



# How to translate ethics to PhD students

Andrea Saltelli

Open Evidence Research, Open University of Catalonia

OUC Doctoral School Workshop: “Tools and strategies for the motivation and follow-up of PhD students”

Thursday, 13 May 2021



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

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CAETERIS ARE  
NEVER PARIBUS

## Tweets by @AndreaSaltelli



**andrea saltelli**

@AndreaSaltelli

Rapper. Arrested. 2021? 🤔 <https://twitter.com/guardian/status/1362147283492552712>



55m



andrea saltelli Retweeted



**Philip Stark**

@philipstark

Replying to @AndreaSaltelli and 13 others

The IHME COVID model qualifies. The underlying Farr model was debunked by the AIDS epidemic, and its 95% next-day prediction intervals for deaths missed up to 70% of the time btw 3/20 & 8/20 [arxiv.org/abs/2004.04734](https://arxiv.org/abs/2004.04734) & [royalsocietypublishing.org/doi/10.1098/rs...](https://royalsocietypublishing.org/doi/10.1098/rs...)



14h

Ontology, epistemology, ethics ...

Ethics is pills, from the golden rule  
to Bentham to Rawls ...





## **Definition of *integrity***

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

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

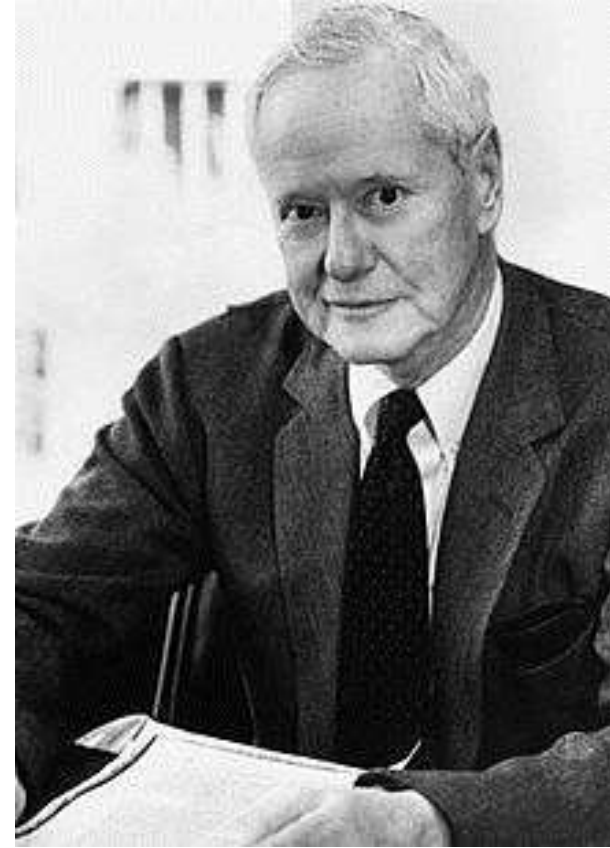
3 : the quality or state of being complete or undivided : [completeness](#)



