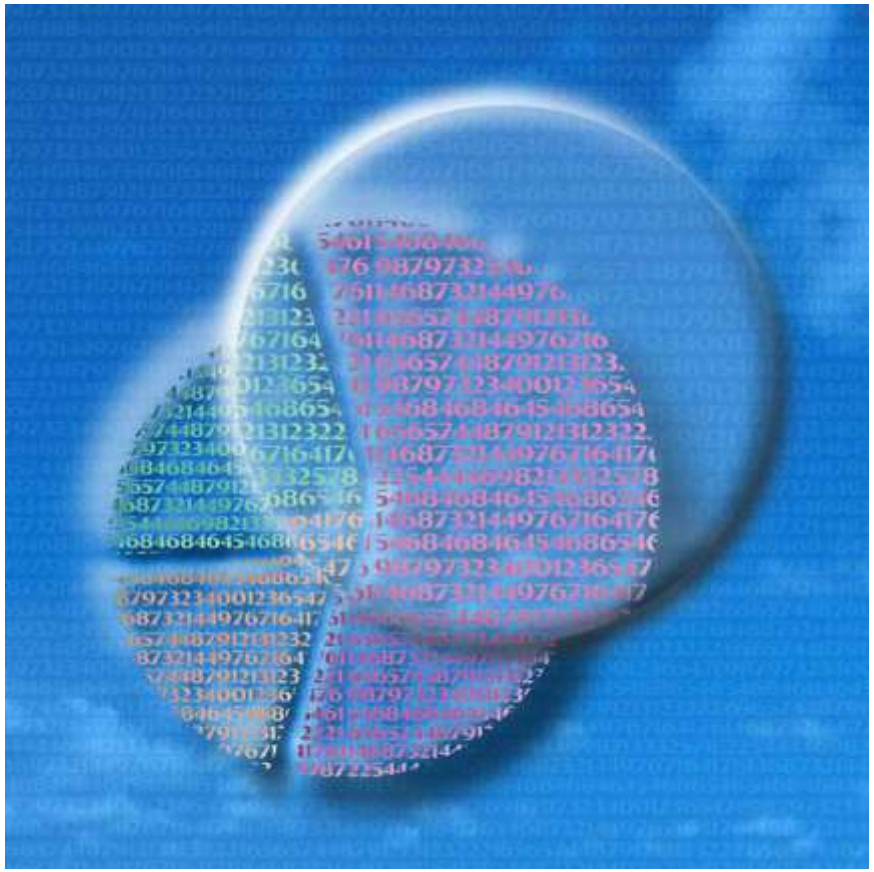


Ethics of quantification

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.

PhD Course: Maintaining Scientific Integrity in Present Day Academic Reality

Utrecht, January 30, 2018

Where to find this talk: www.andreasaltelli.eu

= more material on my web site

= more material on Wikipedia

= discussion point

What you asked for

Science for society of for corporations?

- The influence [of] societal and corporate wishes and whether the beneficial effects outweigh the detrimental ones or if any outside influence is unwelcome in the first place

What you asked for

GRIM ACADEMY REALITIES (I)

- Discuss the main ethical dilemmas of conducting research; Reflection on publish or perish vs. academic integrity

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

What you asked for

GRIM ACADEMY REALITIES (II)

- How is it possible to maintain mutual respect and a positive atmosphere in science despite the frustrating factors of scientific research (e.g. forced publishing, etc.)

  Etc. as being asked to cite papers, add authors?

What you asked for

GRIM ACADEMY REALITIES (III)

- Integrity in collaborations. To what extent trust, check your co-authors

What you asked for

GRIM ACADEMY REALITIES (IV)

- To understand in the academic field with high dependency on output related financing and impact-factor related publishing; how scientists stop doing the meaningless models and focus on the real research problems?

What you asked for

GRIM ACADEMY REALITIES (V)

- Learning about controversial topics, and recognize situations where scientific integrity can be a problem

What you asked for

INTEGRITY (I)

- What scientific integrity entails; what exactly is scientific integrity, besides the obvious (plagiarism, cheating with data, conflicts of interest, etcetera)

What you asked for

INTEGRITY (II)

- Examples of scientific “disintegrity” and how to avoid these; Punishing scientific “disintegrity”; Effects of scientific “disintegrity”, e.g. on the public perception of science

What you asked for

INTEGRITY (III)

- How to use dubious, contested or non-confirming sources
- When repeating oneself becomes self-plagiarism
- How to peer-review responsibly

What you asked for

Tackling metaphysical errors

- How to deal with the encroachment of "scientism" on the academic world, including the blogosphere

What you asked for

Micro-aggressions

- How to deal with him

What you asked for

Micro-aggressions

- How to deal with him

What you asked for

In practice:

- How to properly conduct quantitative analysis; not just showing off the quantitative models
- Experimental/analytical/computational errors
- Using inappropriate research methods

➔Contradictions we live by as scientists and their root causes

➔Publish or perish and perverse metrics

➔Responsible quantifications and recipes

➔Your wish list again

One root of contradiction: Science's crisis

The Economist

HOW SCIENCE GOES WRONG.

Essay

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 > 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

February 4, 2017

This Issue

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

PREV ARTICLE NEXT ARTICLE

Brow

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.

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

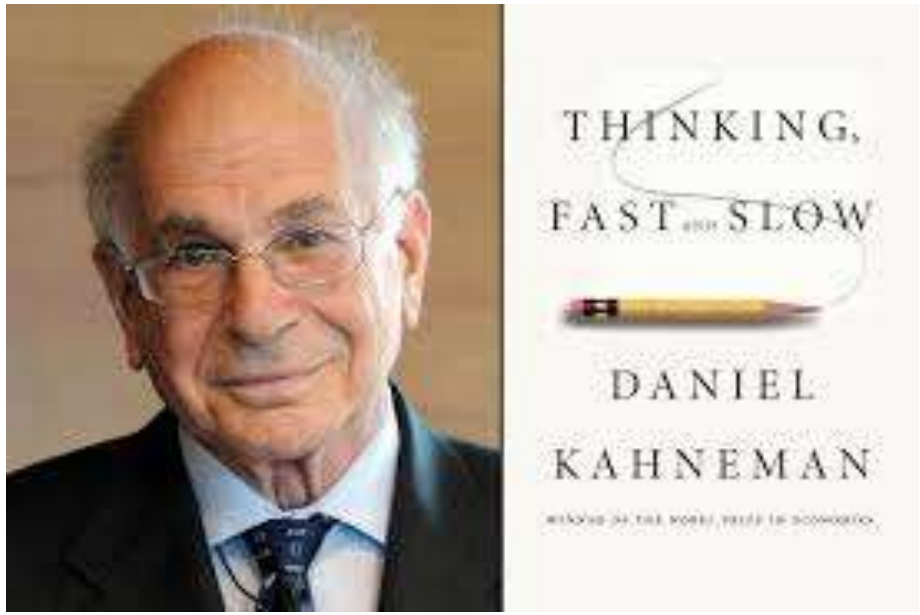
THE POWER OF BIAS IN ECONOMICS RESEARCH*

