

The crisis in the quality control of science and its impact on science's social functions

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

Research Forum Workshop: Towards an impactful evidence-based research grant-making, Wednesday, November 27, 2019, "la Caixa" Foundation headquarters, Avenue Diagonal, 621-629, Barcelona 08028, Spain.



Where to find this talk: www.andreasaltelli.eu

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NEVER PARIBUS

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... and these are 6 m worth watching from Slavoj
Žižek [youtube.com/watch?v=TVwKjG...](https://www.youtube.com/watch?v=TVwKjG...)

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Jul 26, 2019



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Syllabus: numbers for policy

“Uncomfortable knowledge” can be used as a gauge of an institution’s health. The larger the “uncomfortable knowledge” an institution needs to keep silent about, the closer it is to its ancient régime stage



Ethics of quantification



Science in crisis

ANDREA SALTELLI

Save science from itself

Views from a continent in flux

Nature asked nine leading Europeans to pick their top priority for science at this pivotal point. Love, money, and trust got most votes.

nature.com

Statistical and mathematical modelling

nature communications

Comment | [Open Access](#) | Published: 27 August 2019

A short comment on statistical versus mathematical modelling

Andrea Saltelli 

Nature Communications **10**, Article number: 3870 (2019) | [Cite this article](#)

Crisis in science?

There have recently been alarms as to the scientific quality arrangement is several disciplines. The most visible symptom of this possible dysfunction is the so-called reproducibility crisis

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

99
Einsteinium

On the radar: October 2013



Why Most Published Research Findings Are False

John P. A. Ioannidis

2005



John P. A.
Ioannides

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

Failed replications, entire subfields going bad,
fraudulent peer reviews, predatory publishers,
perverse metrics, statistics on trial ...

... misleading science advice, institutions on
denial, a new breed of science wars

The crisis is methodological, epistemological,
ethical and metaphysical



Futures

Volume 91, August 2017, Pages 5-11



What is science's crisis really about?

Andrea Saltelli ^{a, b}  , Silvio Funtowicz ^a



Futures

Volume 104, December 2018, Pages 85-90

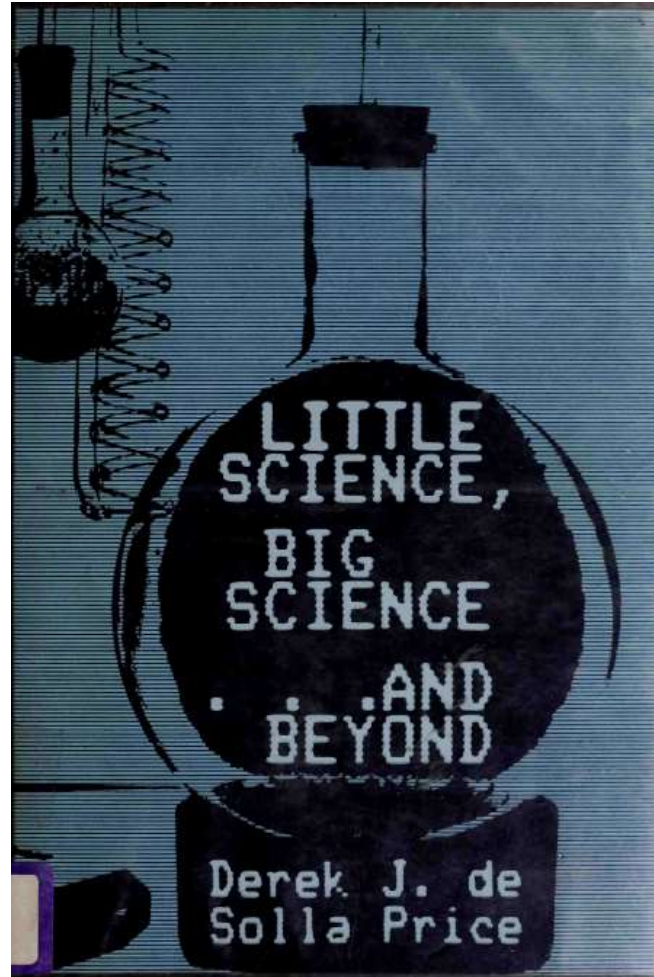


Why science's crisis should not become a political battling ground

Andrea, Saltelli 

Prophecies and takes

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.

~ 2.2 million
articles a year
(2016) over
~ 30,000 journals

newsblog

Nature brings you breaking news from the world of science

NEWS BLOG

Global scientific output doubles every nine years

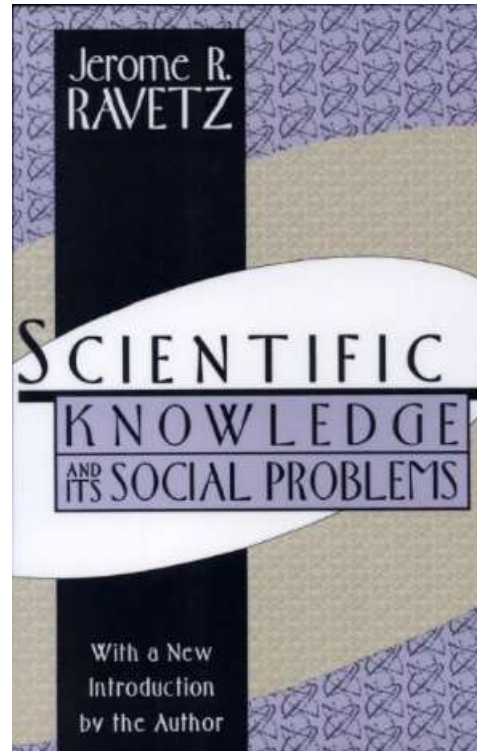
07 May 2014 | 16:46 GMT | Posted by Richard Van
Noorden | Category: Policy, Publishing

<https://www.aje.com/en/arc/scholarly-publishing-trends-2016/>

<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 at the centre of the social problems of the industrialized science of the present period.”

