality of statistics

Jerome Ravetz ✉

https://www.nature.com/articles/d41586-018-00648-8

The statistical garden of the forking paths (check Andrew Gelman's blog at http://andrewgelman.com/

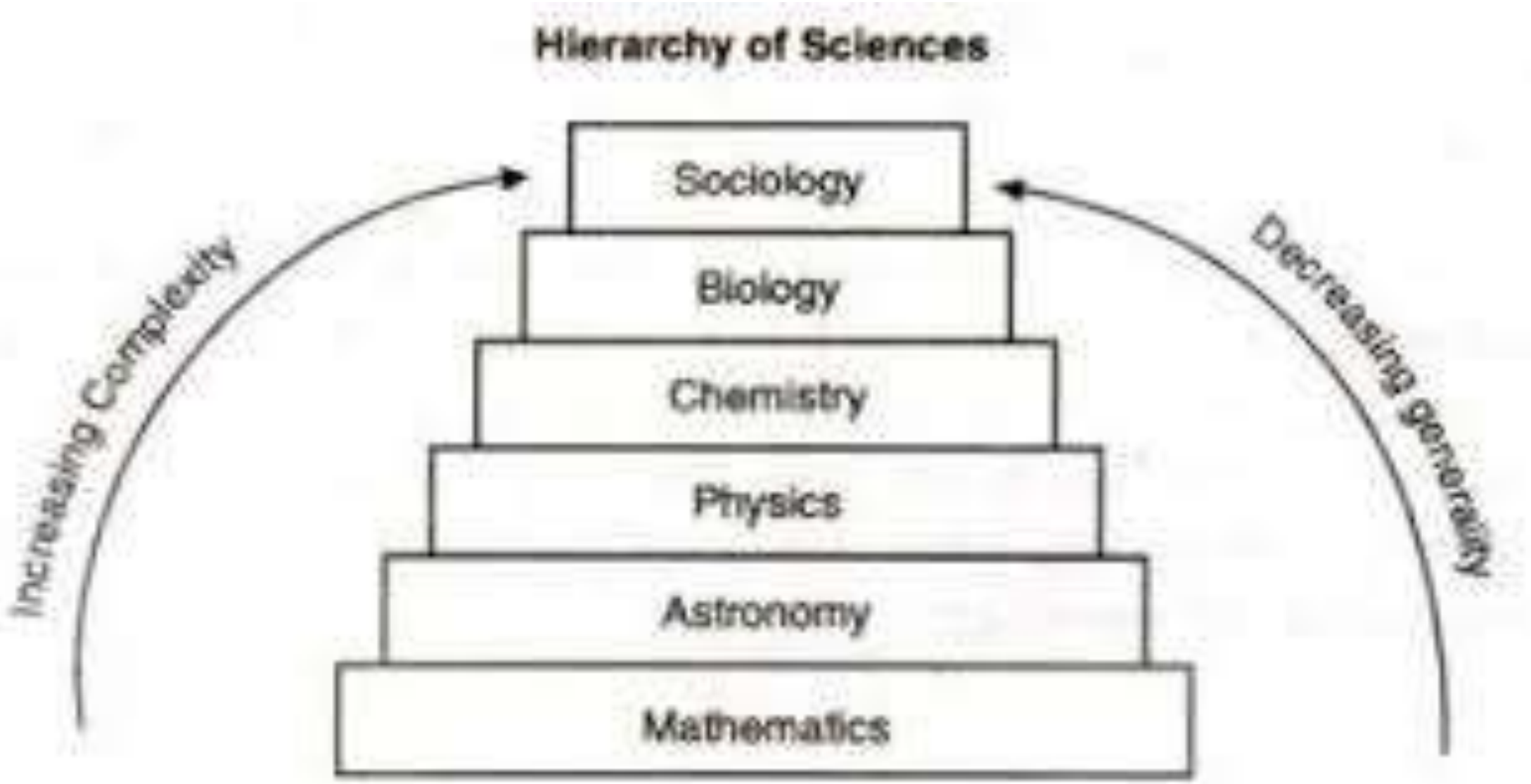
Jorge Luis Borges

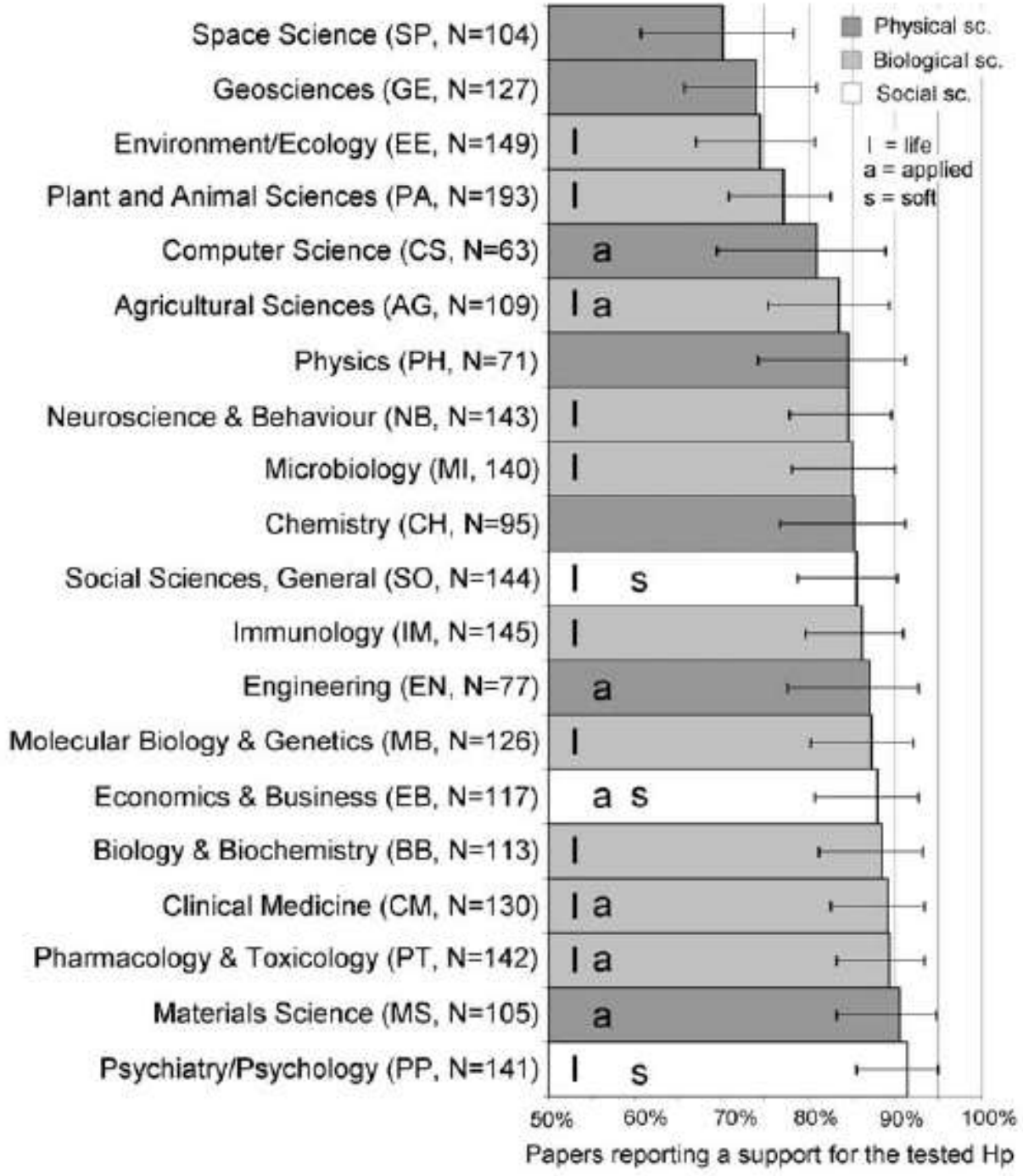
Andrew Gelman

http://www.stat.columbia.edu/~gelman/research/unpublished/p_hacking.pdf

Are all disciplines the same?

August Comte (1798-1857)





OPEN ACCESS Freely available online

PLoS one

"Positive" Results Increase Down the Hierarchy of the Sciences

Daniele Fanelli*

NNOGEN and ISSTI-Institute for the Study of Science, Technology & Innovation, The University of Edinburgh, Edinburgh, United Kingdom

"odds of reporting a positive result ~5 times higher among papers in the disciplines of Psychology and Psychiatry and Economics and Business than Space Science"

April 7, 2010

Publish or perish, Metrics and peer review

San Francisco Declaration on Research Assessment (DORA),

The Leiden Manifesto

The Metric Tide

Initiatives calling for a step change in the culture of metrics use

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)

San Francisco declaration, (2012), as of today 13/02/2018 signed by 11,740 individuals, and 447 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://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.
See also http://ethics-and-integrity.net/

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.

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

The Peer Reviewers' Openness (PRO) Initiative is 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.


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

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

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?