## 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;

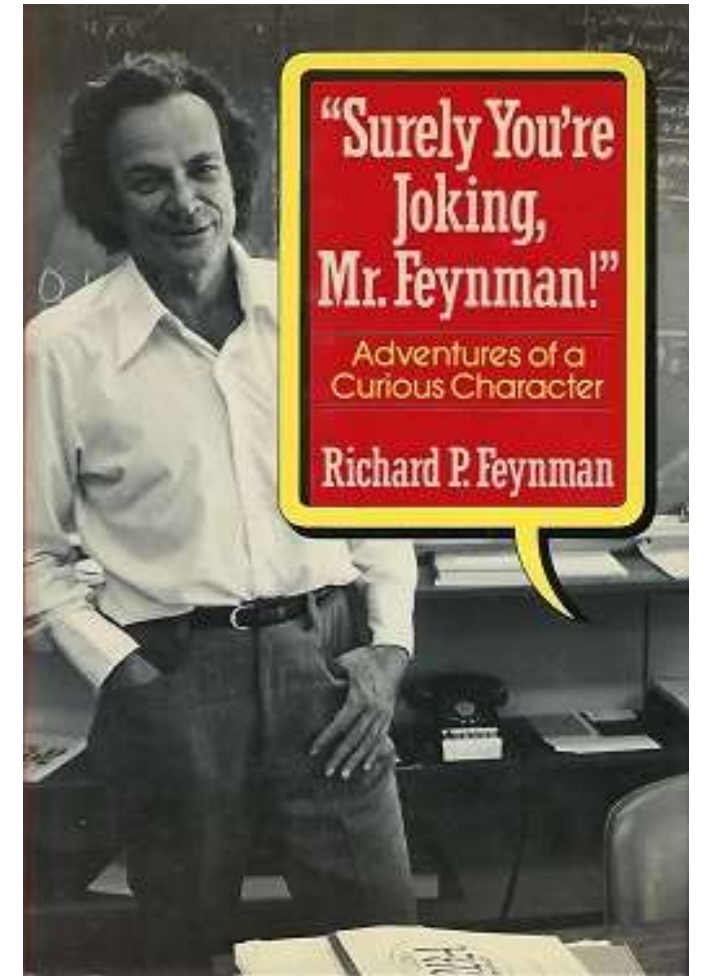
**Disinterestedness** – according to which scientists are rewarded for acting in ways that outwardly appear to be selfless;

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



<https://calteches.library.caltech.edu/51/2/CargoCult.htm>

Caltech's speech  
(1974) of Richard  
Feynman about  
what organized  
scepticism is  
about







## 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?





Francis Bacon  
(1561–1626)

We call Cartesian dream the idea of man as master and possessor of nature, of prediction and control, of Bacon's wonders of science and of Condorcet's *mathematique sociale*...

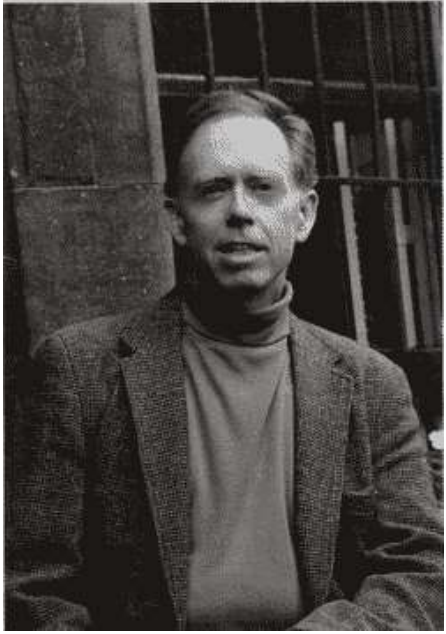


René Descartes  
(1596–1650)



Nicolas de Caritat, marquis de  
Condorcet  
(1743– 1794)