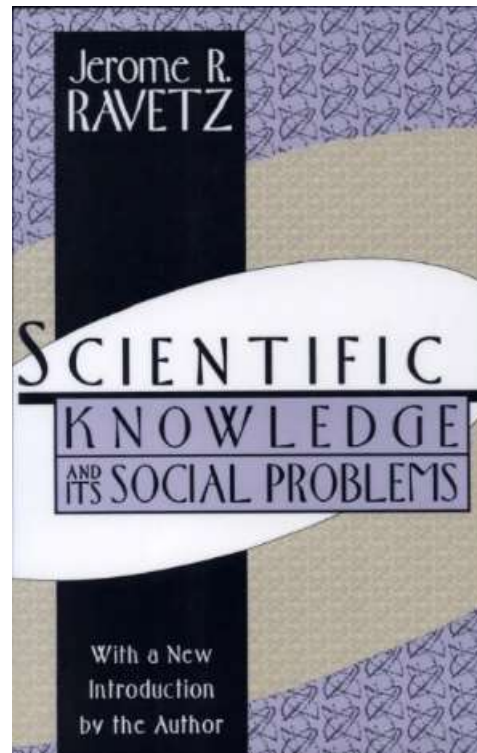
Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press.



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”

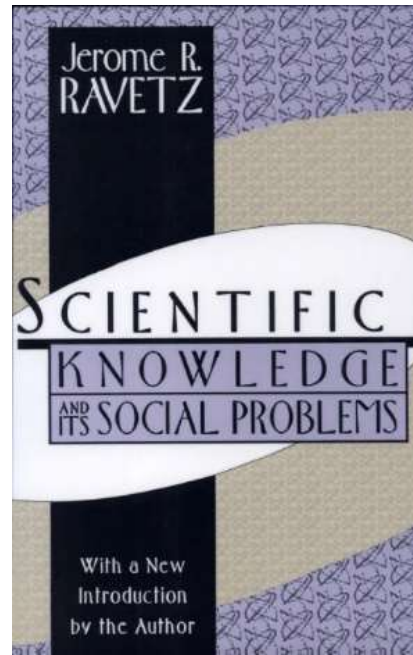
Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press.



Jerome R.
Ravetz

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

 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

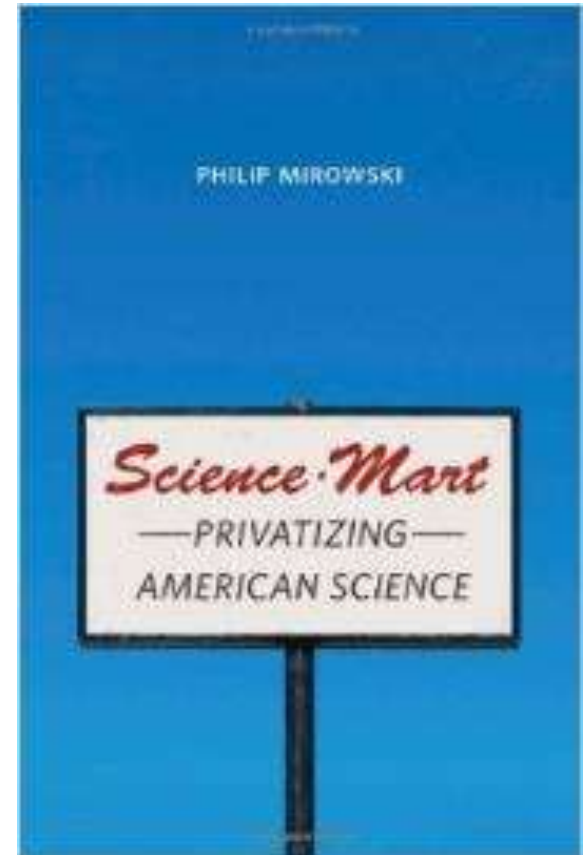
Rather than isolated instances
of corruption now entire fields
of research are found diseased

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



Philip Mirowski

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





COMMENT • 21 MAY 2019

Views from a continent in flux

Nature asked nine leading Europeans to pick their top priority for science at this pivotal point. Love, money, and trust got most votes.

Carlos Moedas, Isabelle Vernos , Stephan Kuster , Helga Nowotny , Andrea Saltelli , Alina Mungiu-Pippidi ,
Jan Wouter Vasbinder , Daniel R. Brooks & Patrick Cunningham 

ANDREA SALTELLI

**Save science
from itself**

All that matters operates
simultaneously in science,
technology, economics, law and
policy ... battles in which science,
ideology and special interests
collide... social media imprint
unprecedented reach and
acceleration

ANDREA SALTELLI
**Save science
from itself**

Science to inform policy decisions
versus science lending a veil of
rationality to the same decisions

Science as a source of emancipation
versus science as the currency of
lobbies

Artificial intelligence & big data foster
inequality and power asymmetries in
platform and surveillance capitalism

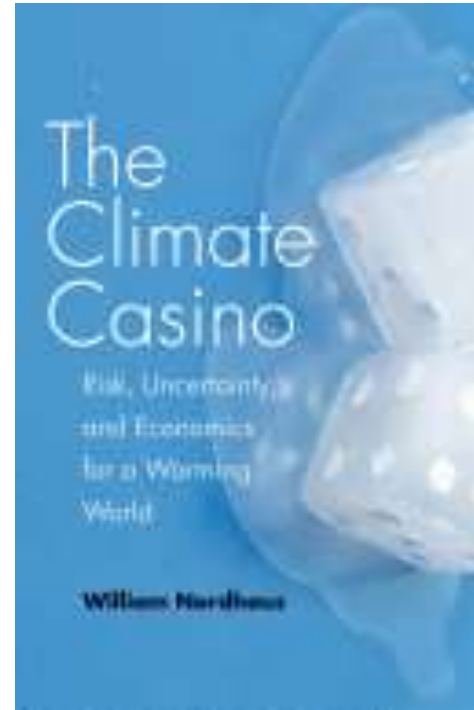
Evidence-based
policy – received
wisdom

“Often, immersion in the facts makes value disagreements feel much less relevant” (Cass Sunstein, winner of the 2018 Holberg Prize)



One of the winner of Nobel prize for economics 2018 is **Willem Nordhaus**, for his work on the economics of climate change.

