

# Scientific integrity

Andrea Saltelli

Universidad Pompeu Fabra

March 11, 2022



# Where to find this talk: [www.andreasaltelli.eu](http://www.andreasaltelli.eu)

Andrea  
Saltelli

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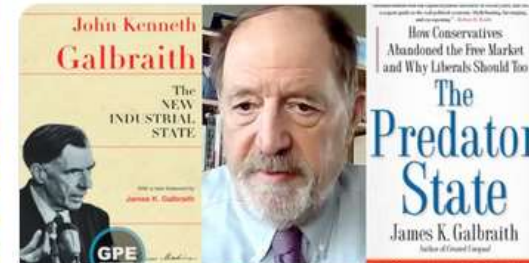
Tweets by @AndreaSaltelli



**andrea saltelli**  
@AndreaSaltelli

Worth listening all; pay heed to the bit at 31'.50".  
Why economics needs to pay heed to its  
biophysical bases @ICTA\_UAB @g\_kallis

Resource Limits to American Capitalism & the  
Predator State Today - % % [GPEnewsdocs.com](http://GPEnewsdocs.com)  
% [gpenewsdocs.com/resource-limit...](http://gpenewsdocs.com/resource-limit...)



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James K. Galbraith discusses the shift of ...  
[gpenewsdocs.com](http://gpenewsdocs.com)

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## **Definition of *integrity***

1 : firm [adherence](#) to a code of especially moral or artistic values : [incorruptibility](#)

2 : an unimpaired condition : [soundness](#)

3 : the quality or state of being complete or undivided : [completeness](#)



## Definition of *integrity*

1 : firm adherence to a code of especially moral or artistic values : incorruptibility



The ethos of open science:  
CUDOS, by R.K. Merton, a  
system of universal norms



Robert K. Merton

R. Merton, The sociology of science: Theoretical and empirical investigations, 1973.

**Communalism** – the common ownership of scientific discoveries, according to which scientists give up intellectual property rights in exchange for recognition and esteem (Merton actually used the term Communism, but had this notion of communalism in mind, not Marxism);

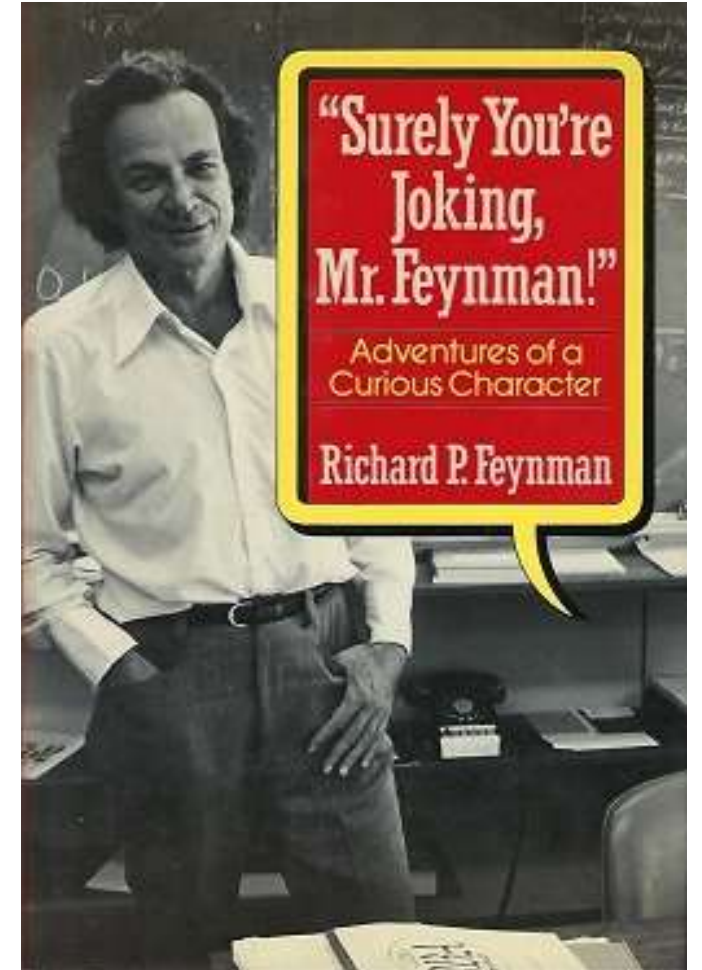
**Universalism** – according to which claims to truth are evaluated in terms of universal or impersonal criteria, and not on the basis of race, class, gender, religion, or nationality;

**Disinterestedness** – according to which scientists are rewarded for acting in ways that outwardly appear to be selfless;

**Organized Skepticism** – all ideas must be tested and are subject to rigorous, structured community scrutiny.



Go to  
<https://calteches.library.caltech.edu/51/2/CargoCult.htm>  
or buy the book ... read  
Caltex's speech (1974) of  
Richard Feynman about  
what organized scepticism  
is about



# Journal of Empirical Research on Human Research Ethics

## **Normative Dissonance in Science: Results from a National Survey of U.S. Scientists**

Melissa S. Anderson, Brian C. Martinson, Raymond De Vries

First Published December 1, 2007 | Research Article | [Find in PubMed](#)

<https://doi.org/10.1525/jer.2007.2.4.3>

survey responses from 3,247 mid- and early-career scientists who had research funding from the U.S. National Institutes of Health



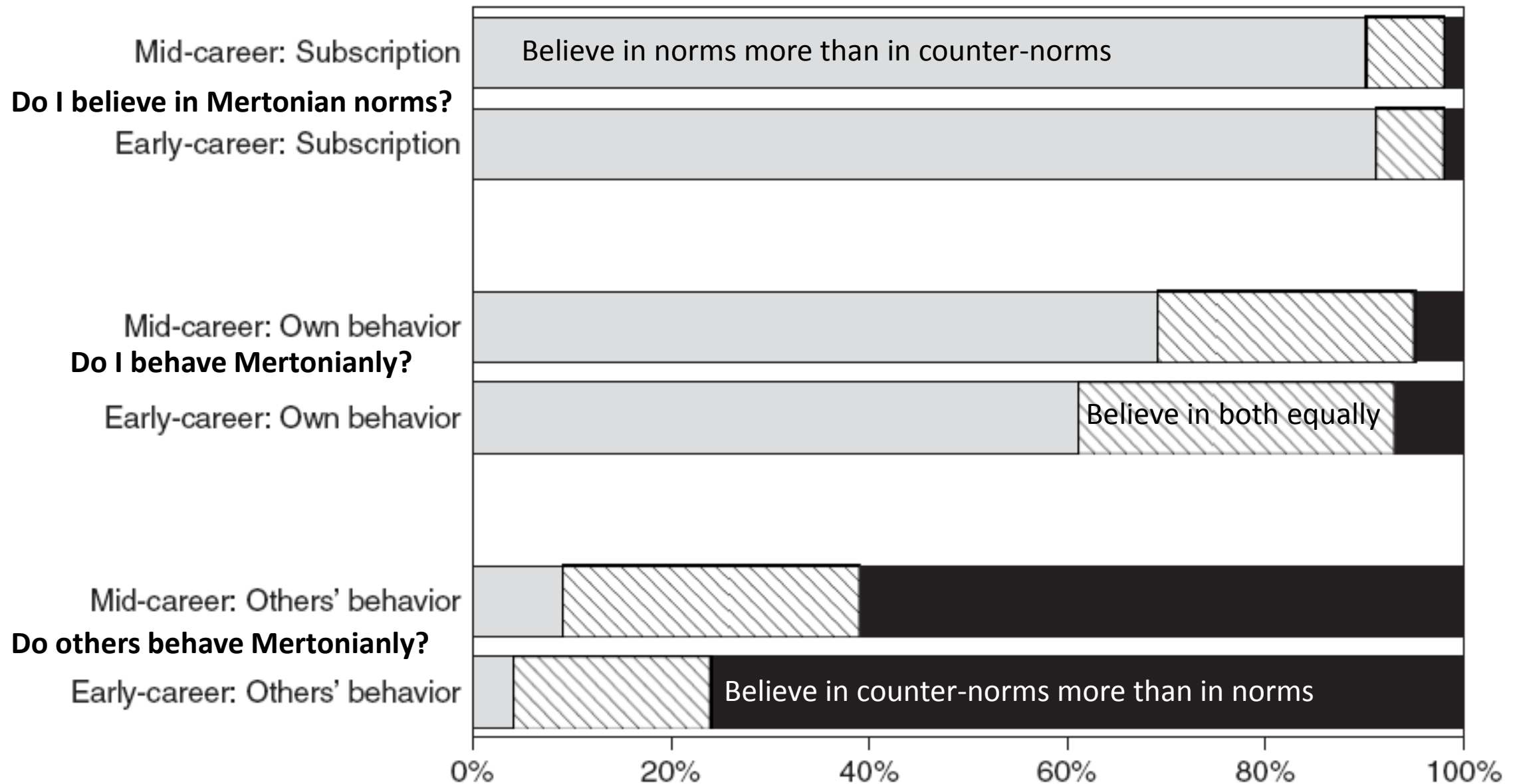


FIG. 3. Norm versus Counternorm Scores: Percent with Norm > Counternorm (dotted), Norm = Counternorm (striped), Norm < Counternorm (solid).



## Definition of *integrity*

1 : firm adherence to a code of especially moral or artistic values : incorruptibility

Integrity (sense 1) is one of the eight pillars of the EC Open Science – Plan S agenda

1. Rewards and incentives
2. Research indicators and next-generation metrics
3. Future of scholarly communication
4. European open science cloud
5. FAIR data
6. Research integrity
7. Skills and education
8. Citizen science



Jefferson Pooley, February 21st, 2020, [blogs.lse.ac.uk/](https://blogs.lse.ac.uk/):

Plan S accelerates read-and-publish deals in the Global North. They lock in and exacerbate existing inequalities in scholarly publishing.

# *Capitalism and Society*

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*Volume 3, Issue 2*

2008

*Article 5*

---

## The Historical Origins of 'Open Science': An Essay on Patronage, Reputation and Common Agency Contracting in the Scientific Revolution

**Paul A. David**, *Stanford University & The University of  
Oxford*

The Historical Origins of 'Open Science': An  
Essay on Patronage, Reputation and Common  
Agency Contracting in the Scientific  
Revolution

**Paul A. David**, *Stanford University & The University of  
Oxford*

Open science was always a fragile  
social construction ...

... resulting from the movement away  
from secret knowledge and princely  
patronage toward state patronage,  
academies, and other modern institutions of science, taking  
place in the period between renaissance and the industrial  
revolution



# What was before open science?

"Regarding the everyday duties, I shun only that type of prostitution consisting of having to expose my labor to the arbitrary prices set by every customer.

