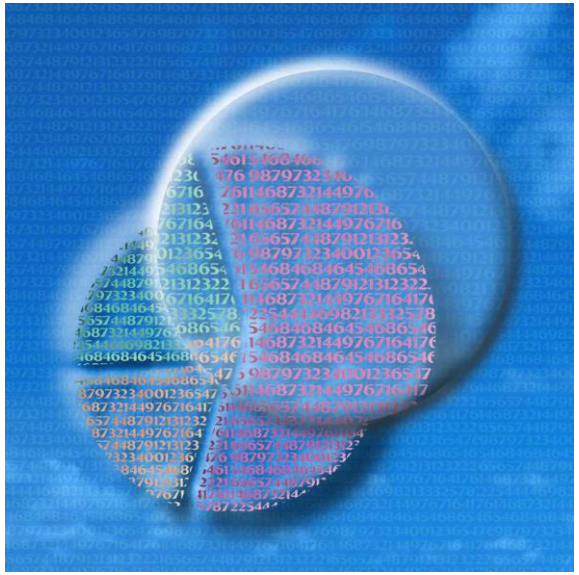


Ethics of quantification

Andrea Saltelli
Open Evidence Research, Open University of Catalonia

Universitat Oberta de Catalunya

OPEN EVIDENCE

Department of Biomedical Sciences and Public Health,
Polytechnic University of the Marches, May 6, 2021

Where to find this talk: www.andreasaltelli.eu

Quantifications and the roots of the Cartesian dream

Separate but related stories

Cartesian dream: possess and domination of nature

The ‘procedural utopia’: grounding social harmony and progress in calculations

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)

Francis Bacon
(1561–1626)

Magnalia Naturae, in the New Atlantis (1627),

'Wonders of nature, in particular with respect to human use'

The prolongation of life; The restitution of youth in some degree; The retardation of age; The curing of diseases counted incurable; The mitigation of pain; More easy and less loathsome p[illegible]urgings; The increasing of strength and activity; The increasing of a[illegible] suffer torture or pain; The altering of complexions, and fat[illegible]s; The altering of statures; The altering of featur[illegible] exalting of the intellectual parts; Versio[illegible] Making of new species; Transplan[illegible]uments of destruction[illegible]its, and putting them in go[illegible] upon another body, or up[illegible] maturations; Acceleration [illegible]ation of putrefaction; Acceleration [illegible] of germination; Making rich composts for t[illegible]ons of the air, and raising of tempests; Great alteration[illegible]ation, emollition, &c; Turning crude and watery substances into [illegible] and unctuous substances; Drawing of new foods out of substances not now in use; Making new threads for apparel ; and new stuffs, such as paper, glass, &c; Natural divinations; Deceptions of the senses; Greater pleasures of the senses; Artificial minerals and cements.

The study of letters leading to “doubts and errors”;

Comparing “disquisitions of the ancient moralists to very towering and magnificent palaces with no better foundation than sand and mud”;

Condemnation of humanities and exaltation of mathematics.

René Descartes (1596–1650)

Discourse on Method (1637)

“I perceived it to be possible to arrive at knowledge highly useful in life; and in room of the Speculative Philosophy […]

René Descartes (1596-1650)

Discourse on Method (1637)

http://www.bartleby.com/34/1/6.html

“to discover a Practical, by means of which, knowing the force and action of fire, water, air, the stars, the heavens, and all the other bodies that surround us, […]we might also apply them […]

and thus render ourselves the lords and possessors of nature.”

René Descartes (1596-1650)

Discourse on Method (1637)

http://www.bartleby.com/34/1/6.html

In the formulation of Condorcet: “All the errors in politics and in morals are founded upon philosophical mistakes, which, themselves, are connected with physical errors” (Ninth Epoch)

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

‘Sketch for a Historical Picture of the Progress of the Human Spirit’

http://oll.libertyfund.org/titles/1669

Overpopulation? War due to scarcity of resources? Will not happen because technical progress and ethical progress will go hand in hand. Man will understand that his duty “will consist not in the question of giving existence to a greater number of beings, but happiness.” (Tenth Epoch)

Nicolas de Caritat, marquis de Condorcet
(1743- 1794)
‘Sketch for a Historical Picture of the Progress of the Human Spirit’

http://oll.libertyfund.org/titles/1669

‘Mathématique sociale’: We still use today terms such as ‘Condorcet method’, ‘Condorcet winner’, ‘Condorcet-ranking procedure’

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

‘

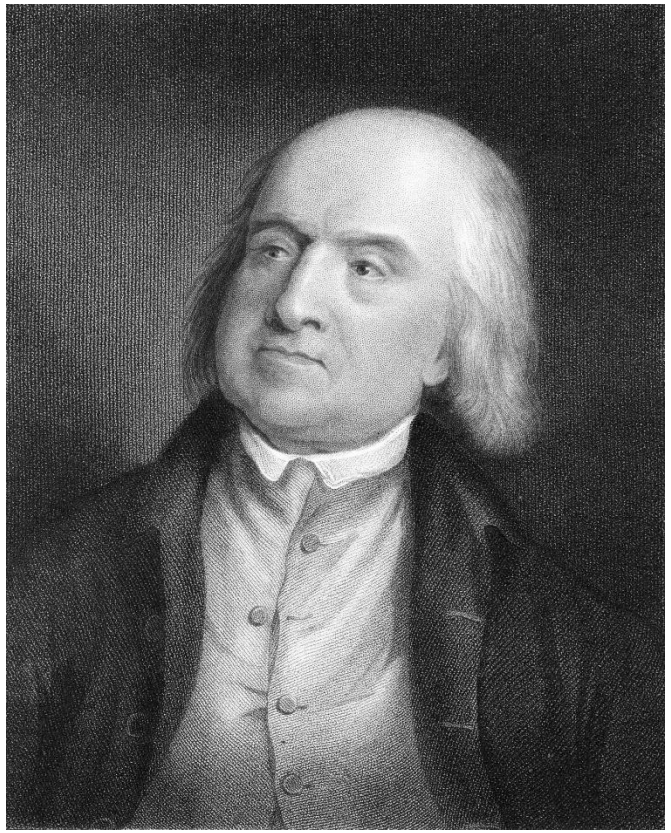
Feldman, J., 2005, Condorcet et la mathematique sociale: enthousiasmes et bemols, Mathematics and Social Sciences, 172(4), 7-41, http://www.ehess.fr/revue-msh/pdf/N172R955.pdf

Munda G. (2007) - Social multi-criteria evaluation, Springer-Verlag, Heidelberg, New York, Economics Series

Condorcet's algorithms and Descartes' Geometry: the dream always had a quantification agenda

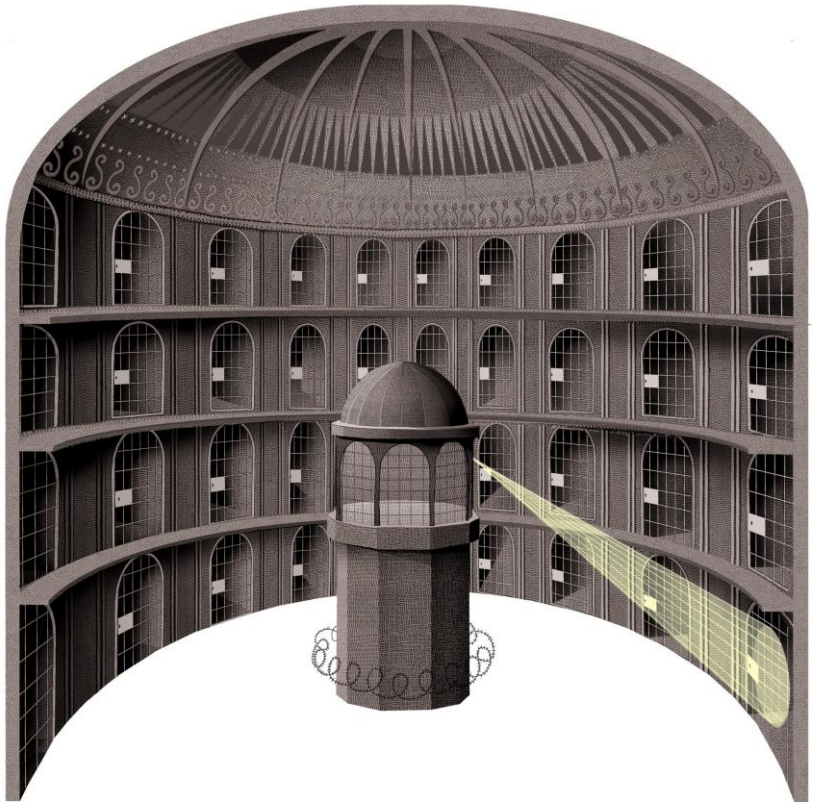
Condorcet's Mathématique sociale had its continuation in Bentham's utilitarianism

Marquis de Condorcet (1743- 1794)



Jeremy Bentham (1748-1832)

