

Ethics of quantification

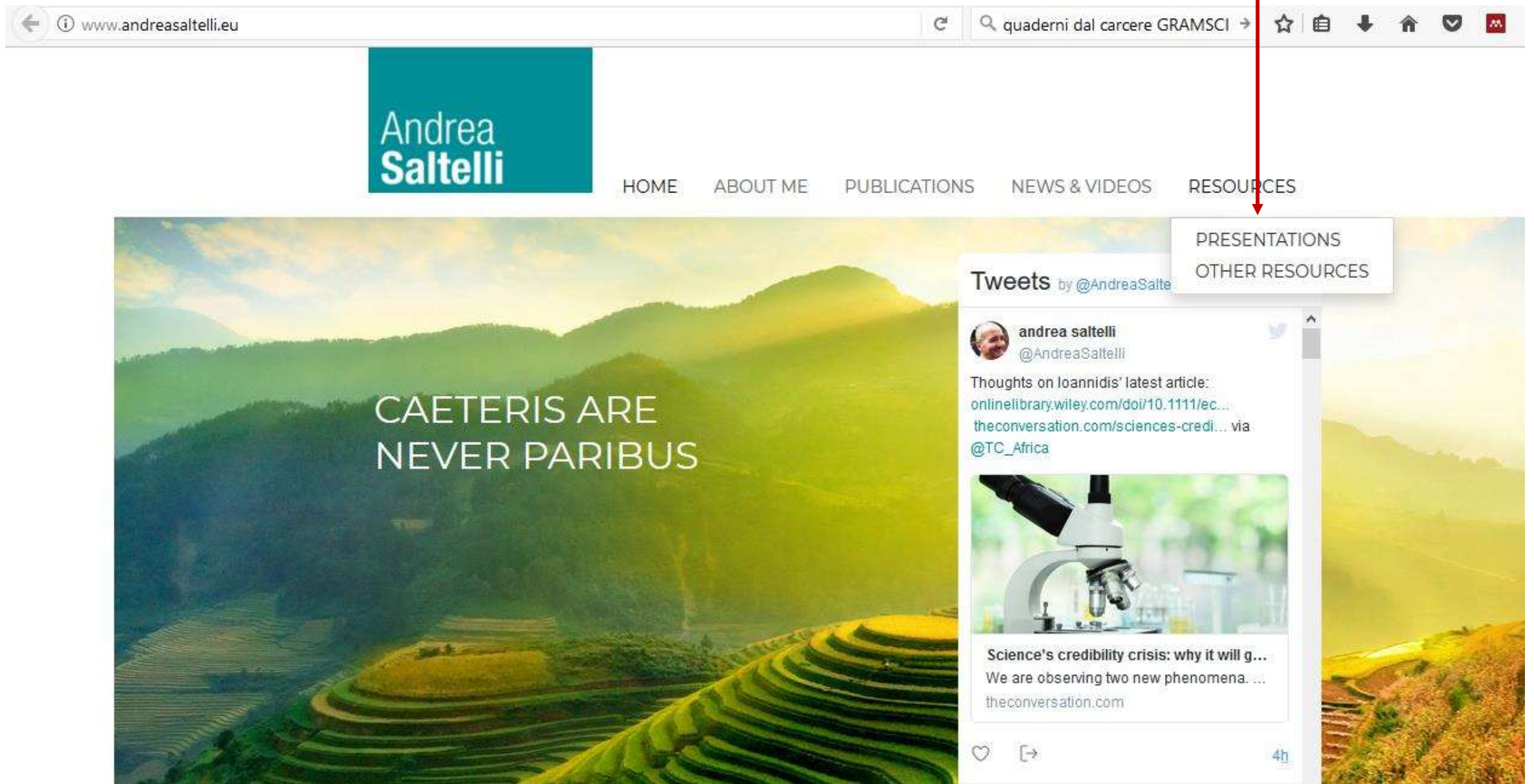
Andrea Saltelli

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.

VITSV900 Philosophy of
Social Science and Ethics

Vatnahalsen, (NO),
February 13–16, 2018

Where to find this talk: www.andreasaltelli.eu



The screenshot shows the homepage of the website www.andreasaltelli.eu. The browser's address bar displays the URL. The website features a teal header with the name "Andrea Saltelli" and a navigation menu with links: HOME, ABOUT ME, PUBLICATIONS, NEWS & VIDEOS, and RESOURCES. A red arrow points to the "RESOURCES" link. Below the navigation menu, a large banner image of terraced rice fields is overlaid with the text "CAETERIS ARE NEVER PARIBUS". On the right side, there is a "Tweets" section by @AndreaSalte, featuring a tweet from andrea saltelli (@AndreaSaltelli) discussing a science credibility crisis. A dropdown menu is open over the "RESOURCES" link, showing options for "PRESENTATIONS" and "OTHER RESOURCES".

www.andreasaltelli.eu

Andrea Saltelli

HOME ABOUT ME PUBLICATIONS NEWS & VIDEOS RESOURCES

PRESENTATIONS
OTHER RESOURCES

Tweets by @AndreaSalte

andrea saltelli
@AndreaSaltelli

Thoughts on Ioannidis' latest article:
onlinelibrary.wiley.com/doi/10.1111/ec...
theconversation.com/sciences-credi... via
@TC_Africa

Science's credibility crisis: why it will g...
We are observing two new phenomena...
theconversation.com

4h



= more material on my web site



= more material on Wikipedia



= discussion point

Neoliberalism

From Anne
Norton's talk

- Primacy of economics
- Experts
- Quantification
- Benchmarking

Plus ...

- Economics as British colonial economics → Erik Reinert
- Evidence based policy
- Scientism

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 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/>

➔ Elements of this ‘cluster’ are coming apart:

➔ Science in crisis;

➔ Fraudulent or incompetent experts

➔ Contradictions and their root causes

➔ Publish or perish and perverse metrics

➔ Problematic quantifications

➔ Responsible quantifications and recipes

The
Economist

OCTOBER 19TH-25TH 2013

Economist.com

Washington's lawyer surplus

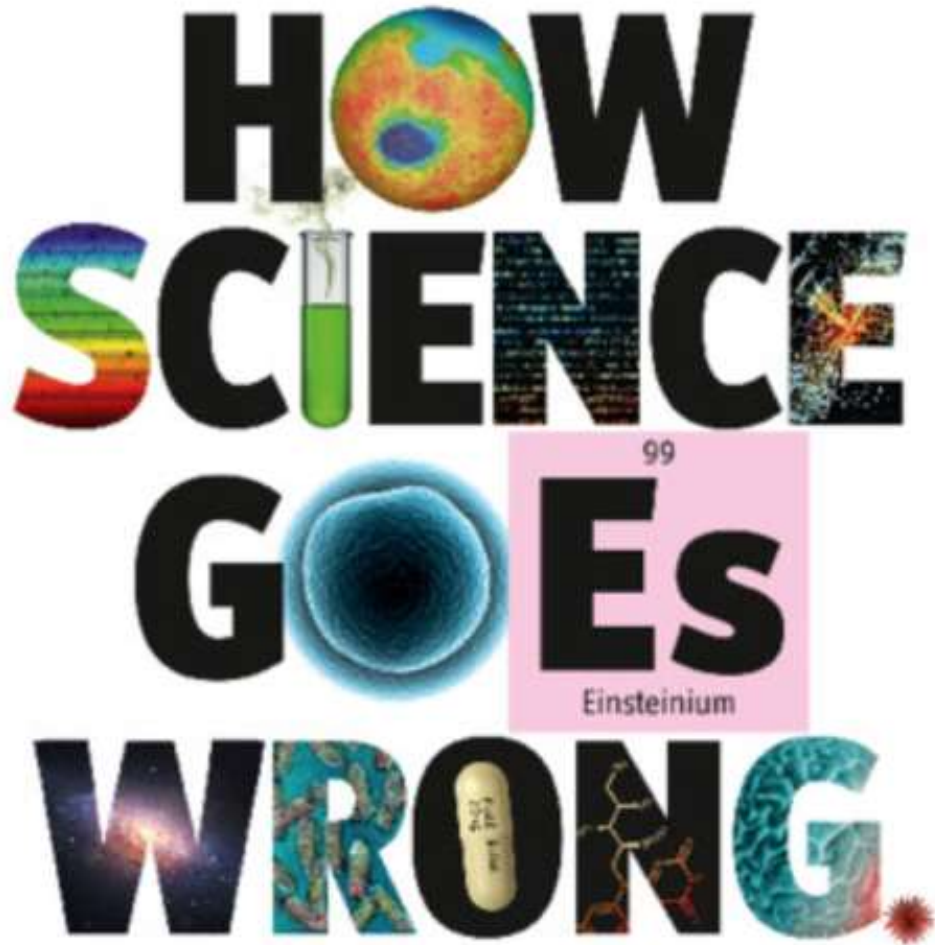
How to do a nuclear deal with Iran

Investment tips from Nobel economists

Junk bonds are back

The meaning of Sachin Tendulkar

HOW
SCIENCE
GOES
WRONG



One root of
contradiction:
Science's crisis



Why Most Published Research Findings Are False

2005

John P. A. Ioannidis

... 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

REPRODUCIBILITY IN CANCER BIOLOGY

Making sense of replications

REPRODUCIBILITY
—PROJECT—
CANCER BIOLOGY

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*

January 19, 2017

Proceedings of the National Academy of Sciences of the United States of America

PNAS

CURRENT ISSUE // ARCHIVE // NEWS & MULTIMEDIA // AUTHORS // ABOUT // COLLECTED ARTICLES // BROWSE BY TOPIC // EARLY EDITION // FRONT MATTER