Instead, I will never look down on service a prince or a great lord or those who may depend on him, but, to the contrary, I will always desire such a position." (Galileo Galilei, 1564 – 1642)



## *Capitalism and Society*

Volume 3, Issue 2

2008

Article 5

The Historical Origins of 'Open Science': An  
Essay on Patronage, Reputation and Common  
Agency Contracting in the Scientific  
Revolution

Paul A. David, *Stanford University & The University of  
Oxford*

Open science exists already, funded by public  
and private actors, based on a distinctive  
ethos

It coexists with commercially oriented  
research

*Capitalism and Society*

---

*Volume 3, Issue 2*

2008

*Article 5*

---

The Historical Origins of 'Open Science': An  
Essay on Patronage, Reputation and Common  
Agency Contracting in the Scientific  
Revolution

**Paul A. David**, *Stanford University & The University of  
Oxford*

Open science lives a tension between:

Defending the existing ethos of the republic of science, Merton's CUDOS, "public knowledge"

Proprietary science, secrecy, visions of a knowledge economy

*Capitalism and Society*

---

*Volume 3, Issue 2*

2008

*Article 5*

---

The Historical Origins of 'Open Science': An  
Essay on Patronage, Reputation and Common  
Agency Contracting in the Scientific  
Revolution

**Paul A. David**, *Stanford University & The University of  
Oxford*

An acceleration toward 'Intellectual Capitalism'  
risks to move science back to the age of  
princely patronage ...

... from CUDOS back to the pre-renaissance  
ethos of secrecy in the pursuit of Nature's  
Secrets

*Capitalism and Society*

---

*Volume 3, Issue 2*

2008

*Article 5*

---

The Historical Origins of 'Open Science': An  
Essay on Patronage, Reputation and Common  
Agency Contracting in the Scientific  
Revolution

**Paul A. David**, *Stanford University & The University of  
Oxford*

# What Philip Mirowski has to say about the dangers of open science

*Article*



S|S|S

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## The future(s) of open science

**Philip Mirowski** 

John J. Reilly Center, University of Notre Dame, Notre Dame, IN, USA

Social Studies of Science  
2018, Vol. 48(2) 171–203

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DOI: 10.1177/0306312718772086

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 SAGE



We already struggle with  
“author–paid Article Publishing  
Charges (APCs) that range from  
\$500 to \$5,000 USD [Elsevier  
OA]”;

Corporate publishers have easily  
assimilated open access into their  
profit model.

## The future(s) of open science

**Philip Mirowski** 

John J. Reilly Center, University of Notre Dame, Notre Dame, IN, USA

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“the agenda [of open science] is effectively to re-engineer science along the lines of platform capitalism, under the misleading banner of opening up science to the masses”

Article

S|S|S

## The future(s) of open science

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“the open science movement is an artifact of the current neoliberal regime of science, [to] reconfigures both the institutions and the nature of knowledge to better conform to market imperatives”



Article

S|S|S

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# Open science is not there to solve

- Distrust of science in the general population
- Science's democracy deficit
- Slowdown in scientific productivity
- Reproducibility crisis

*Article*

S|S|S

## **The future(s) of open science**

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# How a neoliberal agenda has damaged science

Article

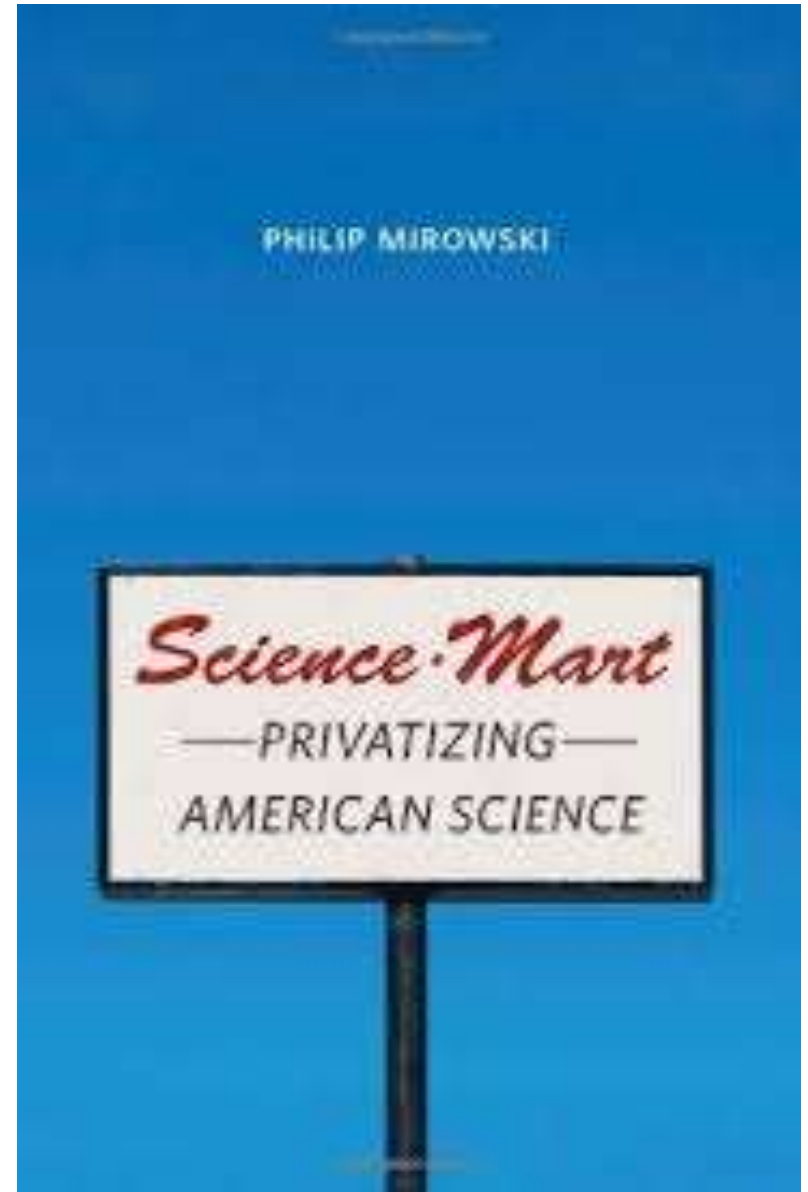
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## The future(s) of open science

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# What is hence the danger for Mirowski?

## Platform capitalism and the uberization of science

*Article*

S|S|S

### **The future(s) of open science**

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# Platforms competing to become the ‘Facebook for Science’



The future is with us already

we as scientists already live in “a quasi-market that constantly monitors [our] ‘net worth’ through a range of metrics, scores and indicators”

H-index, impact factors, peer contacts, network affiliations, and the like”

Article

S|S|S

## The future(s) of open science

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Elsevier BV



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Sign in

# August 2021 data-update for "Updated science-wide author databases of standardized citation indicators"

Published: 19 October 2021 | Version 3 | DOI: 10.17632/btchxktzyw.3

Contributors: [Jeroen Baas](#), [Kevin Boyack](#), [John P.A. Ioannidis](#)

## Description

Citation metrics are widely used and misused. We have created a publicly available database of over 100,000 top-scientists that provides standardized information on citations, h-index, co-authorship adjusted hm-index, citations to papers in different authorship positions and a composite indicator. Separate data are shown for career-long and single year impact. Metrics with and without self-citations and ratio of citations to citing papers are given. Scientists are classified into 22 scientific fields and 176 sub-fields. Field- and subfield-specific percentiles are also provided for all scientists who have published at least 5 papers. Career-long data are updated to end-of-2020. The selection is based on the top 100,000 by c-score (with and without self-citations) or a percentile rank of 2% or above.

The dataset and code provides an update to previously released version 1 data under <https://doi.org/10.17632/btchxktzyw.1>; The version 2 dataset is based on the May 06, 2020 snapshot from Scopus and is updated to citation year 2019 available at <https://doi.org/10.17632/btchxktzyw.2>

## Dataset metrics

### Usage

Views:	1651027
Downloads:	445155

### Mentions

References:	1
-------------	---

### Social Media

Shares, Likes & Comments:	76
Tweets:	8



[View details >](#)

Source: <https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/3>



## Definition of *integrity*

1 : firm [adherence](#) to a code of especially moral or artistic values : [incorruptibility](#)

To what sort of science do I  
pledge my integrity to?



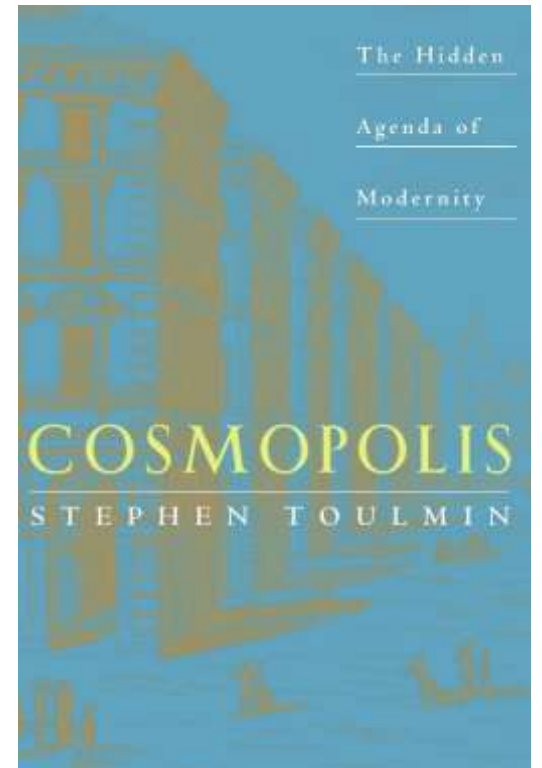


If you are a scientists you were  
nourished and trained in what Stephen  
Toulmin calls 'The hidden agenda of  
modernity'

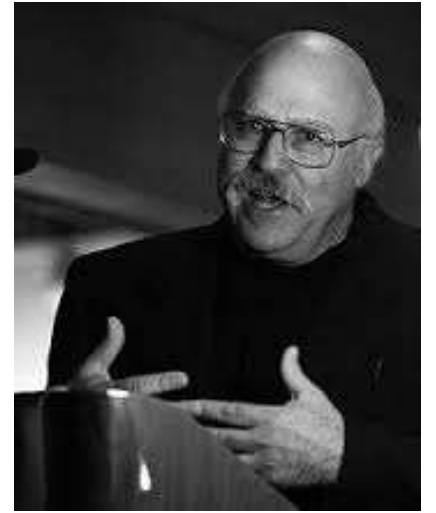
The vision of Cosmopolis, a society as  
rationally ordered as the Newtonian  
view of nature



Stephen Toulmin



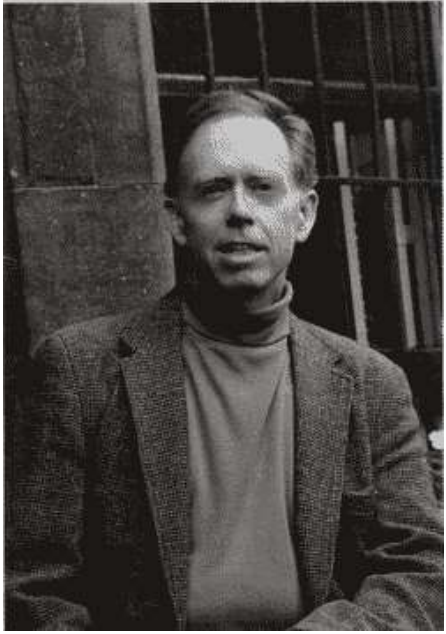
The dream was spectacularly successful, in all fields of endeavor, leading to what Steven Shapin calls ‘invisible science’



Steven Shapin

Steven Shapin, 2016, Invisible Science, The Hedgehog Review: Vol. 18 No. 3 (Fall 2016).