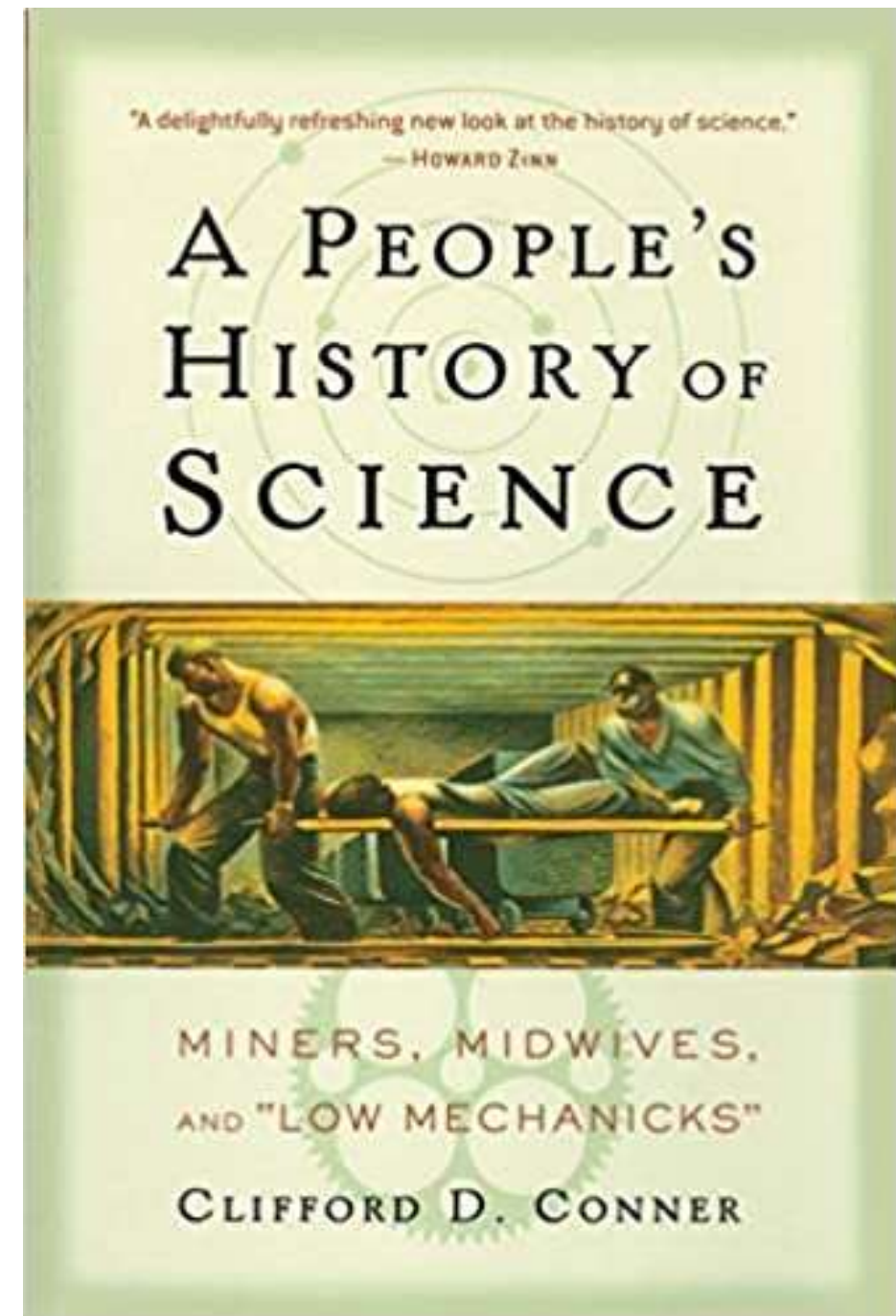
# What is science?