Cost benefit analysis to the year 2100



Clark and Majone → The appraisals of quality in evidence based policy is a complex affair:

- Different parties have a legitimate say;
- There are multiple criteria of value, quality, effectiveness and legitimacy

**The Critical Appraisal of Scientific
Inquiries with Policy Implications**

p. [6]

William C. Clark and Giandomenico Majone

... and the matter is complex even
in the context of evaluating
research impact:

Table 1 Philosophical assumptions underpinning approaches to research impact

Perspective	Positivist	Constructivist	Realist	Critical	Actor-Network Theory
Assumptions about what [research] knowledge is	Facts (especially statements on relationships between variables), independent of researchers and transferable to new contexts	Explanations/interpretations of a situation or phenomenon, considering the historical, cultural and social context	Studies of how people interpret external reality, producing statements on 'what works for whom in what circumstances'	Studies that challenge the status quo; focus on the changing 'actor-scenario' and how this gets stabilised in the network	is brought into existence through interactions in practice networks of people and things
Assumed purpose of research	Predictive generalisations ('laws')	Meaning: perhaps in a single, unique case	Theoretical (value-free)	Development of critical consciousness; partnership-building; lobbying; advocacy	Understanding what gave rise to a situation; how it changes over time
Preferred research methods	Hypothesis-testing; experiments; modelling and measurement	Naturalistic inquiry (i.e. in real-world conditions)			
Assumed way to achieve quality in research	Hierarchy of preferred study designs; standardised instruments to help eliminate bias				
Assumed relationship between science and values					Controversial; arguably, Actor-Network Theory is consistent with a value-laden view of science
Assumed mechanism through which impact achieved					'Translations' (stable changes in the actor-network), achieved by actors who mobilise other actors into new configurations
Implications for the study of research impact			Impact studies should address variability in uptake and use of research by exploring context-mechanism-outcome-impact configurations	Impact has a political dimension; research may challenge the status quo; some stakeholders stand to lose power, whereas others may gain	For research to have impact, a re-alignment of actors (human/technological) is needed; focus on the changing 'actor-scenario' and how this gets stabilised in the network

Greenhalgh et al. BMC Medicine (2016) 14:78
DOI 10.1186/s12916-016-0620-8

REVIEW

Research impact: a narrative review

Trisha Greenhalgh^{1*}, James Raftery², Steve Hanney³ and Matthew Glover³

BMC Medicine

Open Access

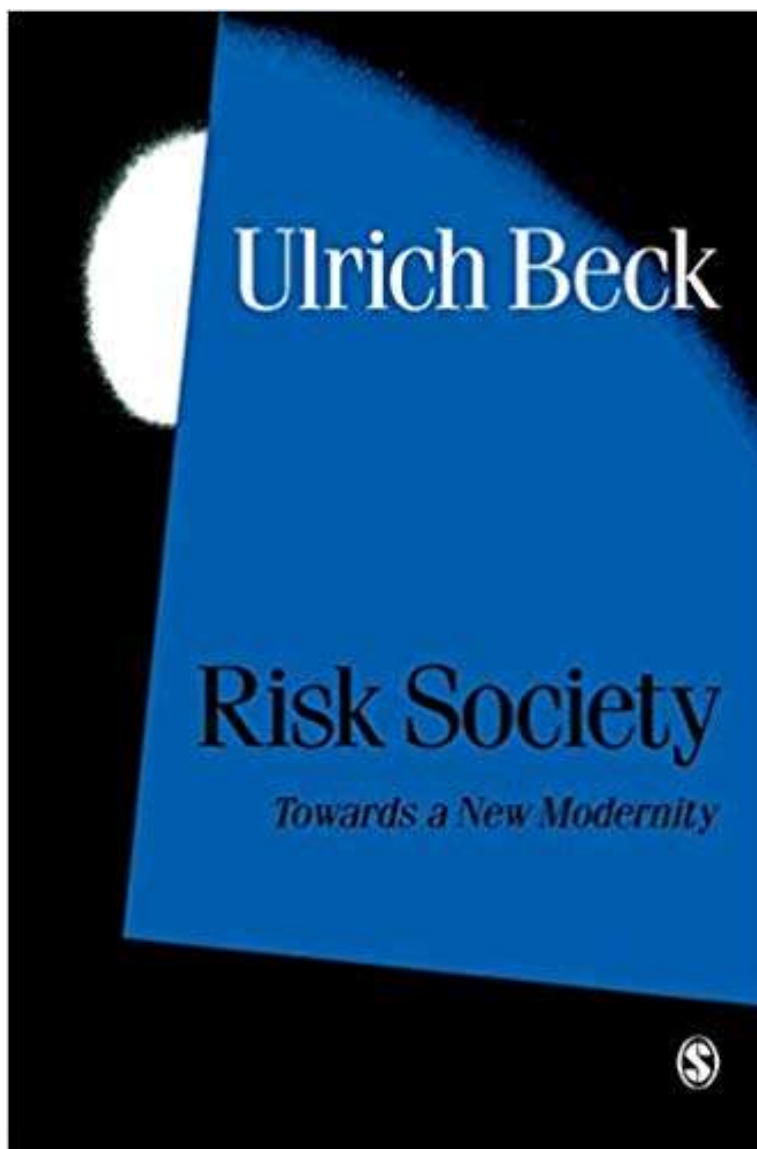


CrossMark

Critical voices



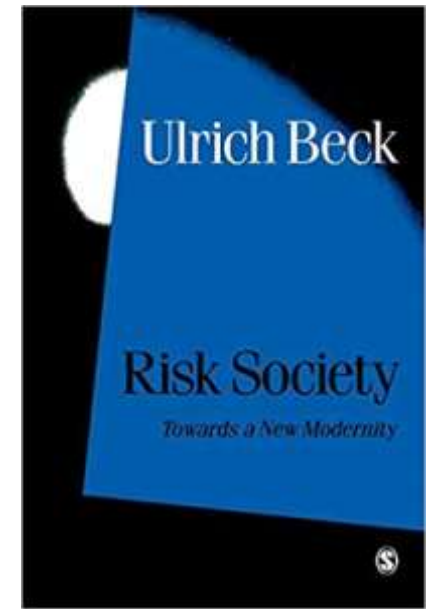
Ulrich Beck
(1944 –2015)