Panopticon

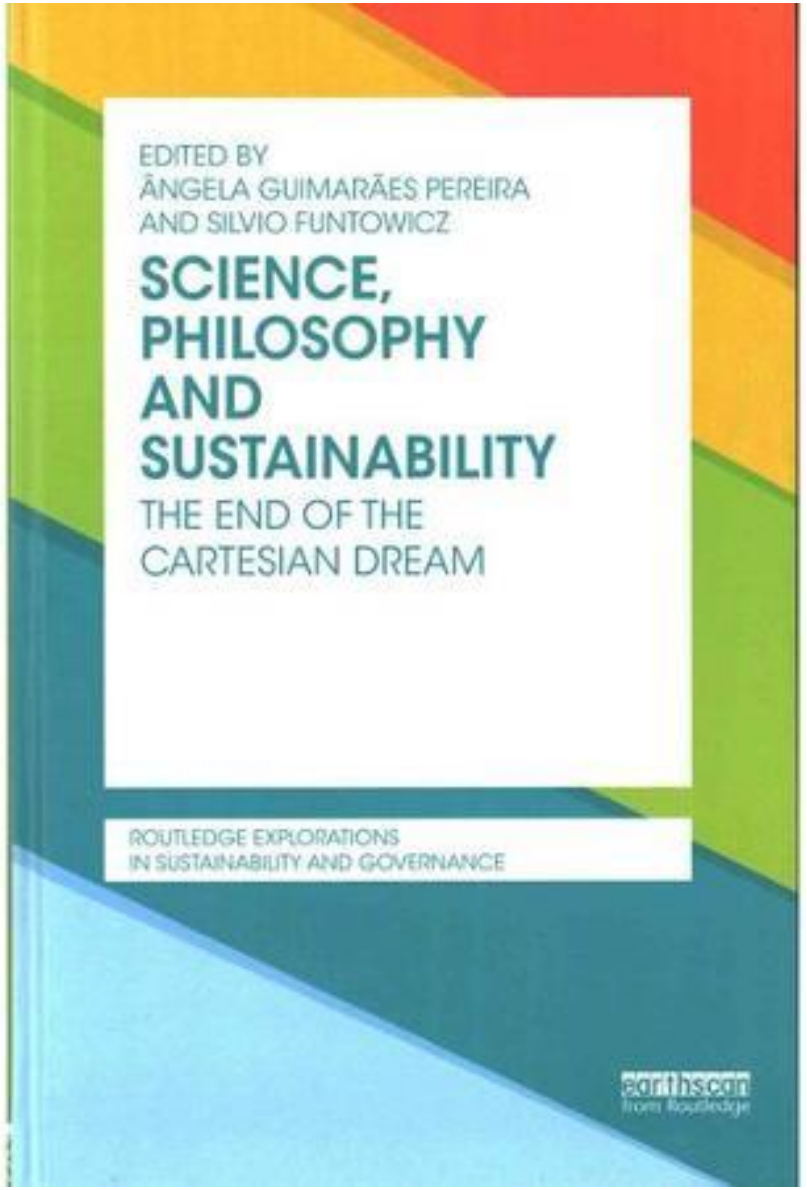


Artwork: Adam Simpson, New York Times

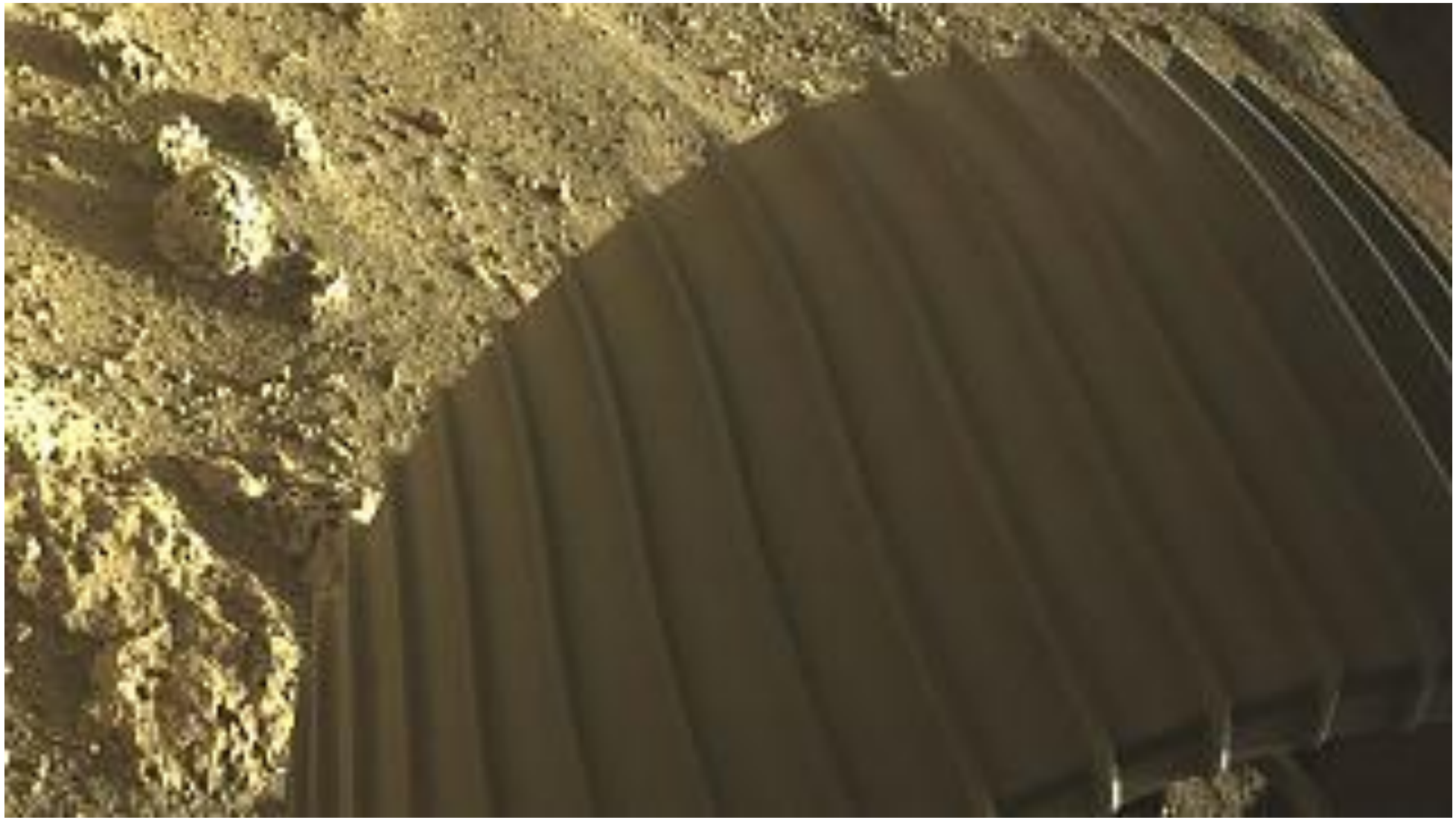
Ravetz, J, R, 2015, Descartes and the rediscovery of ignorance,

in

Guimarães Pereira, Â, and Funtowicz, S, Eds, 2015, The end of the Cartesian dream, Routledge.

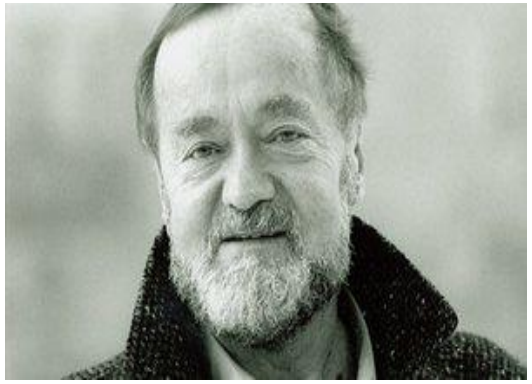


The success of the Cartesian dream



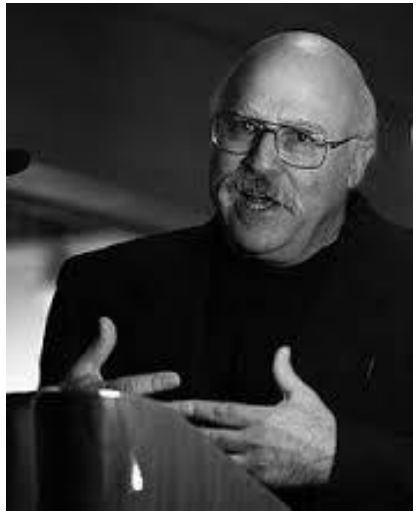
February 18, 2021, Landing of Perseverance on Mars

If you are a natural scientists you were nourished and trained in the Cartesian dream, (S. Toulmin: ‘The hidden agenda of modernity’)



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).

Many voices of alarm as to misuse of quantification

Numbers, visible and invisible…

Blurring lines:

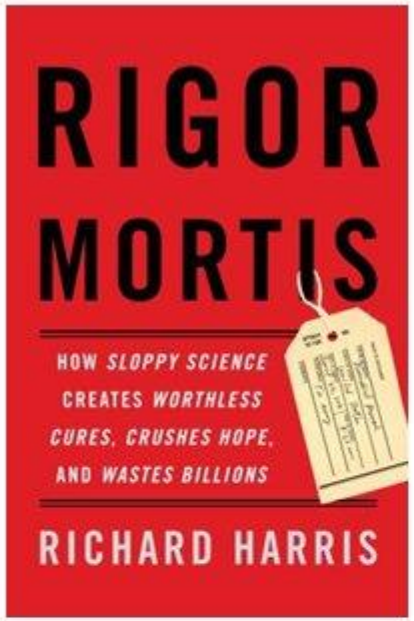
"what qualities are specific to rankings, or indicators, or models, or algorithms?"

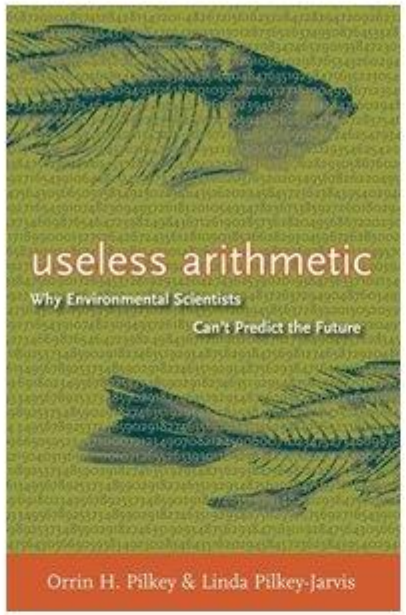
Elizabeth Popp Berman

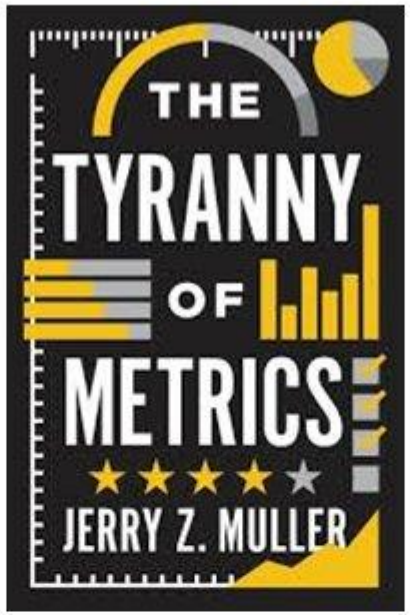
E. Popp Berman and D. Hirschman, The Sociology of Quantification: Where Are We Now?, Contemp. Sociol., vol. in press, 2017.

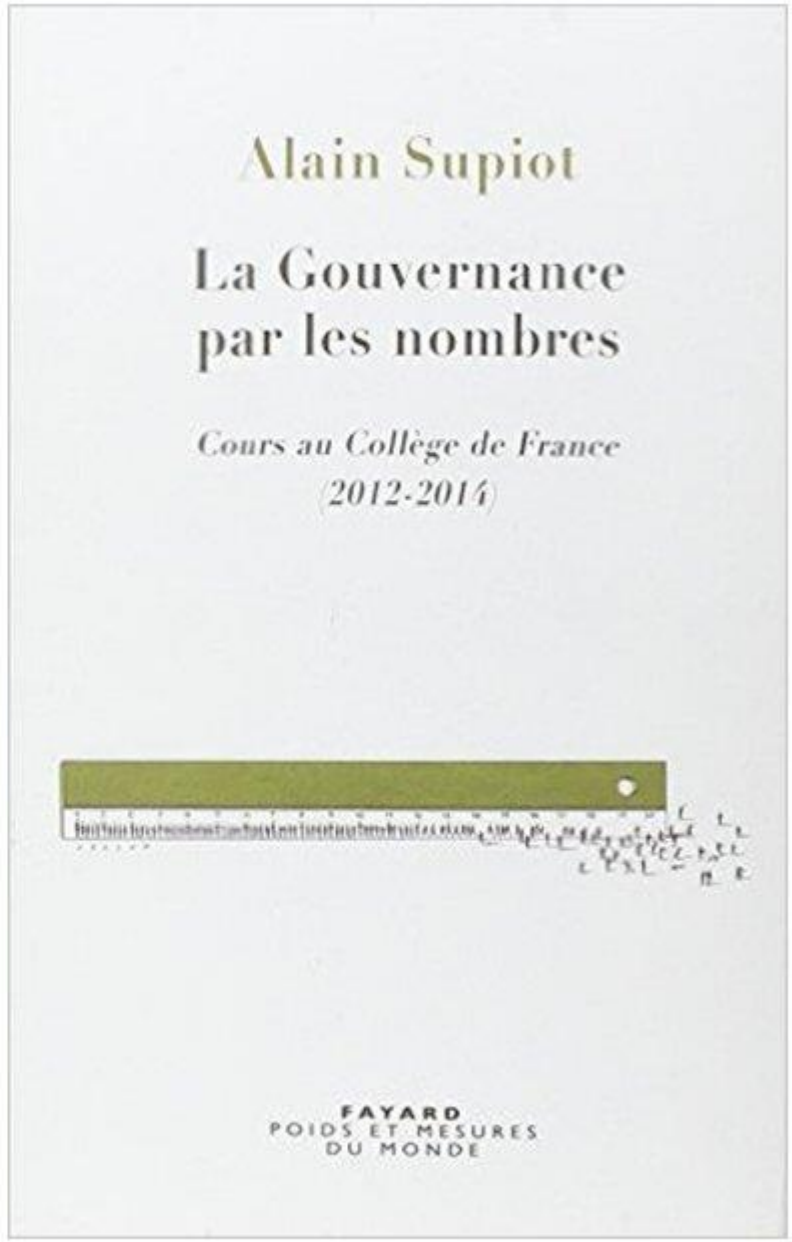
And an explosion of works, from within and without, from many disciplines