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/

Retraction Watch

April 20, 2017

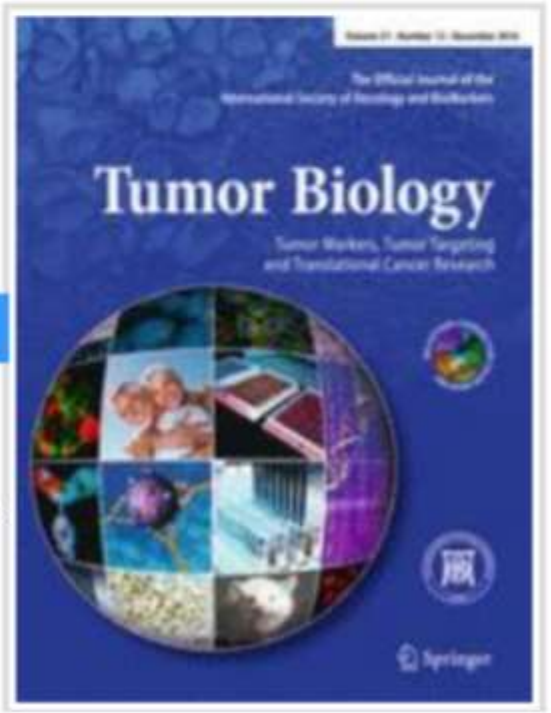
Tracking retractions as a

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

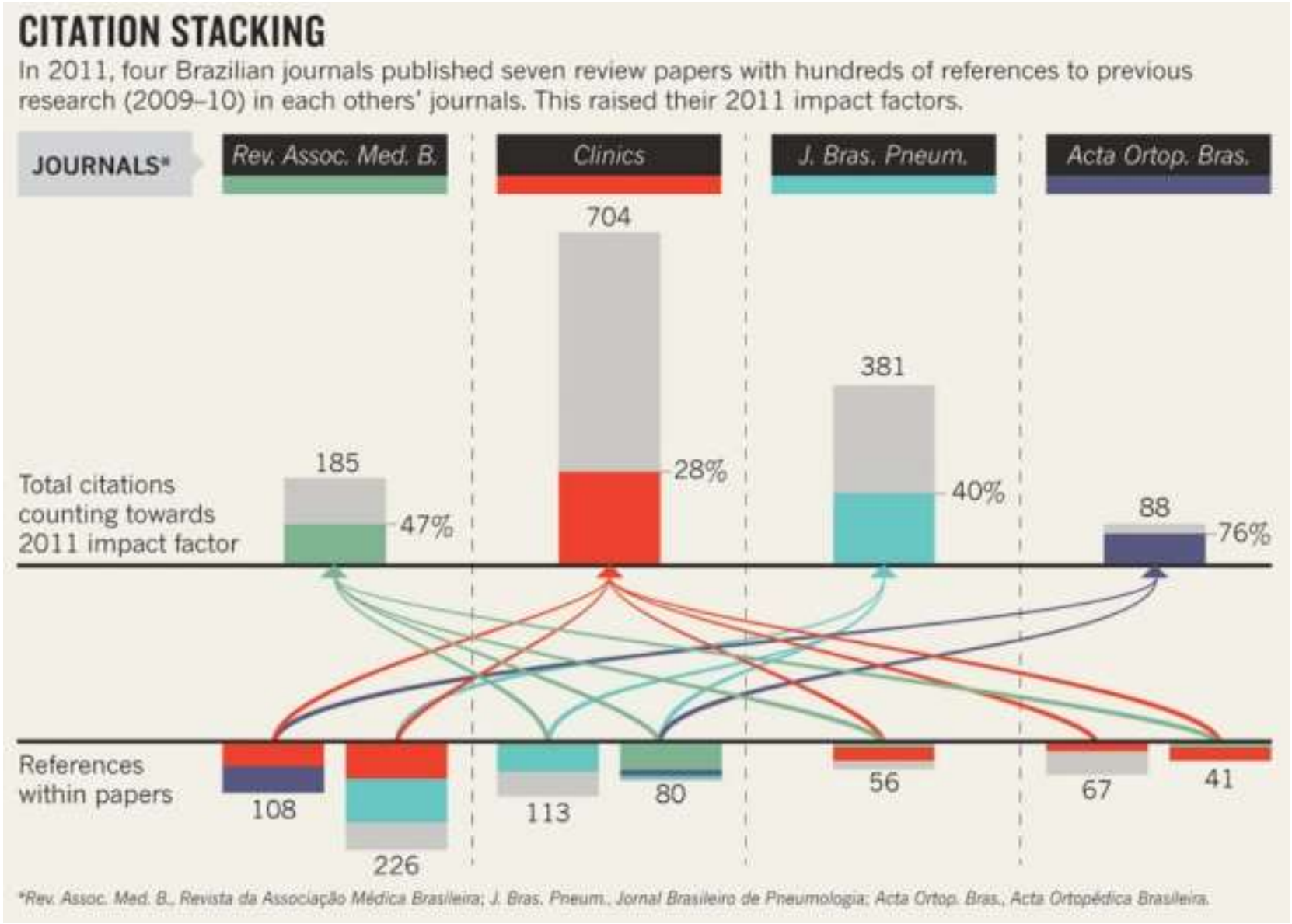
with 11 comments

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

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.

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 .

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

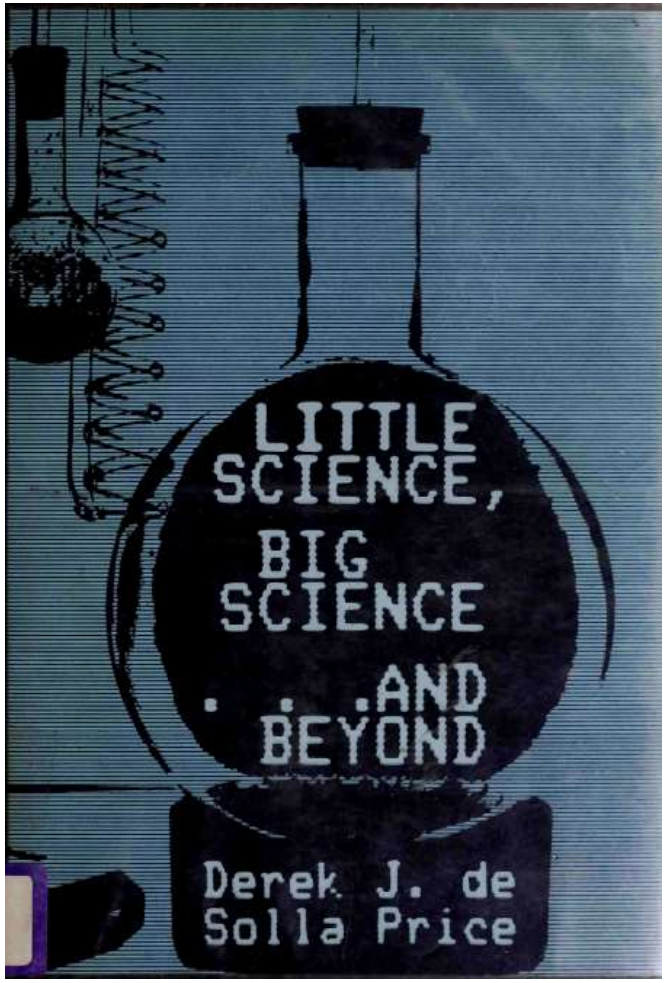
Andrea Saltelli, *University of Bergen*

Trump is not science's biggest problem.

Scholars who
saw it coming
...

and how they
were vindicated

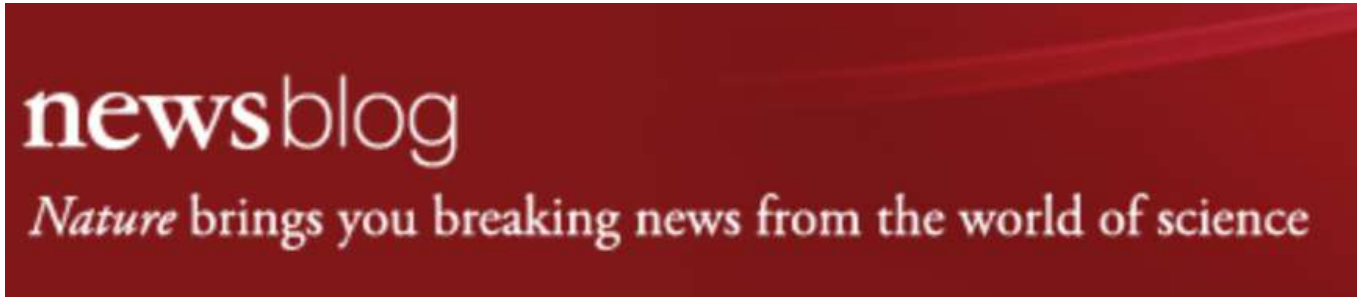
In 1963 Derek J. de Solla Price prophesized that Science would reach saturation (and in the worst case senility) under its own weight, victim of its own success and exponential growth (pp 1-32).



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



NEWS BLOG

Global scientific output doubles every nine years

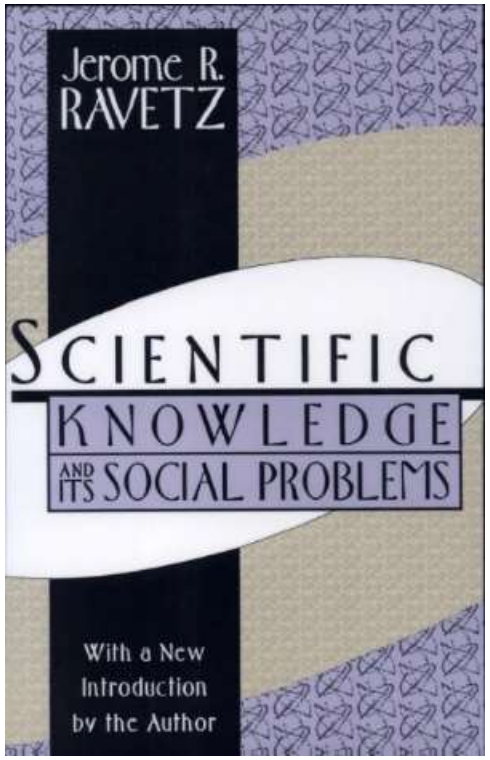
07 May 2014 | 16:46 GMT | Posted by Richard Van Noorden | Category: Policy, Publishing

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."

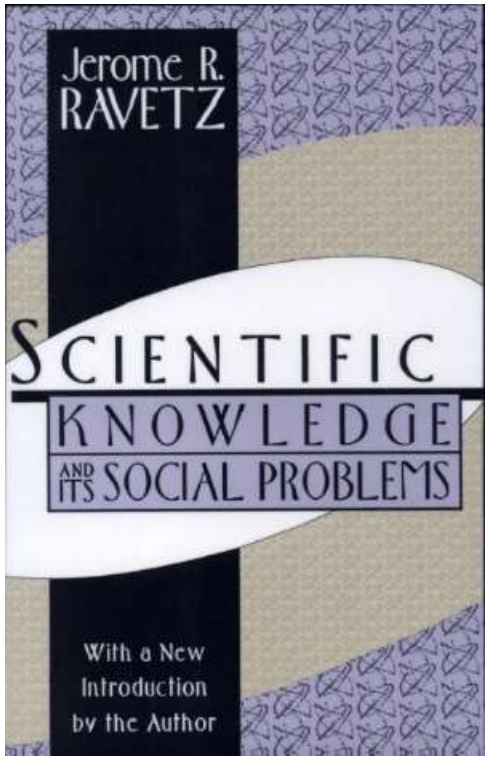
Ravetz, J., **1971**, Scientific Knowledge and its Social Problems, Oxford University Press.



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.