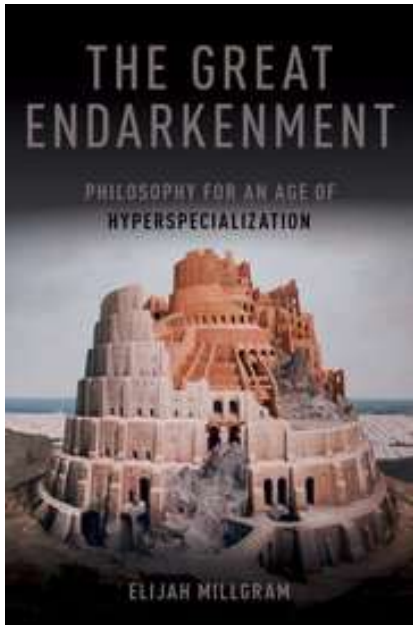


1992 (1986)

Chapter 7 Science beyond truth and enlightenment

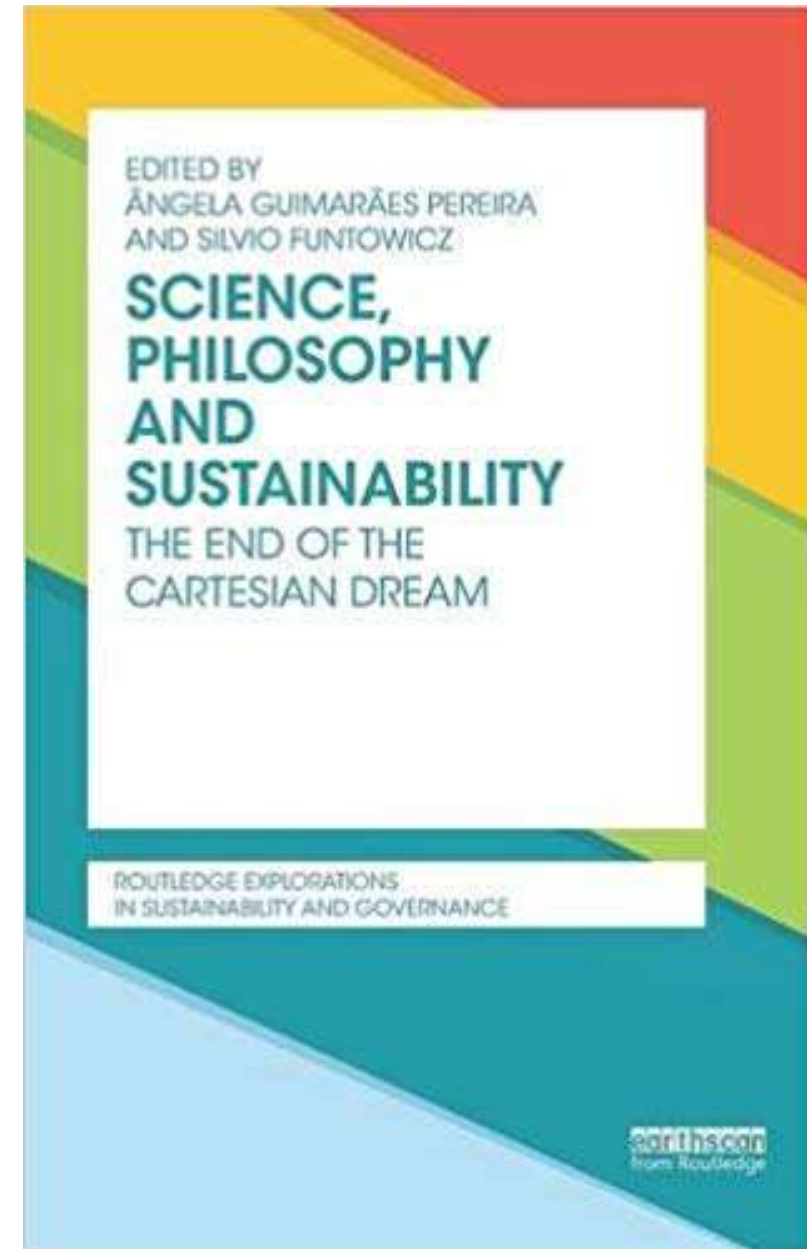
1. “The differentiation and complexification of the sciences transforms it into a “self service shops for financially well endowed customers in need of arguments.”
2. “It is not uncommon for political programs to be decided in advance simply by the choice of what expert representatives are included in the circle of advisers.” → The technique is never neutral





Elijah Millgram: warns against “procedural utopia”, a machinery to take the right decision based on a set of logical rules and methods.

A Cartesian dream?



<<[...] rhetoric clamour [surrounds]
'expected utility', 'decision theory',
'life cycle assessment', 'ecosystem
services' 'sound scientific decisions'
and 'evidence-based policy'



Andrew Stirling

Each technique routinely delivers its
answers with formidable levels of
precision. Yet the resulting impression
of accuracy is deeply misplaced >>

<https://steps-centre.org/blog/how-politics-closes-down-uncertainty/>



Futures

Volume 91, August 2017, Pages 62–71



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}

Highlights

- The closure of any issue in a pre-established frame used for quantification may correspond to normative and political stances.
- 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.