Reading on the crisis

Futures 91 (2017) 5–11

Contents lists available at ScienceDirect

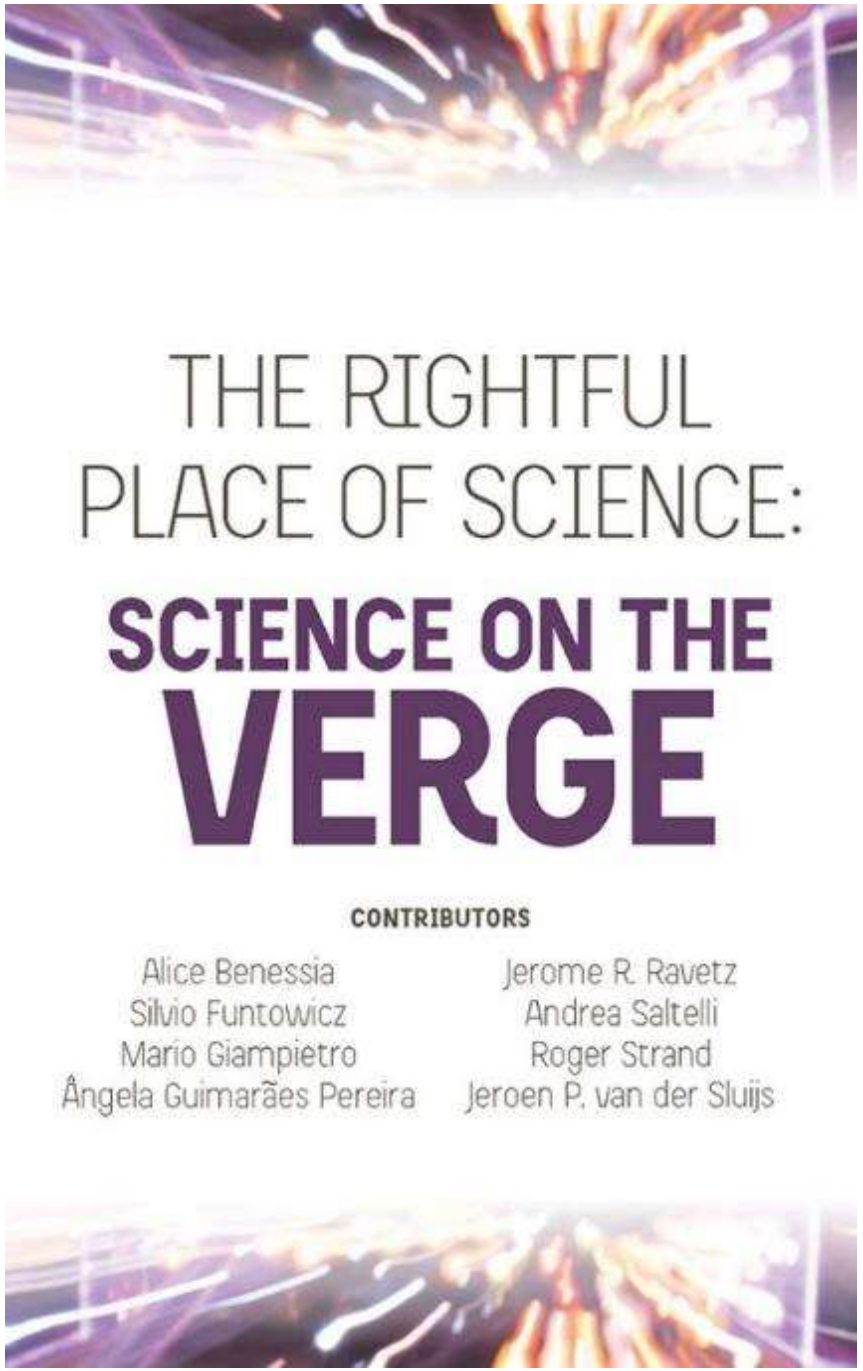
Futures

journal homepage: www.elsevier.com/locate/futures

What is science's crisis really about?

Andrea Saltelli[a,b,*], Silvio Funtowicz[a]

[a] Centre for the Study of the Sciences and the Humanities (SVT), University of Bergen, Norway
[b] Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona, Spain



See a review by Deepanwita Dasgupta (2017) in International Studies in the Philosophy of Science, 31:1, 108-110.

December 2017

https://thewire.in/208014/replication-crisis-science/

Problematic quantifications

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 easily 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,

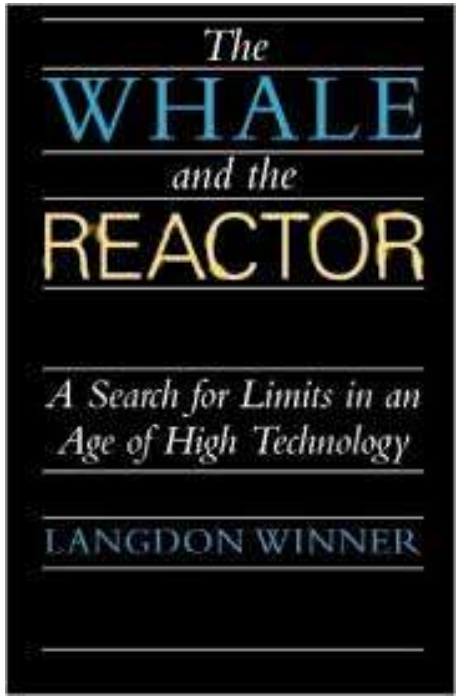
Frames

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

Langdon Winner

8

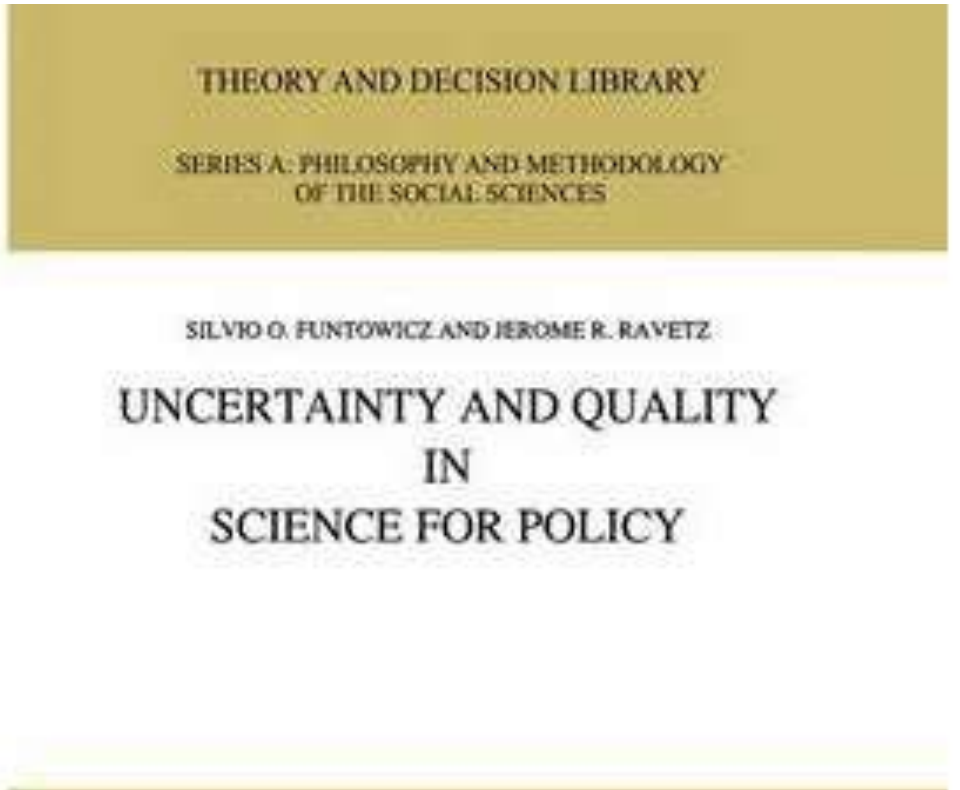
ON NOT HITTING
THE TAR-BABY



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.

Funtowicz and Ravetz ➔ poor quality in science for policy ➔ post normal science

J. Ravetz and S. Funtowicz



Post-Normal Science as a reaction to cost benefit and risk analysis applied to 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.

About a paper (Nordhaus 1991) on the economics of the greenhouse effect “since the paper displays considerable sophistication in the handling of uncertainties in data.”

“the paper by Nordhaus is liberally sprinkled with caveats...”

Nordhaus, W.D., 1991. To slow or not to slow: the economics of the greenhouse effect. Econ. J., 101: 920-937.