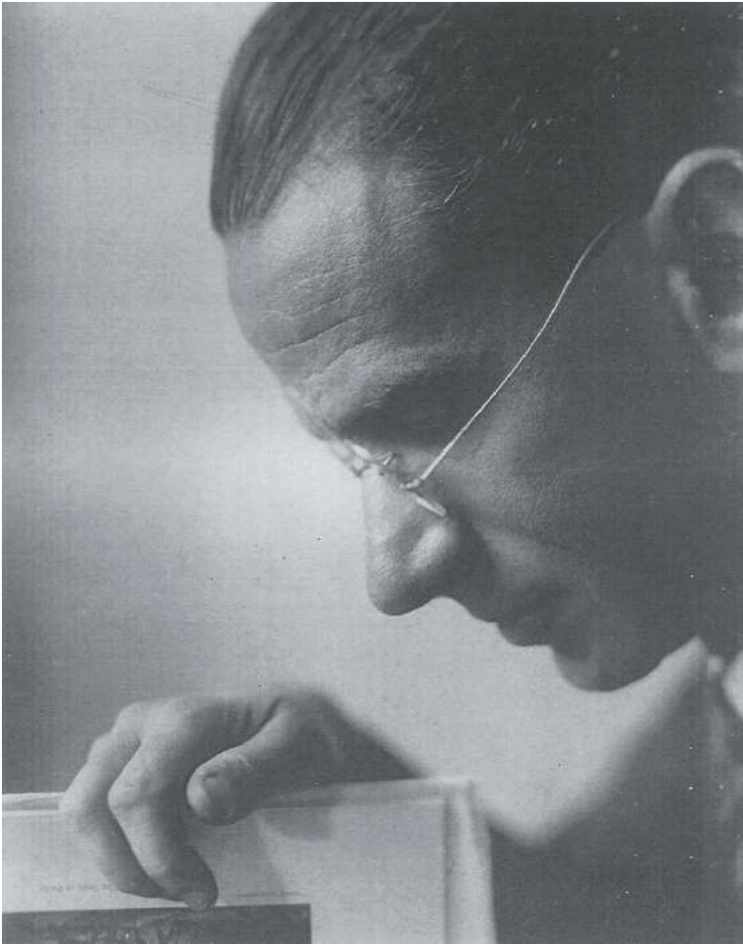
Clifford D. Conner

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

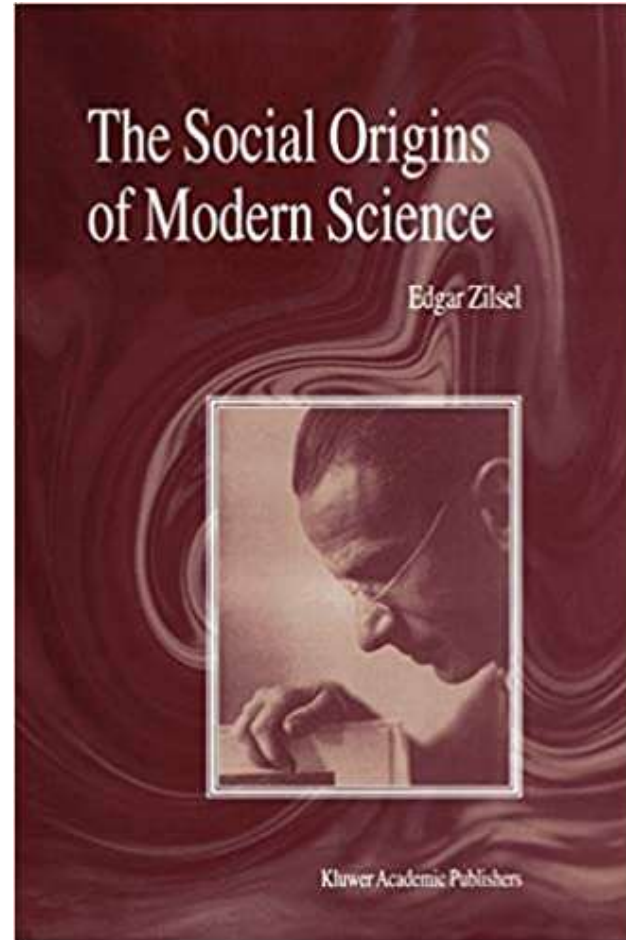
‘Knowing what’ was often only possible after  
‘knowing how’ had been discovered







Edgar Zilsel  
(1891–1944)



The Zilsel thesis:

- Superior artisans,
- Secular humanists,
- University scholars

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

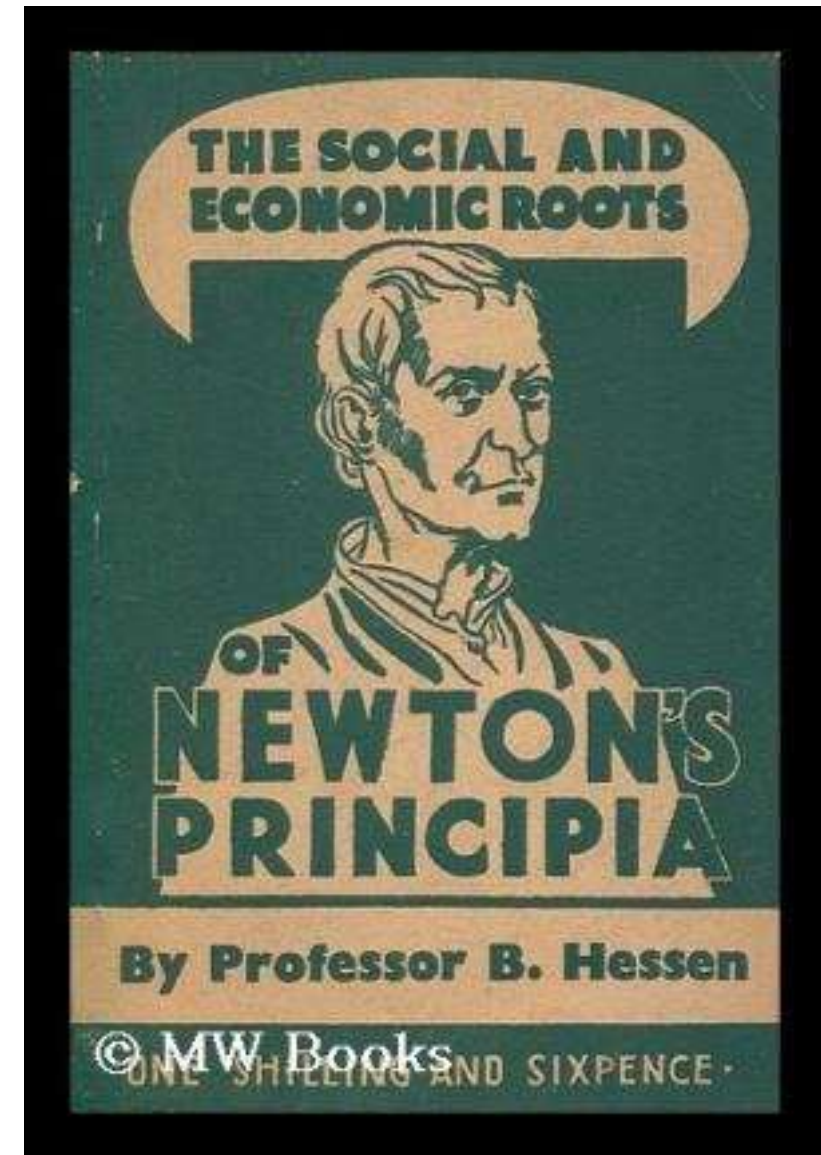


Boris Hessen  
(1893–1936)

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'





## **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?

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



Source: The Economist, Trouble  
at the lab, Oct 19th 2013.

**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**

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Dear Andrea Saltelli,  
I hope everything is going well.



Google Cus

We cordial

As you bei

If you have

Hoping

SUBMIT MANUSCRIPT

ISSN: 2575-7091  
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A photograph of a bowl of green leafy vegetables and a slice of orange.

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





## 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



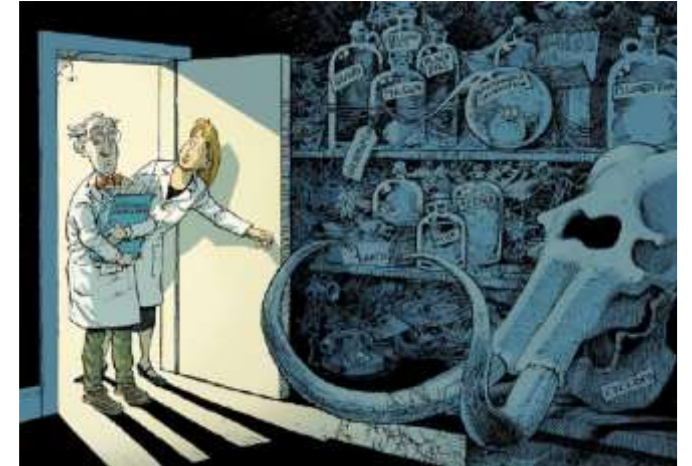
# Why science's crisis should not become a political battling ground