🏠 > Current Issue > vol. 114 no. 14 > Daniele Fanelli, 3714–3719, doi: 10.1073/pnas.1618569114

 Check for updates

Meta-assessment of bias in science

Daniele Fanelli^{a,1}, Rodrigo Costas^b, and John P. A. Ioannidis^{a,c,d,e}

Author Affiliations 

This Issue

 April 4, 2017
vol. 114 no. 14
[Masthead \(PDF\)](#)
[Table of Contents](#)

[PREV. ARTICLE](#) [NEXT ARTICLE](#)


February 4, 2017

 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 POWER OF BIAS IN ECONOMICS RESEARCH*

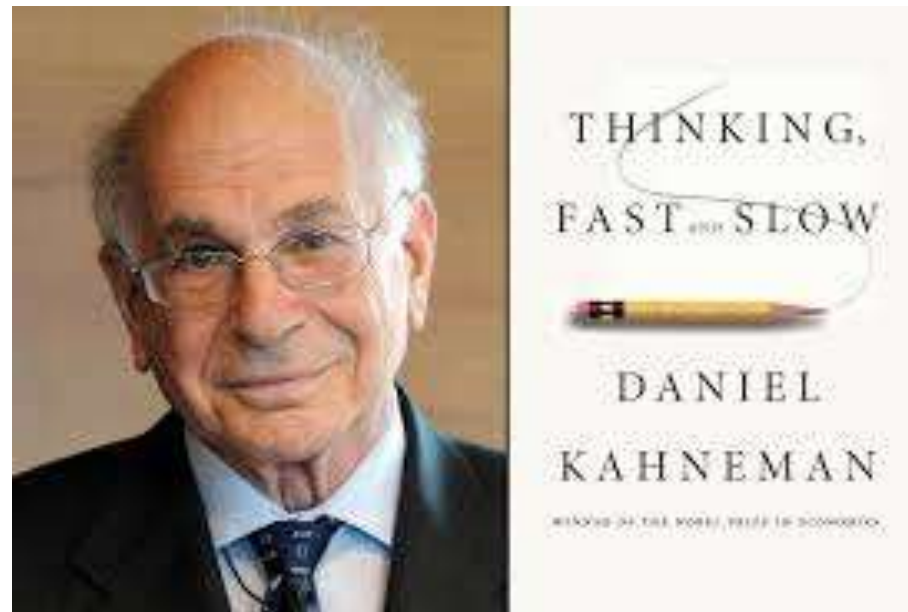
John P. A. Ioannidis, T. D. Stanley and Hristos Doucouliagos

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...”

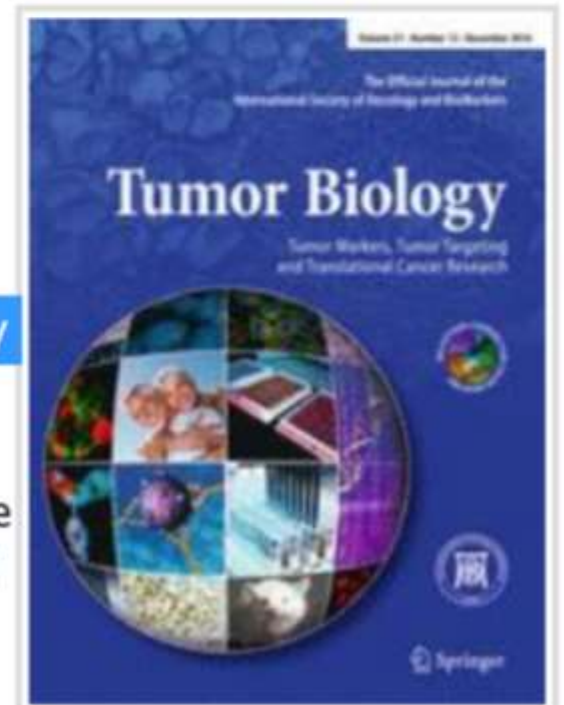
<https://replicationindex.wordpress.com/2017/02/02/reconstruction-of-a-train-wreck-how-priming-research-went-of-the-rails/comment-page-1/>

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

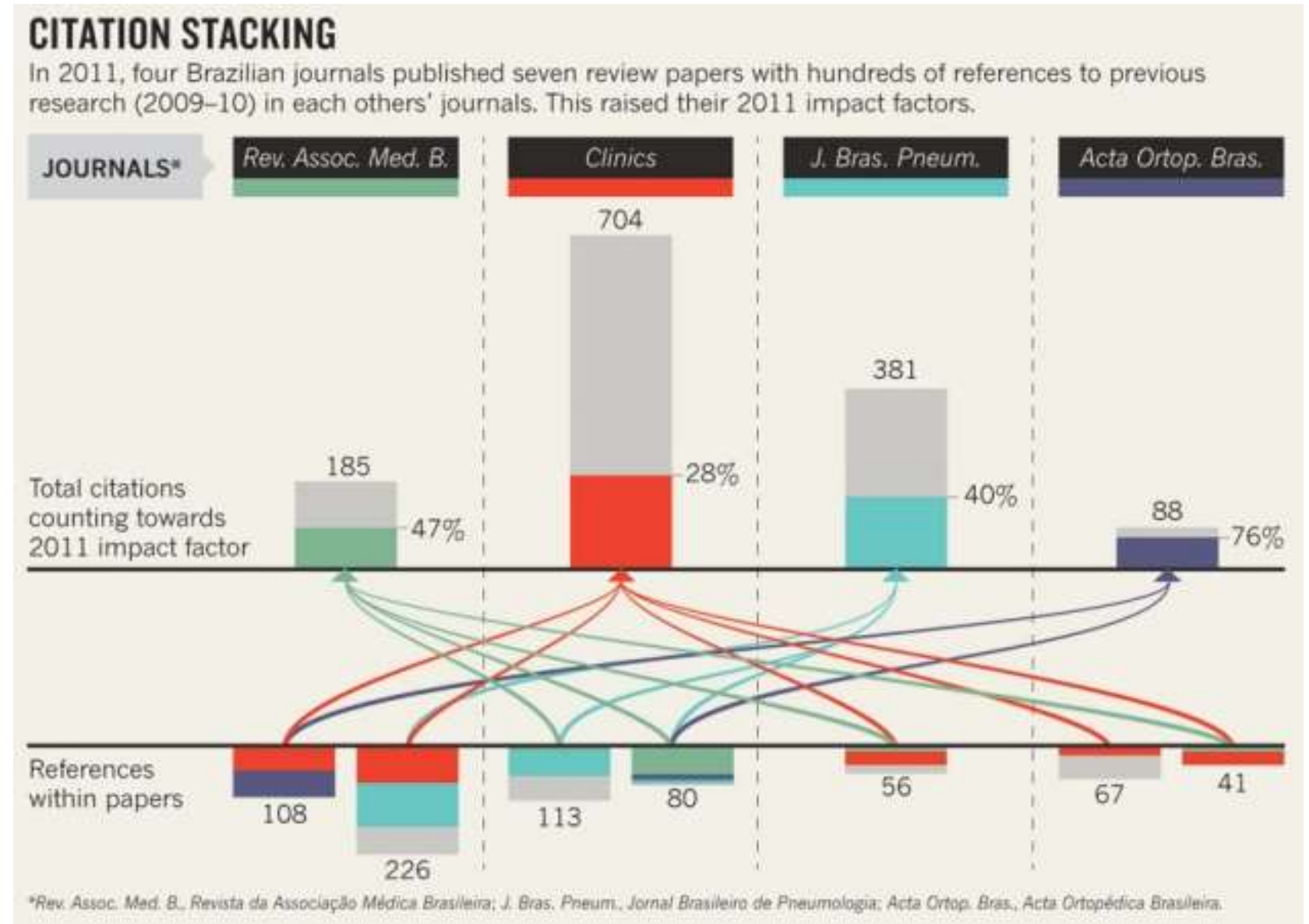
with 11 comments

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



ELSEVIER

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



ELSEVIER



CrossMark

Journal of Clinical Epidemiology 73 (2016) 82–86

**Journal of
Clinical
Epidemiology**

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.



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 .

JAMA Internal Medicine

Home Current Issue All Issues Online First Collections CME Multimedia

Online First >

Special Communication | September 12, 2016

Sugar Industry and Coronary Heart Disease Research

A Historical Analysis of Internal Industry Documents FREE

ONLINE FIRST

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

[+] Author Affiliations

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

Text Size: A A A

September 12, 2016

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

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

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

The screenshot shows the JAMA Internal Medicine website. At the top is a navigation bar with links: The JAMA Network, Journals >, Collections, Store, Physician Jobs, and About Mobile. Below this is the JAMA Internal Medicine logo. A secondary navigation bar includes links: Home, Current Issue, All Issues, Online First, Collections, CME, and Multimedia. The main content area features a 'Special Communication' dated September 12, 2016, titled 'Sugar Industry and Coronary Heart Disease Research: A Historical Analysis of Internal Industry Documents'. The article is marked as 'ONLINE FIRST' and 'FREE'. The authors listed are Cristin E. Kearns, DDS, MBA^{1,2}; Laura A. Schmidt, PhD, MSW, MPH^{1,3,4}; and Stanton A. Glantz, PhD^{1,5,6,7,8}. A link for '[+] Author Affiliations' is provided. At the bottom, the publication information states: 'JAMA Intern Med. Published online September 12, 2016. doi:10.1001/jamainternmed.2016.5394'. There are also text size adjustment icons (A A A).