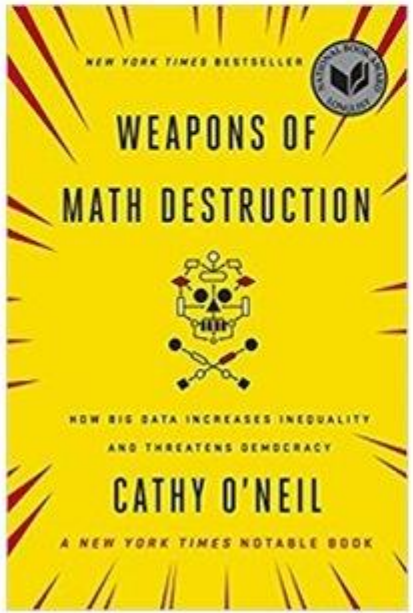
Algorithms, models, metrics, statistics…

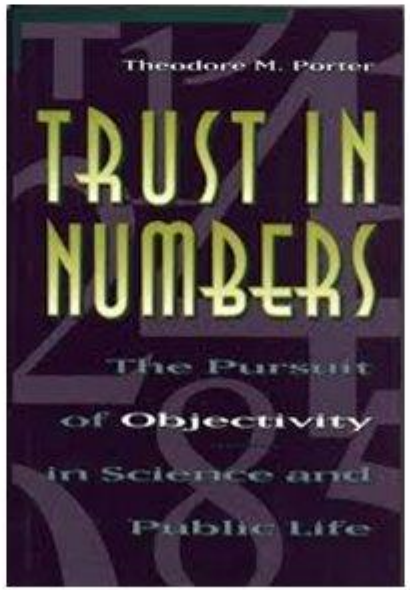




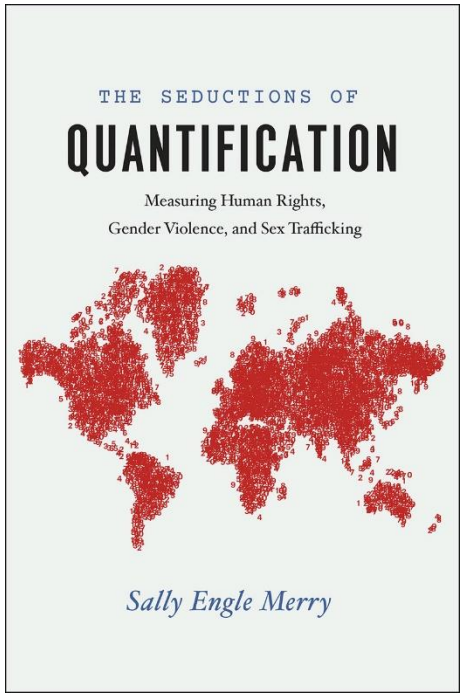


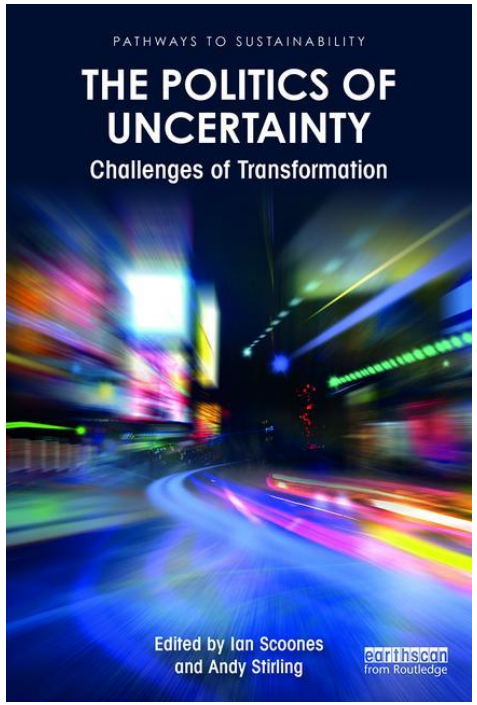


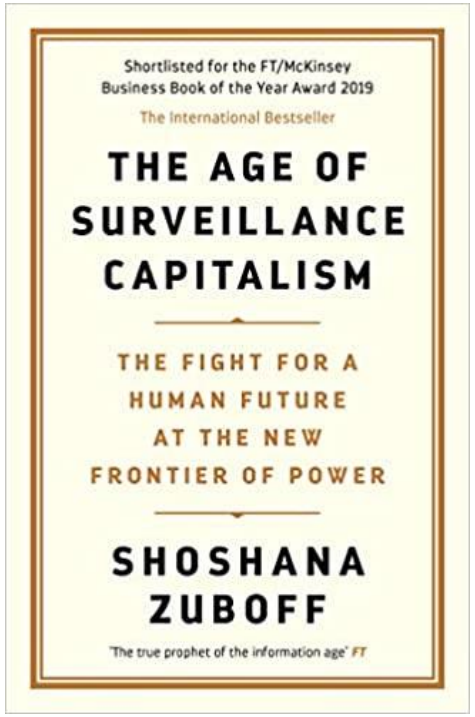


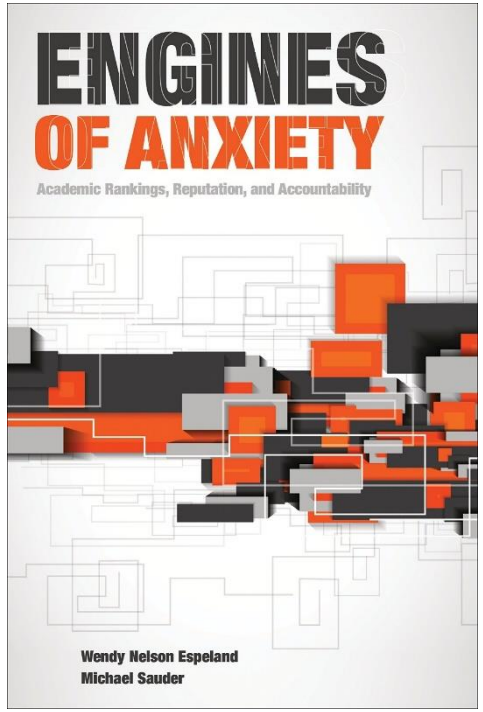


Algorithms, models, metrics, statistics…









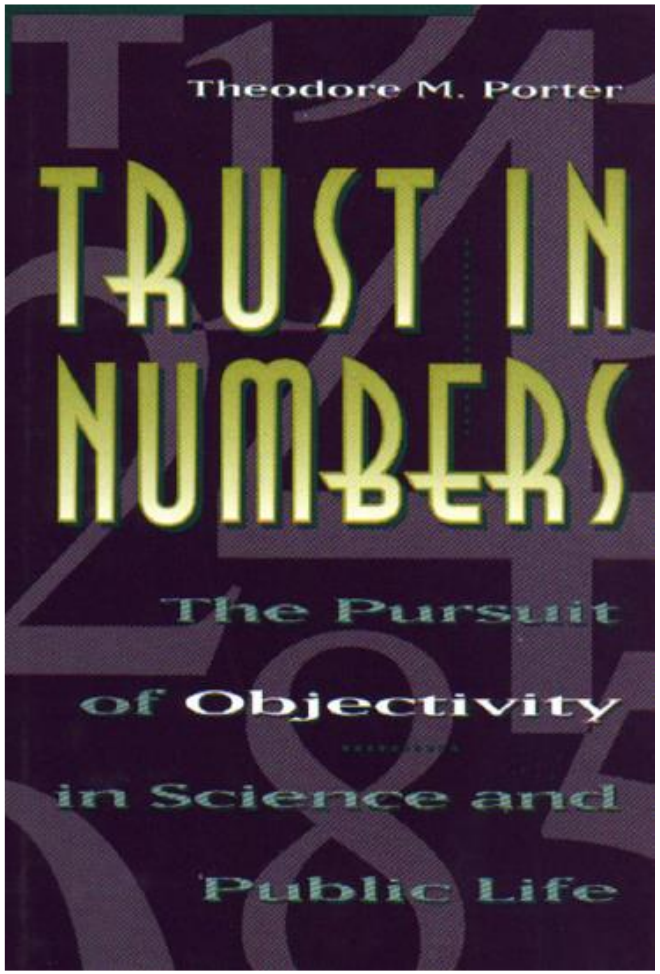
Numbers and their ‘reactivity’
(Espeland and Sauder, 2016)

Incumbent numbers affect what society will measure in the future (Merry 2016)

Numbers “create the environment that justifies their assumptions”
(O’Neil, 2016)

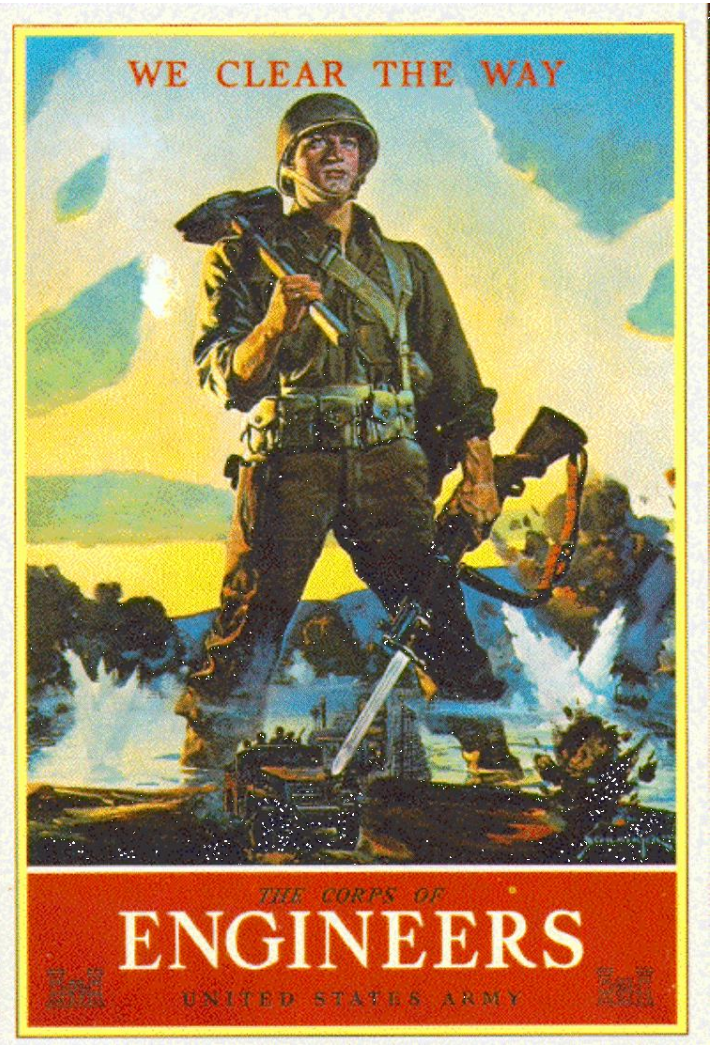
Numbers and trust

Theodor
M. Porter



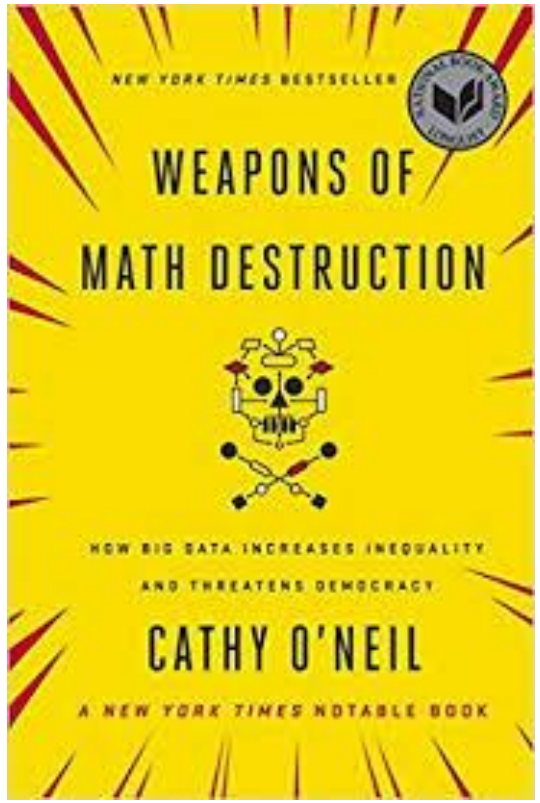
Theodore M. Porter, Trust in Numbers,
The Pursuit of Objectivity in Science and Public Life, Princeton 1995

Porter's story: Quantification needs judgment which in turn needs trust …without trust quantification becomes mechanical, a system, and 'systems can be played'.