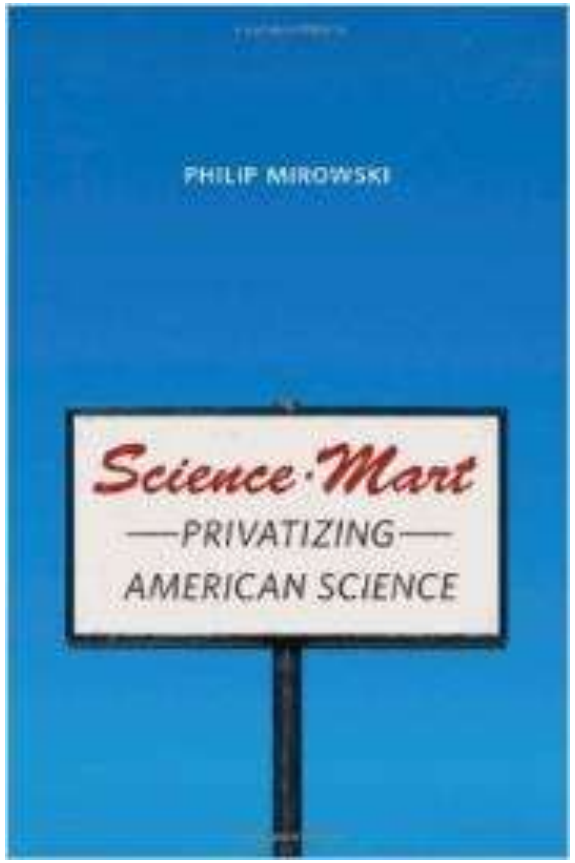


Jerome R. Ravetz

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

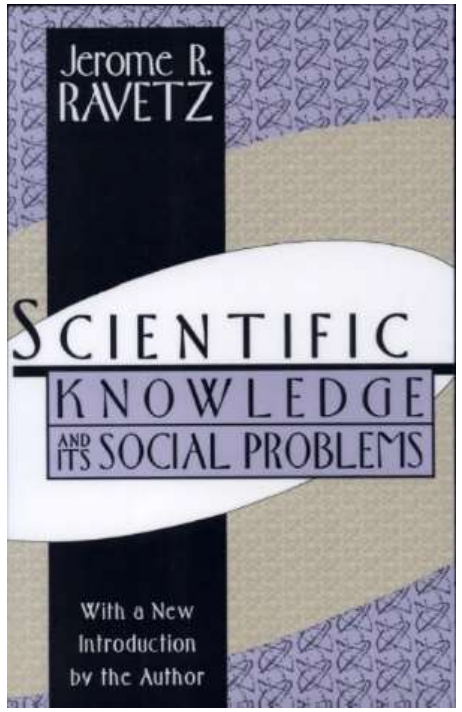
Philip Mirowski

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

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

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.

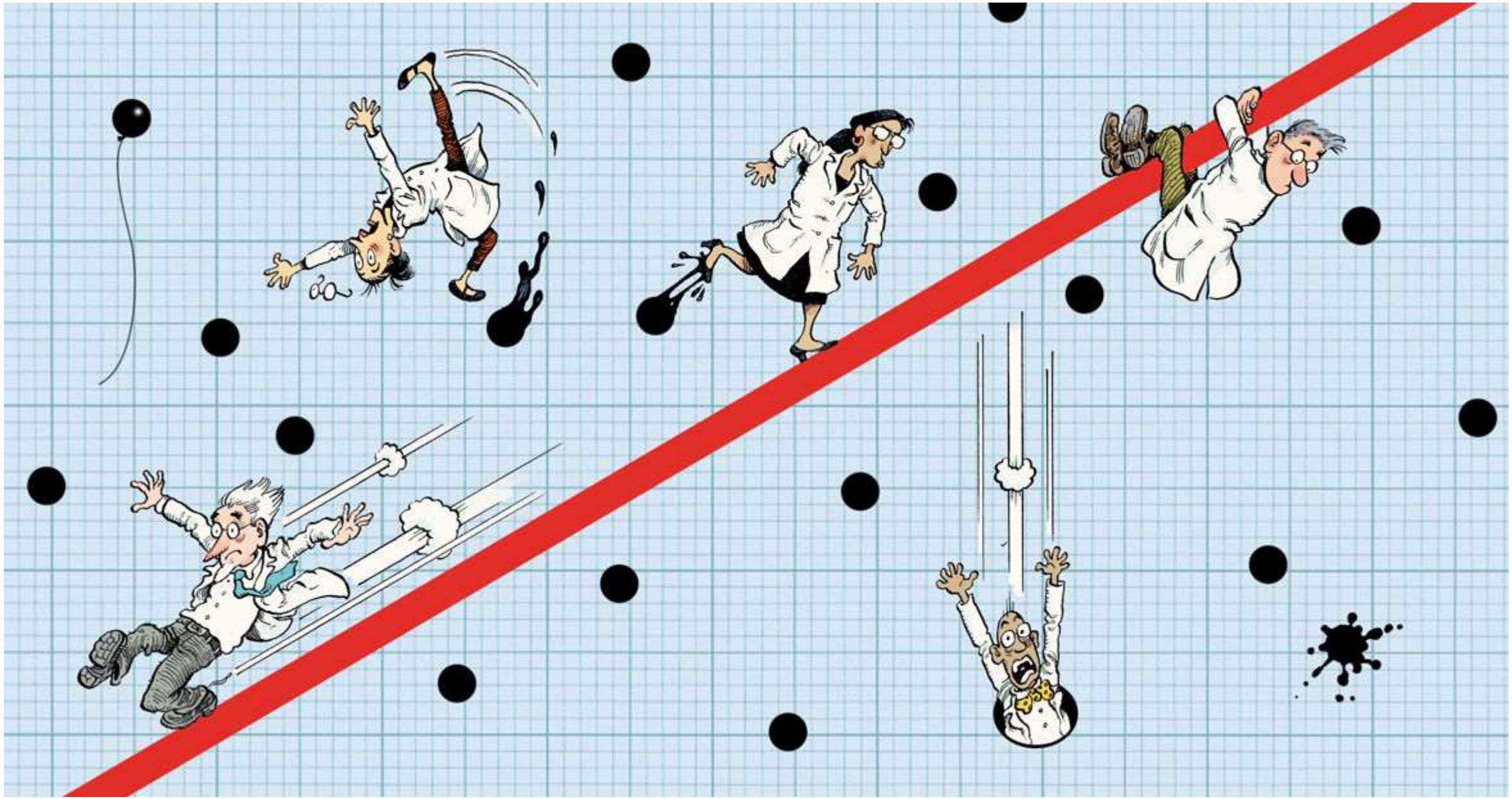
See also Christie Aschwanden at http://fivethirtyeight.com/features/not-even-scientists-can-easily-explain-p-values/

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

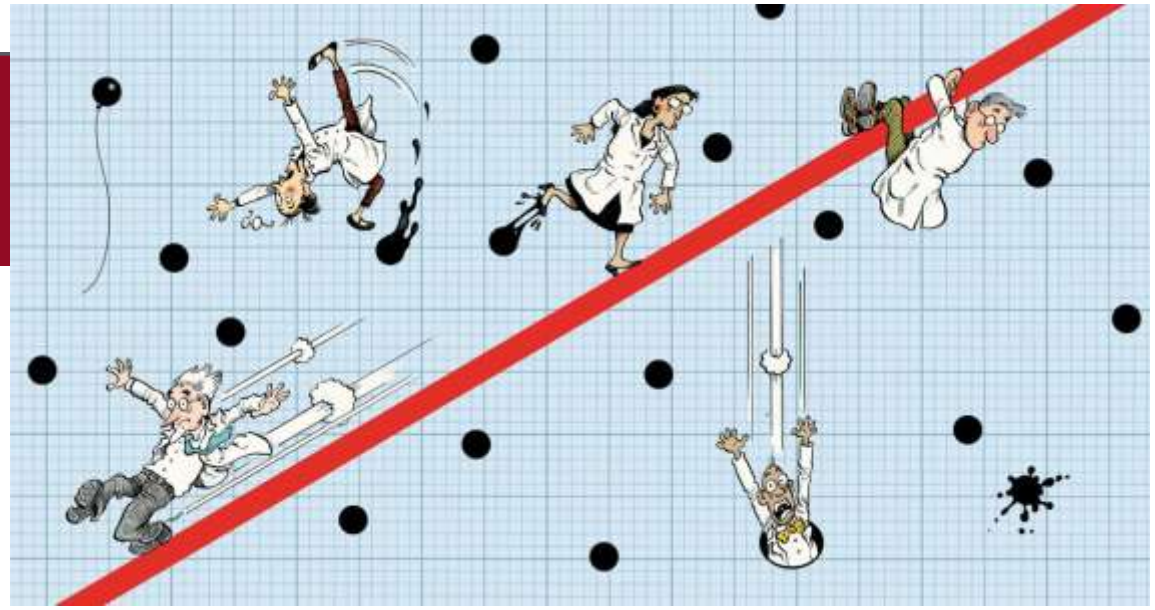
Desire to achieve a sought for – or simply publishable – result leads to fiddling with the data points, the modelling assumptions, the statistical analysis, or the research hypotheses themselves.