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

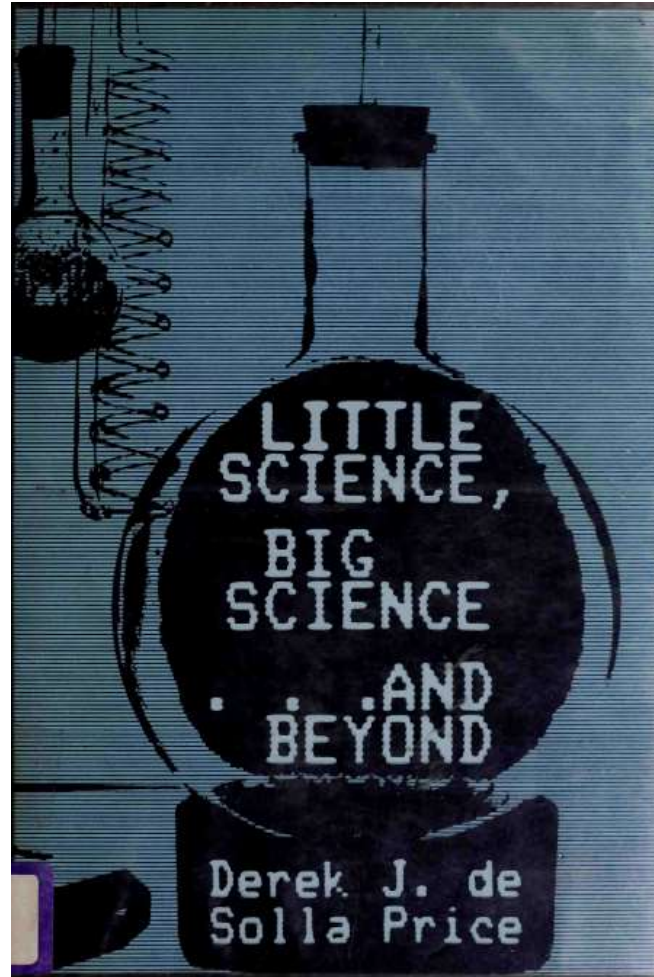
A scientists' march on Washington is a bad idea – here's why

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

newsblog

Nature brings you breaking news from the world of science

NEWS BLOG

Global scientific output doubles every nine years

07 May 2014 | 16:46 GMT | Posted by Richard Van
Noorden | Category: Policy, Publishing

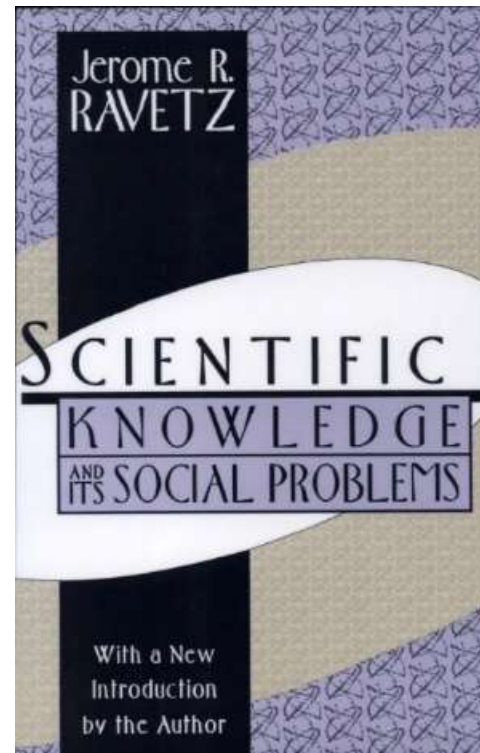
https://www.researchgate.net/publication/229062236_Article_50_million_An_estimate_of_the_number_of_scholarly_articles_in_existence

<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.

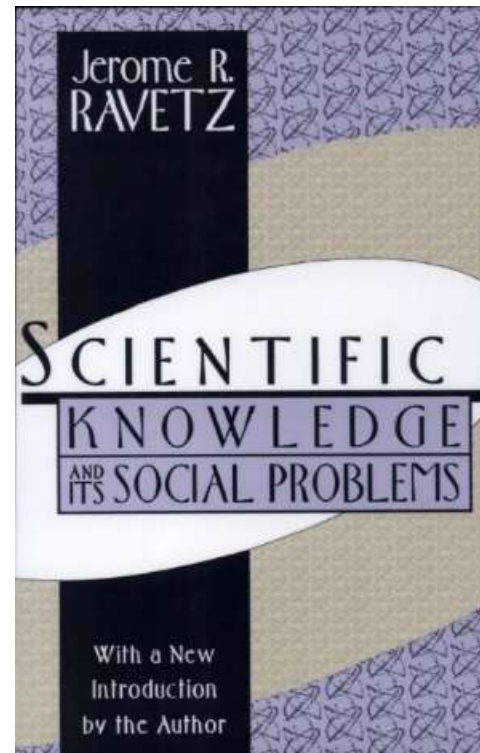


Jerome R.
Ravetz

“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.



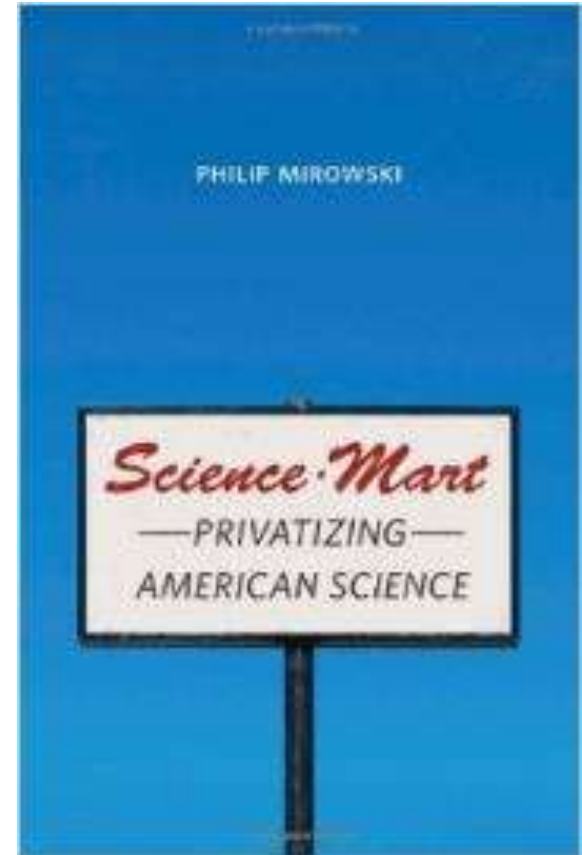
Jerome R.
Ravetz

... 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

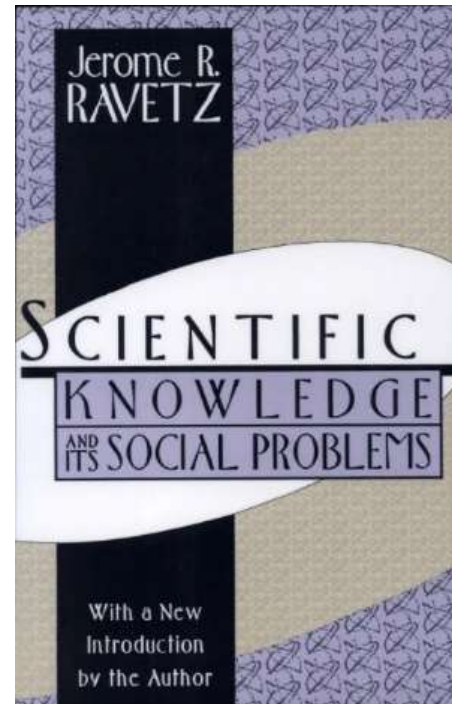
Mirowski, P. 2011. *Science-Mart: Privatizing American Science*, Harvard University Press.



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

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OPEN SCIENCE

rsos.royalsocietypublishing.org



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. Smaldino¹ and Richard McElreath²

¹Cognitive and Information Sciences, University of California, Merced, CA 95343, USA

²Department 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>

[redacted] 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. [redacted]

[redacted] 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>

Statistics under trial



AMERICAN STATISTICAL ASSOCIATION
Promoting the Practice and Profession of Statistics®

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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.