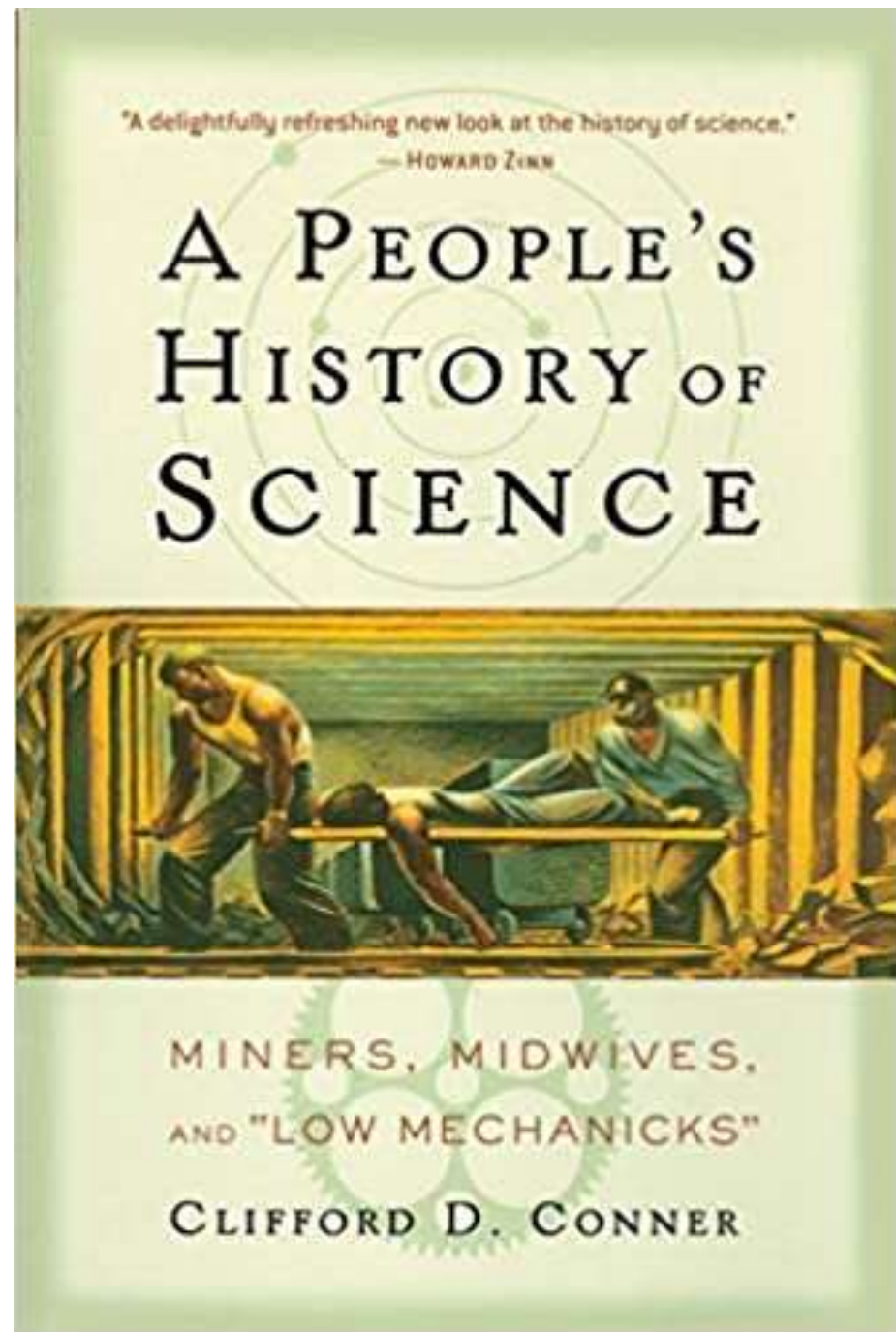
# What is science?

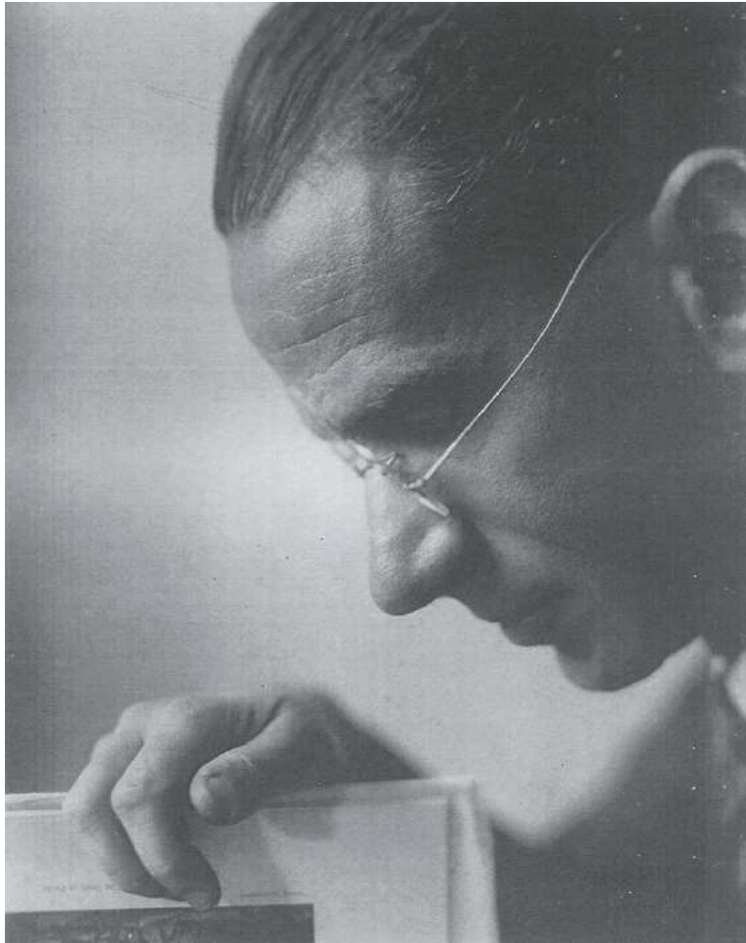


Clifford D. Conner

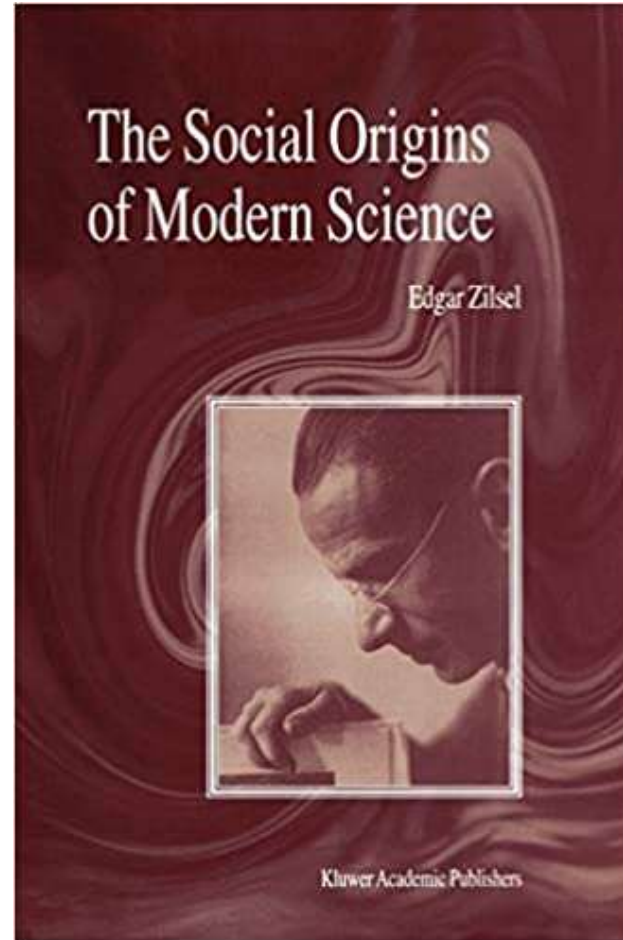
An antidote to a vision of the history of science as the fruit of the intuition of great (mostly) men

‘Knowing what’ was often only possible after  
‘knowing how’ had been discovered





Edgar Zilsel  
(1891–1944)



The Zilsel thesis:

- Superior artisans,
- Secular humanists,
- University scholars

“Science originates in urban cultures, money economy, market economy...”