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

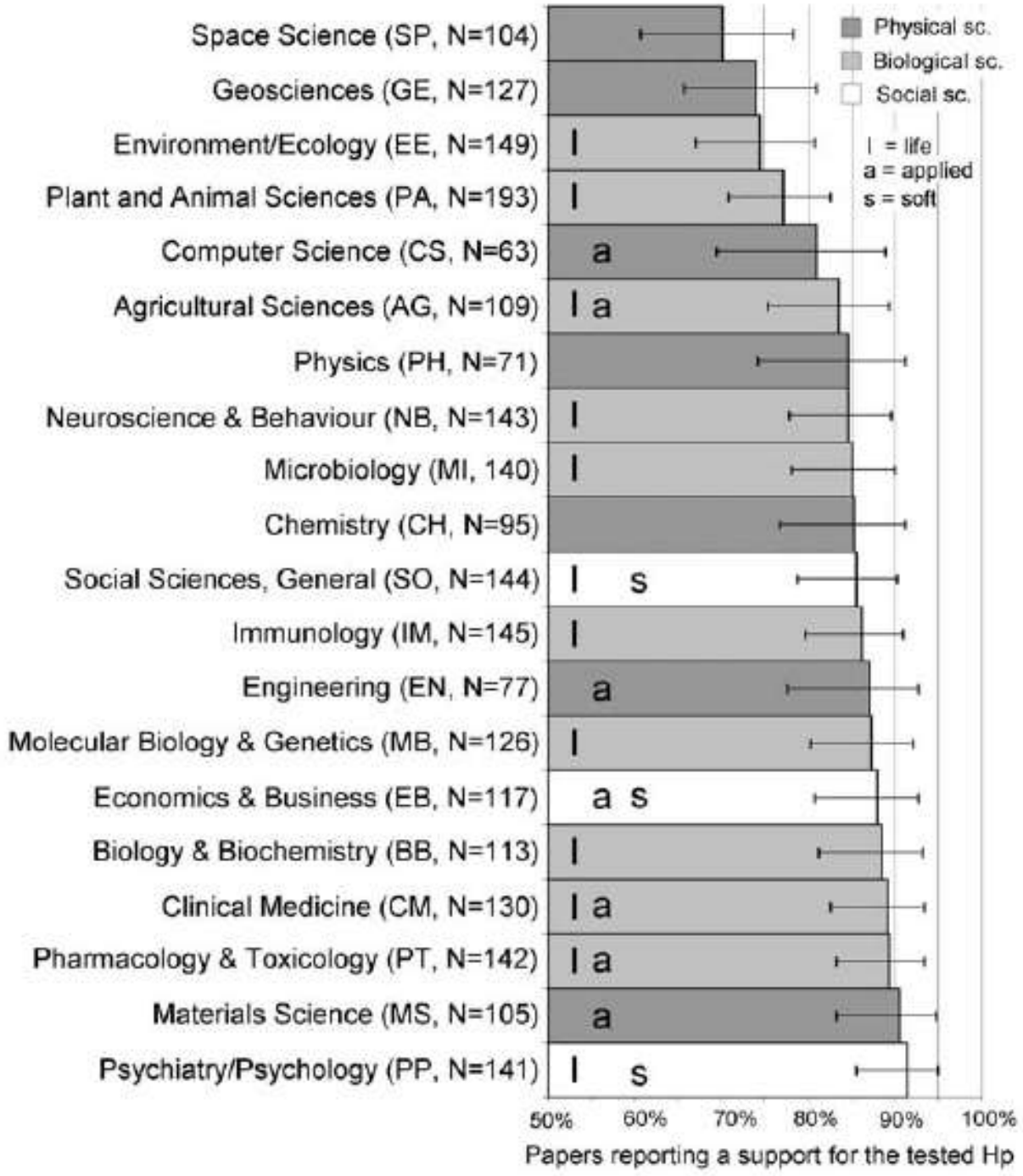
http://www.stat.columbia.edu/~gelman/research/unpublished/p_hacking.pdf

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.



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

December 2017

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

Futures 91 (2017) 5–11

Contents lists available at ScienceDirect

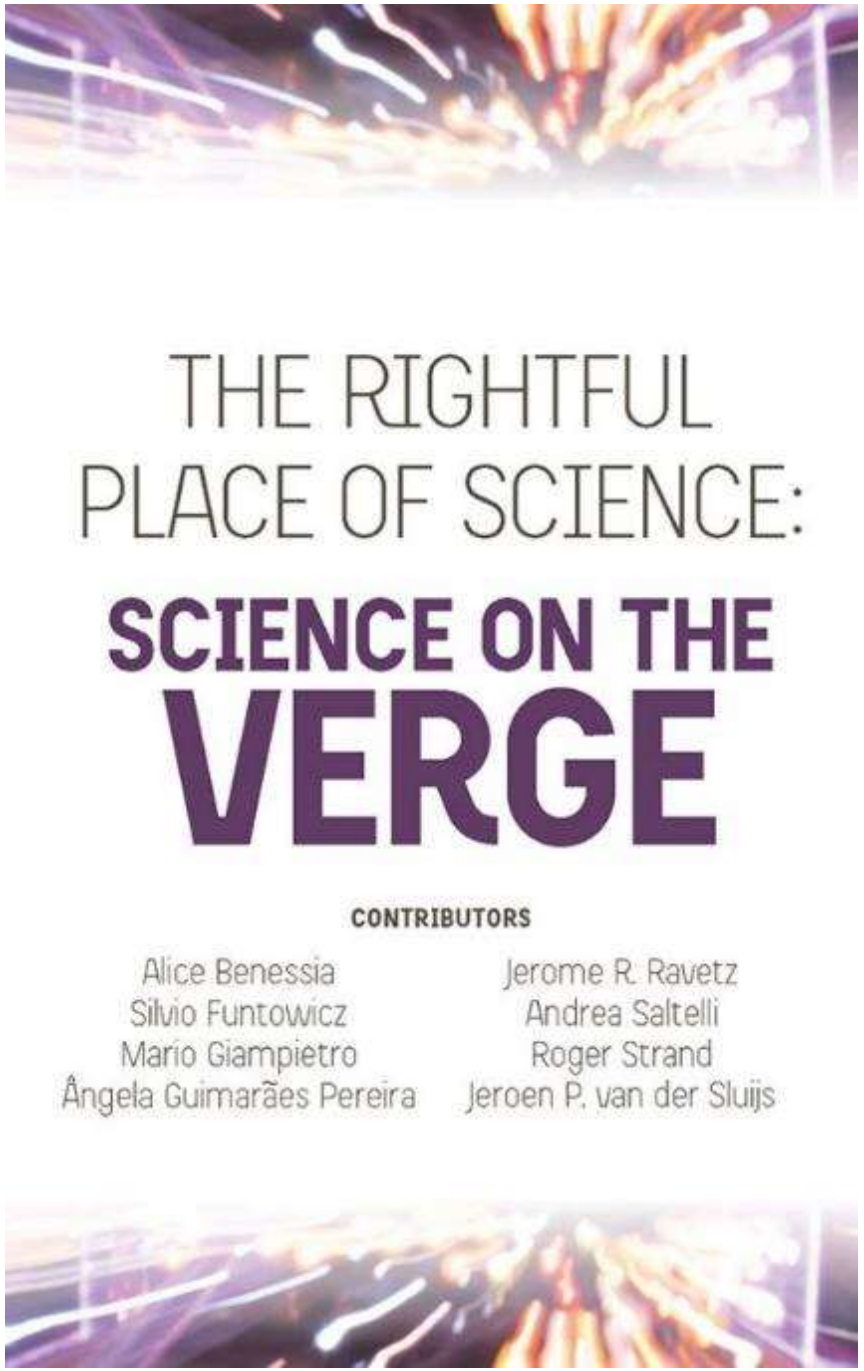
Futures

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.

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

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 yesterday signed by 12,705 individuals, and 438 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 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)”

See a recent piece here https://www.timeshighereducation.com/news/beall-social-justice-warrior-librarians-betraying-academy

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?

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)

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, 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

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?

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

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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 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,

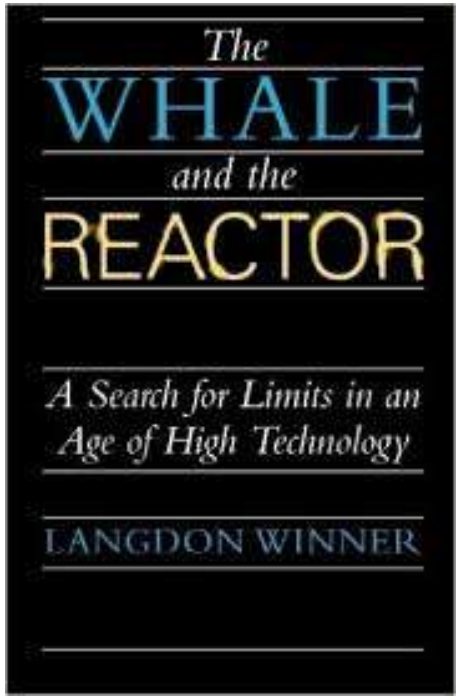
Frames

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

Langdon Winner

8

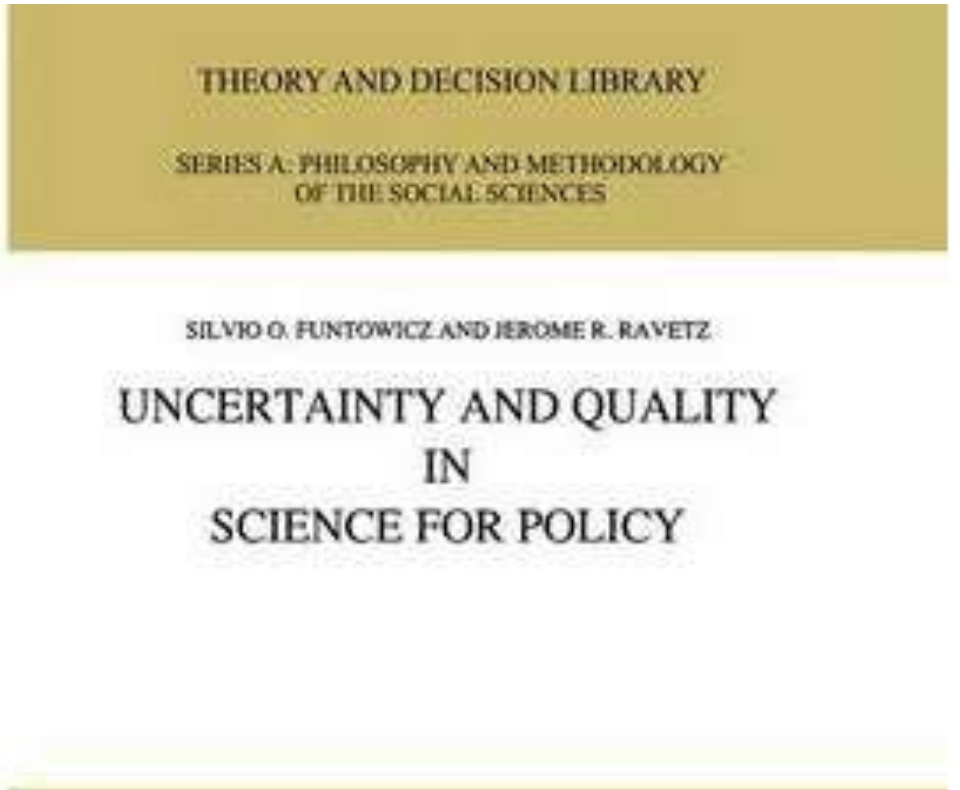
ON NOT HITTING
THE TAR-BABY



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.