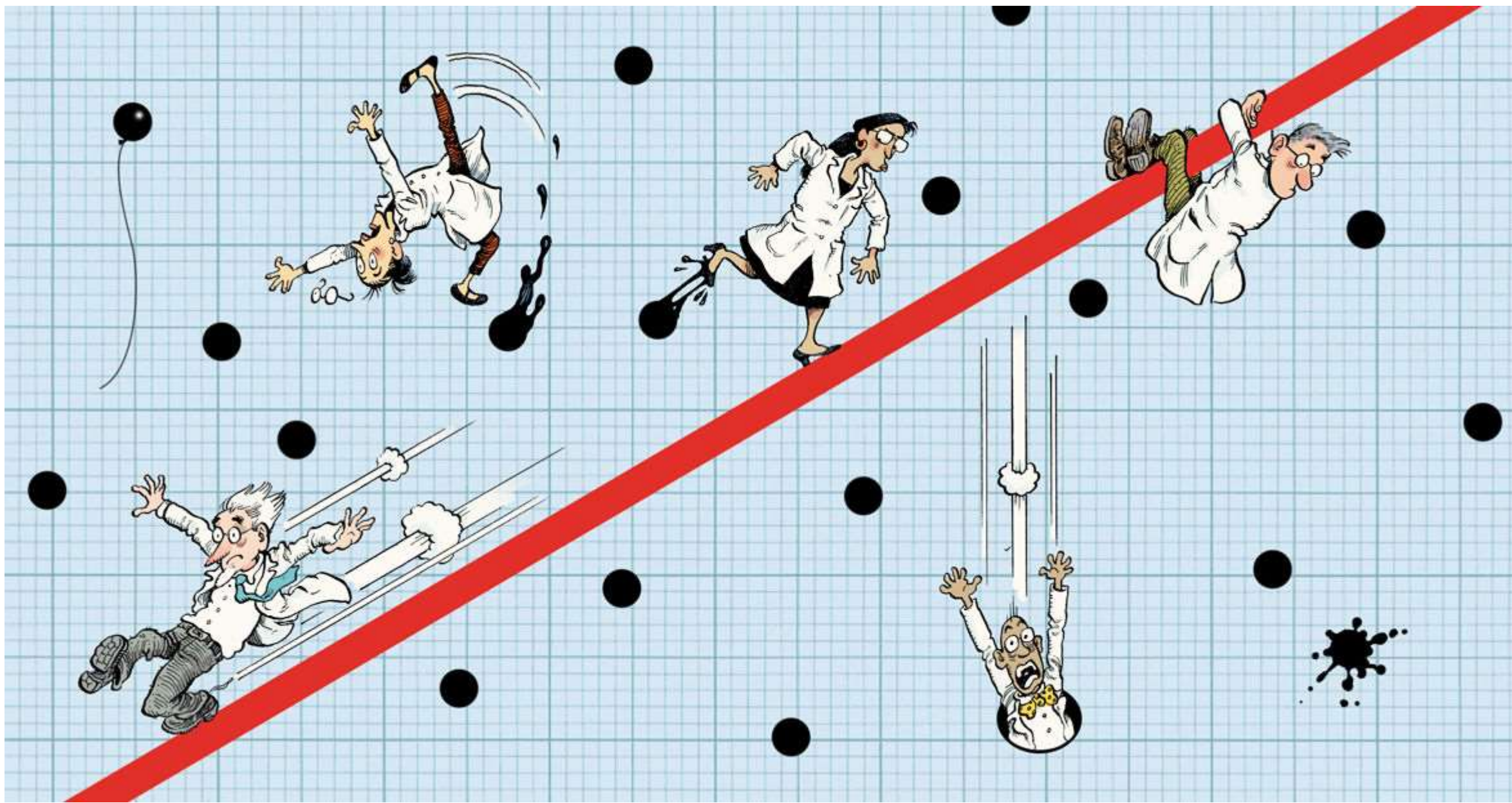
See also Christie Aschwanden at <http://fivethirtyeight.com/features/not-even-scientists-can-easily-explain-p-values/>

P-hacking (fishing for favourable p-values) and
HARKing (formulating the research **H**ypothesis
After 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).



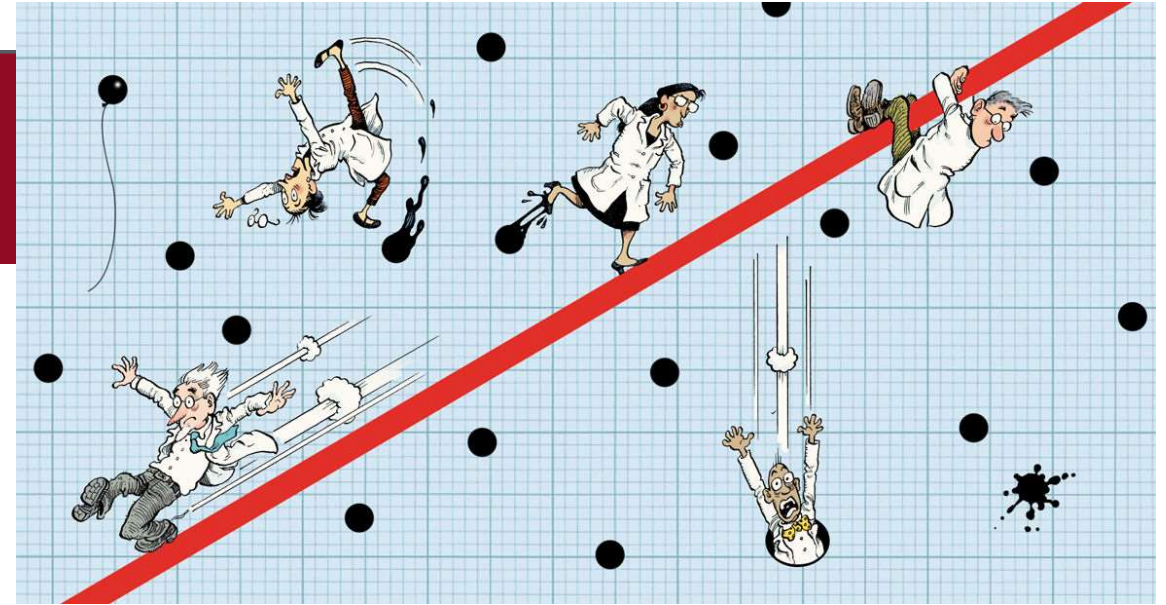


nature
International journal of science

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 

—
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>

—
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

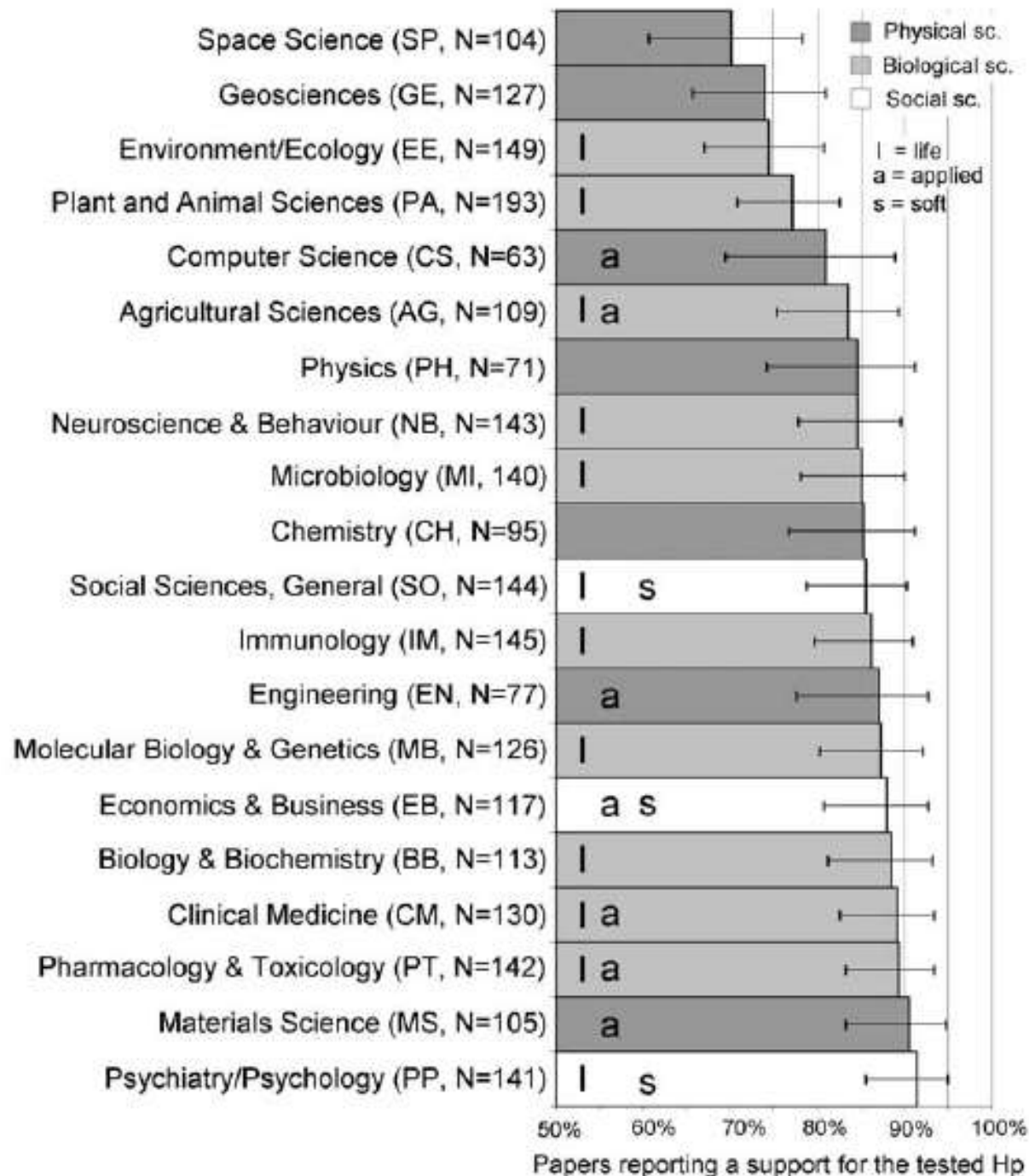
How to Make More Published Research True (Ioannides 2014)



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.