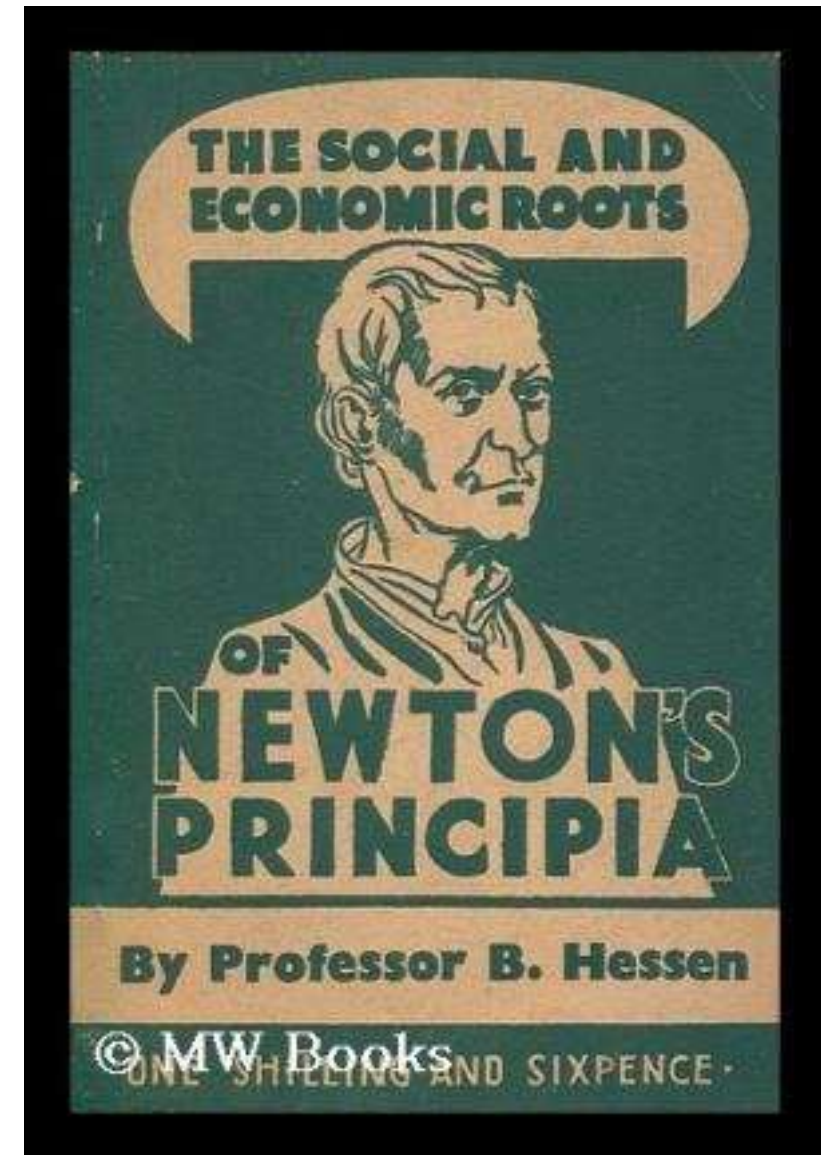


Boris Hessen  
(1893–1936)

The Hessen thesis:

Science originates from the  
commercial and capitalistic  
needs of the XVII century  
nascent bourgeoisie ...

... not just from the work of  
'great minds'



# The Printing Revolution in Early Modern Europe

ELIZABETH L. EISENSTEIN



*Canto*

... and in case you are interested in the “how all this came about” discussion

How about the way we  
are taught our science?



Kuhn said that the “educational initiation that prepares and licenses the student for professional practice... is both rigorous and rigid”

and “It is a narrow and rigid education [in physics/science], probably more so than any other except perhaps in orthodox theology”



Thomas Kuhn, *The structure of scientific revolution*, 192, Chapters I and XIII

and “the member of a mature scientific community is, like the typical character of Orwell’s 1984, the victim of a history rewritten by the powers that be.”

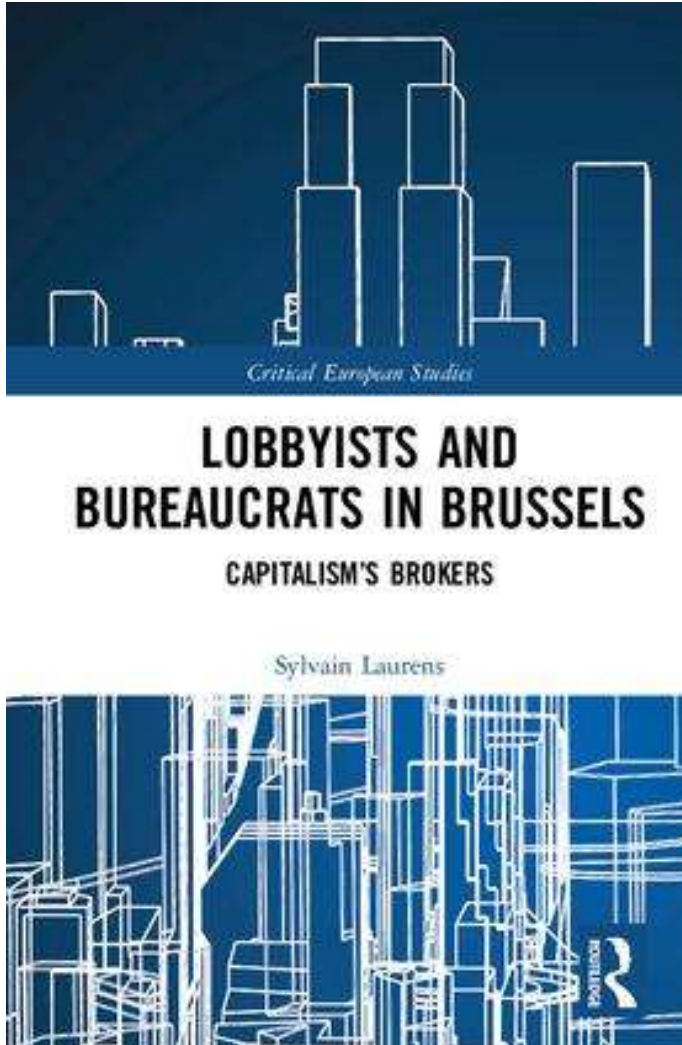


Thomas Kuhn, The structure of scientific revolution, 192, Chapter XIII

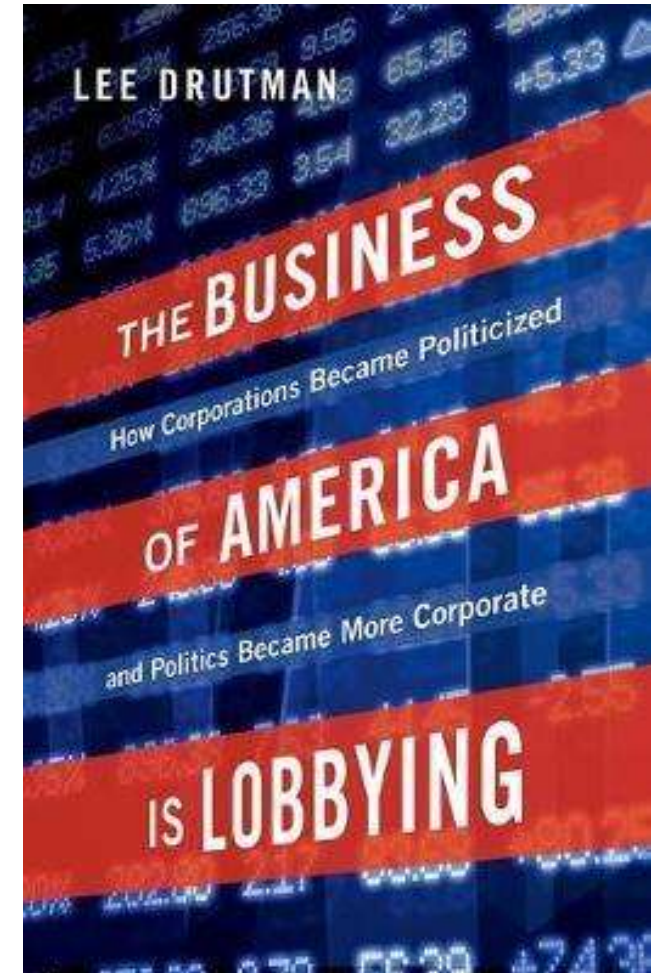
# What is science?

- The legacy of Enlightenment
- The way to emancipation and Bildung
- ...
- ...
- A tool of corporate power?

# Sylvain Laurens



Lee Drutman





# Futures

Volume 135, January 2022, 102860



## Science, the endless frontier of regulatory capture

Andrea Saltelli <sup>a</sup>  , Dorothy J. Dankel <sup>b, c</sup>, Monica Di Fiore <sup>d</sup>, Nina Holland <sup>e</sup>,  
Martin Pigeon <sup>e</sup>





**MENOS  
MEDICINA** | **MAS  
SALUD**

Organización Civil Internacional por la  
transparencia, la integridad, la participación  
y la equidad en las políticas de salud,  
la asistencia sanitaria y la investigación biomédica.

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## Los guardianes de la razón: Fact check, captura cultural e imaginario sociotécnico. Por Abel Novoa

por nmurcia | Jun 9, 2021 | Regulación e Industria | 0 Comentarios



Abel Nova

<http://www.nogracias.org/2021/06/09/los-guardianes-de-la-razon-fact-check-captura-cultural-e-imaginario-sociotecnico-por-abel-novoa/>

# From the abstract:

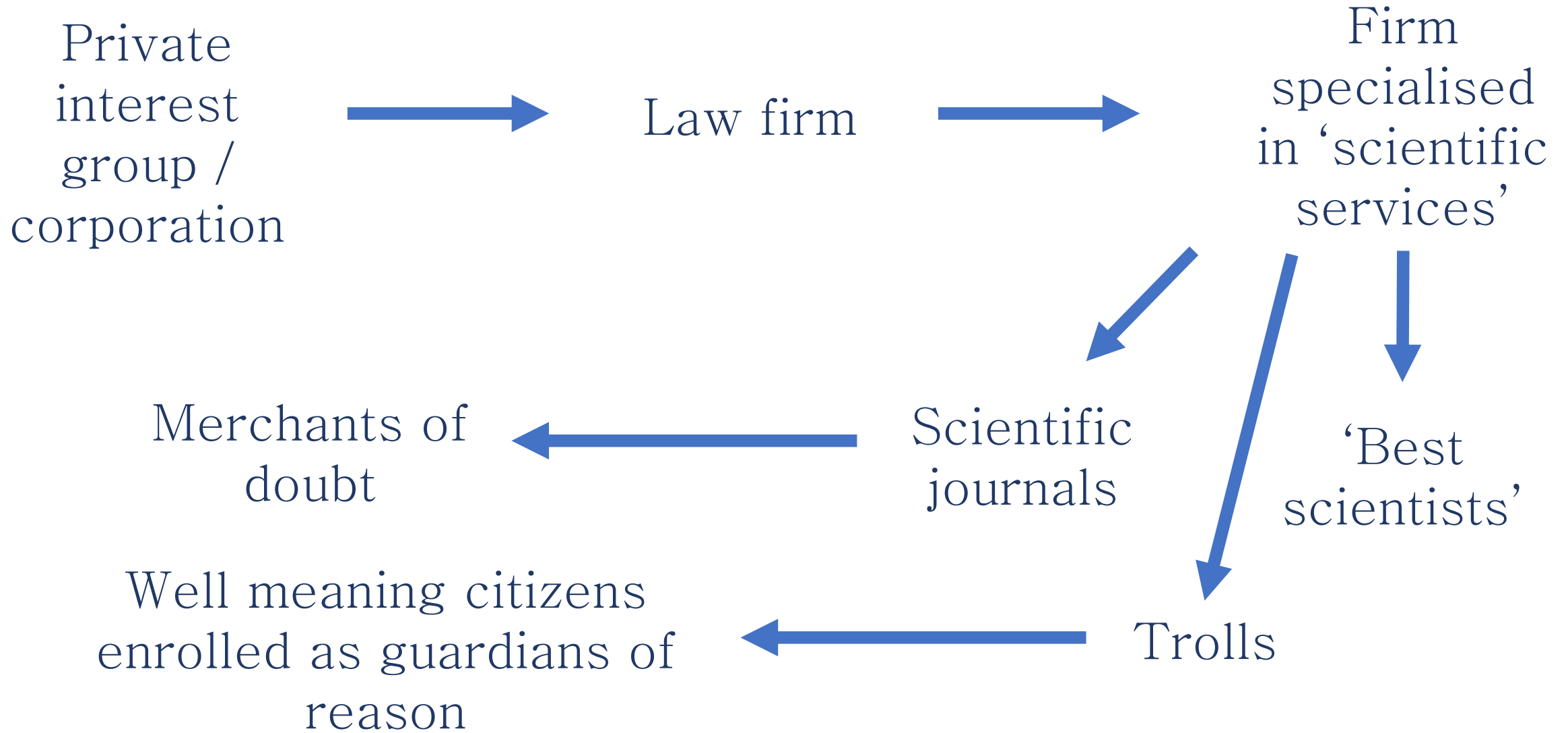
... a form of corporate penetration which is based on a strategic use of the image and legitimacy of science