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:

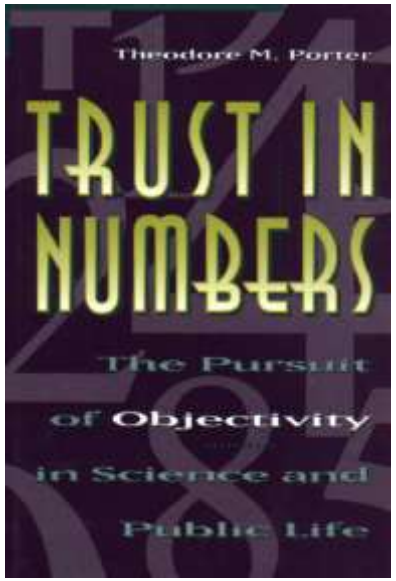
"How much is a songbird worth?"

Example: deconstruction of the economics of climate change.

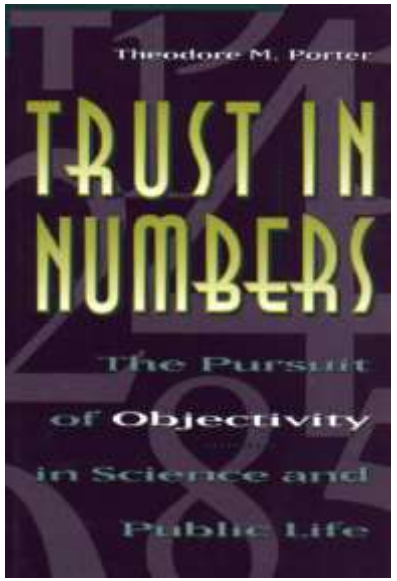
Funtowicz, S.O. and Ravetz, J.R. (1994). The worth of a songbird: Ecological economics as a post-normal science. Ecological Economics 10(3), 197-207.

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

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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

… and today:

alarm about algorithms

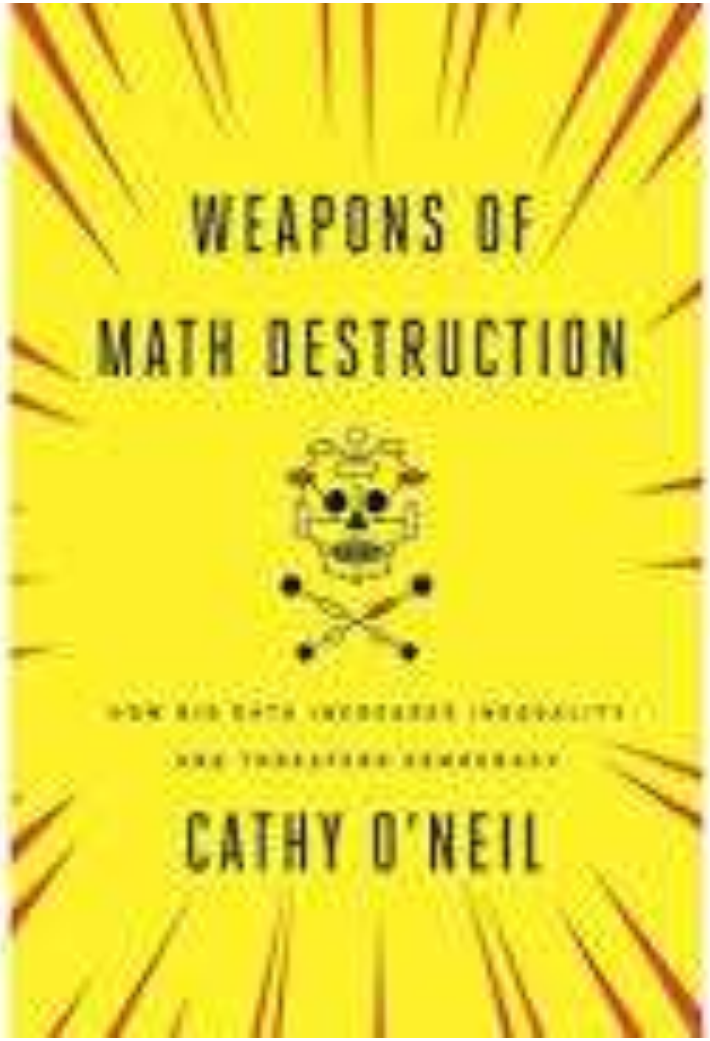
Algorithms decide upon an ever-increasing list of cases, such as recruiting, carriers - including of researchers, prison sentencing, paroling, custody of minors…

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

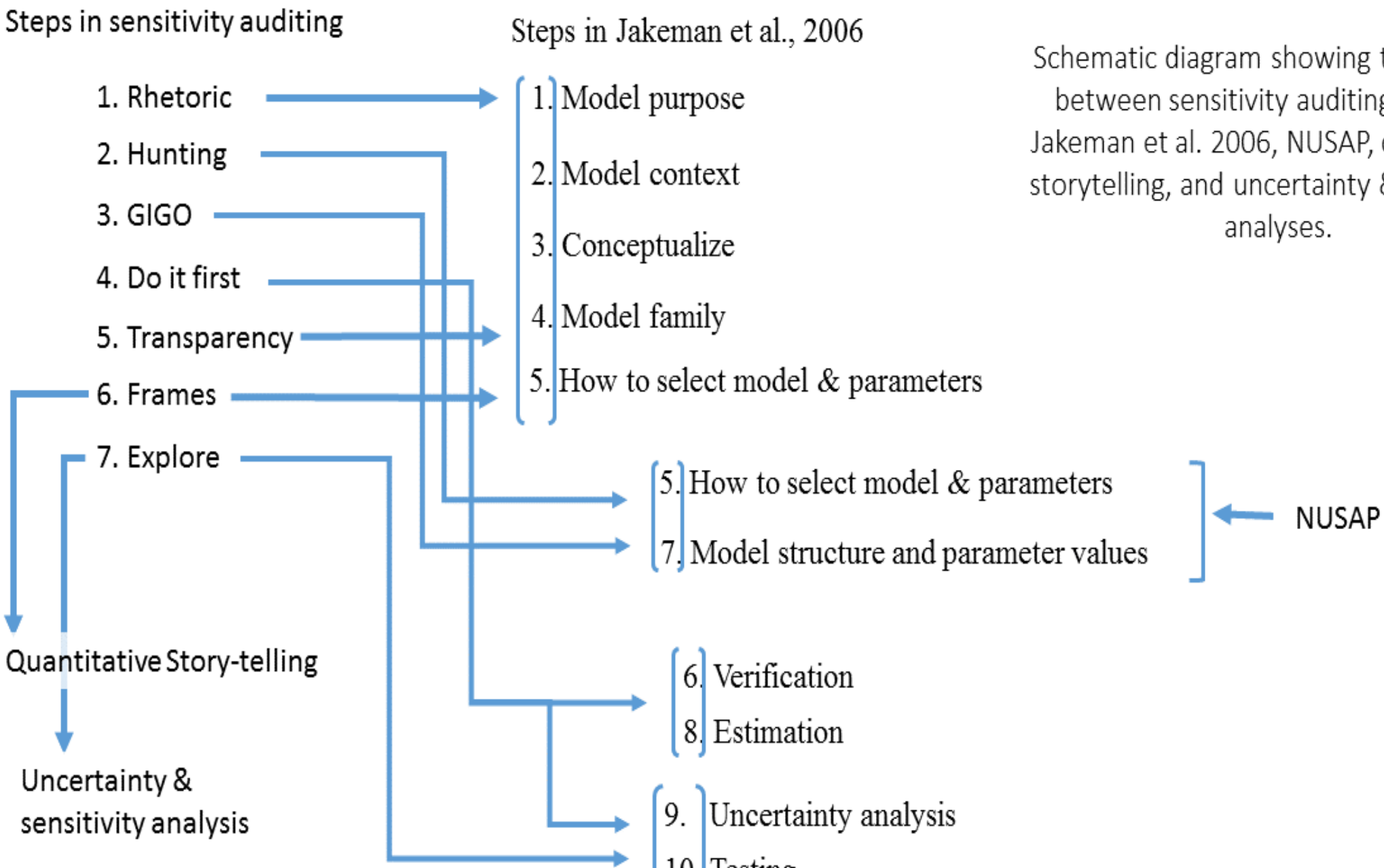
Did this discussion meet some of your ‘wish-list’ entries?

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?