“Positive” Results Increase Down the Hierarchy of the Sciences

Daniele Fanelli*

NNOGBN and ISSI-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



FEATURED

The Replication Crisis in Science

BY SHRAVAN VASISHTH ON 29/12/2017 • 3 COMMENTS

December 2017

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



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





THE RIGHTFUL PLACE OF SCIENCE: **SCIENCE ON THE VERGE**

CONTRIBUTORS

| | |
|--------------------------|--------------------------|
| Alice Benessia | Jerome R. Ravetz |
| Silvio Funtowicz | Andrea Saltelli |
| Mario Giampietro | Roger Strand |
| Ângela Guimarães Pereira | Jeroen P. van der Sluijs |



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





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'?

Publish or perish &

Metrics

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

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.

Predatory publishers

Jeffrey Beall, librarian, University of Colorado, Denver.

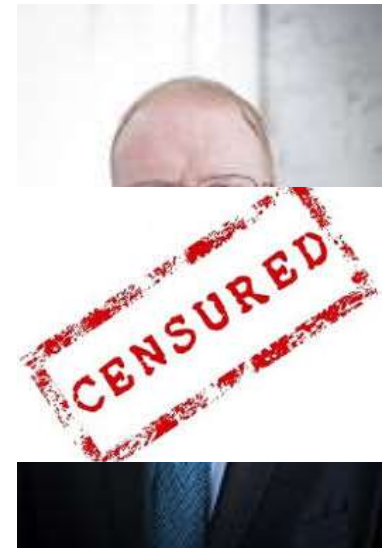
Monitored predatory open access publishers <https://beallslist.weebly.com/>



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)

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



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**?



The Metric Tide



Report of the Independent Review
of the Role of Metrics in Research
Assessment and Management

July 2015

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)

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

Richard D. Morey¹, Christopher D. Chambers¹,
Peter J. Etchells², Christine R. Harris³, Rink Hoekstra⁴,
Daniël Lakens⁵, Stephan Lewandowsky^{6,7},
Candice Coker Morey⁸, Daniel P. Newman⁹,
Felix D. Schönbrodt¹⁰, Wolf Vanpaemel¹¹,
Eric-Jan Wagenmakers¹² and Rolf A. Zwaan¹³

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 a 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?

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 [...]



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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.

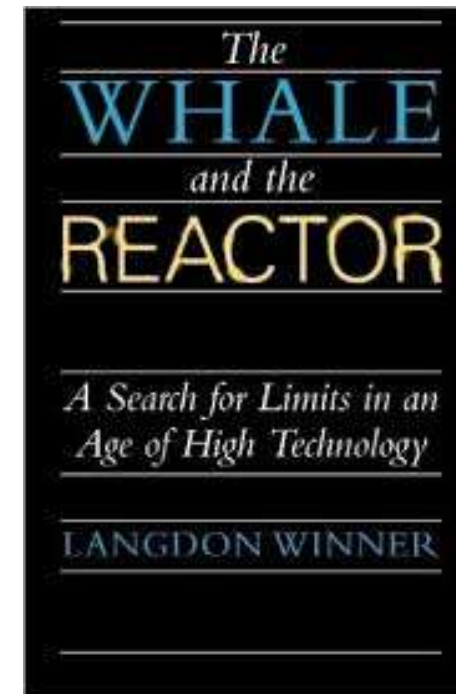
8

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.



Langdon Winner



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.



Ecological Economics

Volume 10, Issue 3, August 1994, Pages 197-207

The worth of a songbird: ecological economics as a post-normal science

Silvio O. Funtowicz ^a, Jerome R. Ravetz ^{a,b}

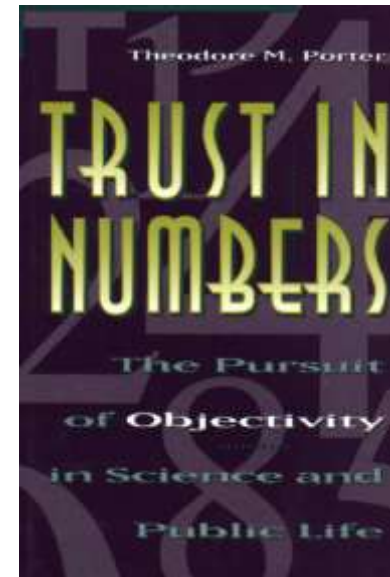
Expand this discussion

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.

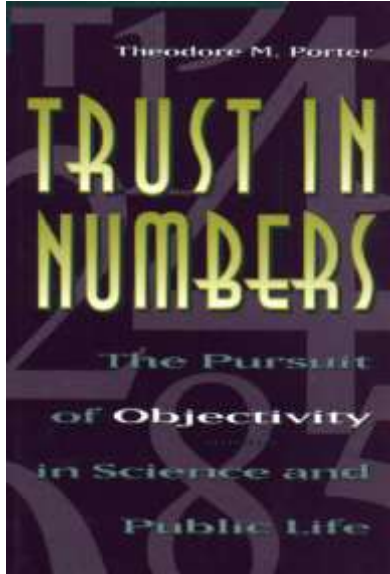
p. 8: “The appeal of numbers is especially compelling to bureaucratic officials who lack the mandate of a popular election, or divine right. Arbitrariness and bias are the most usual grounds upon which such officials are criticized. A decision made by the numbers (or by explicit rules of some other sort) has at least the appearance of being fair and impersonal.”



Theodor M. Porter

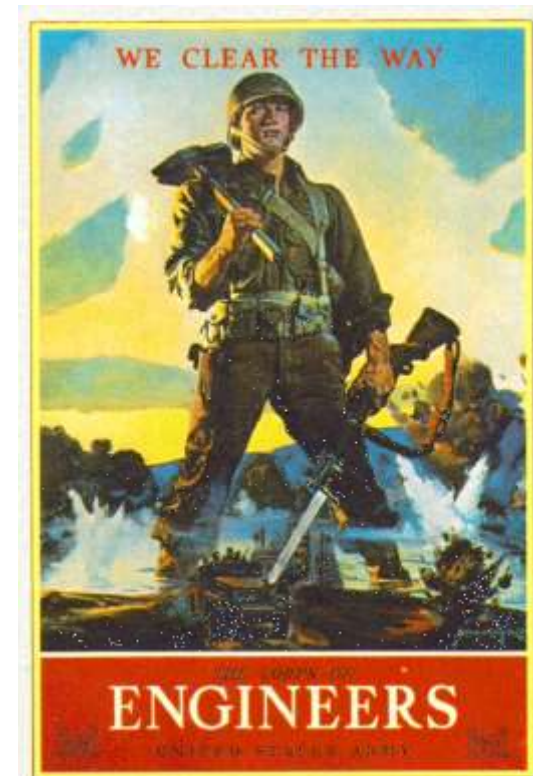
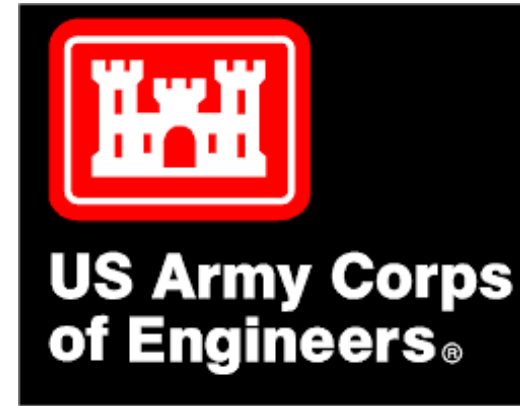


Theodore M. Porter, *Trust in Numbers, The Pursuit of Objectivity in Science and Public Life*, Princeton 1995

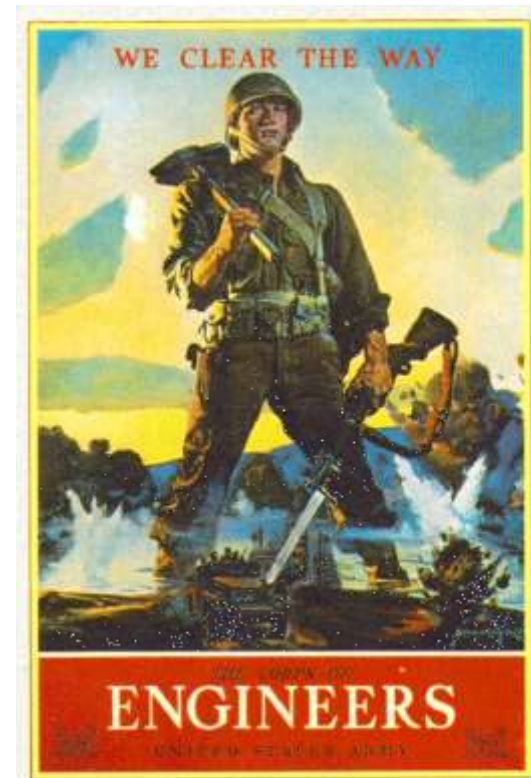


p. 8: “Scientific objectivity thus provides an answer to a moral demand for impartiality and fairness. Quantification is a way of making decisions without seeming to decide. Objectivity lends authority to officials who have very little of their own.”