Andrea, Saltelli 



Silvio Funtowicz

The crisis is methodological,  
epistemological, ethical and  
metaphysical



COMMENT • 20 MARCH 2019

## Scientists rise up against statistical significance

Valentin Amrhein, Sander Greenland, Blake McShane and more than 800 signatories call for an end to hyped claims and the dismissal of possibly crucial effects.

Valentin Amrhein , Sander Greenland & Blake McShane



**nature**

International journal of science



# Powerful drivers: the crisis will be worse before it can be better

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

ROYAL SOCIETY  
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

## 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



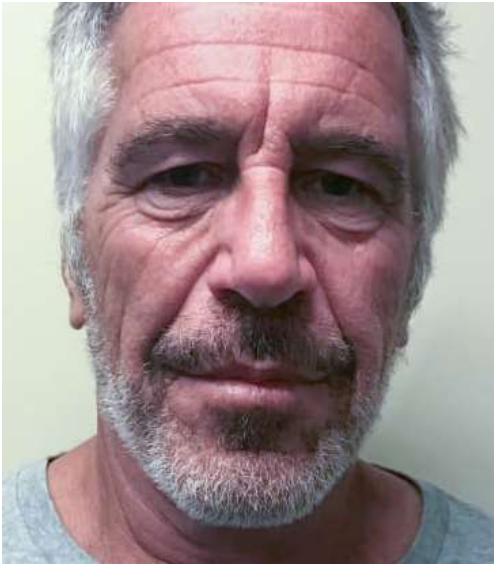




I. Graber-Stiehl, "Science's pirate queen," *Verge*, Feb-2018.



Kazakhstani scientist  
Alexandra Elbakyan



Jeffrey Epstein  
& paedophilia



Sackler family  
& opioids



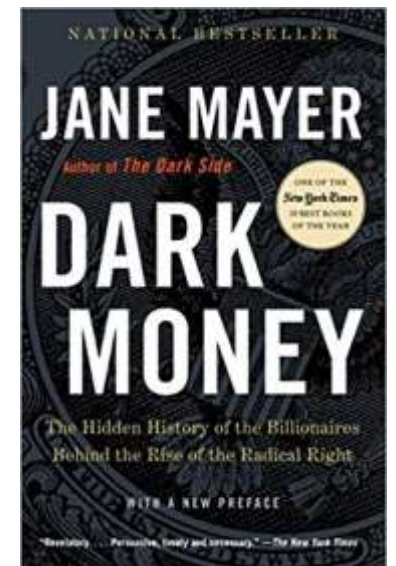
Koch brothers  
& climate

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

ADAM ROGERS

SCIENCE 09.15.2019 07:00 AM

WIRED





## 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



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



Prosecutors say Charles M. Lieber, the chair of Harvard's chemistry department, lied about contacts with a Chinese state-run initiative that seeks to draw foreign-educated talent.