One such caveat is – in the words of William Nordhaus – the difficulty to move from the "terra infirma of climate change to the terra incognita of the social and economic impacts of climate change" … but:

"[Although] in his rhetoric at least, the author shows a clear awareness of the presence of the various sorts of uncertainty, […he] does not successfully manage the problems of uncertainty."

Table 1
Impact estimates for different sectors, for doubling of CO_2, U.S. (positive number indicates gain; negative number loss) (Nordhaus, 1991, Table 6, p. 932)

Sectors	Billions (1981 $)
Severely impacted sectors	
Farms	
Impact of greenhouse warming and CO_2 fertilisation	−10.6 to +9.7
Forestry, fisheries, other	Small + or −
Moderately impacted sectors	
Construction	+
Water transportation	?
Energy and utilities	
Energy (electric, gas, oil)	
Energy demand	−1.65
Non-electric space heating	1.16
Water and sanitary	−?
Real estate	
Land-rent component	
Estimate of damage from sea-level rise	
Loss of land	−1.55
Protection of sheltered areas	−0.90
Protection of open coasts	−2.84
Hotels, lodging, recreation	?
Total	
Central estimate	
Billions, 1981 level of national income	−6.23
Percentage of national income	−0.26

Sources for Table 6: Underlying data on impacts are summarised in EPA (1988). Translation into national-income accounts by author. Details are available on request.

"The hyper-precision in the expression of the key number - 0.26% […] shows that this is one of those 'magic numbers' designed to produce confidence in the existence of a hard core of objective fact deep inside the mass of intuitive fuzz."

For Nordhaus - based on a 'hunch' this -0.26% could become -2% …

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A more recent paper:

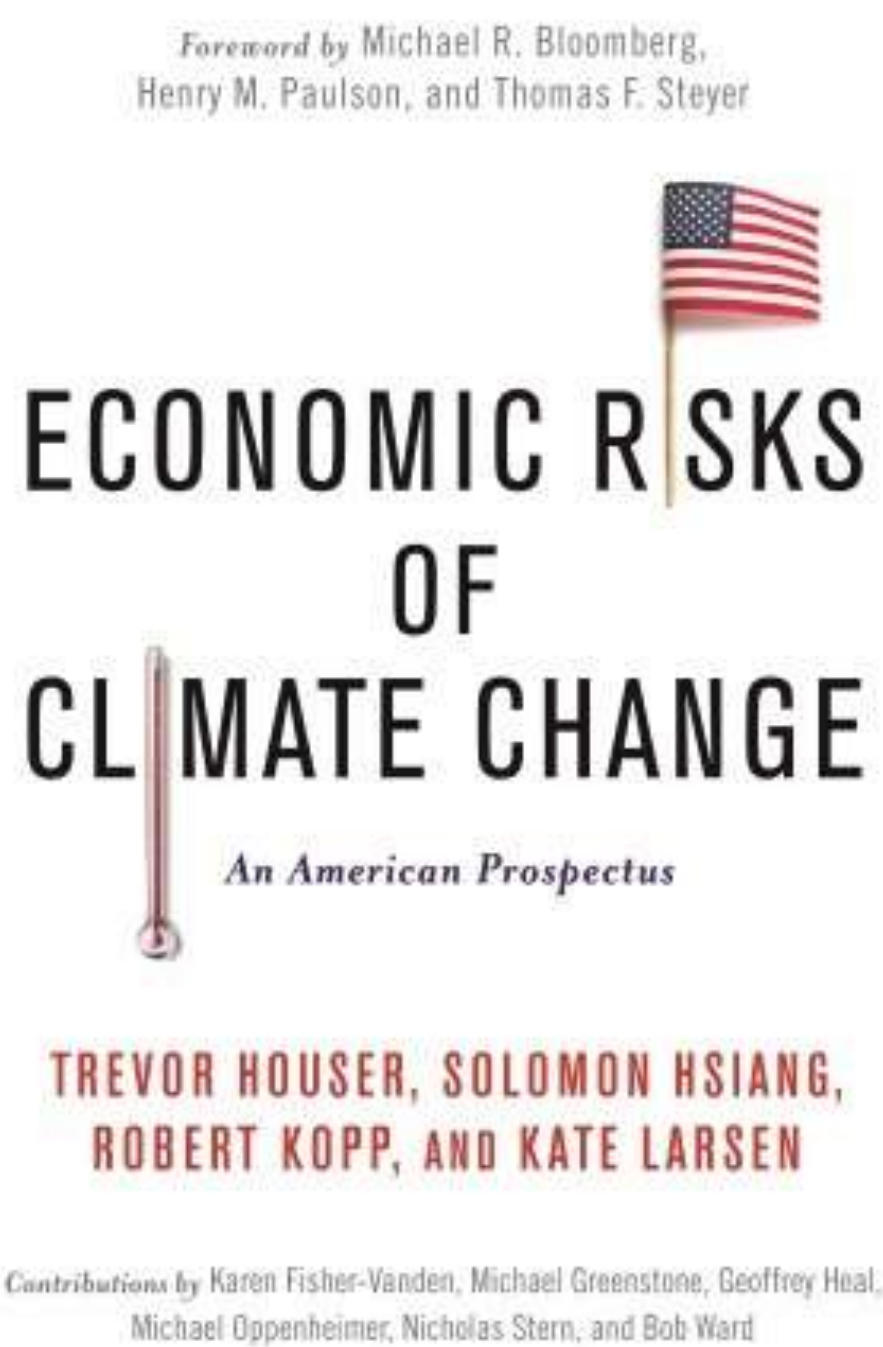
ANDREA SALTELLI
PHILIP B. STARK
WILLIAM BECKER
PAWEL STANO

Climate Models as Economic Guides

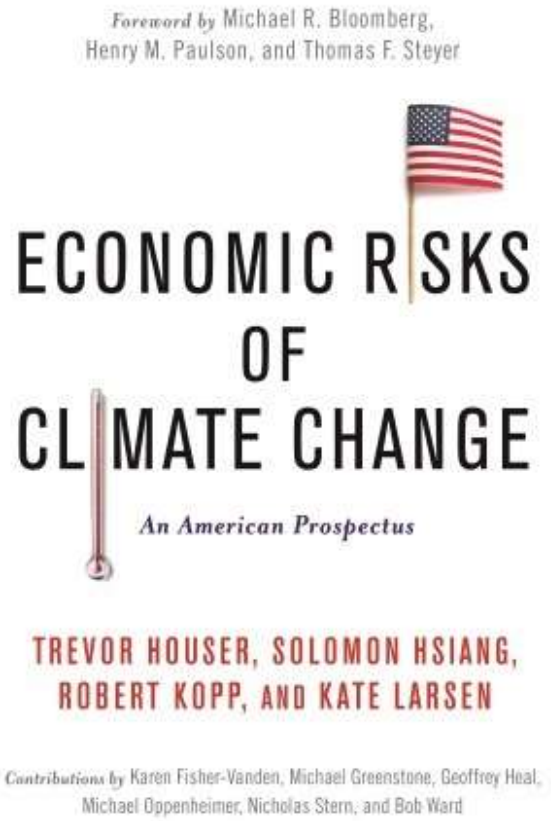
Scientific Challenge or Quixotic Quest?

The uncertainties associated with mathematical models that assess the costs and benefits of climate change policy options are unknowable. Such models can be valuable guides to scientific inquiry, but they should not be used to guide climate policy decisions.