Trust, authority and styles of quantification: two different stories



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.



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

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
Ravetz



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 is now the model not the problem).

... 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...

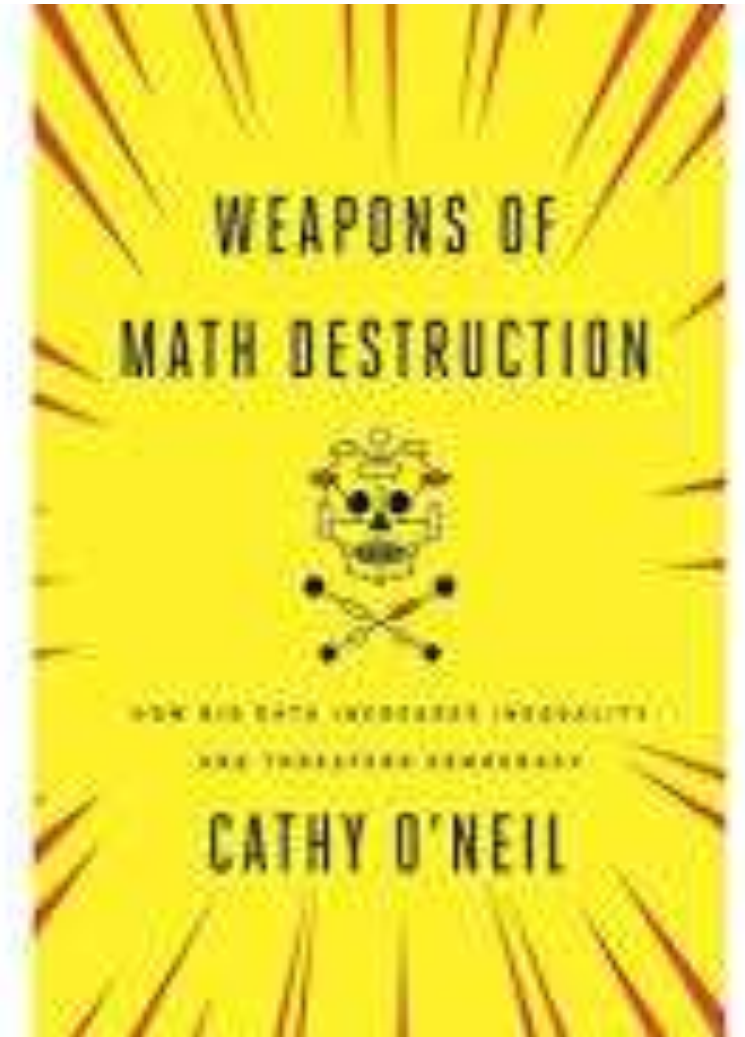


Alexander, L. Is an algorithm any less racist than a human? | Technology | The Guardian. Available at <https://www.theguardian.com/technology/2016/aug/03/algorithm-racist-human-employers-work> (2016) (Accessed: 30th August 2017).

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?

Recipes for diligent quantification

A new grammar for
modelling

Steps in sensitivity auditing

1. Rhetoric

2. Hunting

3. GIGO

4. Do it first

5. Transparency

6. Frames

7. Explore

Quantitative Story-telling

Uncertainty &
sensitivity analysis

Steps in Jakeman et al., 2006

1. Model purpose

2. Model context

3. Conceptualize

4. Model family

5. How to select model & parameters

5. How to select model & parameters

7. Model structure and parameter values

6. Verification

8. Estimation

9. Uncertainty analysis

10. Testing

Schematic diagram showing the linkages between sensitivity auditing, steps in Jakeman et al. 2006, NUSAP, quantitative storytelling, and uncertainty & sensitivity analyses.