...cases where lobbyists present themselves as upholders of the values of the evidence-based policy, and interested in the methodological and ethical aspect of science for policy



# From the abstract:

Epistemic ladder: lobbyists move from  
**questioning** the evidence to  
**questioning** its legitimacy, all the way to  
**creating** a worldview where not only the evidence, but the very  
idea of regulation, become irrelevant or undesirable





## **Definition of *integrity***

1 : firm [adherence](#) to a code of especially moral or artistic values : [incorruptibility](#)

Wrapping up: what sort of science and what sort of integrity we embrace are not trivial questions. They demand choices and come to a cost



## Definition of *integrity*

2 : an unimpaired condition : [soundness](#)

Is the science we are receiving unimpaired?

# Predatory publishing?



Credit: David Parkins, Nature,  
<https://www.nature.com/articles/d41586-019-03759-y>

**NEWS** • 08 FEBRUARY 2021

# Hundreds of ‘predatory’ journals indexed on leading scholarly database

Scopus has stopped adding content from most of the flagged titles, but the analysis highlights how poor-quality science is infiltrating literature.

[Dalmeet Singh Chawla](#)

---

# Predatory: cloning existing journals



Recent cases:

- Talent Development and Excellence,
- Transylvanian Review
- Test Engineering and Management

<https://retractionwatch.com/2021/05/26/how-hijacked-journals-keep-fooling-one-of-the-worlds-leading-databases/>



Predatory publishers (the Achilles heel of the APC model)

Predatory open access publishers

<https://beallslist.net>

Beall was threatened by Omics International with a \$1billion lawsuit



Jeffrey Beall,  
librarian,  
University  
of Colorado,  
Denver

Dear Andrea Saltelli,  
I hope everything is going well.



Google Cus

We cordial

As you bei

If you have

Hoping

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[SUBMIT MANUSCRIPT](#)

**ISSN: 2575-7091**

**Food & Nutrition Jou**

A photograph of a bowl of fresh green salad with orange slices.

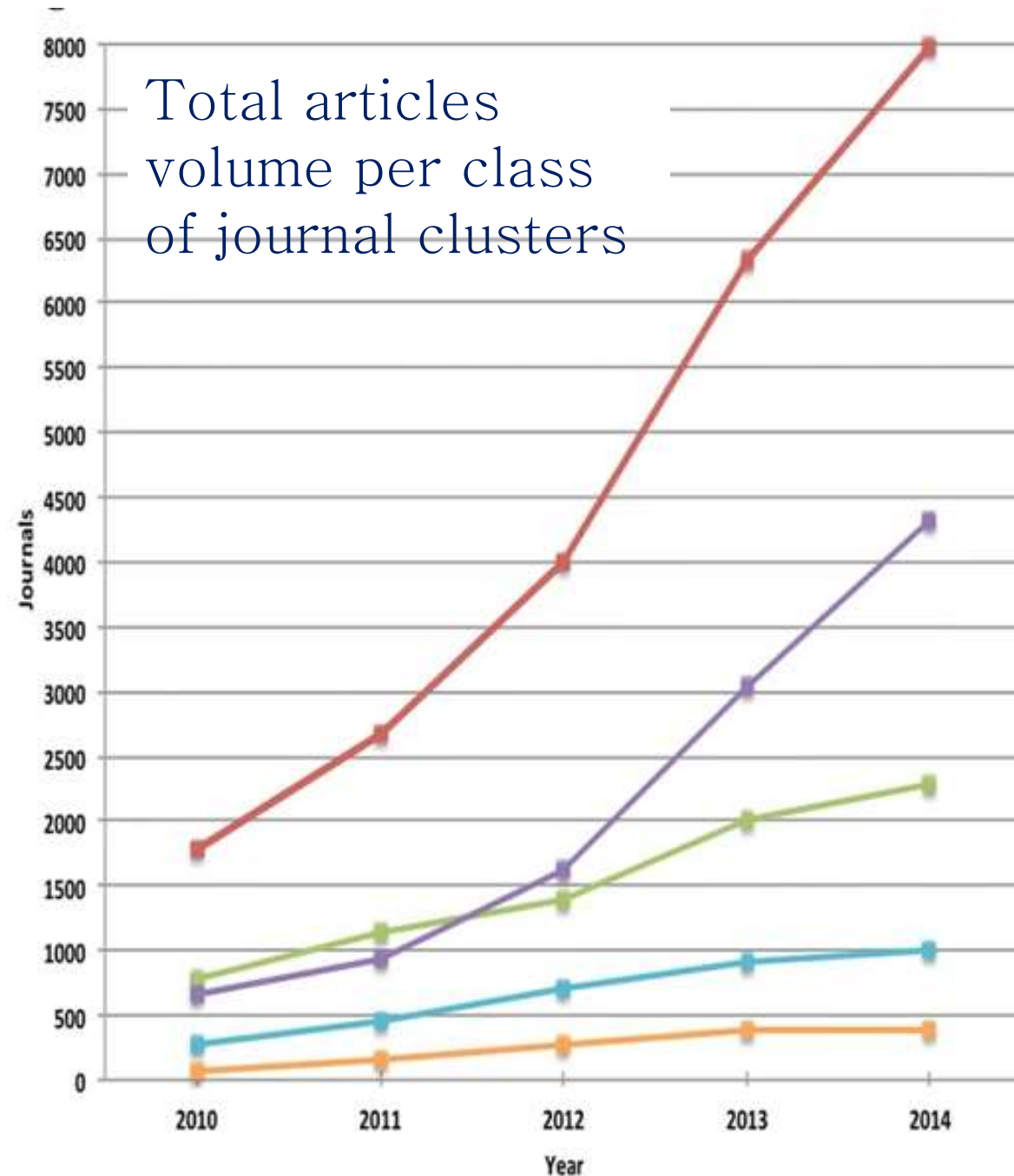
About the Journal

**Journal Impact Factor 1.2\***

Is on Beall's list ←

- \*Genamics – JournalSeek
- \*Academic Keys
- \*ResearchBib - Academic Research Index
- \*Free Medical Journals - Geneva Foundation for Medical Education and Research
- \*International Innovative Journal Impact Factor (IIJIF)
- \*Al-Azhar University
- \*Open J-Gate
- \* Directory of Journals indexing

C. Shen and B.-C. Björk, “‘Predatory’ open access: a longitudinal study of article volumes and market characteristics,” BMC Med., vol. 13, no. 1, p. 230, Dec. 2015.



Crisis of reproducibility

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




Brow

 OPEN ACCESS

ESSAY

June 21, 2017

Why Most Clinical Research Is Not Useful

John P. A. Ioannidis 

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

THE  
ECONOMIC  
JOURNAL



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

THE POWER OF BIAS IN ECONOMICS RESEARCH\*

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

October 27, 2017



## Futures

Volume 91, August 2017, Pages 5-11



# What is science's crisis really about?

Andrea Saltelli <sup>a, b</sup>  , Silvio Funtowicz <sup>a</sup>



## Futures

Volume 104, December 2018, Pages 85-90



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

Andrea Saltelli 



# Darwinian fitness of malpractices

Downloaded from <http://rsos.royalsocietypublishing.org/> on September 23, 2016

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OPEN SCIENCE

[rsos.royalsocietypublishing.org](http://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<sup>1</sup> and Richard McElreath<sup>2</sup>

<sup>1</sup>Cognitive and Information Sciences, University of California, Merced, CA 95343, USA

<sup>2</sup>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

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>

Is the present publishing  
system sound?

## Opinion

Peer review and scientific publishing

Thu 13 Sep 2018

# Scientific publishing is a rip-off. We fund the research – it should be free

*George Monbiot*



## Those who take on the global industry that traps research behind paywalls are heroes, not thieves







I. Graber-Stiehl, "Science's pirate queen," *Verge*, Feb-2018.



Kazakhstani scientist  
Alexandra Elbakyan



## **Is the staggeringly profitable business of scientific publishing bad for science?**

Elsevier profits 2010 = £724m on £2bn revenue: a 36% margin – higher than Apple, Google, or Amazon

Stephen Buranyi, The Guardian, 27 Jun 2017.