Alarm for Weapons of Math Destruction

Cathy O’Neil

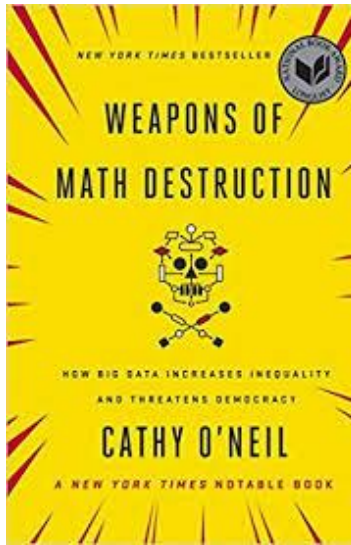


O’Neil, C. (2016). Weapons of math destruction : how big data increases inequality and threatens democracy. Random House Publishing Group.

Opacity (also because of trade secrecy) of algorithms used to decide on recruiting, carriers (including of researchers), prison sentencing, paroling, custody of minors, political campaigns…

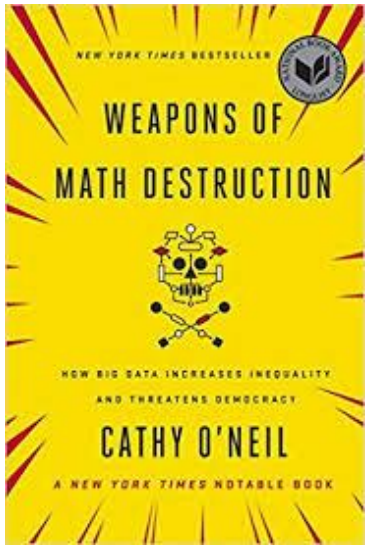
O'Neil, C. (2016). Weapons of math destruction : how big data increases inequality and threatens democracy. Random House Publishing Group.

Brauneis, R., & Goodman, E. P. (2018). Algorithmic Transparency for the Smart City. Yale Journal of Law & Technology, 20, 103–176. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3012499



Opacity coupled with opportunity for scale and damage and with non-appealability make them an instrument of oppression & inequality

Cathy O'Neil Google talk https://www.youtube.com/watch?v=TQHs8SA1qpk

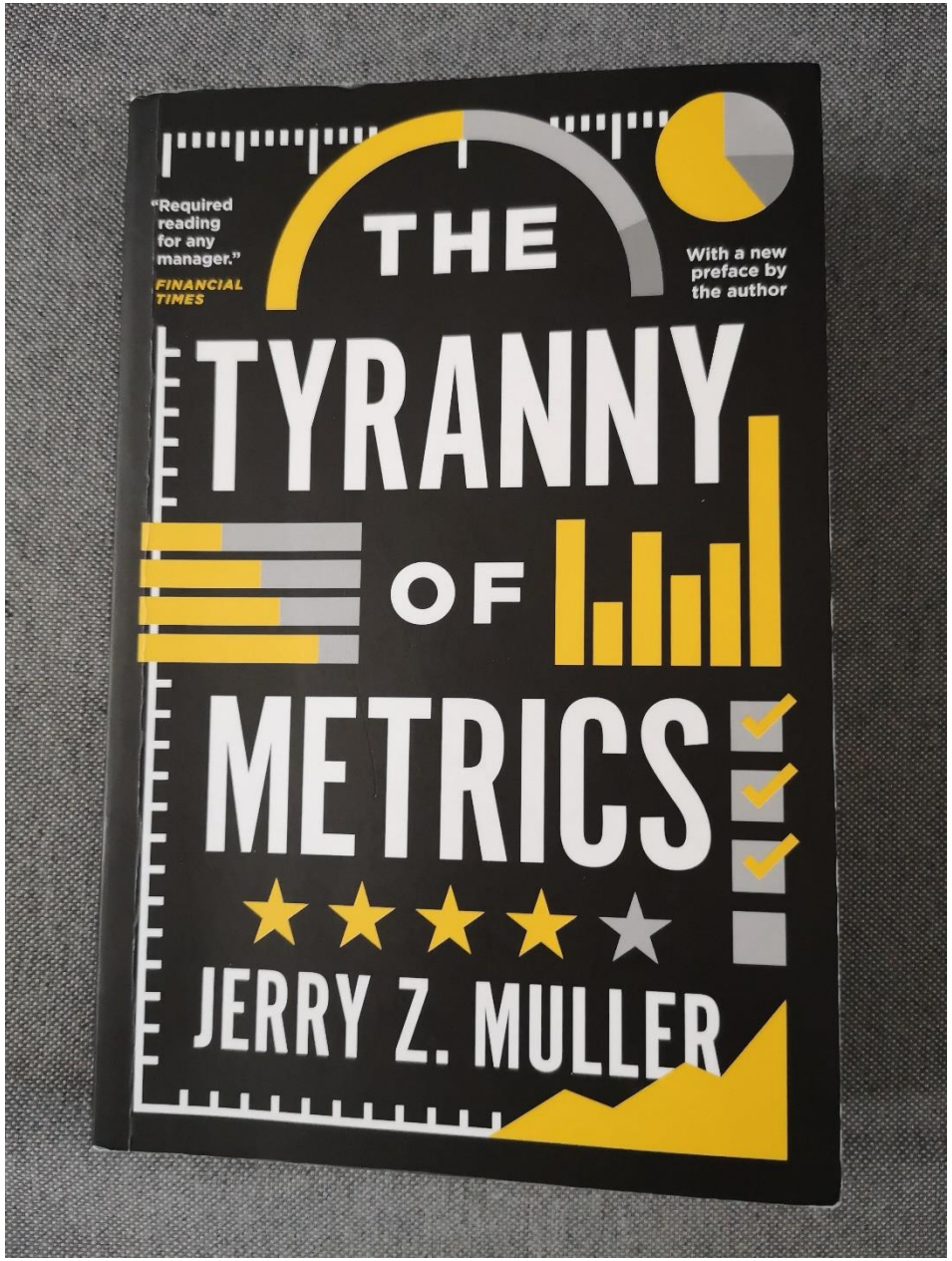


Charles Goodhart

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."

Also known as Campbell's law (1976);
https://en.wikipedia.org/wiki/Goodhart%27s_law

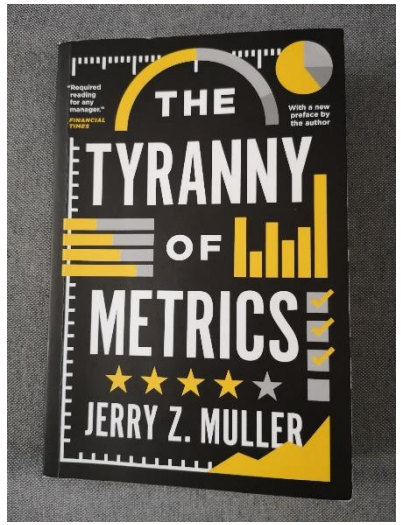


J. Z. Muller, The tyranny of metrics. Princeton University Press , 2018.

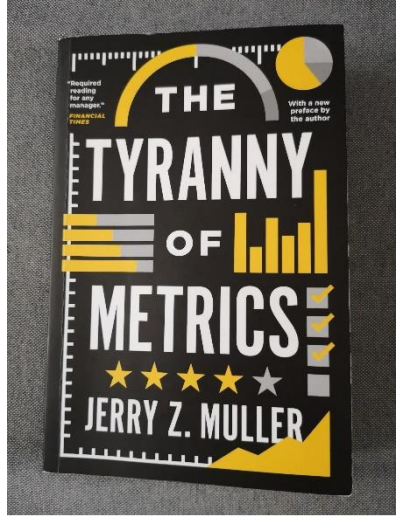
Metric fixation, or the irresistible pressure to measure performance

Gaming of metrics (recall Goodhart law)

A wealth of case studies from education to war to medicine to foreign aid..



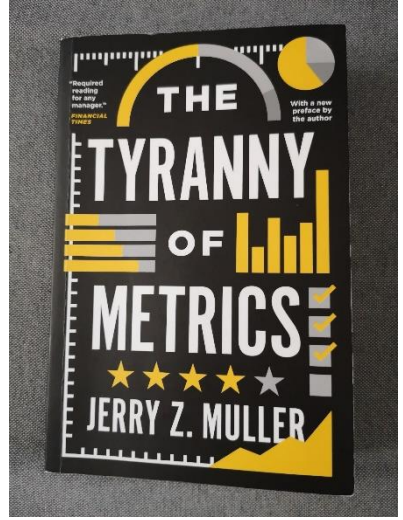
Unintended consequences: a litany



- Goal displacement
- Short termism
- Diminishing utility
- Rule cascade
- Discouraging risk taking
- Discouraging innovation
- Rewarding luck
- Discouraging cooperation and common purpose
- Degrading work
- Time waste
- Loss of productivity

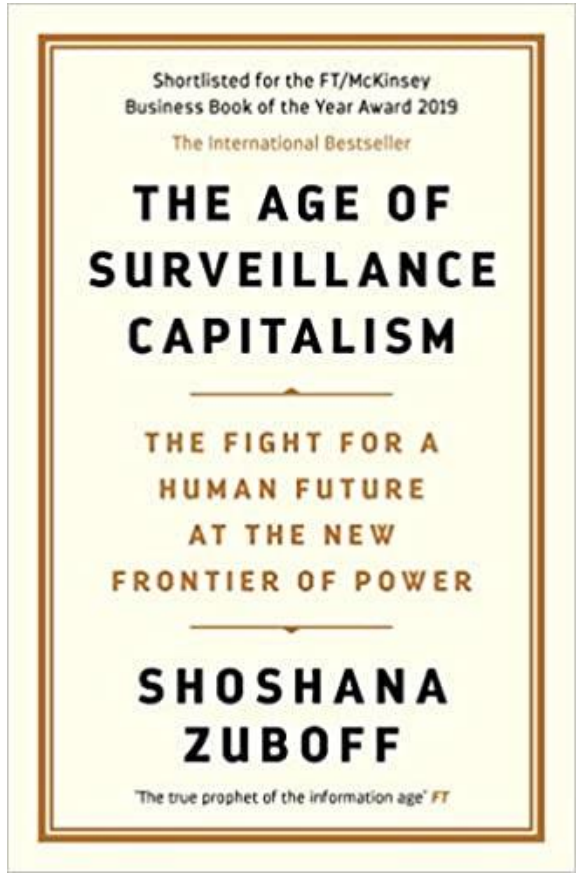
A concluding remark

Considering all of the above keep in mind at every step that “the best use of metrics may be not to use it at all”



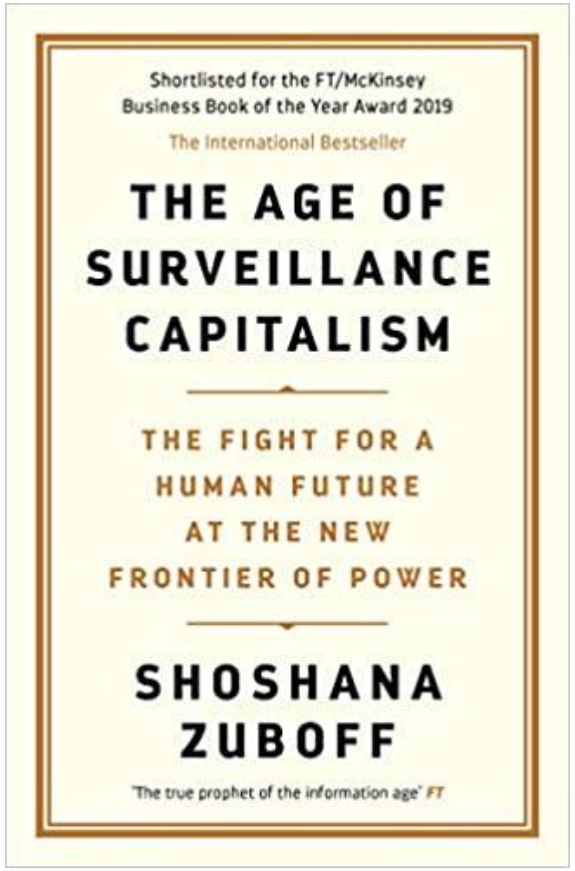
Do we need a movement of resistance?