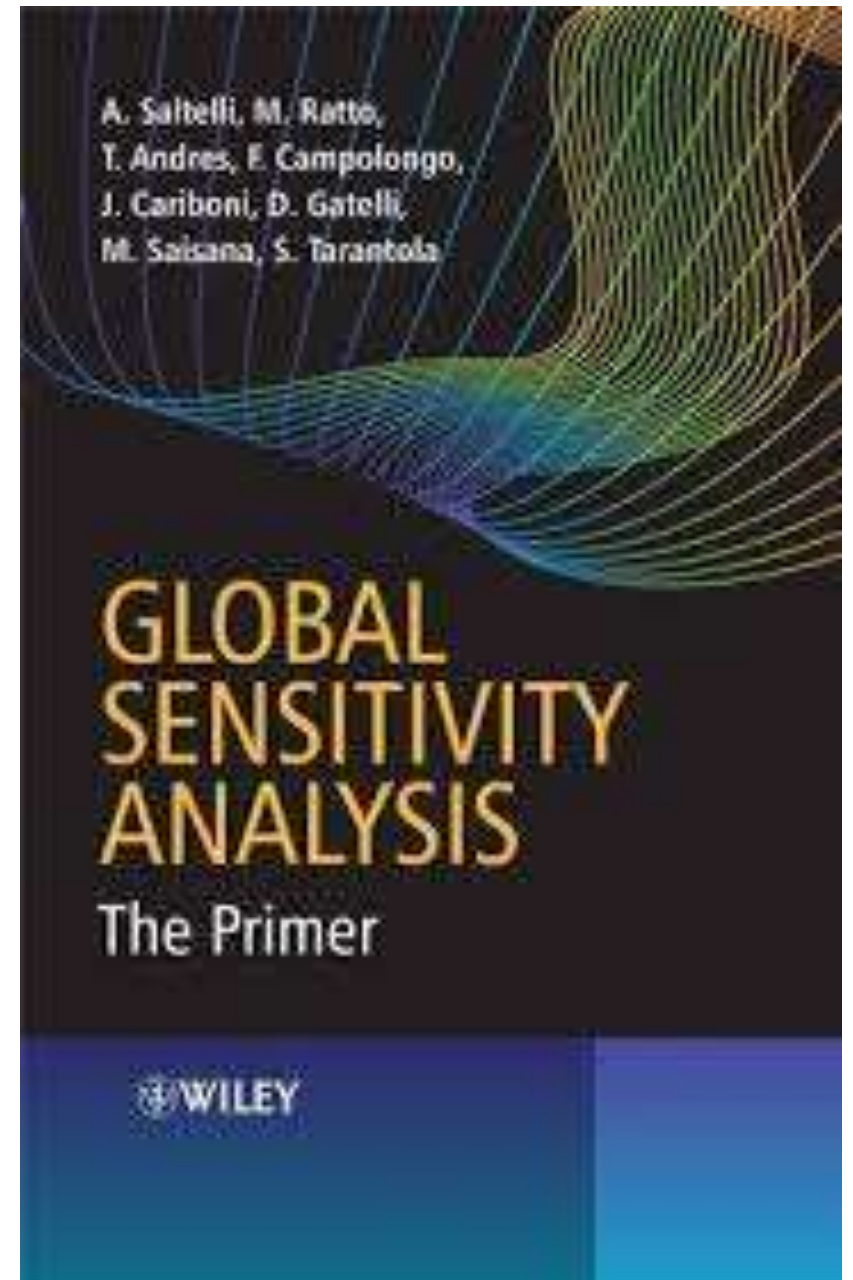
NUSAP

Sensitivity analysis and sensitivity auditing

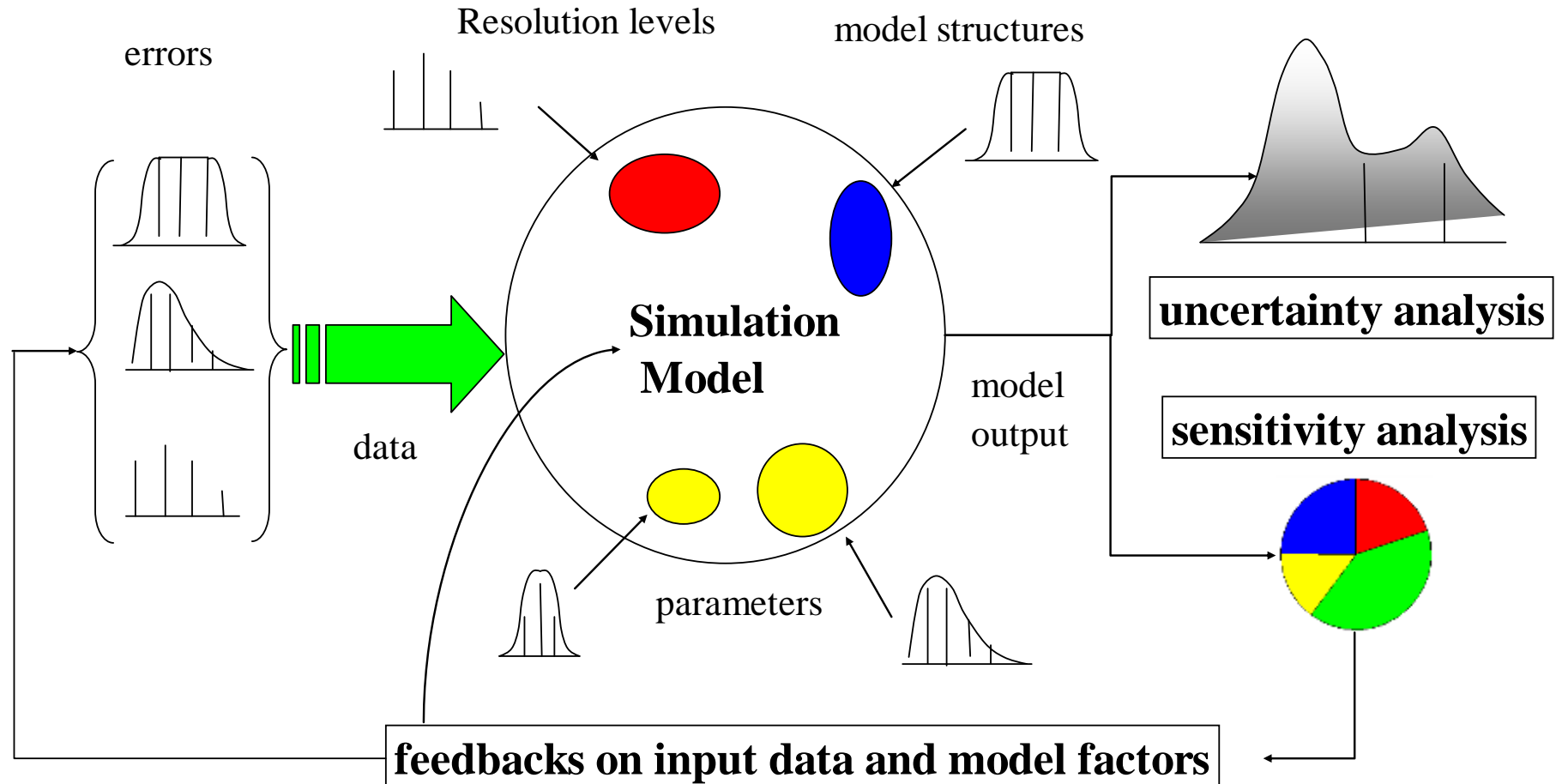


Sensitivity analysis

See also: Saltelli, A., Annoni P., 2010, How to avoid a perfunctory sensitivity analysis, *Environmental Modeling and Software*, 25, 1508–1517.



An engineer's vision of UA, SA





= more material on my web site



= discussion time

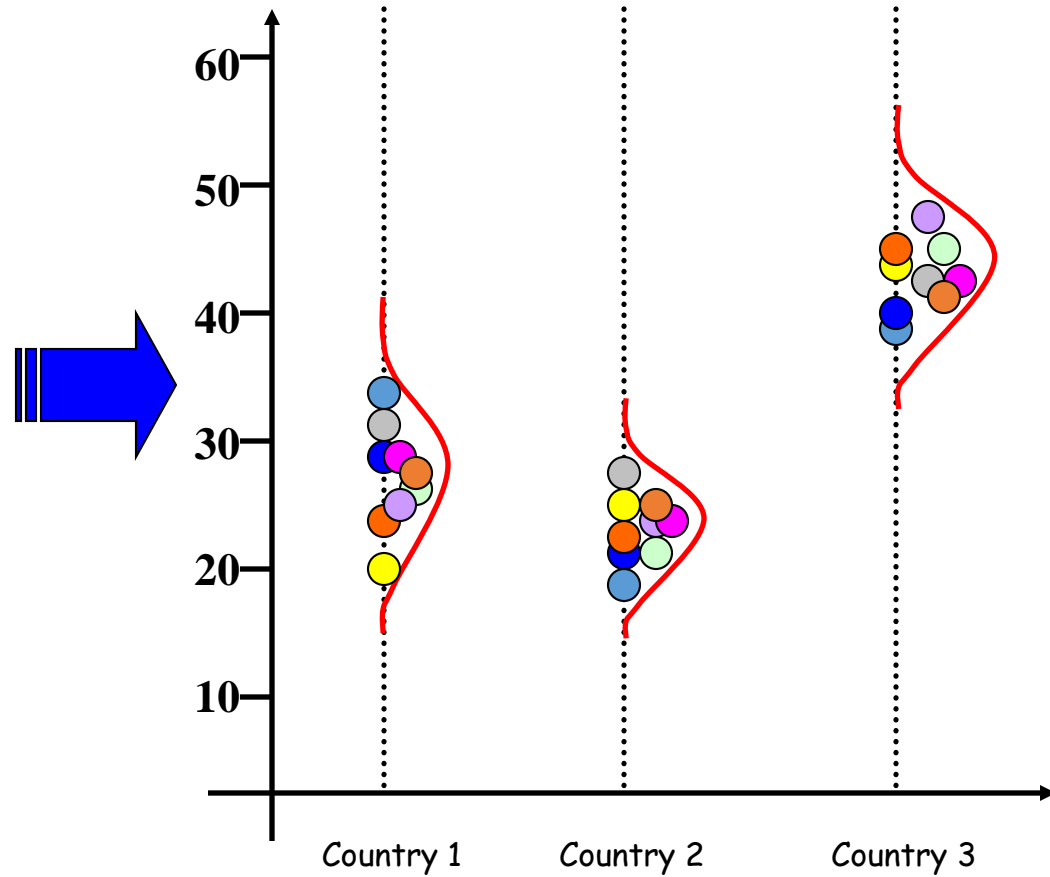
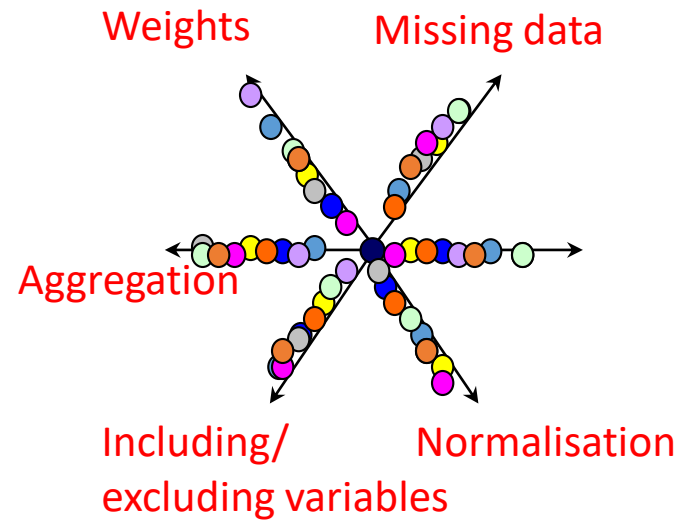
One can sample more than just factors

One can sample modelling assumptions

Example: The output is a composite indicator

| Assumption | Alternatives |
|----------------------|--|
| Number of indicators | <ul style="list-style-type: none">▪ all six indicators included or one-at-time excluded (6 options) |
| Weighting method | <ul style="list-style-type: none">▪ original set of weights,▪ factor analysis,▪ equal weighting,▪ data envelopment analysis |
| Aggregation rule | <ul style="list-style-type: none">▪ additive,▪ multiplicative,▪ Borda multi-criterion |

Space of alternatives



https://ec.europa.eu/info/sites/info/files/better-regulation-toolbox_1.pdf



The screenshot shows the 'Better Regulation' section of the European Commission's website. The header includes the European Commission logo and the text 'Better Regulation'. A navigation menu on the left lists various topics, with 'Guidelines' selected. The main content area is titled 'Better Regulation Guidelines' and contains text explaining the guidelines, their purpose, and their structure. It also lists three related documents: 'Public consultation on the revision of the Commission's Impact Assessment Guidelines', 'Stakeholder Consultation Guidelines', and 'Consultation on the draft Commission Evaluation Policy Guidelines'. The right sidebar contains a search bar, social media links, and a 'Latest documents' section.

European Commission

Better Regulation

European Commission > Better Regulation > Guidelines

Home

REFIT

Stakeholder consultations

Roadmaps / Inception Impact Assessments

Impact Assessment

Evaluation

Regulatory Scrutiny Board

Guidelines

- Better Regulation Guidelines
- Better Regulation "Toolbox"
- Key documents

Better Regulation Guidelines

These guidelines explain what Better Regulation is and how it should be applied in the day to day practices when preparing new initiatives and proposals or managing existing policies and legislation.

They cover the whole policy cycle, from policy preparation and adoption to implementation and application, to evaluation and revision of EU law. For each of these phases there are a number of Better Regulation principles, objectives, tools and procedures to make sure that the EU has the best regulation possible. These relate to planning, impact assessment, stakeholder consultation, implementation and evaluation.

The [Better Regulation Guidelines](#) are structured into chapters which cover each of the instruments of the law-making process. The corresponding [toolbox](#) gives more detailed and technical information.

Better Regulation Guidelines are based on the outcomes of public consultation exercises carried out in 2013 and 2014.