Science and lobbying

Power asymmetries in the framing of issues:
those who have the deepest pockets marshal
the best evidence → Instrumental use of
quantification to obfuscate

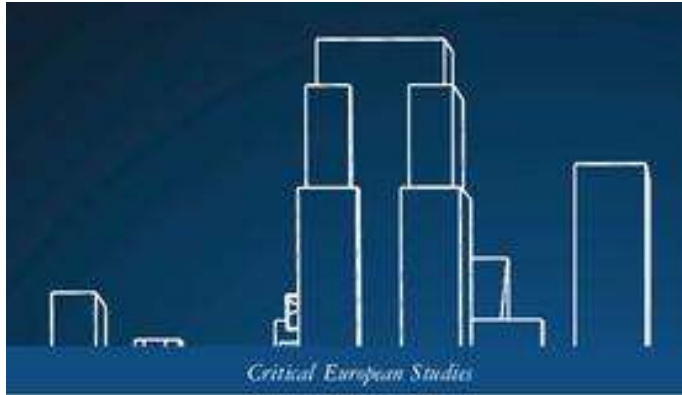


Why science's crisis should not become a political battling ground

Andrea Saltelli

Centre for the Study of the Sciences and the Humanities – University of Bergen, Norway; Open Evidence Research, Universitat Oberta de Catalunya (UOC), Barcelona, Spain

Sylvain Laurens

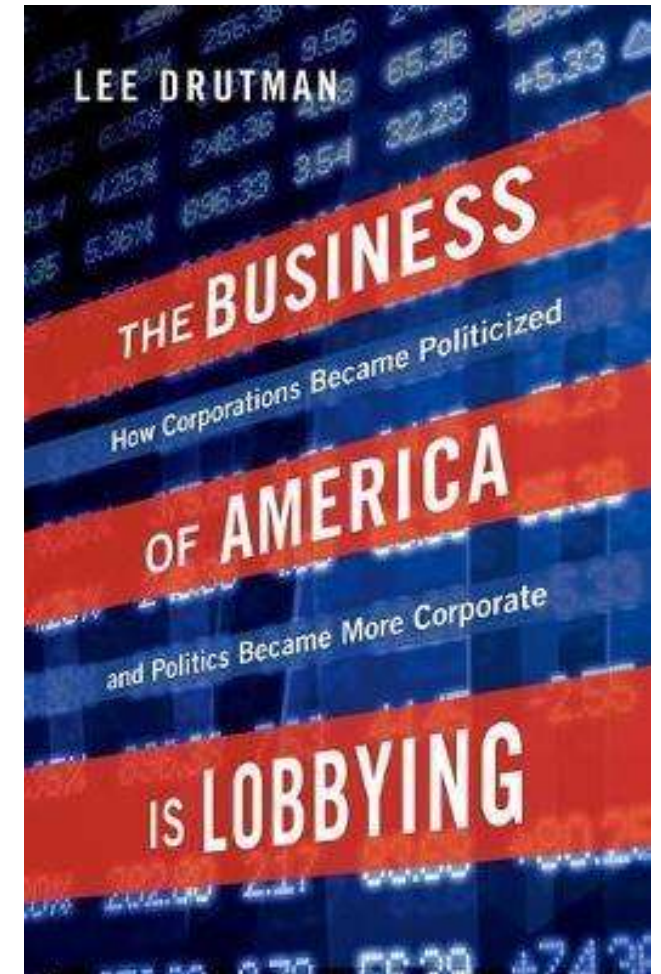


LOBBYISTS AND BUREAUCRATS IN BRUSSELS CAPITALISM'S BROKERS

Sylvain Laurens



Lee Drutman



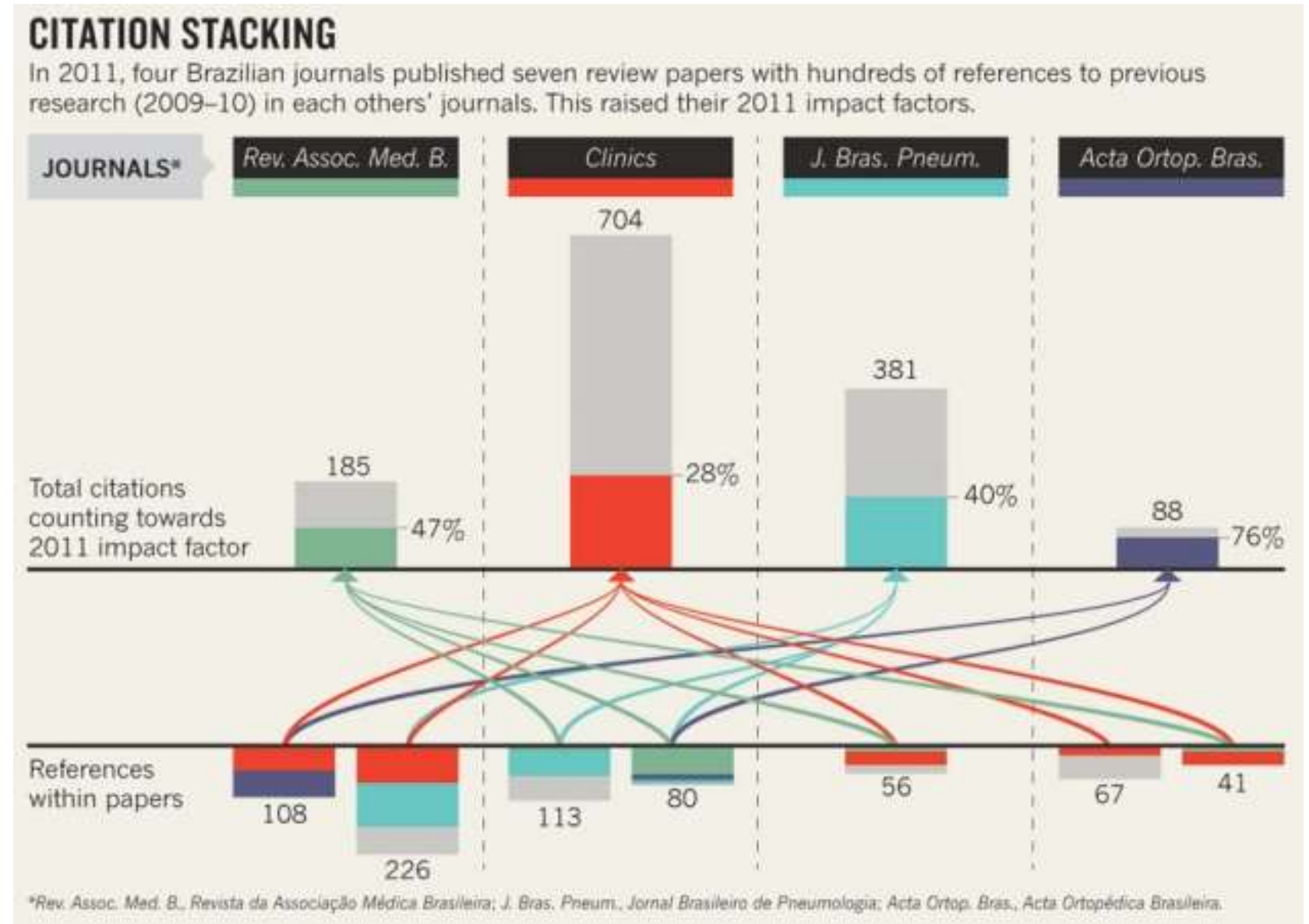
For both scholars a salient aspect of this power is lobbyists' access to more and better disseminated knowledge/science:

“They have the data”



What issues for philanthropic grant making? Use of metrics

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

Calls for change in the culture of metrics use

- San Francisco Declaration on Research Assessment (DORA)
- The Leiden Manifesto
- The Metric Tide
- Plan S and cOAlition S for open science
- ...

The Metric Tide



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

JAMES WILSDON

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)

San Francisco declaration, (2012), signed by 15006 individuals, and 1565 organizations (26/11/2019)

“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/> ; 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.

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. 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 pledge: scientists who sign up to the initiative agree that

“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”

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



How about lotteries?





nature

NEWS • 20 NOVEMBER 2019

David Adam

Science funders gamble on grant lotteries

A growing number of research agencies are assigning money randomly.



What can one learn from the Health Research Council of New Zealand?



Research Policy

Volume 49, Issue 1, February 2020, 103831



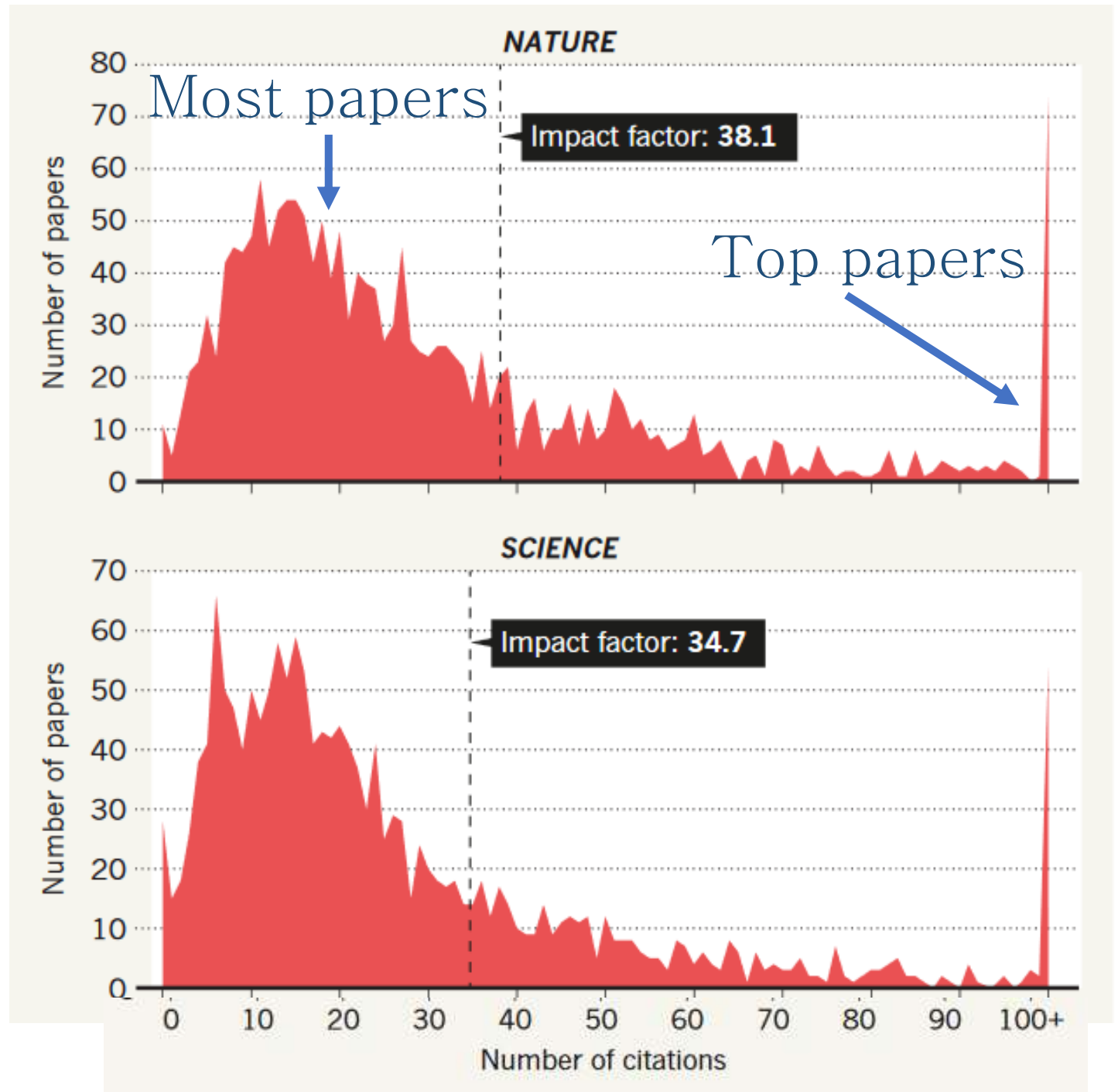
How to avoid borrowed plumes in academia

Margit Osterloh  , Bruno S. Frey 

The impact factor is a misleading measure
of the importance of an individual article.

The average paper is cited much less than the journal's impact factor

Source: E.
Callaway, 2014
Publishing elite turns
against impact factor,
Nature, 535, 210-211.