I. Bruno, E. Didier, and J. Prévieux, Stat-activisme. Comment lutter avec des nombres. Paris: Zones, La Découverte, 2014



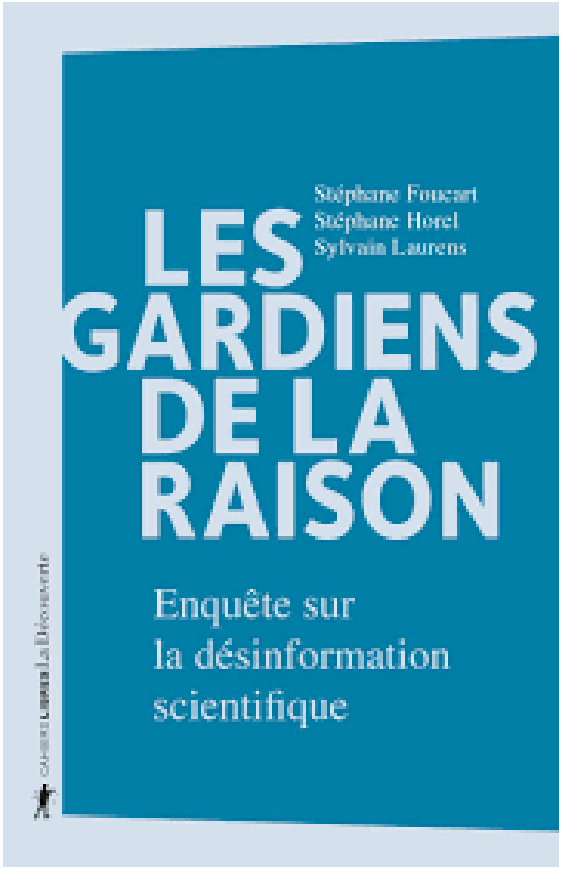
A project of domination of consumers and voters is made possible by artificial intelligence, big data & cognitive psychology

Inequality, power asymmetries and the world of surveillance capitalism



Chapters 11 & 12

Instrumentarian power



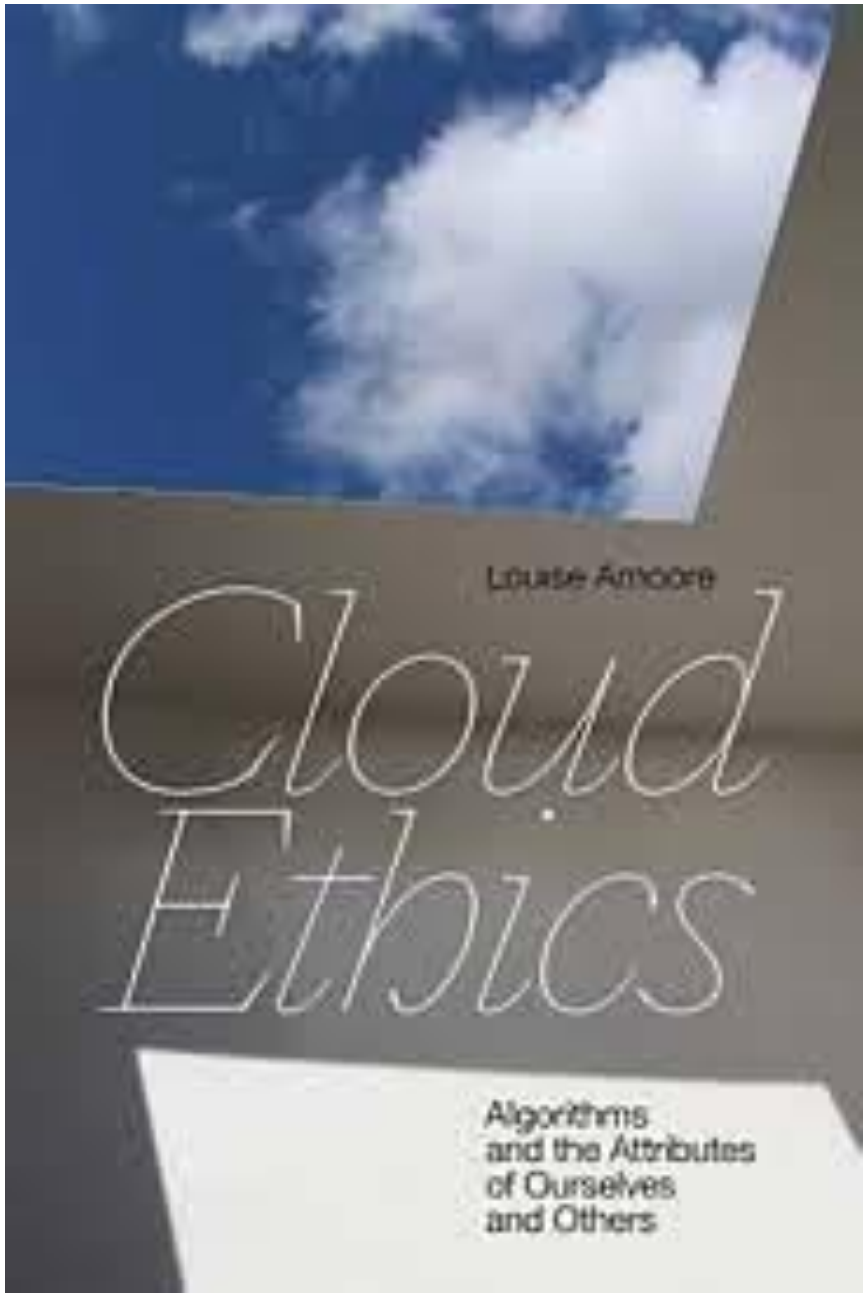
Chapter 10

Néorationalism d' importation

La trollisation de l'espace public

Cognitive psychology and evolutionary psychology

A project of domination?



Making algorithms ‘good’ or ‘transparent’ is beyond the point. Algorithms create new norms of good or bad.

Algorithm = ethicopolitical arrangement of values, assumptions, and propositions about the world

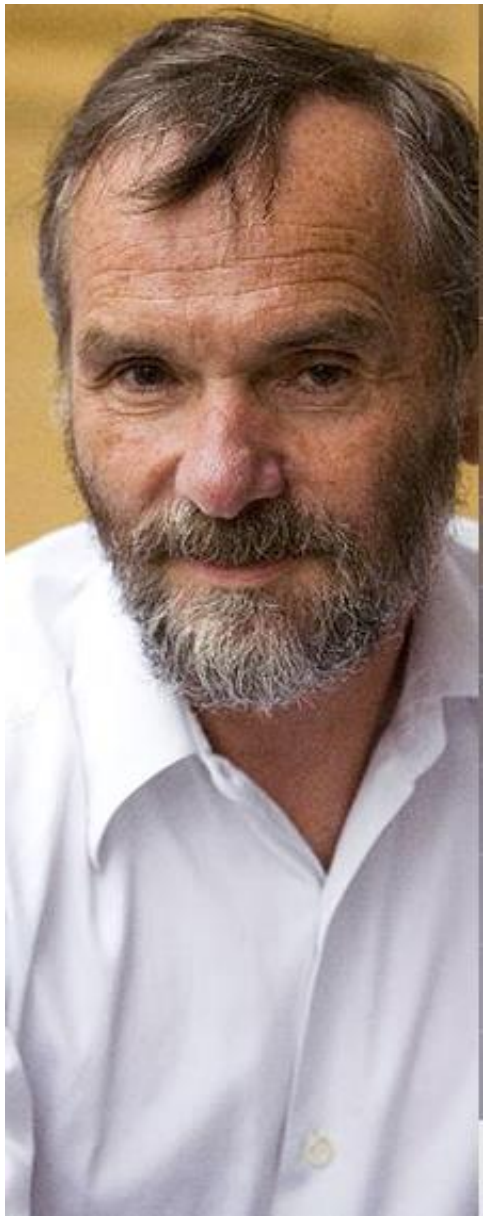
Louise Amoore

Nick Couldry and Ulises Mejias

Data colonialism: rethinking big data's relation to the contemporary subject

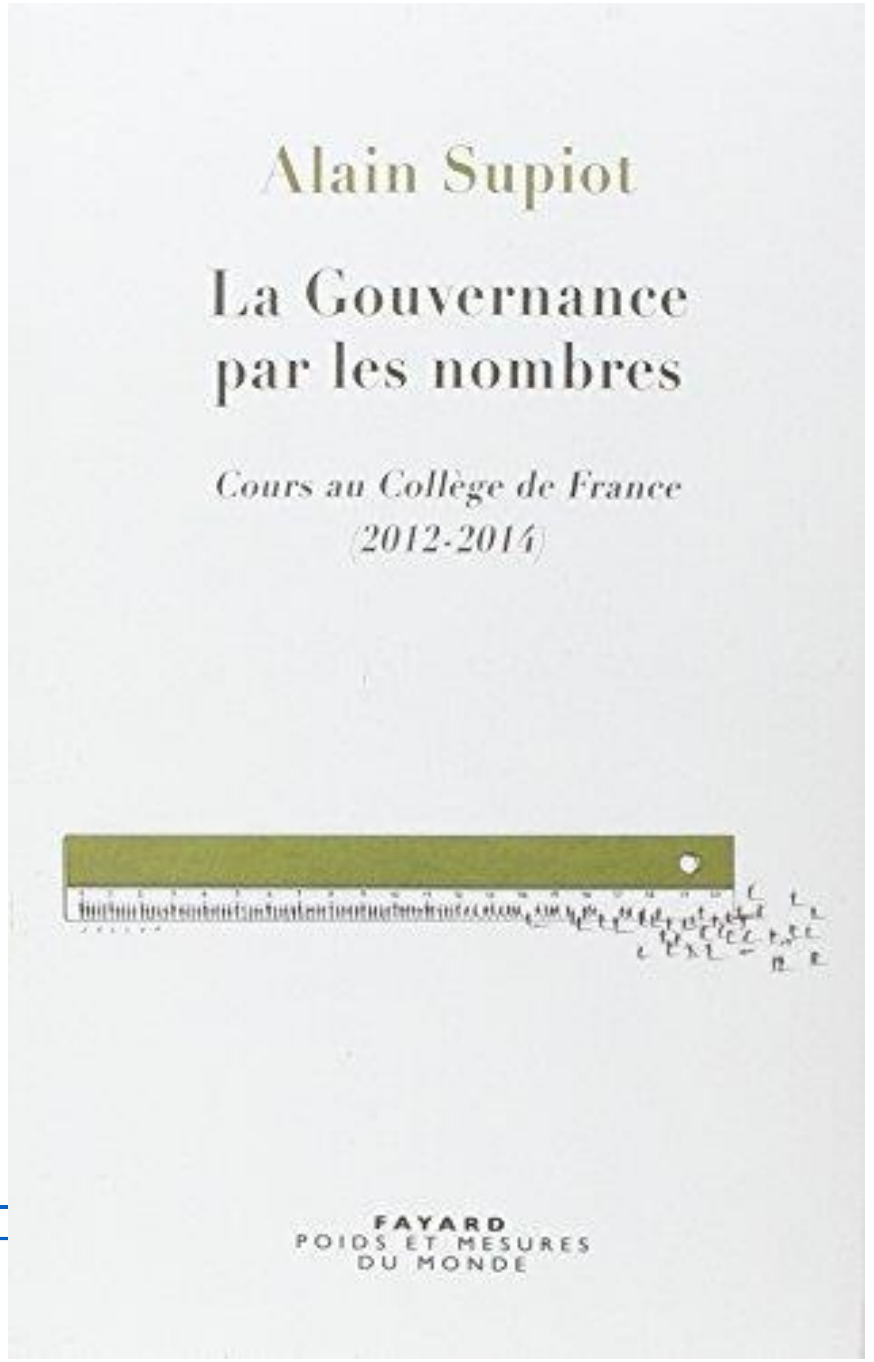
Article (Accepted version)
(Refereed)