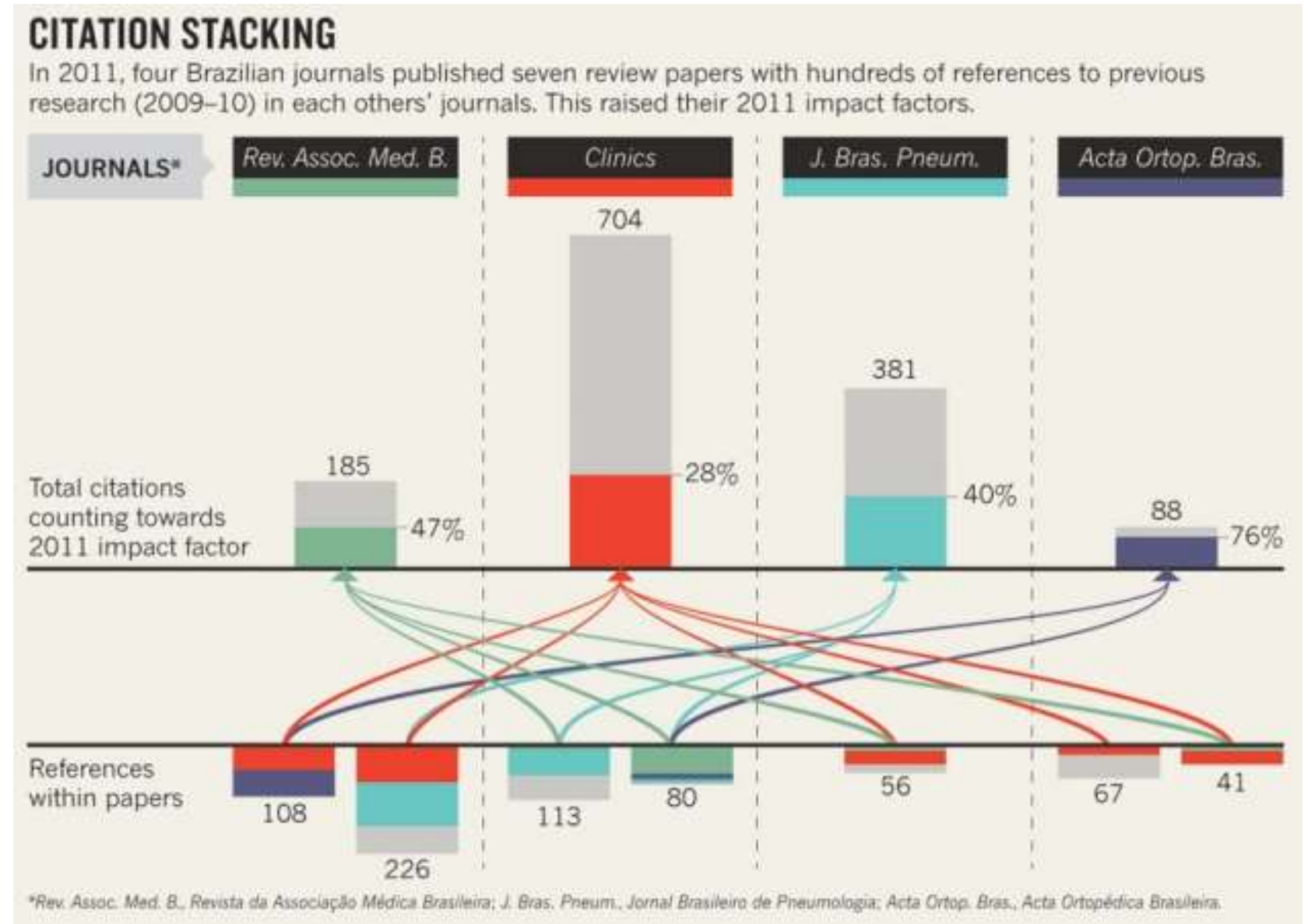




A 2005 Deutsche Bank report referred to it as a “bizarre” “triple-pay” system, in which “the state funds most research, pays the salaries of most of those checking the quality of research, and then buys most of the published product”

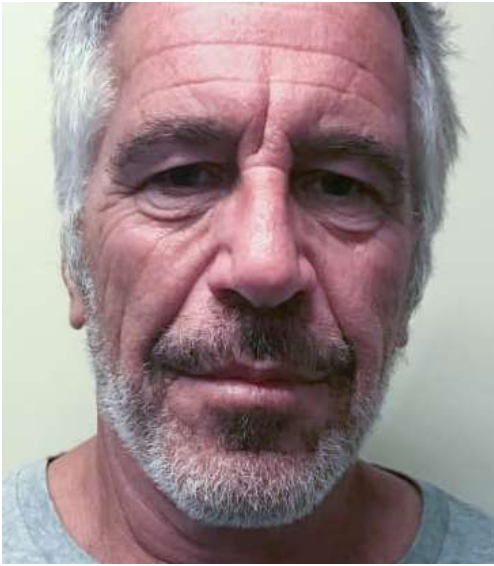
Stephen Buranyi, The Guardian, 27 Jun 2017.

# 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

Sound donations?



Jeffrey Epstein  
& paedophilia



Sackler family  
& opioids



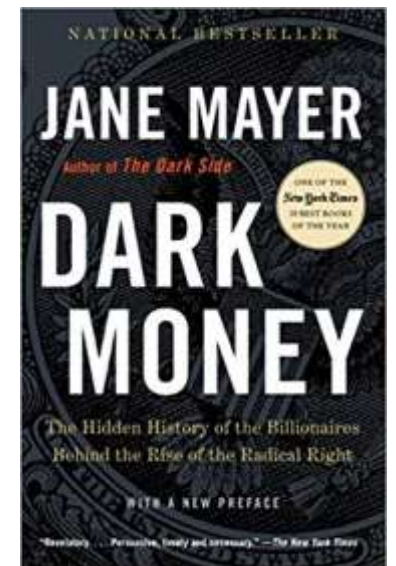
Koch brothers  
& climate

## How Rich Donors Like Epstein (and Others) Undermine Science

ADAM ROGERS

SCIENCE 09.15.2019 07:00 AM

WIRED



Is the grant  
system sound?

- … researchers spend much of their research time writing research proposals
- … the costs of peer review and non-granted project applications are often higher than the total budget of a call
- … grants are preferentially allocated to well endowed labs and teams …
- … strategic behavior of evaluators
- … a system based on lotteries would be way more efficient





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



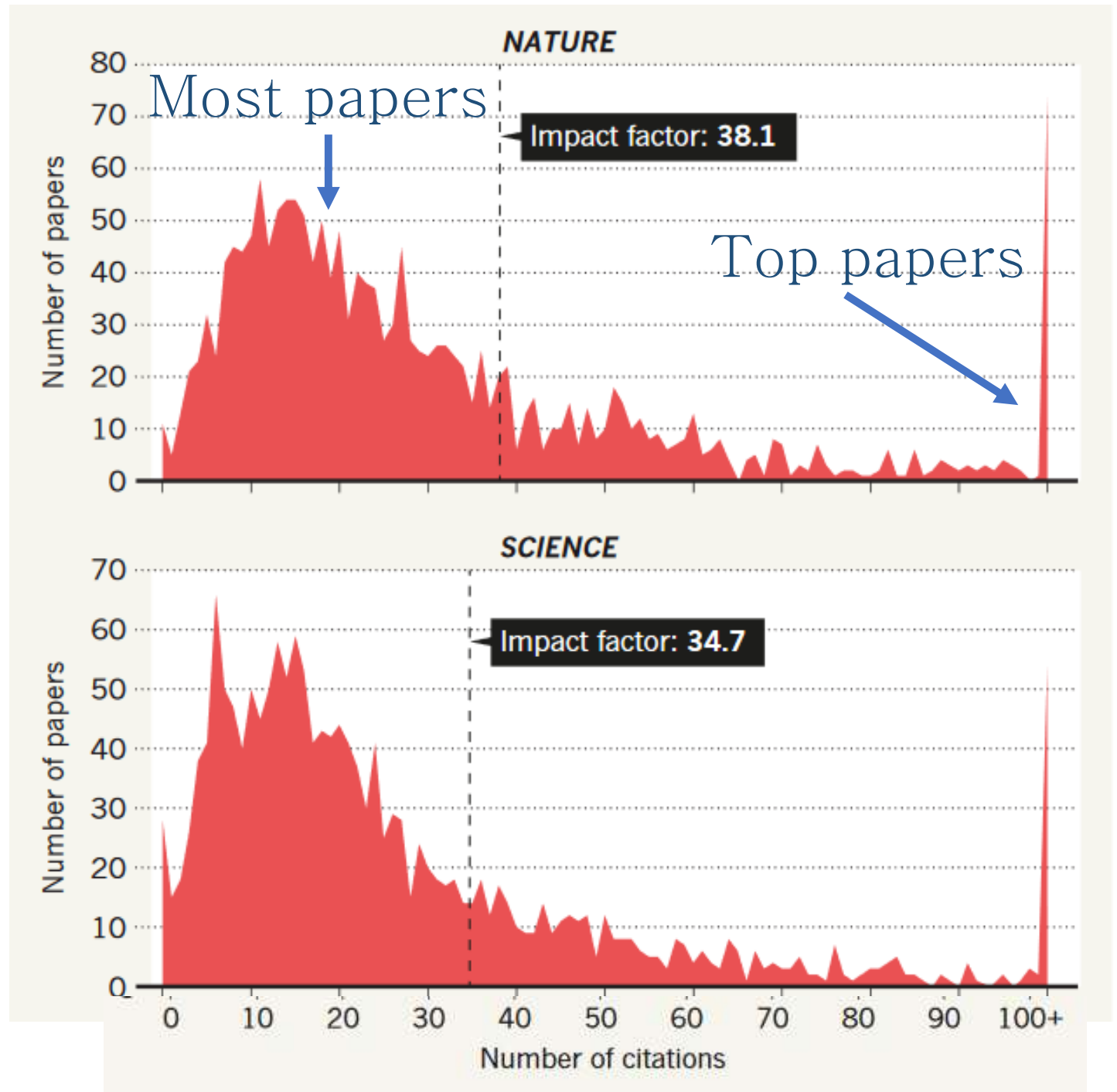
### How to avoid borrowed plumes in academia

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.





## Definition of *integrity*

2 : an unimpaired condition : [soundness](#)

Wrapping up: The science we receive in heritage from our fathers has aspects which are unsound



## Definition of *integrity*

3 : the quality or state of being complete or undivided : completeness

Undivided or strained by contradictions?



Contradiction: a situation in which inherent factors, actions, or propositions are inconsistent or contrary to one another

Bending to reviewer-coerced  
citation or not?





NEWS • 06 FEBRUARY 2020

## Highly cited researcher banned from journal board for citation abuse

Investigation finds that biophysicist Kuo-Chen Chou repeatedly suggested dozens of citations be added to papers.

Richard Van Noorden

Accepting a seducing salary ...  
without too much thought?

# U.S. Accuses Harvard Scientist of Concealing Chinese Funding



Prosecutors say Charles M. Lieber, the chair of Harvard's chemistry department, lied about concealing Chinese state-run initiative that seeks to develop a new generation of scientists.

NEWS

**Harvard Doesn't Have to Pay Legal Fees for Professor Convicted of Hiding Ties to China**

BY LORA KORPAR ON 1/10/22 AT 5:02 PM EST

Source: <https://www.newsweek.com/harvard-doesnt-have-pay-legal-fees-professor-convicted-hiding-ties-china-1667672>

Jan. 28, 2020

... a U.S. scientific luminary was in ... false statement to federal authorities about his financial relationship with the Chinese ... Thousand Talents program”

\$50,000 monthly salary, \$150,000 in annual in living expenses and more than \$1.5 million for a second laboratory in Wuhan

Cutting corners or not?

## Cargo-cult statistics and scientific crisis

Written by Philip B. Stark and Andrea Saltelli on 05 July 2018. Posted in [Science](#)



P-hacking,  
HARKing, salami  
slicing, ...