Impact factors' resilience due to a combination of:

- Incumbents' support (by those up the ladder)
- Goodhart Law (misplaced goal, gaming the measure)
- Existing institutional bureaucracies



Research Policy

Volume 49, Issue 1, February 2020, 103831



How to avoid borrowed plumes in academia

Margit Osterloh  , Bruno S. Frey 

“Our own proposal to overcome the performance paradox and the lock-in effect is based on the insight that uncertainty about future success is symptomatic of scholarly work. This insight can be liberating”



Research Policy

Volume 49, Issue 1, February 2020, 103831



How to avoid borrowed plumes in
academia

Margit Osterloh  , Bruno S. Frey 

Papers/project unanimously
approved – published/accepted
as such

Papers/project unanimously
disliked – rejected

All the rest: lottery



Research Policy
Volume 49, Issue 1, February 2020, 103831



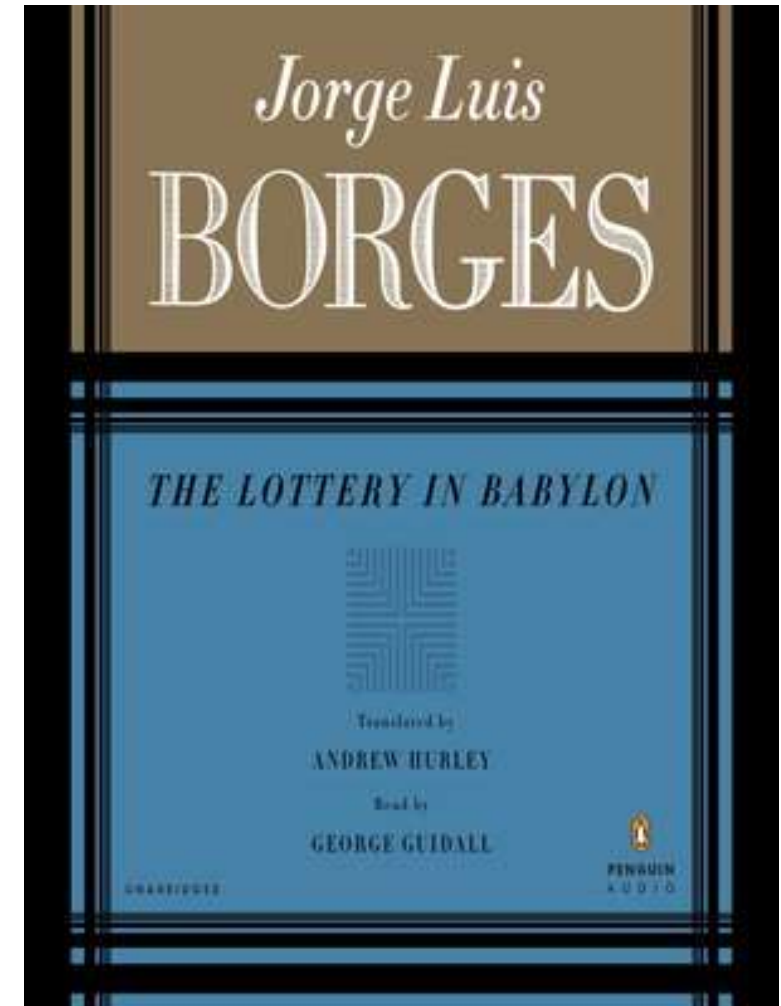
How to avoid borrowed plumes in
academia [Margit Osterloh](#)  , [Bruno S. Frey](#) 

- Reduce conservative bias
- Encourage non orthodox submissions
- Reduce losers' disappointment
- Temper winners' hubris

Isn't the publishing / winning process
already a lottery?

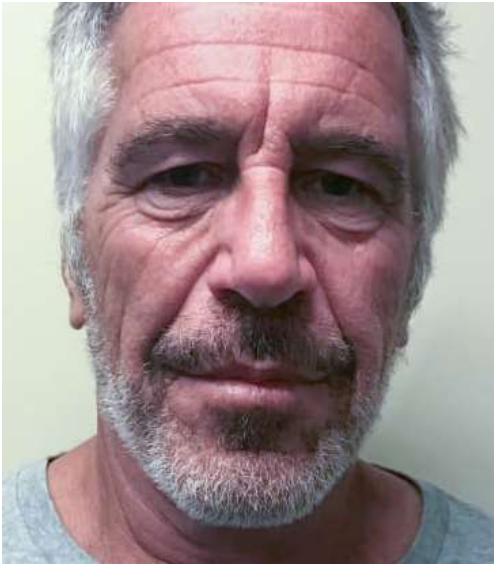


Adam Ruben, 2017,
Another tenure-track
scientist bites the dust,
Science,
<https://www.sciencemag.org/careers/2017/07/another-tenure-track-scientist-bites-dust>



What issues for philanthropic
grant making?

“Tainted donation”



Jeffrey Epstein
& paedophilia



Sackler family
& opioids



Koch brothers
& climate

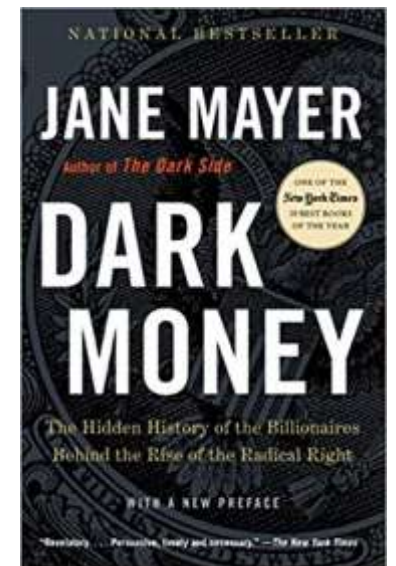
How Rich Donors Like Epstein (and Others) Undermine Science