Alain Supiot

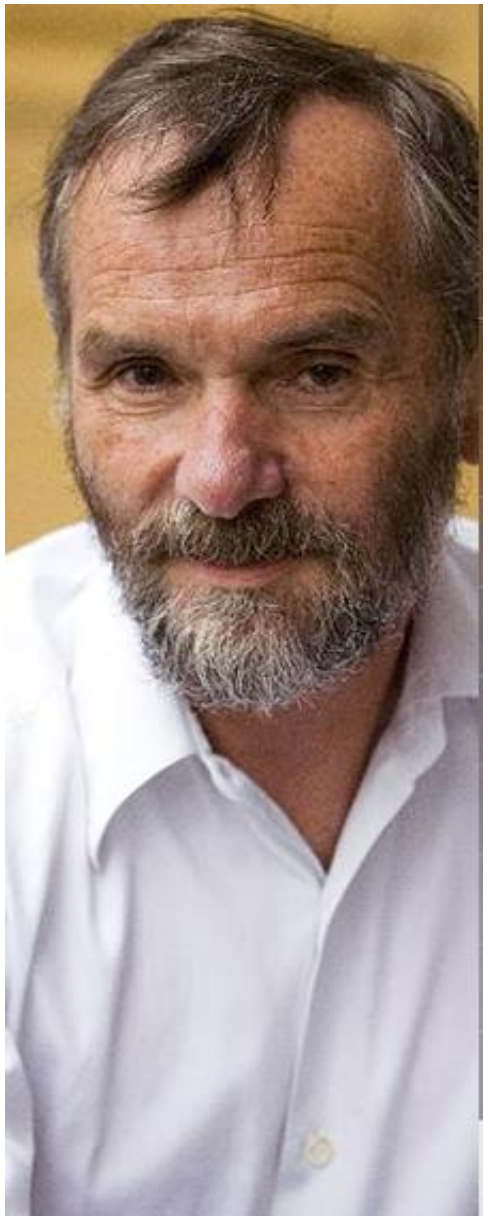


An indictment of the Total Market and the normative uses of economic quantification

https://www.college-de-france.fr/site/en-alain-supiot/Governance-by-Numbers-Introduction.htm



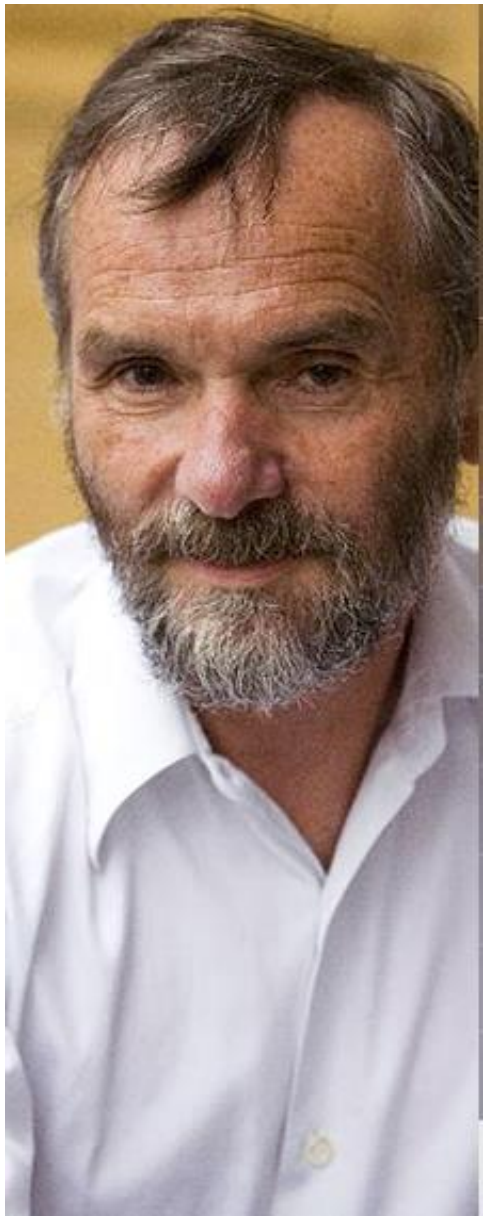
Alain Supiot



…we have entered the era of the cybernetic imaginary, which revives the West's age-old dream of grounding social harmony in calculations.

Repudiating the goal of governing by just laws, this new discourse advocates in its stead the attainment of measurable objectives efficiently

Alain Supiot



… This leaves no option open to populations or countries than to ride roughshod over social legislation, and pledge allegiance to those stronger than they are

Dangers of mathematization of economics

Wolfgang Drechsler

Erik S. Reinert

Paul Romer

Philip Mirowski

W. Drechsler, “On the possibility of quantitative-mathematical social science, chiefly economics,” *J. Econ. Stud.*, vol. 27, no. 4/5, pp. 246–259, 2000.

E. S. Reinert, “Full circle: economics from scholasticism through innovation and back into mathematical scholasticism,” *J. Econ. Stud.*, vol. 27, no. 4/5, pp. 364–376, Aug. 2000.

P. Romer, “Mathiness in the Theory of Economic Growth,” *Am. Econ. Rev.*, vol. 105, no. 5, pp. 89–93, May 2015.

Mirowski, Philip. 2013. Never Let a Serious Crisis Go to Waste: How Neoliberalism Survived the Financial Meltdown. Verso.

IIPP Innovation and Public Purpose

UCL

WORKING PAPER
WP 2021/07

Altered States: Cartesian and Ricardian dreams

Erik S. Reinert
Tallinn University of Technology
UCL Institute for Innovation and Public Purpose

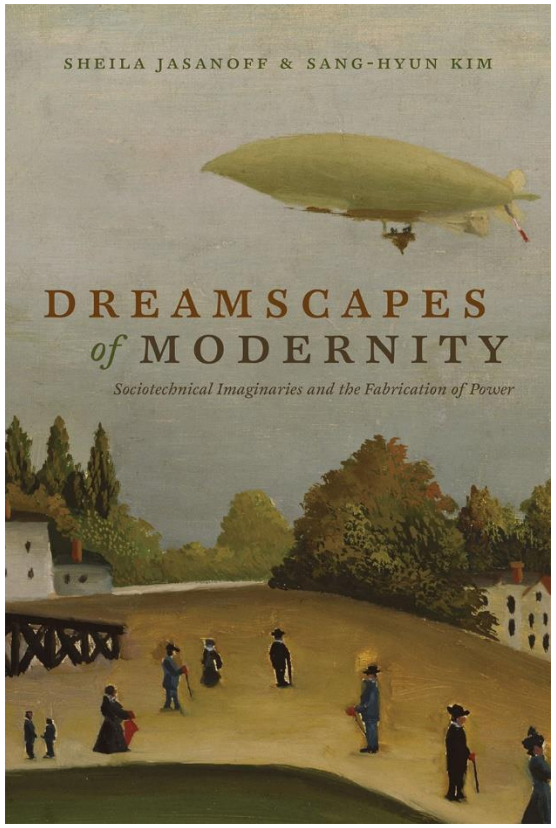
Monica di Fiore
Institute for Cognitive Sciences and Technologies, Consiglio Nazionale delle Ricerche

Andrea Saltelli
Open Evidence Research, Universitat Oberta de Catalunya (UOC)

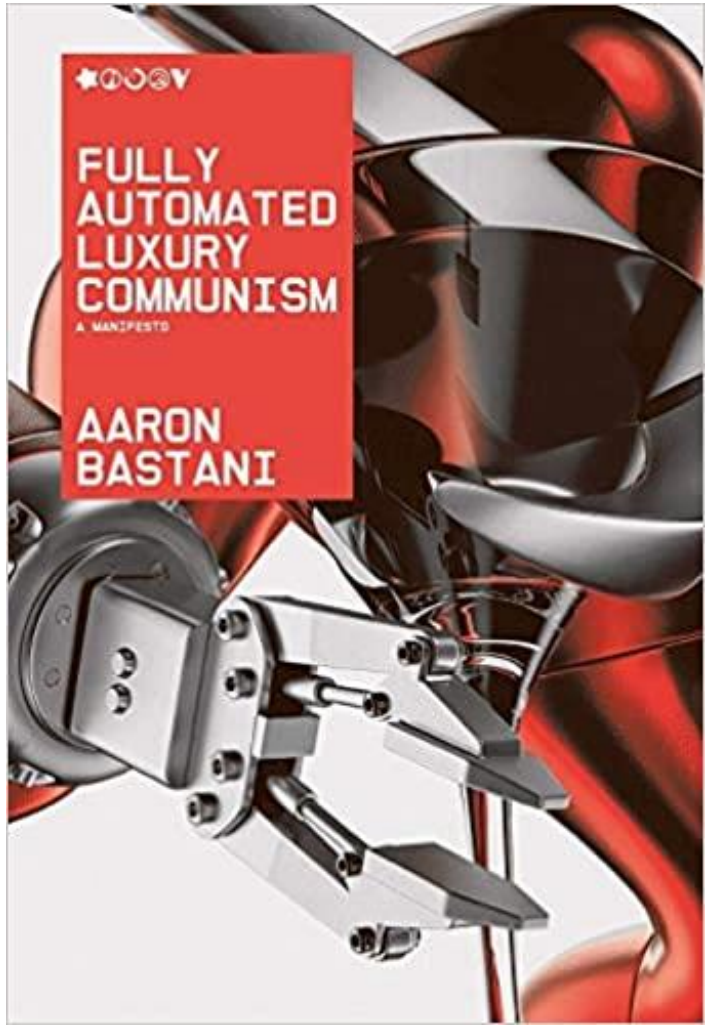
Jerome R. Ravetz
Institute for Science, Innovation and Society, University of Oxford

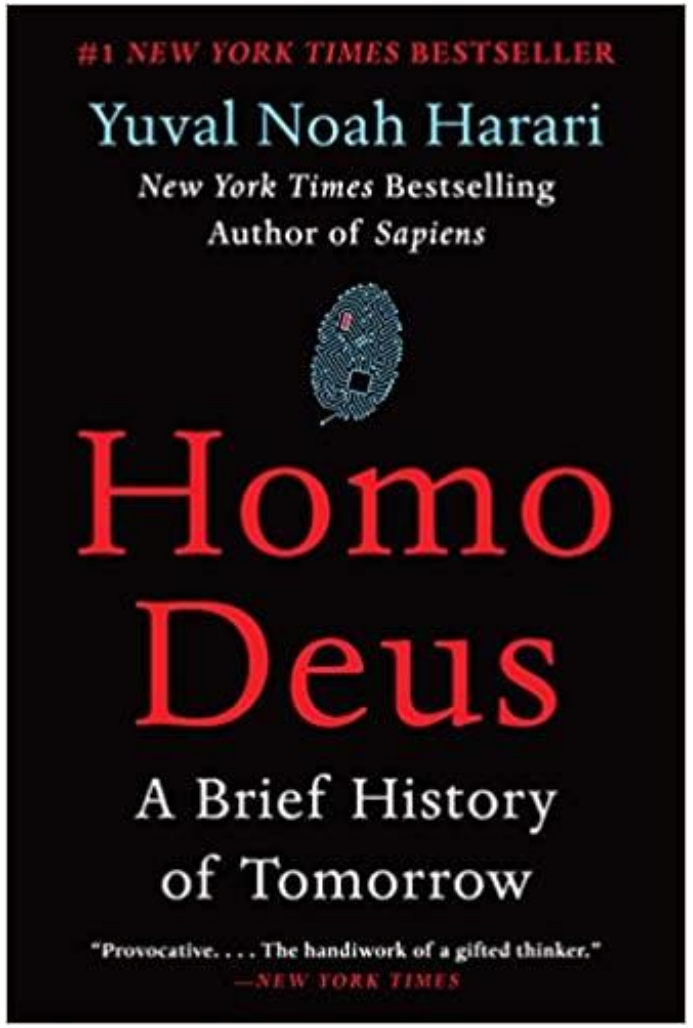
And yet …which is the prevailing sociotechnical imaginary ?