**nature materials**

Published: January 2005

**The cost of salami slicing**


Nature Materials 4, 1(2005) | [Cite this article](#)



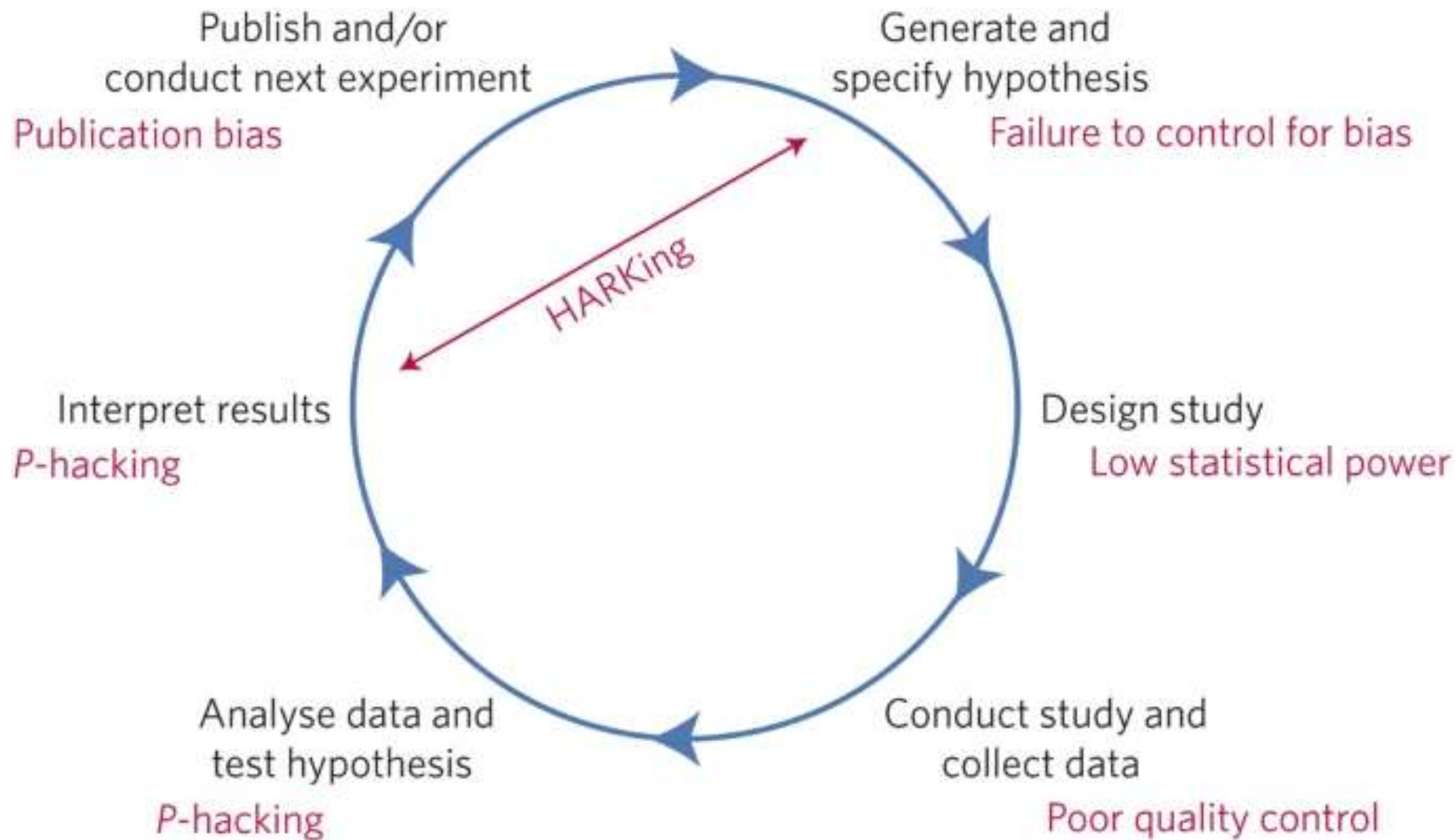
**nature human behaviour**

Open Access | Published: 10 January 2017

# **A manifesto for reproducible science**

Marcus R. Munafò , Brian A. Nosek, Dorothy V. M. Bishop, Katherine S. Button, Christopher D. Chambers, Nathalie Percie du Sert, Uri Simonsohn, Eric-Jan Wagenmakers, Jennifer J. Ware & John P. A. Ioannidis





Are the numbers you produce responsible?

Models ‘too big to fail’

# Five ways to ensure that models serve society: a manifesto

Pandemic politics highlight how predictions need to be transparent and humble to invite insight, not blame.

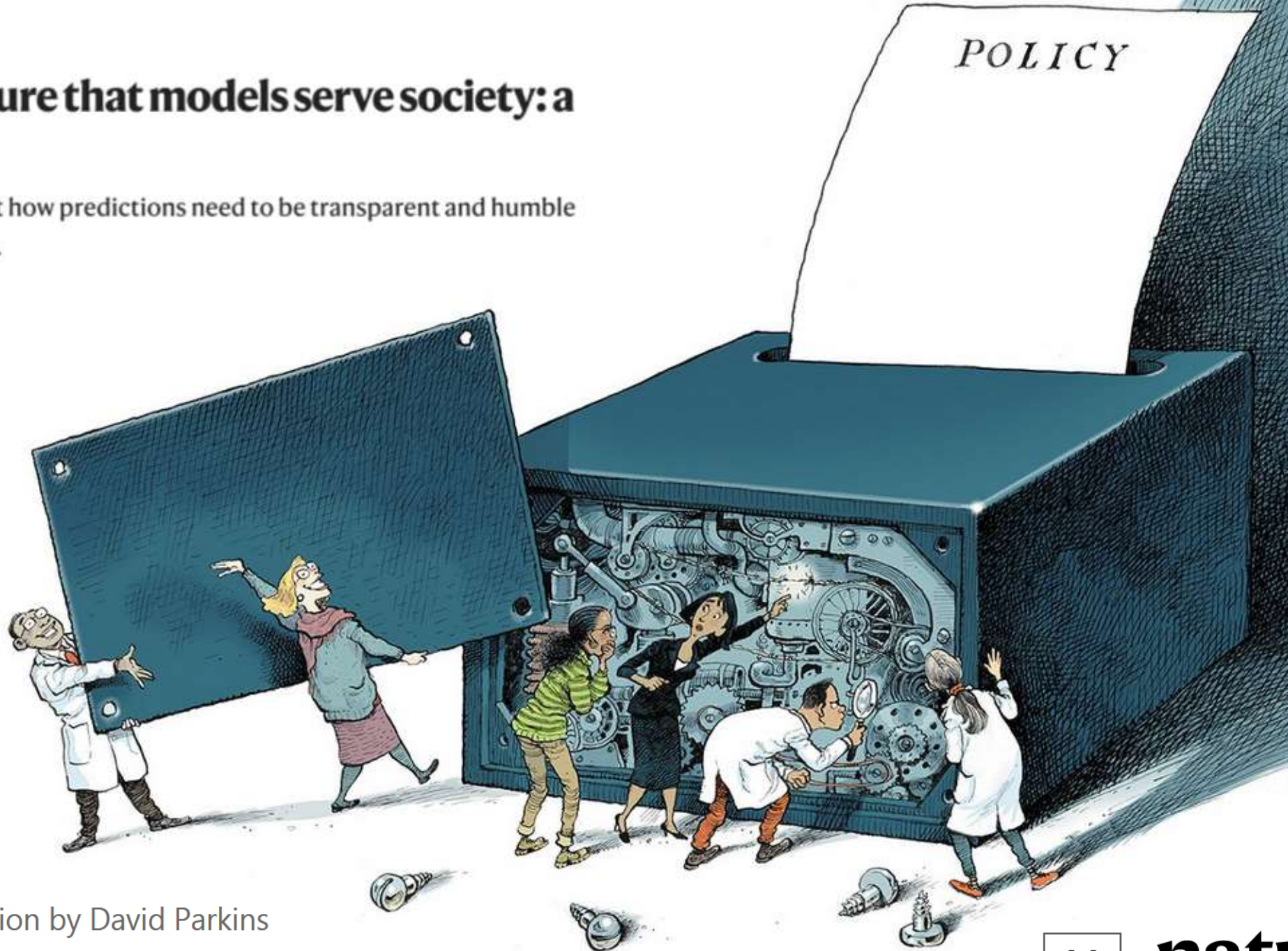


Illustration by David Parkins



**nature**

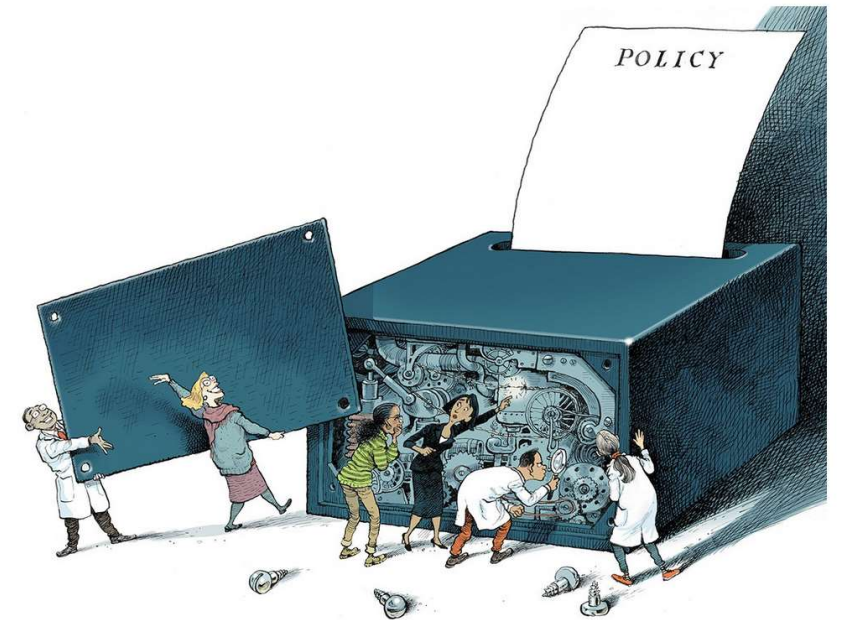




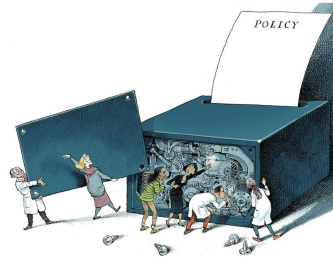
# Five ways to ensure that models serve society: a manifesto

Pandemic politics highlight how predictions need to be transparent and humble to invite insight, not blame.