By **Ellen Barry**

Jan. 28, 2020

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

## 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](#)

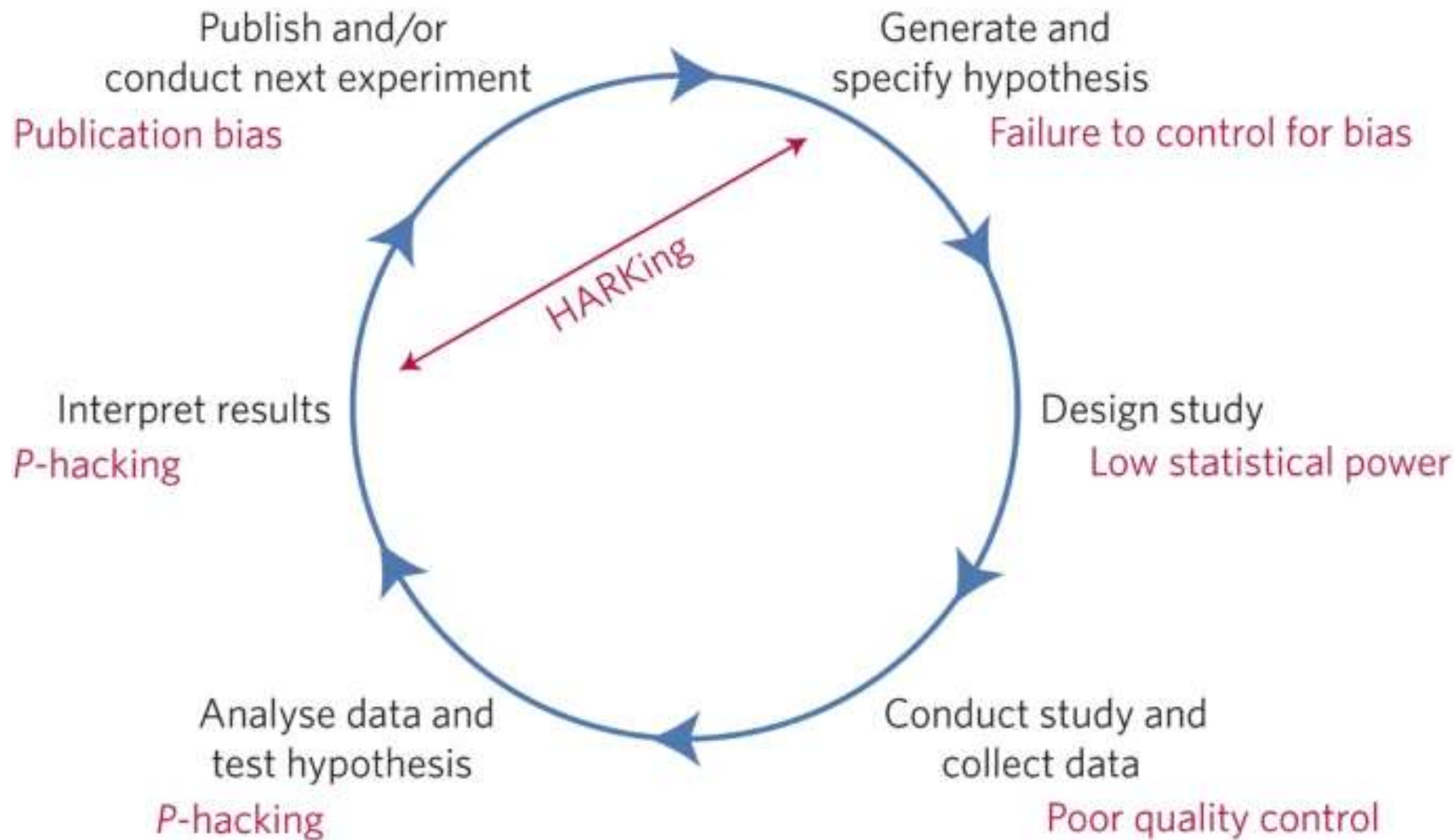


# nature human behaviour

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





# 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.

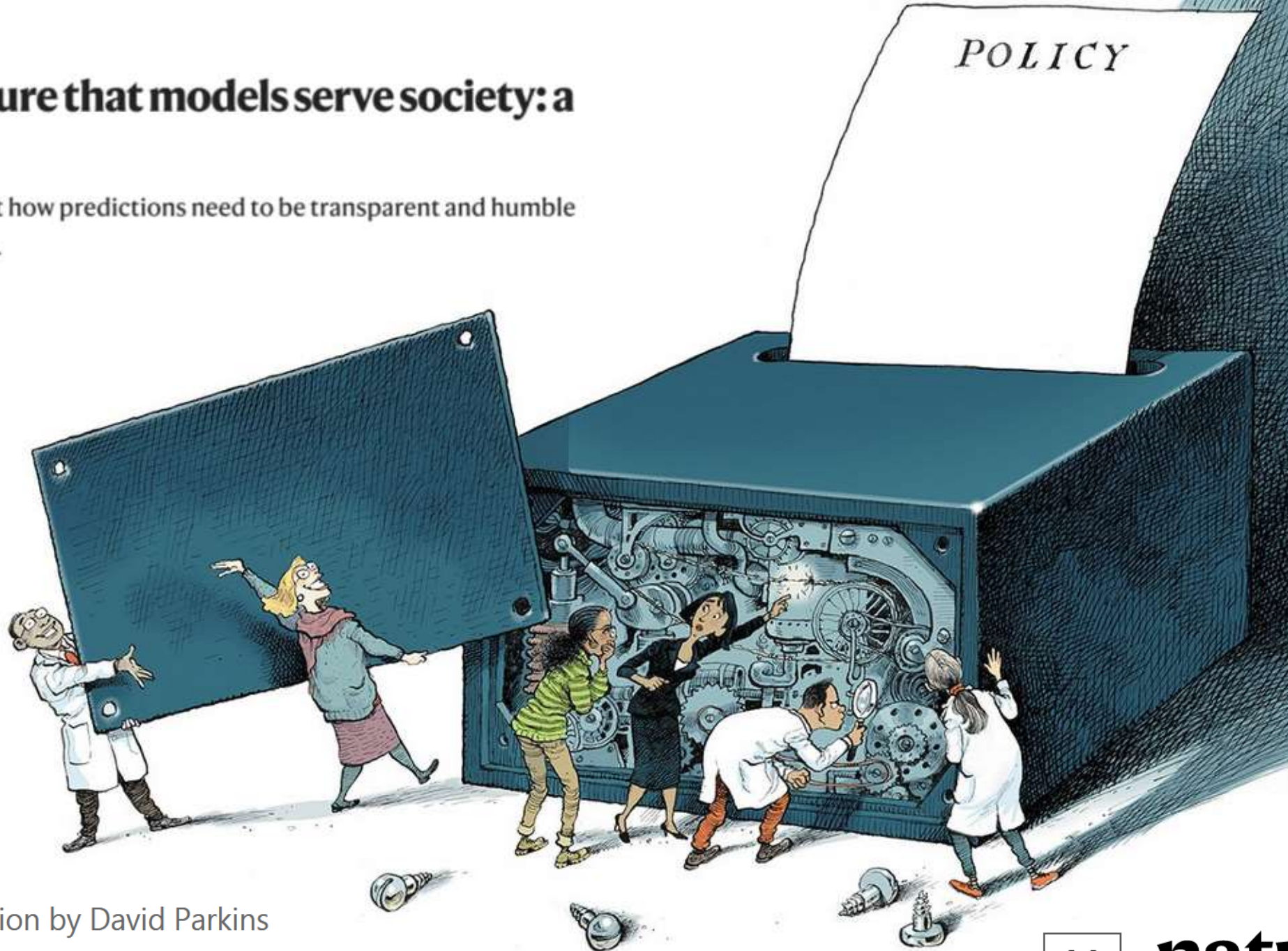


Illustration by David Parkins



**nature**

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*

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“Researchers rewarded for increased number of publications.”

### *Intended effect*

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

### *Actual effect*

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“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

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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

Ethics → Integrity → Mertonian norms →  
What is science? → Integrity & science's  
crisis → Integrity and living through  
contradictions



# The End



@andreasaltelli