… targeting
an
audacious
study:

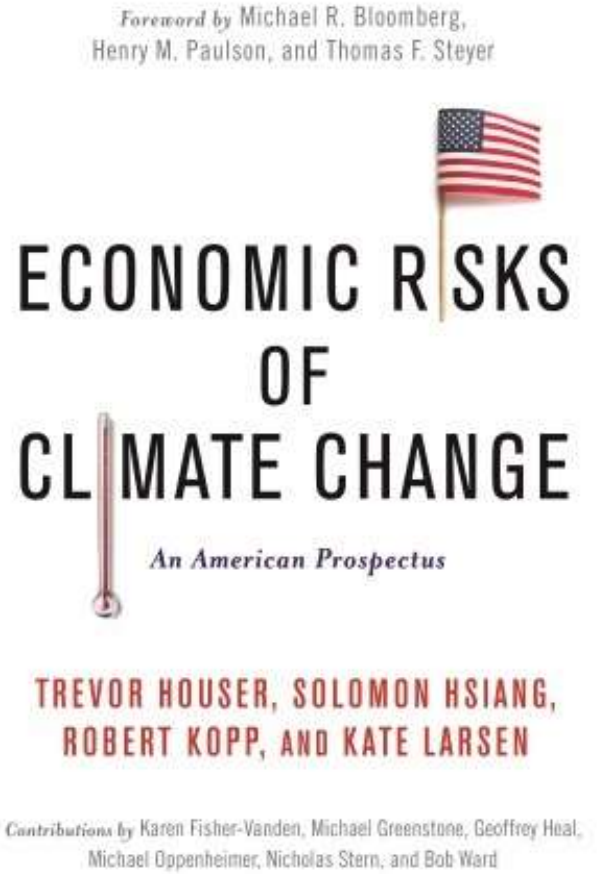


"[…] the report forecasts—at the level of individual counties in the U.S.—energy costs and demand, labor supply, mortality, violent crime rates, and real estate property prices up to the year 2100 […]"

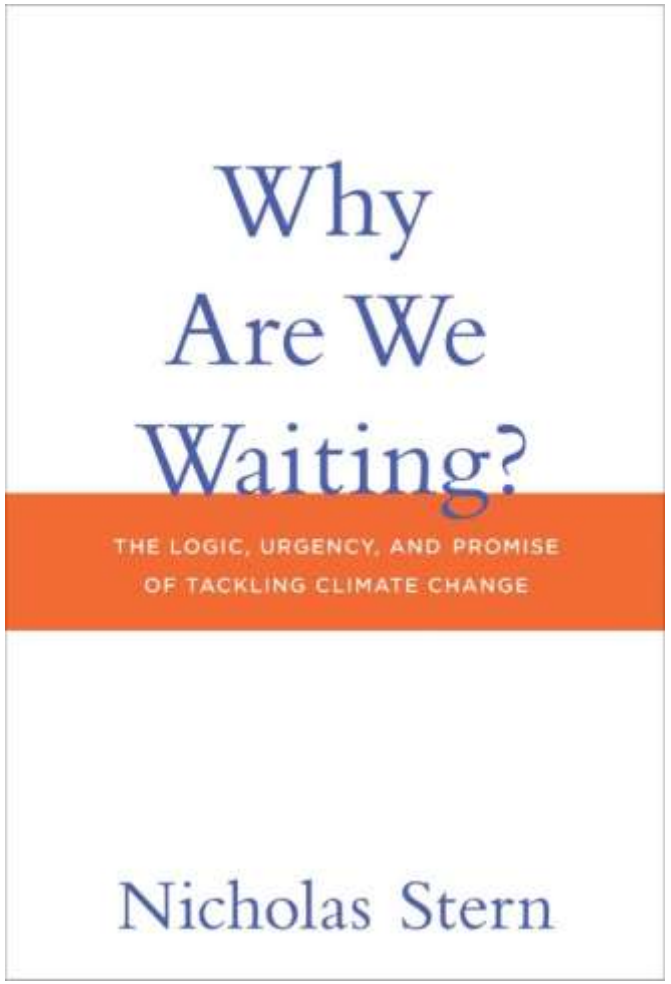


“The report presents the amount of computer power and data generated as evidence of the scientific legitimacy of the enterprise.