Andrea Saltelli , Gabriele Bammer, Isabelle Bruno, Erica Charters, Monica Di Fiore, Emmanuel Didier, Wendy Nelson Espeland, John Kay, Samuele Lo Piano, Deborah Mayo, Roger Pielke Jr, Tommaso Portaluri, Theodore M. Porter, Arnald Puy, Ismael Rafols, Jerome R. Ravetz, Erik Reinert, Daniel Sarewitz, Philip B. Stark, Andrew Stirling, Jeroen van der Sluijs & Paolo Vineis



COVID-19 policies dictated by  
'science' with several digits  
precision in the presence of  
fundamental uncertainties



Undocumented research code used  
as a policy tool (chameleon models)



Pfleiderer, P. Chameleons: The Misuse of Theoretical Models in Finance and Economics. *Economica* 87, 81–107 (2020).

Contradictions in the unintended  
effects of reforms?



# Good intentions going bad

TABLE 1. GROWING PERVERSE INCENTIVES IN ACADEMIA

<i>Incentive</i>	<i>Intended effect</i>	<i>Actual effect</i>
“Researchers rewarded for increased number of publications.”	“Improve research productivity,” provide a means of evaluating performance.	“Avalanche of” substandard, “incremental papers”; poor methods and increase in false discovery rates leading to a “natural selection of bad science” (Smaldino and McElreath, 2016); reduced quality of peer review
“Researchers rewarded for increased number of citations.”	Reward quality work that influences others.	Extended reference lists to inflate citations; reviewers request citation of their work through peer review
“Researchers rewarded for increased grant funding.”	“Ensure that research programs are funded, promote growth, generate overhead.”	Increased time writing proposals and less time gathering and thinking about data. Overselling positive results and downplay of negative results.
Increase PhD student productivity	Higher school ranking and more prestige of program.	Lower standards and create oversupply of PhDs. Postdocs often required for entry-level academic positions, and PhDs hired for work MS students used to do.
Reduced teaching load for research-active faculty	Necessary to pursue additional competitive grants.	Increased demand for untenured, adjunct faculty to teach classes.
“Teachers rewarded for increased student evaluation scores.”	“Improved accountability; ensure customer satisfaction.”	Reduced course work, grade inflation.
“Teachers rewarded for increased student test scores.”	“Improve teacher effectiveness.”	“Teaching to the tests; emphasis on short-term learning.”
“Departments rewarded for increasing U.S. News ranking.”	“Stronger departments.”	Extensive efforts to reverse engineer, game, and cheat rankings.
“Departments rewarded for increasing numbers of BS, MS, and PhD degrees granted.”	“Promote efficiency; stop students from being trapped in degree programs; impress the state legislature.”	“Class sizes increase; entrance requirements” decrease; reduce graduation requirements.
“Departments rewarded for increasing student credit/contact hours (SCH).”	“The university’s teaching mission is fulfilled.”	“SCH-maximization games are played”: duplication of classes, competition for service courses.

Modified from Roache (more: comm. 2015) with permission

Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hyper-competition, Marc A. Edwards and Siddhartha Roy, ENVIRONMENTAL ENGINEERING SCIENCE, 34(1), 2017

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## *Incentive*

---

“Researchers rewarded for increased number of publications.”

### *Intended effect*

---

“Improve research productivity,” provide a means of evaluating performance.

### *Actual effect*

---

“Avalanche of” substandard, “incremental papers”; poor methods and increase in false discovery rates leading to a “natural selection of bad science” (Smaldino and McElreath, 2016); reduced quality of peer review

Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hyper-competition, Marc A. Edwards and Siddhartha Roy, ENVIRONMENTAL ENGINEERING SCIENCE, 34(1), 2017

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## *Incentive*

---

“Researchers rewarded for increased number of citations.”

*Intended effect*

---

Reward quality work that influences others.

*Actual effect*

Extended reference lists to inflate citations; reviewers request citation of their work through peer review

Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hyper-competition, Marc A. Edwards and Siddhartha Roy, ENVIRONMENTAL ENGINEERING SCIENCE, 34(1), 2017

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## *Incentive*

---

“Researchers rewarded for increased grant funding.”

### *Intended effect*

---

“Ensure that research programs are funded, promote growth, generate overhead.”

### *Actual effect*

---

Increased time writing proposals and less time gathering and thinking about data.  
Overselling positive results and downplay of negative results.

Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hyper-competition, Marc A. Edwards and Siddhartha Roy, ENVIRONMENTAL ENGINEERING SCIENCE, 34(1), 2017

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# *Incentive*

---

Increase PhD student productivity

*Actual effect*

*Intended effect*

---

Lower standards and create oversupply of PhDs. Postdocs often required for entry-level academic positions, and PhDs hired for work MS students used to do.

Higher school ranking and more prestige of program.

---

*Incentive*

---

“Teachers rewarded for increased student test scores.”

“Departments rewarded for increasing U.S. News ranking.”

*Intended effect*

---

“Improve teacher effectiveness.”

“Stronger departments.”

*Actual effect*

---

“Teaching to the tests; emphasis on short-term learning.”

Extensive efforts to reverse engineer, game, and cheat rankings.



Contradictions in CUDOS?

The same R.K. Merton realized later in life that norms have corresponding counter norms

Mitroff, I. I. 1974, Norms and Counter-Norms in a Select Group of the Apollo Moon Scientists: A Case Study of the Ambivalence of Scientists, American Sociological Review, 39, 579–595.

# NORMS AND COUNTER-NORMS IN A SELECT GROUP OF THE APOLLO MOON SCIENTISTS: A CASE STUDY OF THE AMBIVALENCE OF SCIENTISTS\*

IAN I. MITROFF

American Sociological Review 1974, Vol. 39 (August): 579-595

*This paper describes a three and a half year study conducted over the course of the Apollo lunar missions with forty-two of the most prestigious scientists who studied the lunar rocks. The paper supports the Merton-E. Barber concept of sociological ambivalence, that social institutions reflect potentially conflicting sets of norms. The paper offers a set of counter-norms for science, arguing that if the norm of universalism is rooted in the impersonal character of science, an opposing counter-norm is rooted in the personal character of science. The paper also argues that not only is sociological ambivalence a characteristic of science, but it seems necessary for the existence and ultimate rationality of science.*

Three-and-a-half-year study conducted over the course of the Apollo lunar missions with forty-two of the most prestigious scientists who studied the lunar rocks

The paper supports the Merton-E. Barber concept of sociological ambivalence, that social institutions reflect potentially conflicting sets of norms

[We must] consider, first, how potentially contradictory norms develop in every social institution; next, how in the institution of science conflicting norms generate marked ambivalence in the lives of scientists; and finally, how this ambivalence affects the actual, as distinct from the supposed, relations between men of science (Merton, 1963a:80).

- Solitariness (secrecy, miserism) is often used to keep findings secret in order to be able to claim patent rights...

Instead of Communalism

- Particularism [...] a real issue, particularly when you consider the ratio of researchers in rich countries compared with those in poor countries

Instead of Universalism



- Interestedness arises because scientists have genuine interests at stake in the reception of their research...  
Instead of Disinterestedness

- Dogmatism because careers are built upon a particular premise (theory) being true...

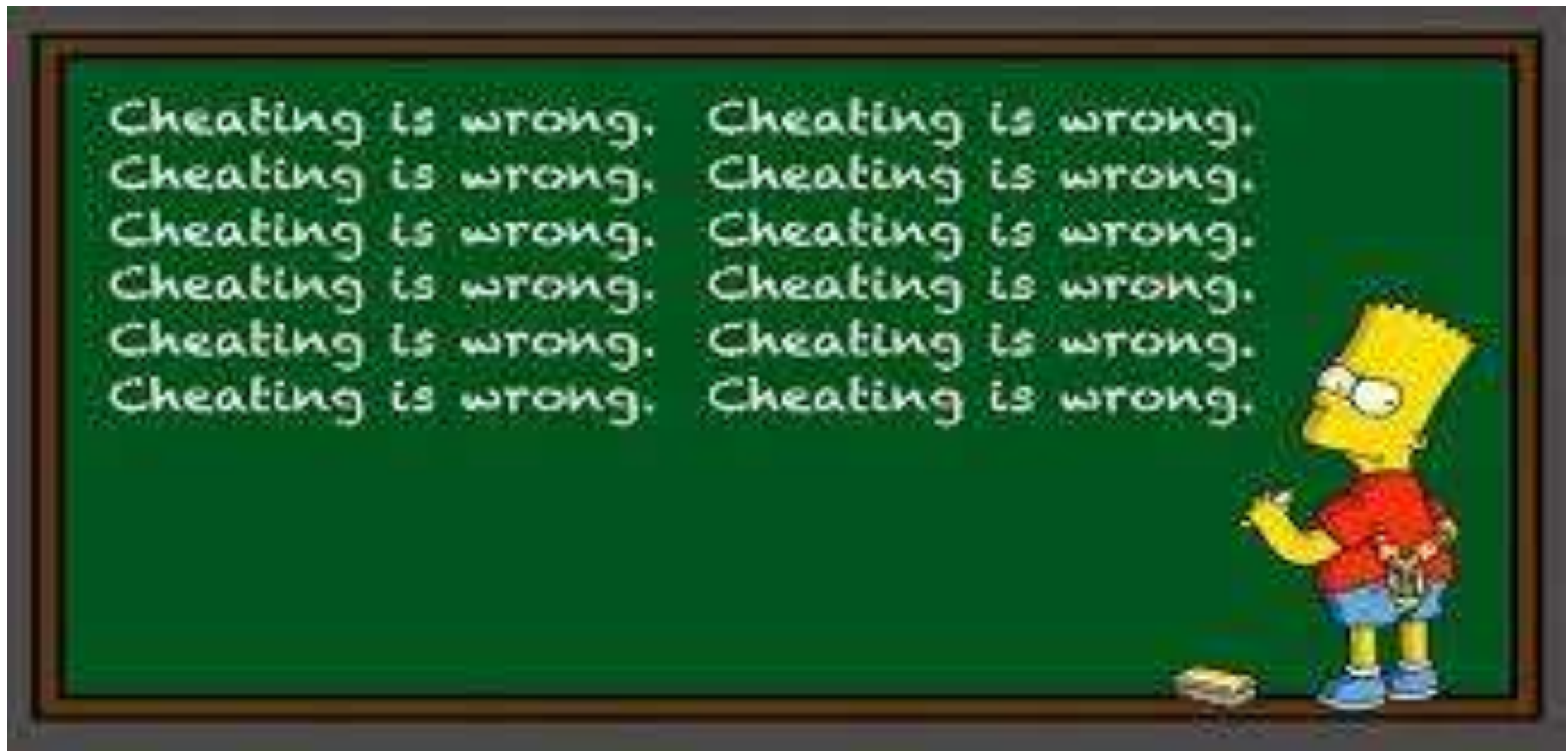
Instead of Organized  
Skepticism



## Definition of *integrity*

3 : the quality or state of being complete or undivided : [completeness](#)

Wrapping up: being of 'one piece' in the present configuration is fraught with difficulties



@andreasaltelli