Recipes for diligent quantification

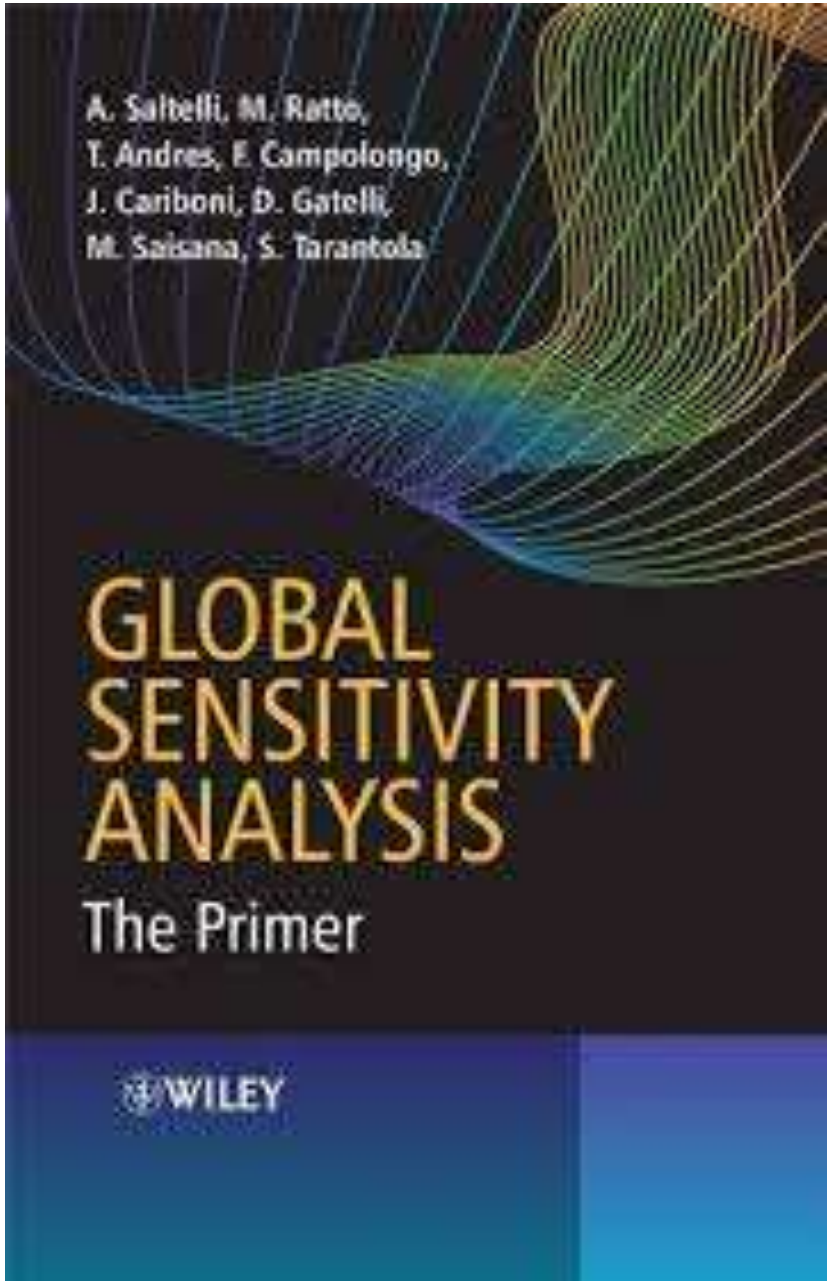
A new grammar for modelling



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

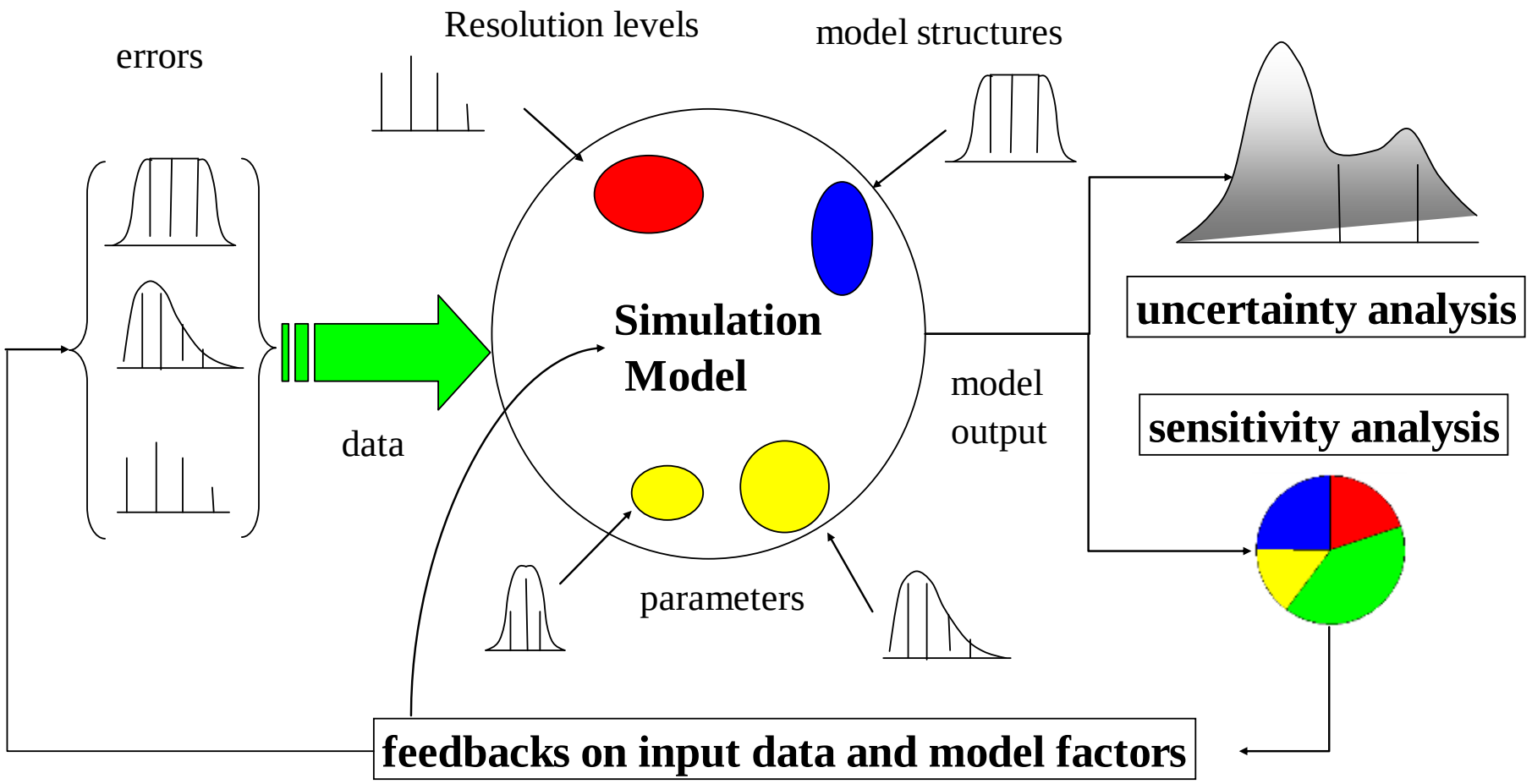
Sensitivity analysis and sensitivity auditing