The authors note, however, that out of an abundance of caution they did not model deterioration in cognitive performance as temperatures rise”



Next comes the latest (2015) book of Nicholas Stern …



- Advocates for better integrated assessment models (IAM)

THE LOGIC, URGENCY, AND PROMISE OF TACKLING CLIMATE CHANGE

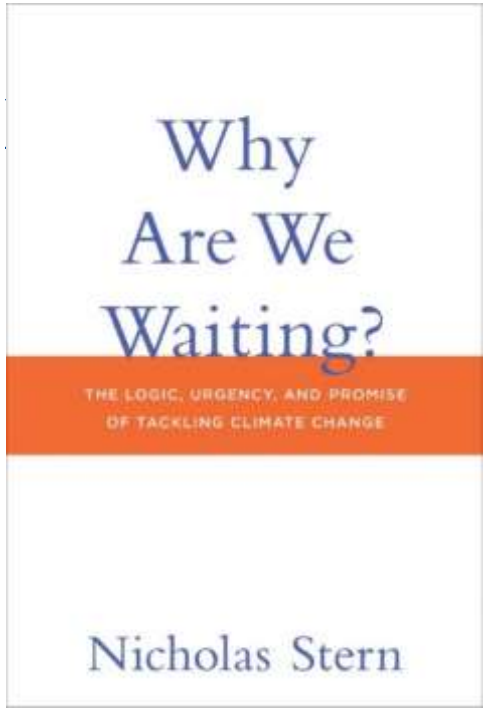
After a list of criticism moved to the realism of Integrated Assessment Models:

“[…] the point is that estimates based on these models are very sensitive to assumptions and are likely to lead to gross underestimation” p.139

Things to be incorporated in ‘formal modelling’

“Damage to social, organizational or environmental capital […]
  Damage to stock of capitals and land […]
  Damage to overall factor productivity […]
  Damage to learning and endogenous growth”,

‘formal modelling’ as to produce ‘numbers’?



N. Stern suggests using different mathematical models, including dynamic stochastic general equilibrium models.

Philip Mirowski

See Philip Mirowski's book for a critique of DSGE as used in economics … inquiries by the US senate and the Queen of the England about their failure to predict the crisis …

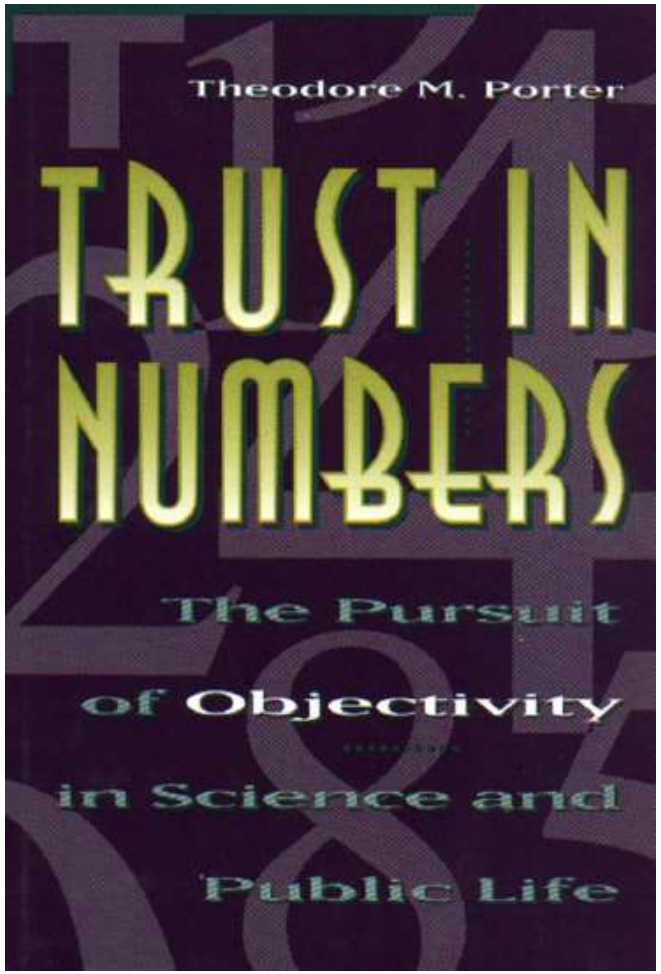
Everybody in the profession knows that DSGE work under the economists' standard 'caeteris paribus' hypothesis (=all the rest being equal)

But

Caeteris are never paribus

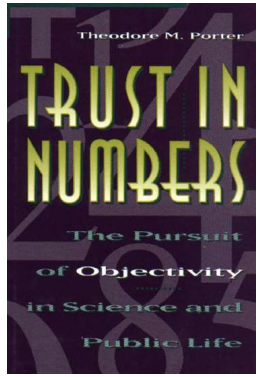
Numbers and trust

Theodor
M. Porter



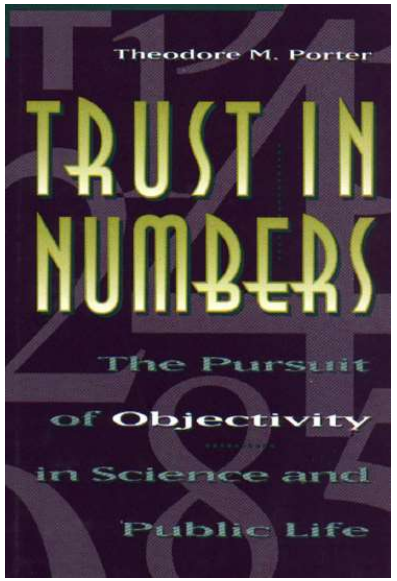
Theodore M. Porter, Trust in Numbers,
The Pursuit of Objectivity in Science and Public Life, Princeton 1995

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

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.

For Rayner (2012) “Sense-making is possible only through processes of exclusion. Storytelling is possible only because of the mass of detail that we leave out. Knowledge is possible only through the systematic ‘social construction of ignorance’ (Ravetz, 1986)”

Steve Rayner

Jerry Ravetz

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.

Rayner's (2012) strategies societies may use to deal with "uncomfortable knowledge".