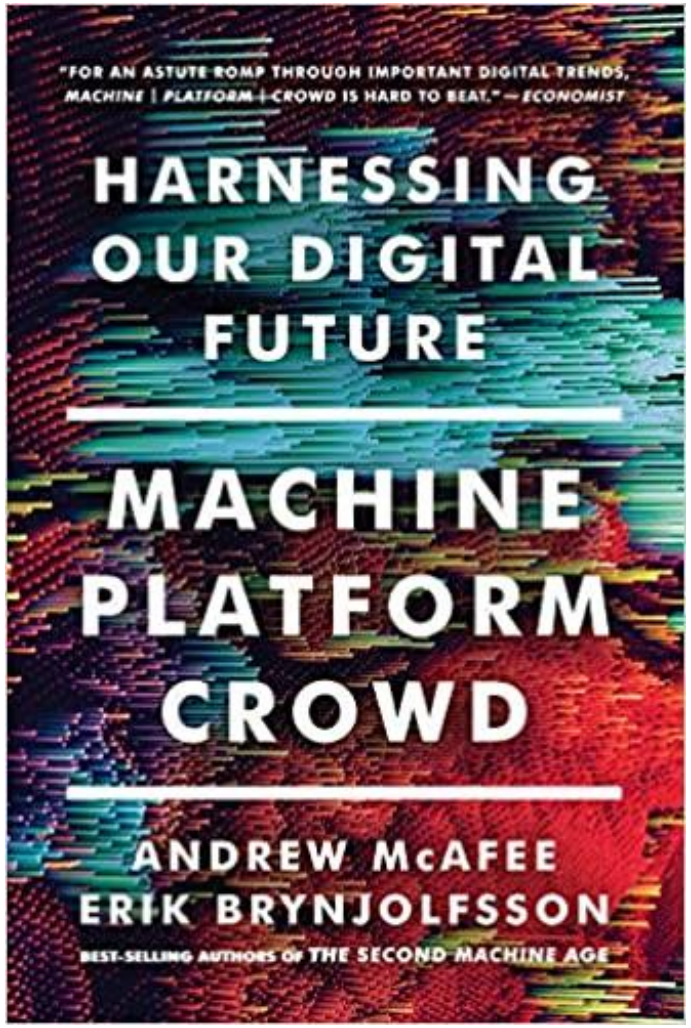
Sociotechnical imaginary: How visions of scientific and technological progress carry with them implicit ideas about public purposes, collective futures, and the common good



Sheila Jasanoff


FULLY AUTOMATED LUXURY COMMUNISM
A MANIFESTO
AARON BASTANI


#1 NEW YORK TIMES BESTSELLER
Yuval Noah Harari
New York Times Bestselling
Author of Sapiens
Homo Deus
A Brief History of Tomorrow
"Provocative. . . . The handiwork of a gifted thinker."
—NEW YORK TIMES


"FOR AN ASTUTE ROMP THROUGH IMPORTANT DIGITAL TRENDS, MACHINE | PLATFORM | CROWD IS HARD TO BEAT." —ECONOMIST
HARNESSING OUR DIGITAL FUTURE
MACHINE PLATFORM CROWD
ANDREW McAFEE
ERIK BRYNJOLFSSON
BEST-SELLING AUTHORS OF THE SECOND MACHINE AGE

Good news!

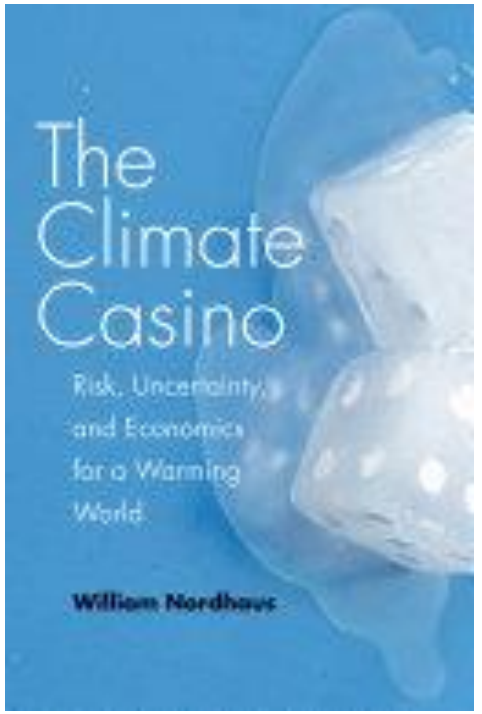
Which is the prevailing sociotechnical imaginary for quantification?

‘Decisionism’ is mainstream

“Often, immersion in the facts often makes value disagreements feel much less relevant” (C. Sunstein)

Cass Sunstein, winner of the 2018 Holberg Prize

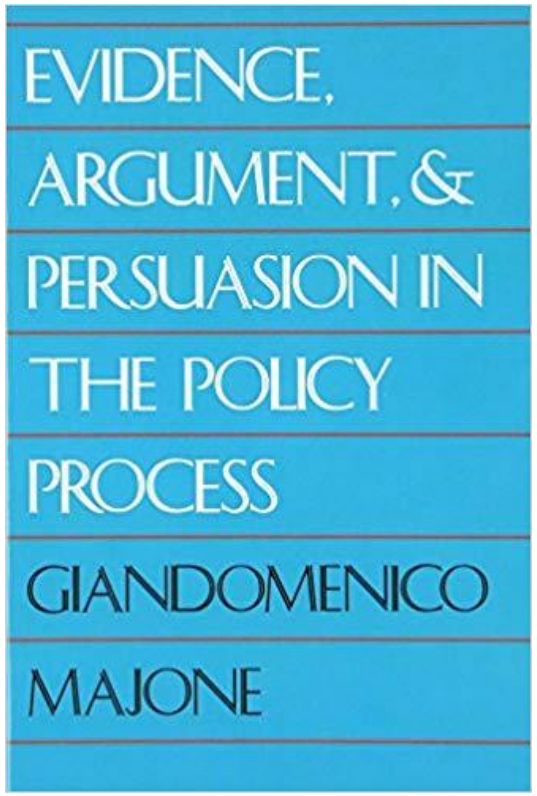
One of the winner of Nobel prize for economics 2018 was Willem Nordhaus, for his work on the economics of climate change.



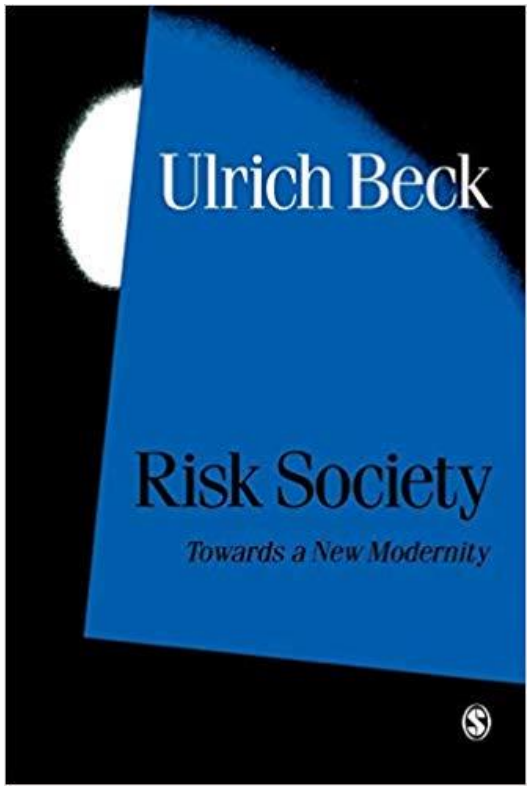
Cost benefit analysis to the year 2100?

From Ulrich Beck to Giandomenico Majone: the technique is never neutral

Ulrich Beck
(1944 –2015)



1989



1992 (1986)

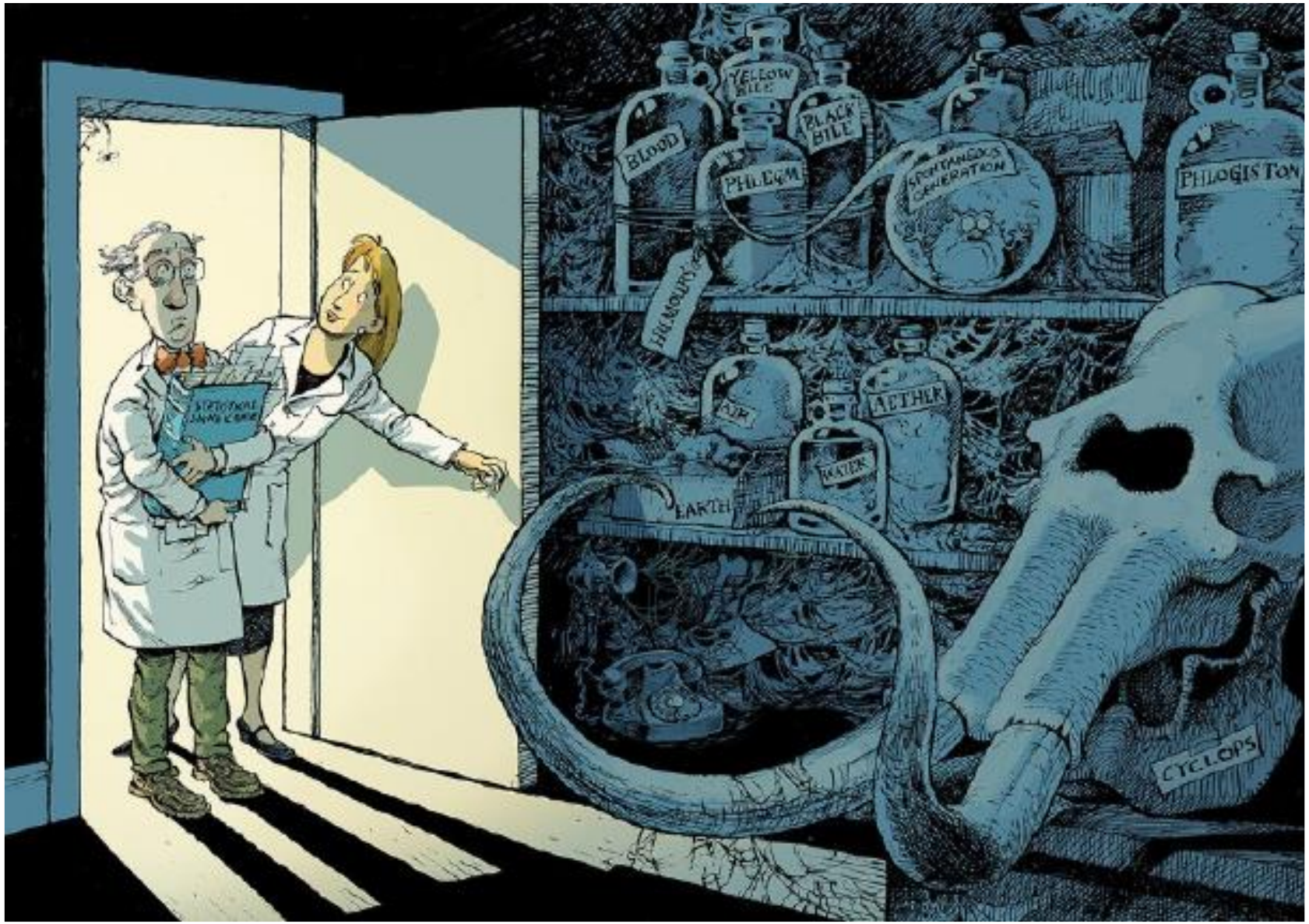
ELSEVIER

Environmental Science & Policy
Volume 106, April 2020, Pages 87-98

The technique is never neutral. How methodological choices condition the generation of narratives for sustainability