ADAM ROGERS

SCIENCE

09.15.2019 07:00 AM

WIRED



Philanthropes 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

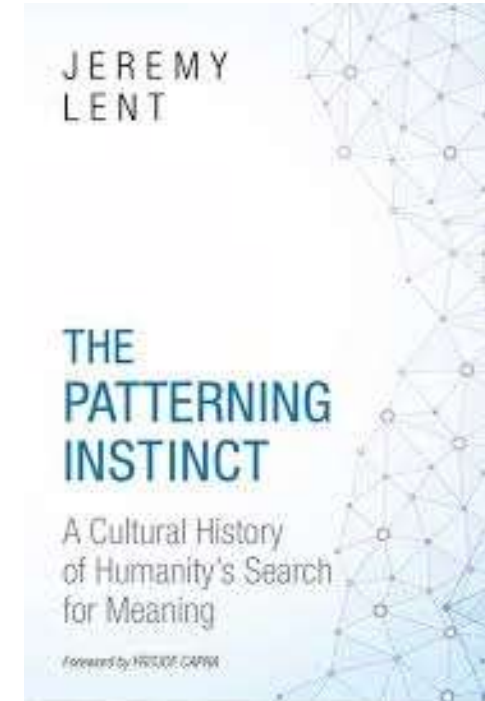
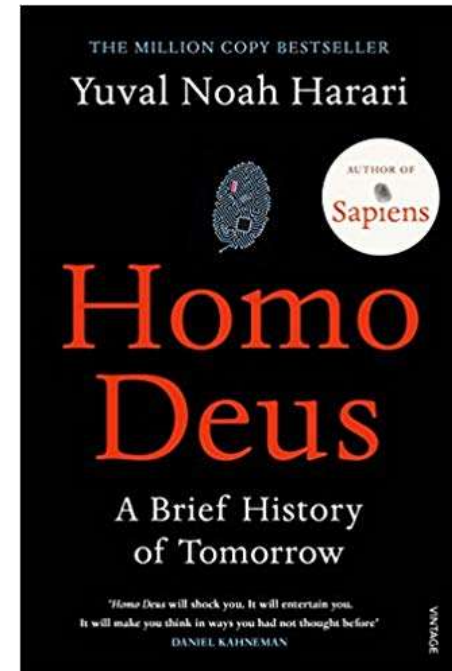
<https://www.wired.com/2017/01/john-arnold-waging-war-on-bad-science/>

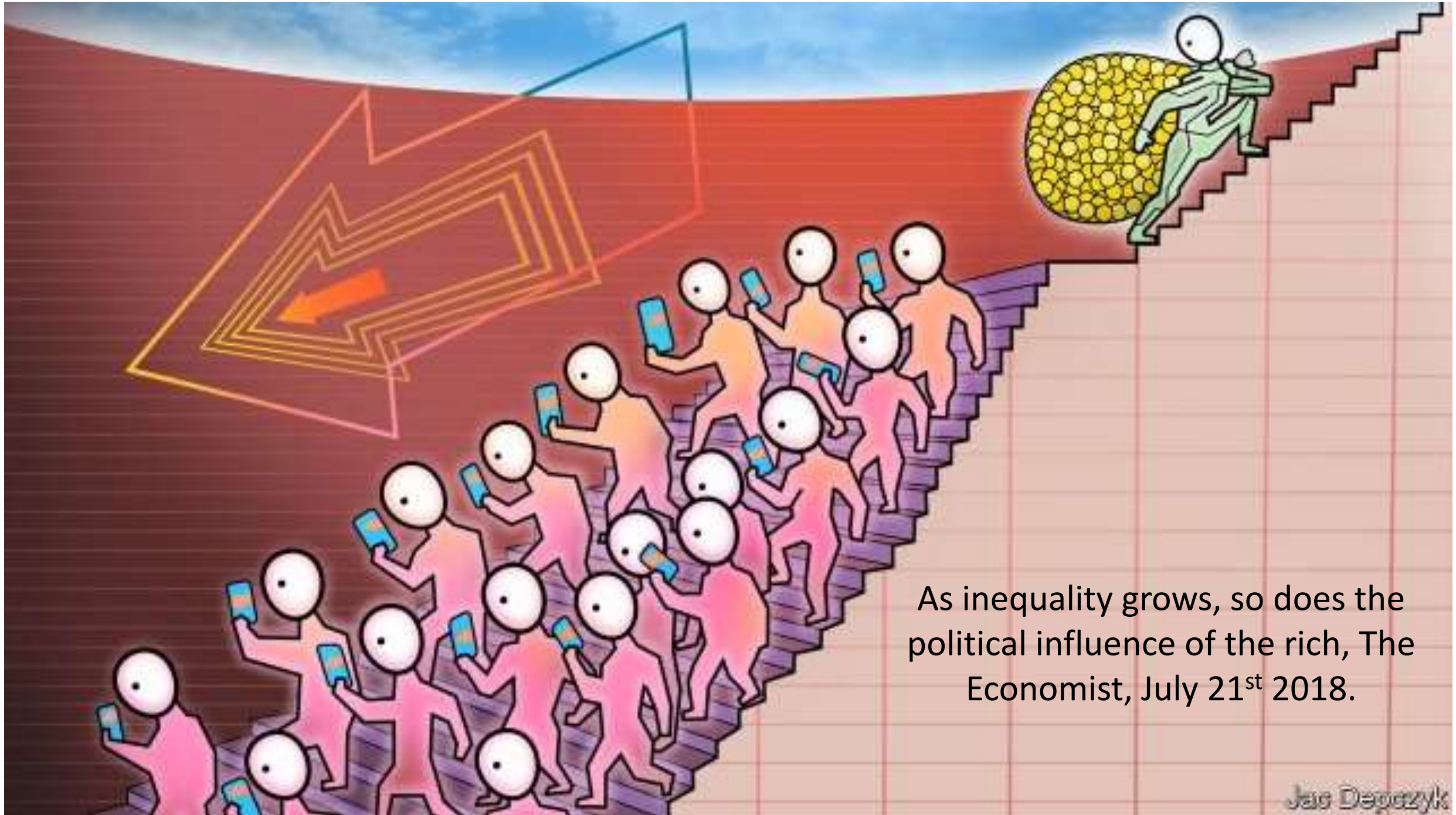
Techno-spit scenario?

An affluent super-technological and possibly trans-human/immortal minority, versus a useless and distracted majority left glued to its mobile phones and tablets

Y. N. Harari, Homo Deus : a brief history of tomorrow. Harvill Secker , 2016.

J. R. Lent, The patterning instinct : a cultural history of humanity's search for meaning. Prometheus Books, 2017.





As inequality grows, so does the political influence of the rich, The Economist, July 21st 2018.

The End



@andreasaltelli