- Denial: "There isn't a problem"
- Dismissal: "It's a minor problem"
- Diversion: "Yes I am working on it" (In fact I am working on something that is only apparently related to the problem)
- Displacement: "Yes and the model we have developed tells us that real progress is being achieved" (The focus in now the model not the problem).

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

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

… and today:

alarm about algorithms

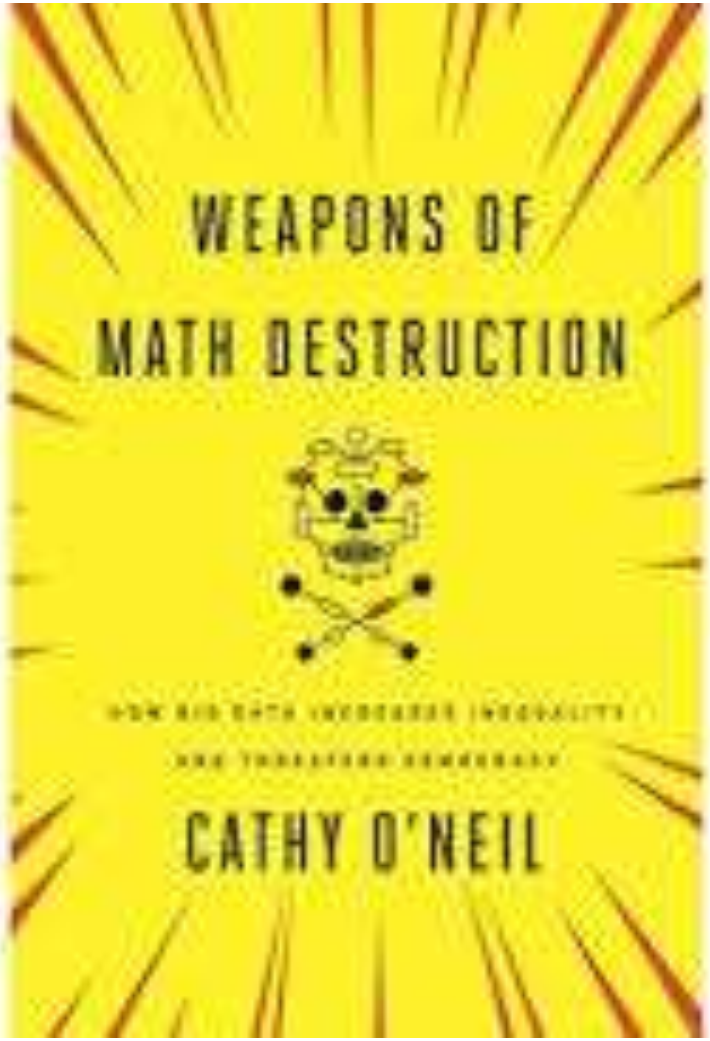
Algorithms decide upon an ever-increasing list of cases, such as recruiting, carriers - including of researchers, prison sentencing, paroling, custody of minors…

Alexander, L. Is an algorithm any less racist than a human? | Technology | The Guardian. Available at https//www.theguardian.com/technology/2016/aug/03/algorithm-racist-human-employers-work (2016) (Accessed: 30th August 2017).

Abraham C. Turmoil rocks Canadian biomedical research community. Statnews, Available at https://www.statnews.com/2016/08/01/cihr-canada-research/ (2016) (Accessed: 30th August 2017).

Brauneis, R. & Goodman, E. P. Algorithmic Transparency for the Smart City, Yale Journal of Law & Technology (2017), Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3012499 (Accessed: 30th August 2017).

A book on algorithms titles “Weapons of Math Destruction”



O’Neil, C. Weapons of math destruction : how big data increases inequality and threatens democracy. (Crown/Archetype, 2016).

In New York, where algorithms are used by the administration for a large array of decisions, the mayor has decided to pursue legislation for “algorithmic audits”.

The New York Times

Showing the Algorithms Behind New York City Services

About New York
By JIM DWYER AUG. 24, 2017

Let us say that James Vacca is not necessarily the first person you’d think would begin a deeply necessary revolution to peel away some of the secrecy around technology that shapes government decisions. In the 1980s, Mr. Vacca admitted, he told an aide that it would be a waste of money to replace office typewriters with

About New York
Twice a week, a chronicle of New York and New Yorkers.

Online Chats Tie Politicians to the Troll of Staten Island SEP 7

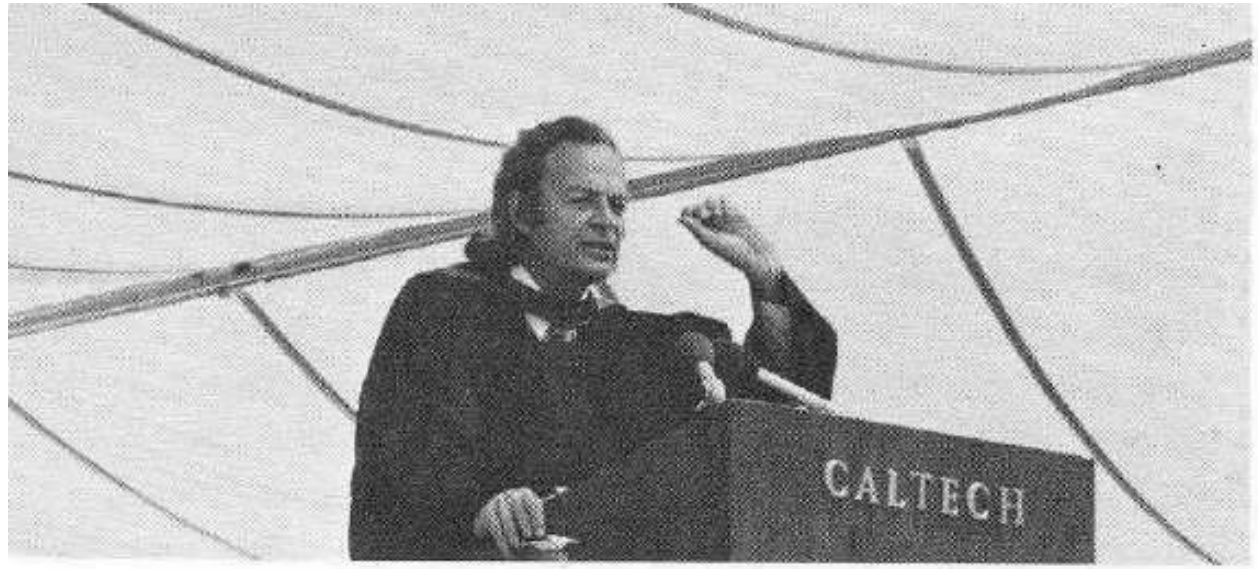
Dwyer J. Showing the Algorithms Behind New York City Services - The New York Times. New York Times Aug. 24, (2014).