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

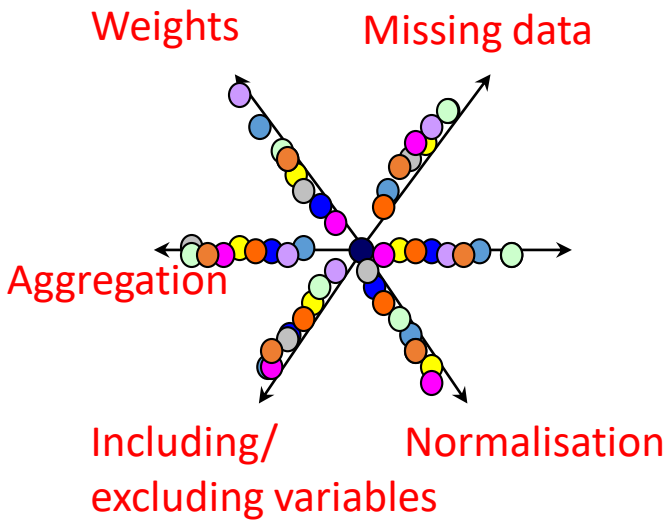
One can sample more than just factors

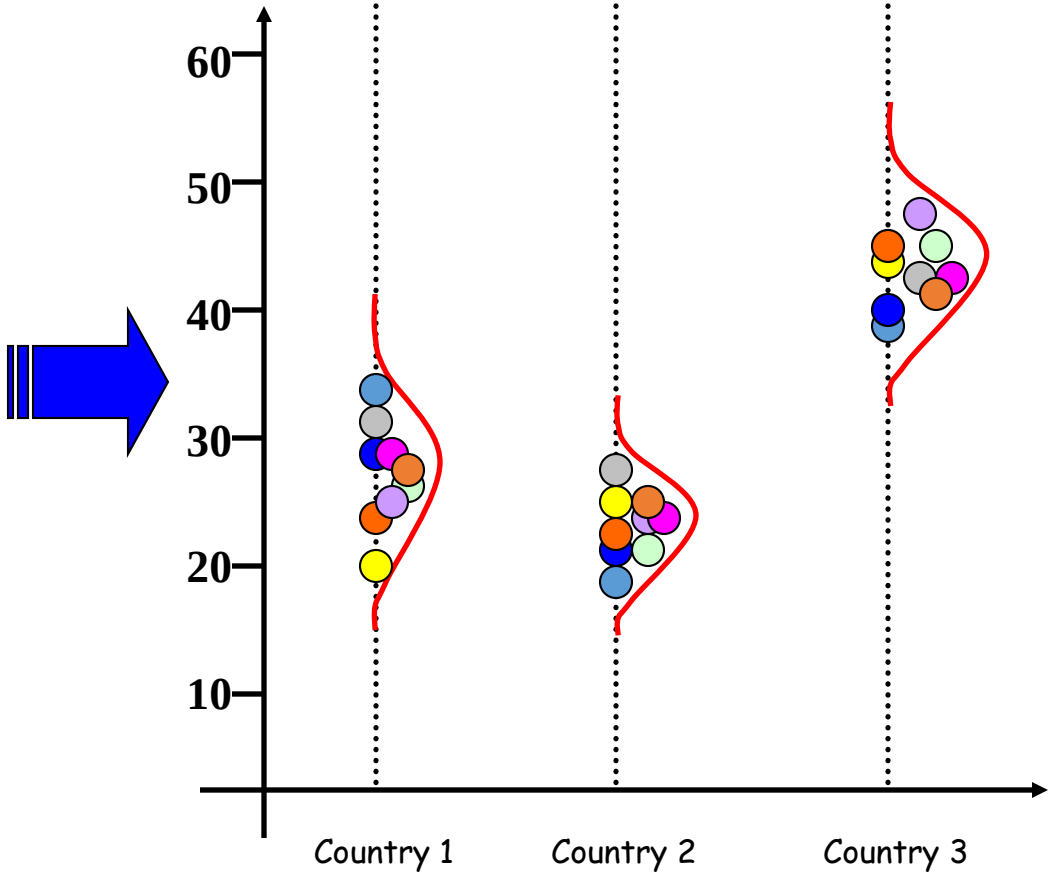
One can sample modelling assumptions

Example: The output is a composite indicator

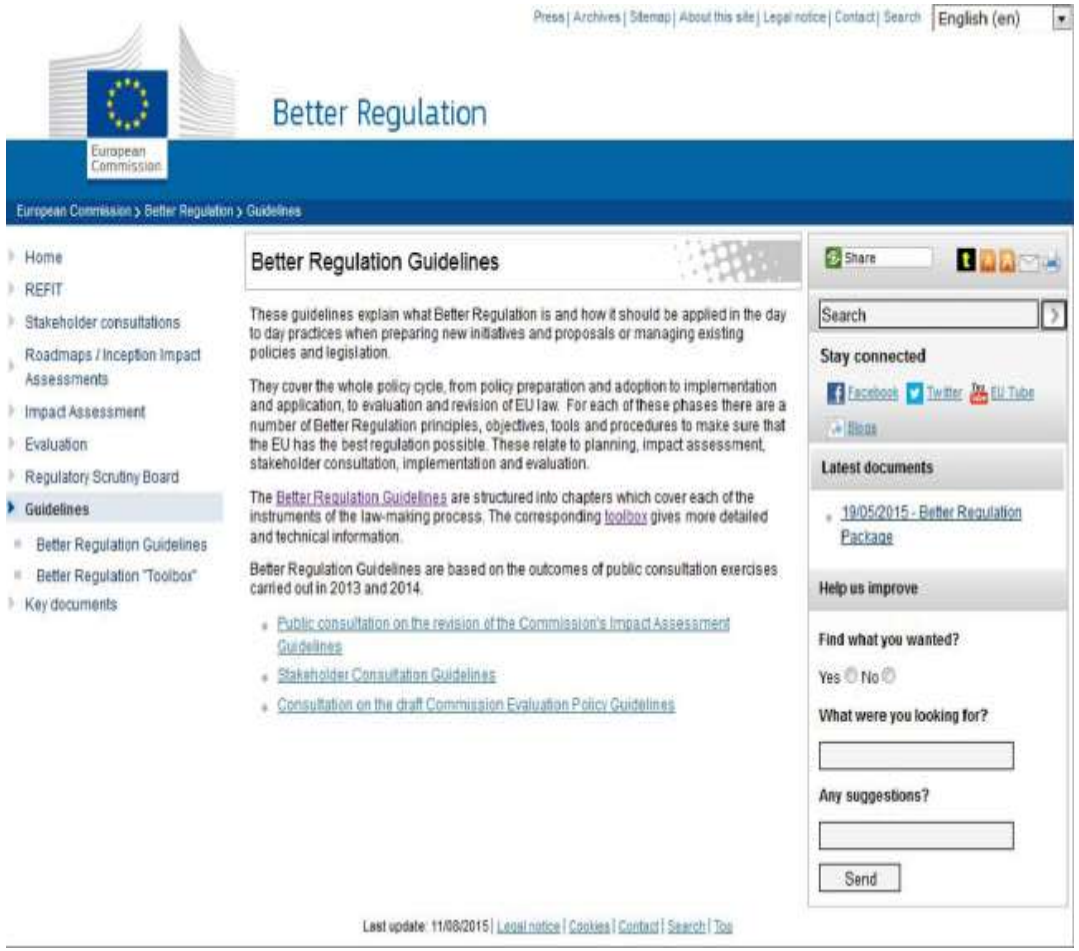
Assumption	Alternatives
Number of indicators	▪ all six indicators included or one-at-time excluded (6 options)
Weighting method	▪ original set of weights, ▪ factor analysis, ▪ equal weighting, ▪ data envelopment analysis
Aggregation rule	▪ additive, ▪ multiplicative, ▪ Borda multi-criterion

Space of alternatives





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



Source: IA Toolbox, p. 510

EUROPEAN COMMISSION

Better Regulation "Toolbox"

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

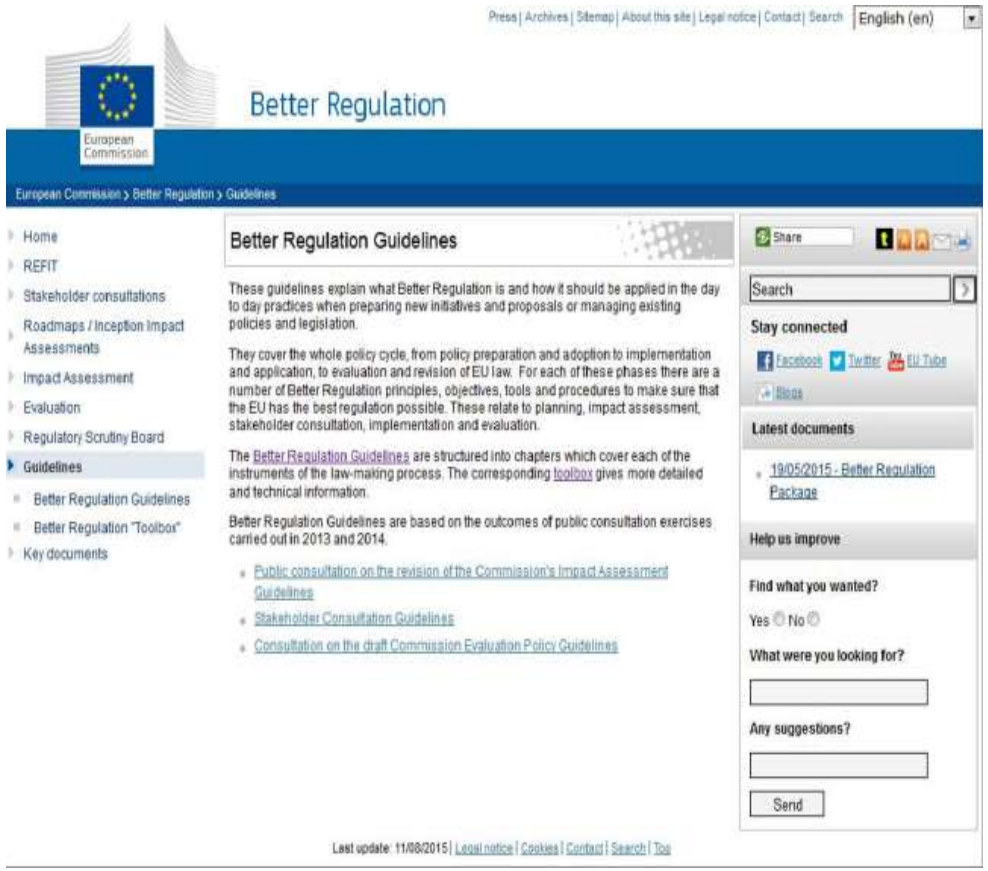
- Why should I not run a sensitivity analysis where each factors has a 5% uncertainty
- Why doing a sensitivity analysis if it can undermine an laborious quantification exercise?
- What do I do if this happens to be the case?

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

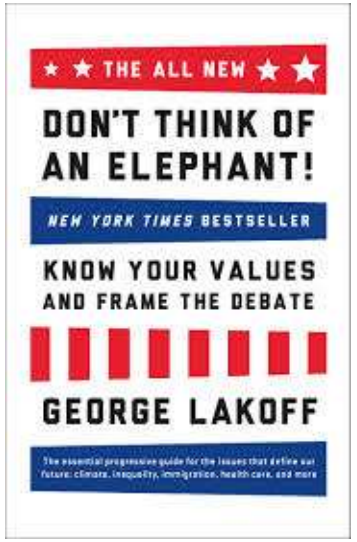
“There is only a perspective seeing, only a perspective “knowing”; and the more affects we allow to speak about one thing, the more eyes, different eyes, we can use to observe one thing, the more complete will our “concept” of this thing, our “objectivity”, be.”

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?)

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.

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?