- [Public consultation on the revision of the Commission's Impact Assessment Guidelines](#)
- [Stakeholder Consultation Guidelines](#)
- [Consultation on the draft Commission Evaluation Policy Guidelines](#)

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- 19/05/2015 - [Better Regulation Package](#)

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Find what you wanted?

Yes ☐ No ☐

What were you looking for?

Any suggestions?

Send

Last update: 11/08/2015 | [Legal notice](#) | [Cookies](#) | [Contact](#) | [Search](#) | [Top](#)

Source: IA Toolbox,
p. 510



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]

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

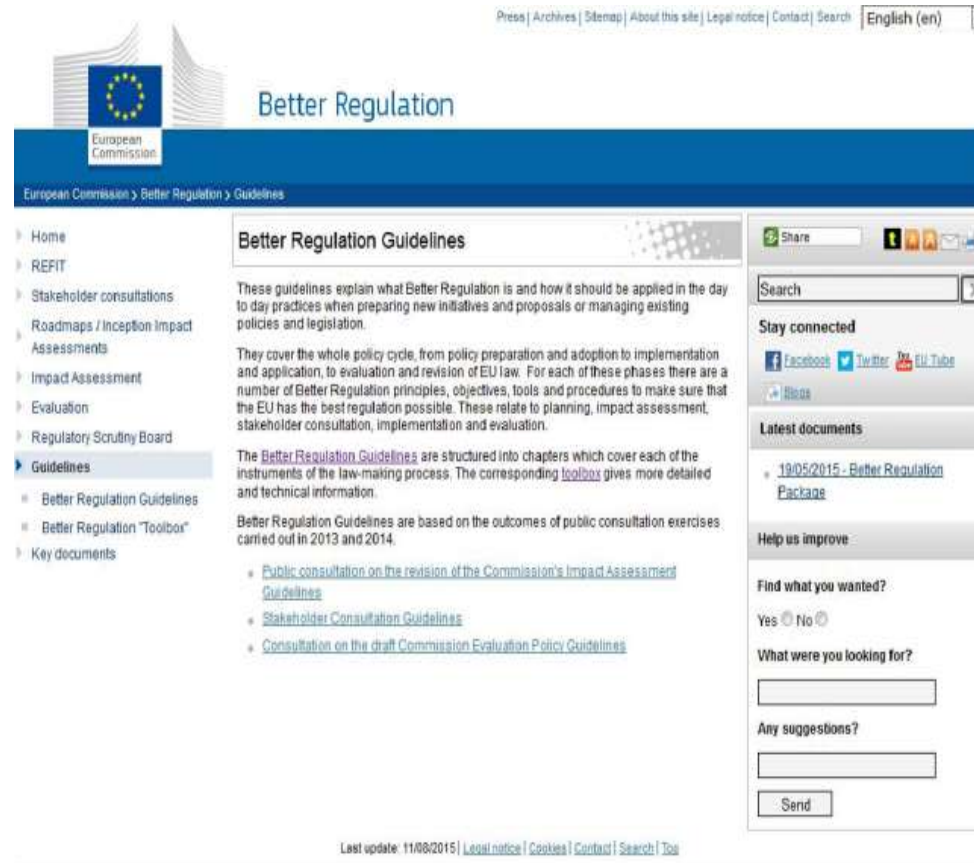


Saltelli, A., Guimarães Pereira, Â., Van der Sluijs, J.P. and Funtowicz, S., 2013, What do I make of your latinorum? Sensitivity auditing of mathematical modelling, Int. J. Foresight and Innovation Policy, 9, 2/3/4, 213–234.

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/>



EC impact assessment guidelines: what do they say about sensitivity auditing ?



https://ec.europa.eu/info/sites/info/files/better-regulation-toolbox_1.pdf

p. 513

... where there is a major disagreement among stakeholders about the nature of the problem, ... then sensitivity auditing is more suitable but sensitivity analysis is still advisable as one of the steps of sensitivity auditing.

Sensitivity auditing, [...] is a wider consideration of the effect of all types of uncertainty, including structural assumptions embedded in the model, and subjective decisions taken in the framing of the problem.

[...]

The ultimate aim is to communicate openly and honestly the extent to which particular models can be used to support policy decisions and what their limitations are.

p. 393

“In general sensitivity auditing stresses the idea of honestly communicating the extent to which model results can be trusted, taking into account as much as possible all forms of potential uncertainty, and to anticipate criticism by third parties.”

The rules of sensitivity auditing

Rule 1: Check against rhetorical use of mathematical modelling;

Rule 2: Adopt an “assumption hunting” attitude; focus on unearthing possibly implicit assumptions;

Rule 3: Check if uncertainty been instrumentally inflated or deflated.

The rules of sensitivity auditing

Rule 4: Find sensitive assumptions before these find you; do your SA before publishing;

Rule 5: Aim for transparency; Show all the data;

Rule 6: Do the right sums, not just the sums right; the analysis should not solve the wrong problem;

Rule 7: Perform a proper global sensitivity analysis.

Quantitative story-telling

“There is only a perspective seeing,
only a perspective “knowing”; and the
more affects we allow to speak about
one thing, the more eyes, different
eyes, we can use to observe one
thing, the more complete will our
“concept” of this thing, our
“objectivity”, be.”



Friedrich Nietzsche, *Genealogy of Morals*,
Third Essay.

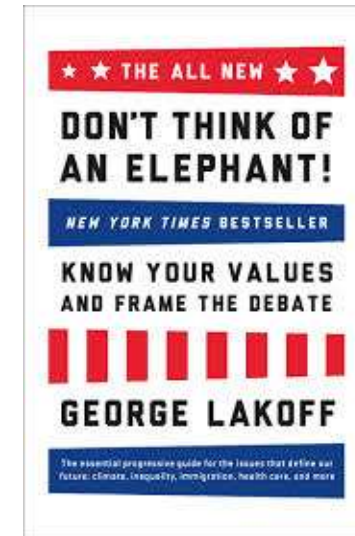
Why frames matter

The expression ‘tax relief’ is apparently innocuous but it suggests that tax is a burden, as opposed to what pays for road, hospitals, education and other infrastructures of modern life (Lakoff, 2004).



George Lakoff

Lakoff, G., 2010, Why it Matters How We Frame the Environment, Environmental Communication: A Journal of Nature and Culture, 4:1, 70-81.
Lakoff, G., 2004-2014, Don't think of an elephant: know your values and frame the debate, Chelsea Green Publishing.



Instead of Evidence-based policy: robust policy:

Test for:

- feasibility (e.g. bio-physical limits);
- viability (e.g. existing legislation);
- desirability (do people want it?)

Extend with examples SA and QST

Discussion point of the discussion on Recipes for diligent quantification



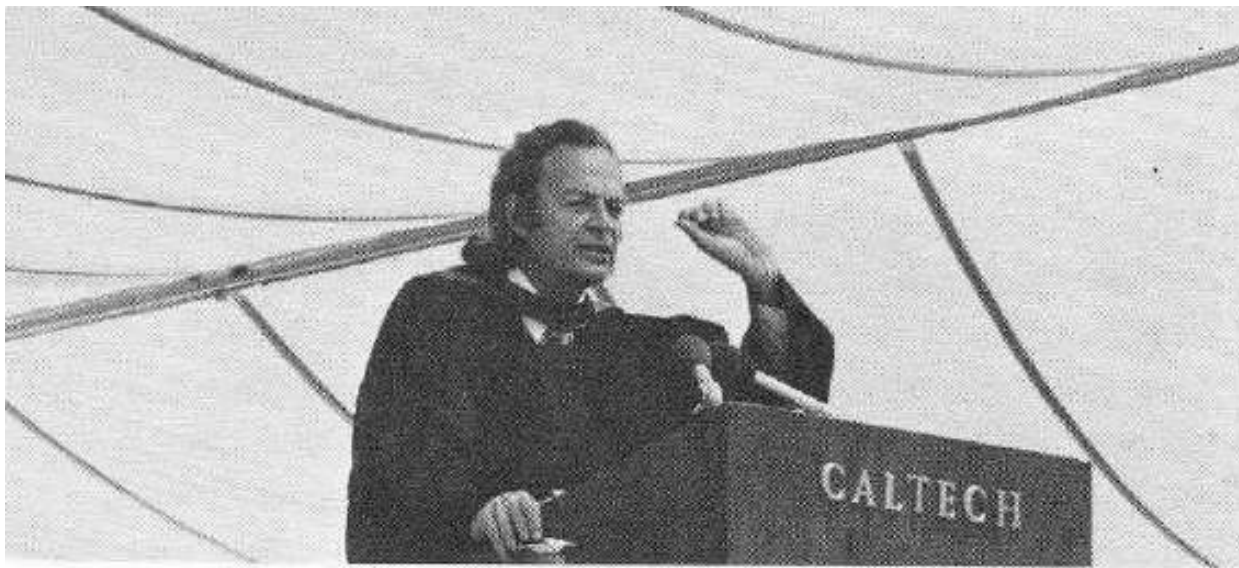
Do you see any use for this discussion in your line of work?

What is missing?

Taking side?

“How to deal with ethical dilemmas in conducting research ”

Different ways of taking side ... old and new



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.”



Reformation?

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

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>

Epilogue: a smile on
our grim academic
realities

- How to act when someone who is more important/powerful than yourself asks you to do something that you think is unethical
- Hurried publishing
- Forced authorship
- Forced citation