Discussion points on problematic quantification

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?

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."

What to do?
(with Silvio Funtowicz)

Science exhibits pathologies / corruptions comparable to the traffic in indulgencies which enraged Luther ~1517

Martin Luther

Johann Tetzel

The internet the new press?

Johannes Gutenberg

The combination of corruption, indignation and a revolutionary technology made the Reformation possible; is the same possible for science?

Seek inspiration in the radical 1970s-era movements that sought to change the world by changing first science itself

Fight asymmetries; offer expertise to the weaker stakeholders as to shape the questions asked of science

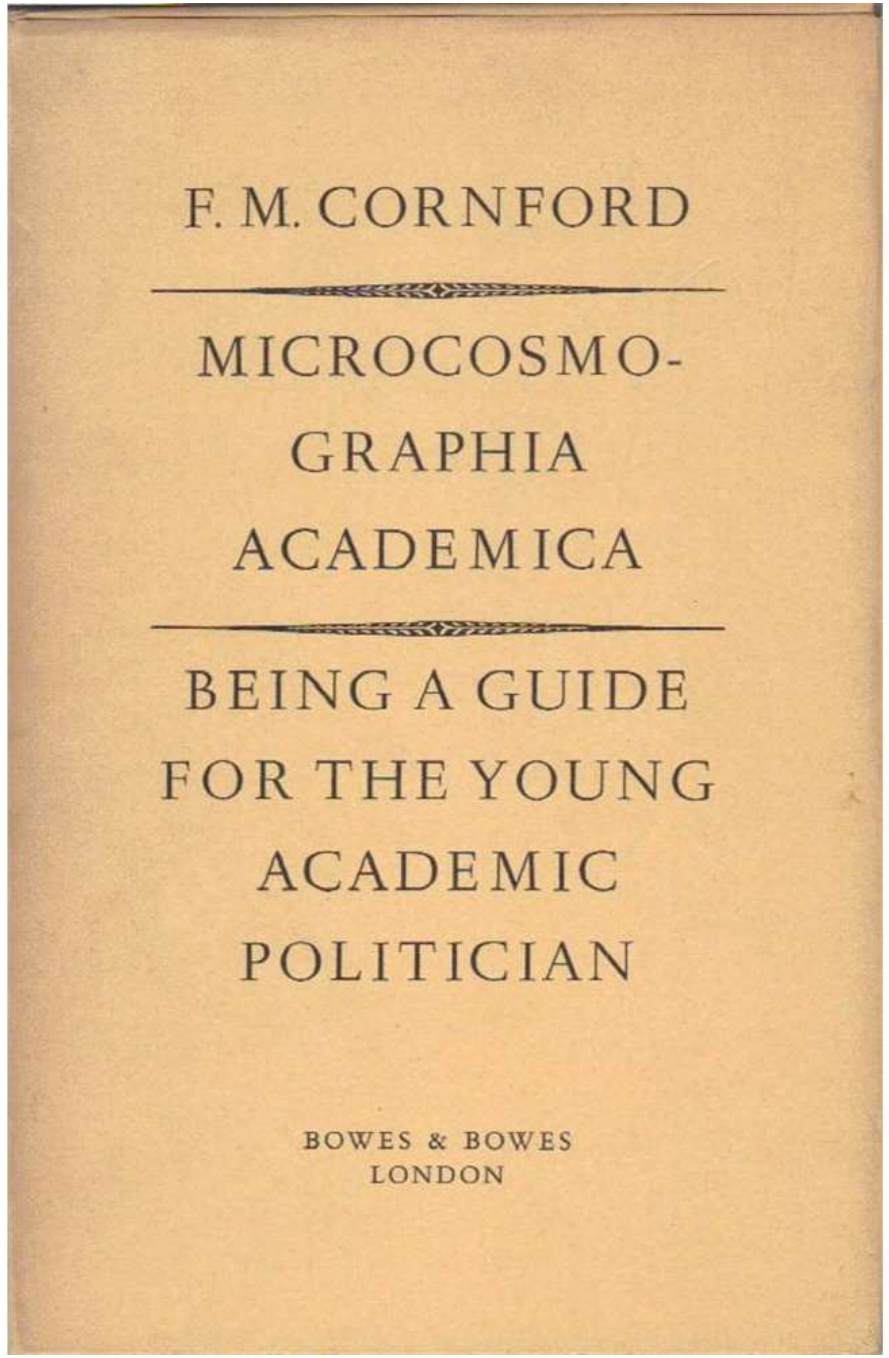
Fight methodological corruption; deconstruct shoddy quantifications, developing a new grammar for modelling

Recast our public conversation about science

About the British Society for Social Responsibility in Science and Science for the People:
https://gizmodo.com/how-radical-70s-scientists-tried-to-change-the-world-1681987399

END

A book written in 1909



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.

Seek inspiration in the radical 1970s-era movements that sought to change the world by changing first science itself

Fight asymmetries; offer expertise to the weaker stakeholders; help those to shape the questions asked of science

Fight methodological corruption, e.g. deconstructing shoddy quantifications

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