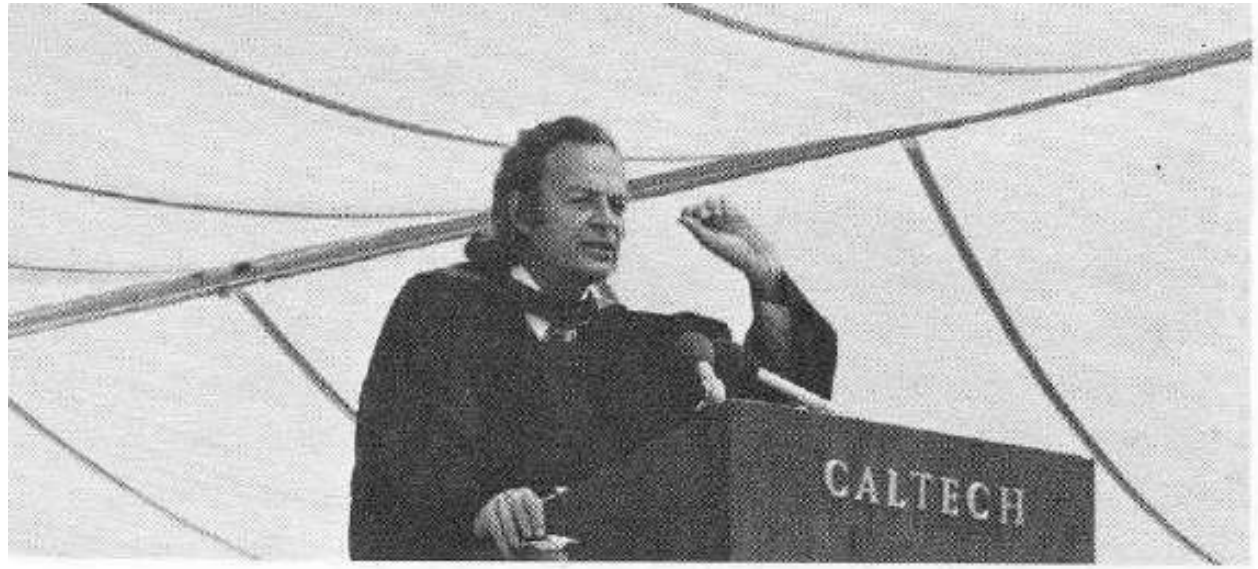
Back to your wishlist

...

Taking side?

“How to deal with ethical dilemmas in conducting research ”

Different ways of taking side … old and new



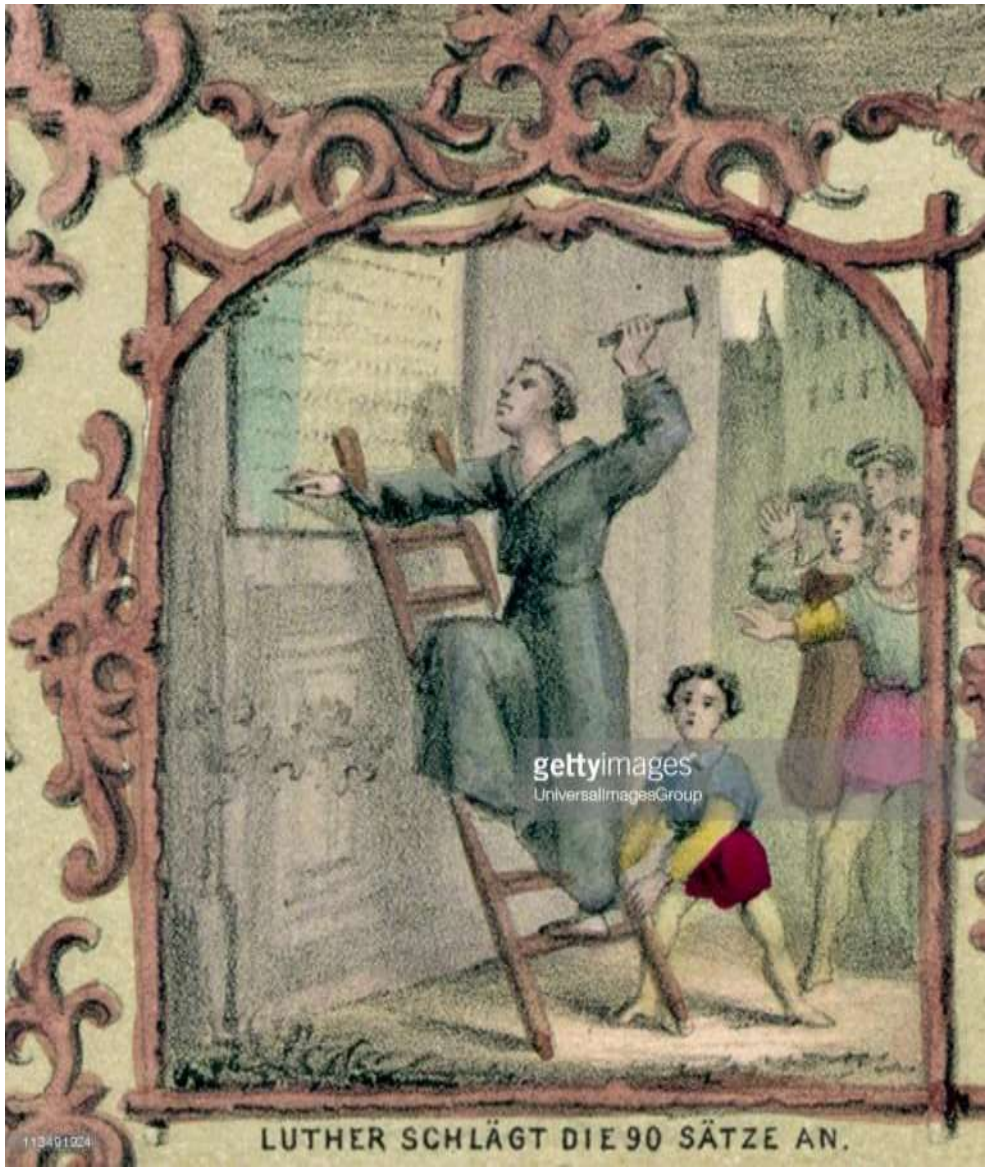
Cargo Cult Science

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

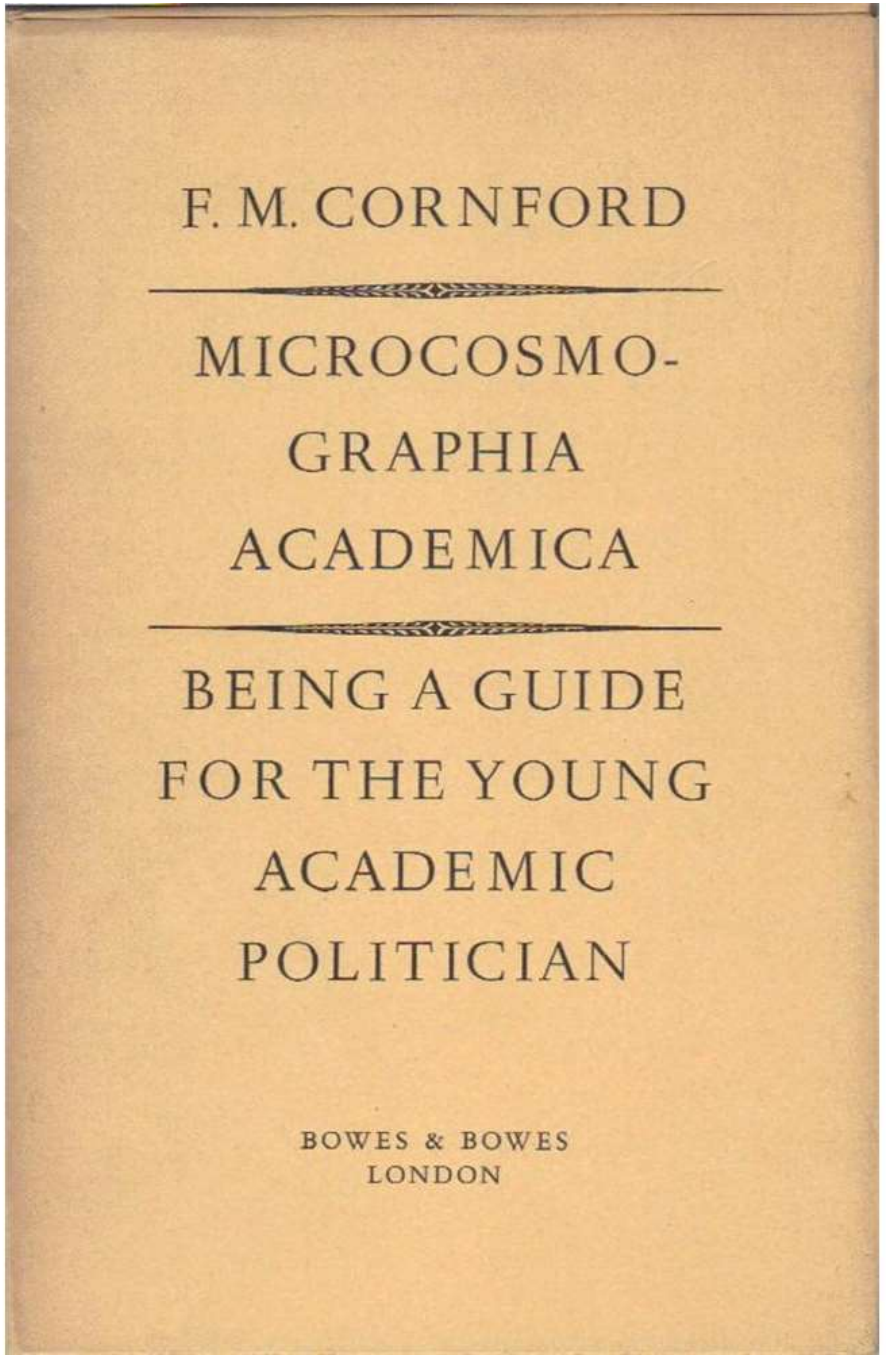
Epilogue: a smile on our grim academic realities

- 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



Discussion point of the discussion on taking side

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