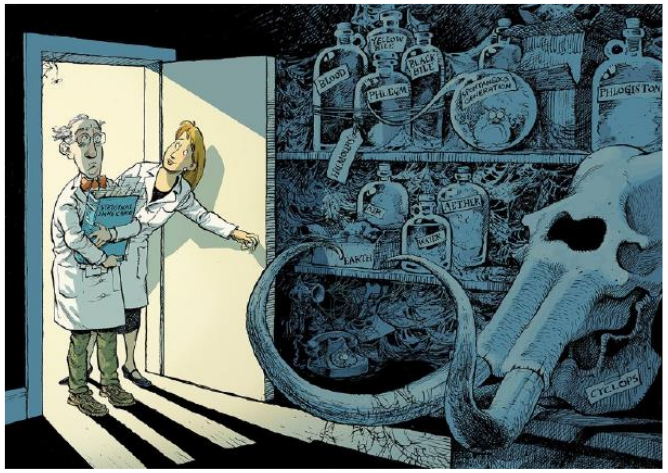
Andrea Saltelli [a, b], Lorenzo Benini [c], Silvio Funtowicz [a], Mario Giampietro [d, e], Matthias Kaiser [a], Erik Reinert [a, f], Jeroen P. van der Sluijs [a, g, h]

Statistical and mathematical modelling



Throw away the concept of statistical significance?

nature
International journal of science



COMMENT · 20 MARCH 2019

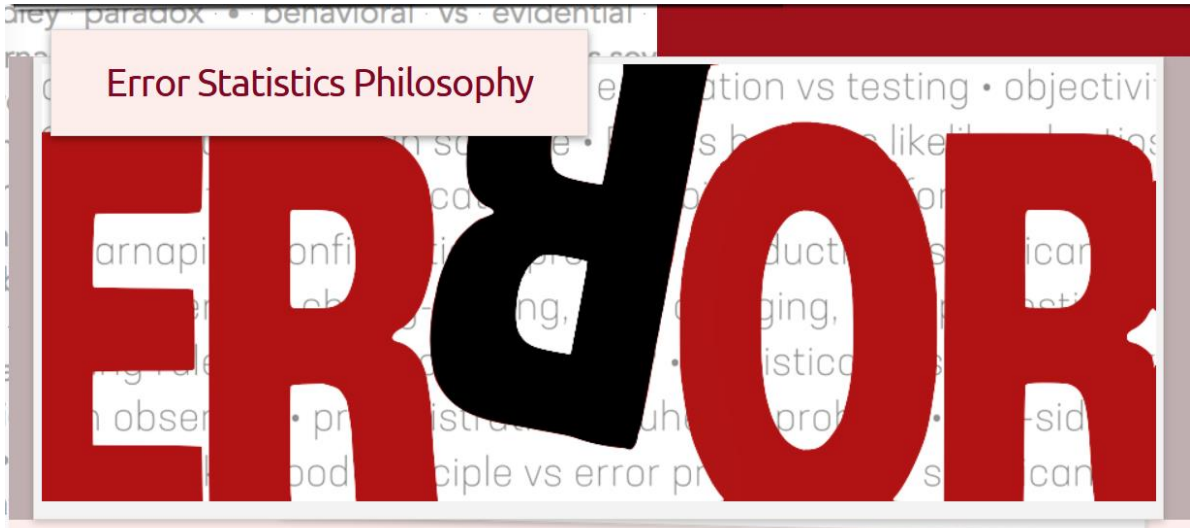
Scientists rise up against statistical significance

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

See the discussion on the blog of Andrew Gelman https://statmodeling.stat.columbia.edu/

Error Statistics Philosophy



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Recent Comments

A. Saltelli (Guest post): What can we learn from the debate on statistical significance?

Posted on November 22, 2019 by Mayo

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

What can we learn from the debate on statistical significance?

SIGNIFICANCE

Business Culture Politics S

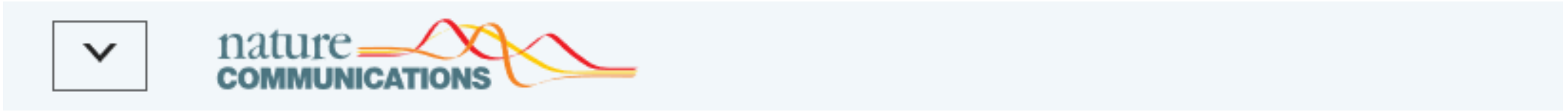
Cargo-cult statistics and scientific crisis

Written by Philip B. Stark and Andrea Saltelli on 05 July 2018. Posted in Science

Statistics in the wake of the reproducibility crisis

Statistical wars?

Is mathematical modelling affected?



Comment | Open Access | Published: 27 August 2019

A short comment on statistical versus mathematical modelling

Andrea Saltelli

Unlike statistics, modelling is not a discipline …

… mathematical modelling cannot do this:

Wasserstein, R.L. and Lazar, N.A., 2016. 'The ASA's statement on p-values: context, process, and purpose', The American Statistician, Volume 70, 2016 - Issue 2, Pages 129-133.

COMMENT · 24 JUNE 2020

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.

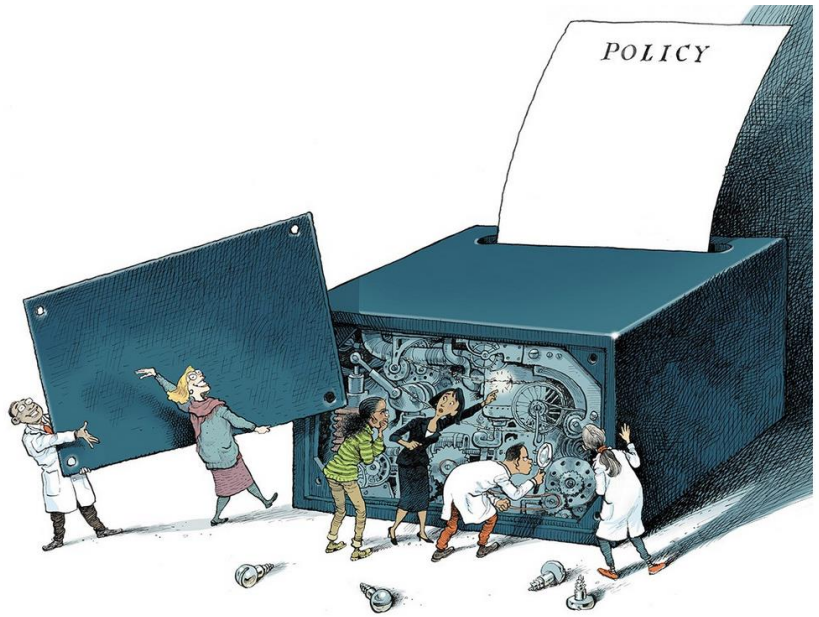
Illustration by David Parkins

nature

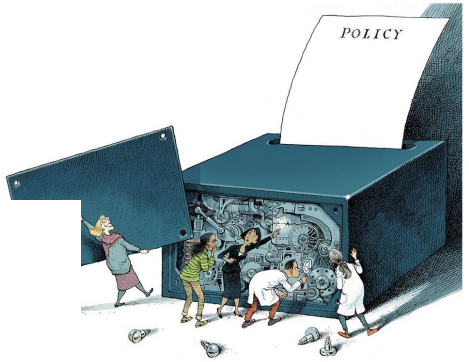
Andrea Saltelli ✉, Gabriele Bammer, Isabelle Bruno, Erica Charters, Monica Di Fiore, Emmanuel Didier, Wendy Nelson Espeland, John Kay, Samuele Lo Piano, Deborah Mayo, Roger Pielke Jr, Tommaso Portaluri, Theodore M. Porter, Arnald Puy, Ismael Rafols, Jerome R. Ravetz, Erik Reinert, Daniel Sarewitz, Philip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

3 modellers
2 experts models and society
3 statisticians
2 *statactivistes*
2 economists
1 epidemiologist

2 sociologists of quantification
3 STS scholars
1 philosopher
1 historian
1 political scientists
1 expert RRI - Open Science



Power



The New York Times

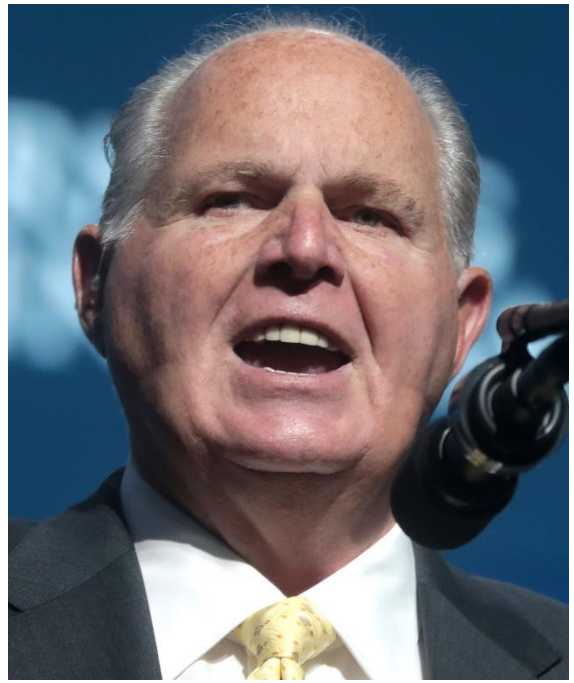
Behind the Virus Report That Jarred the U.S. and the U.K. to Action

It wasn't so much the numbers themselves, frightening though they were, as who reported them: Imperial College London.

Landler, Mark, and Stephen Castle. 2020. Behind the Virus Report That Jarred the U.S. and the U.K. to Action - The New York Times.

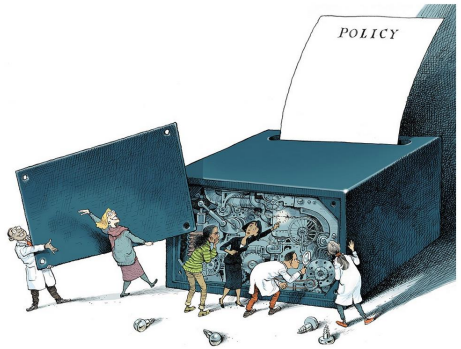
Conflicts, when questions of urgency, stakes, values and uncertainty collide

"Wild-Ass Covid numbers … The minute I hear anybody start talking about models and modeling, I blanch"



Rush Limbaugh

Rhodes, Tim, and Kari Lancaster. 2020. "Mathematical Models as Public Troubles in COVID-19 Infection Control: Following the Numbers." Health Sociology Review 1-18. doi: 10.1080/14461242.2020.1764376

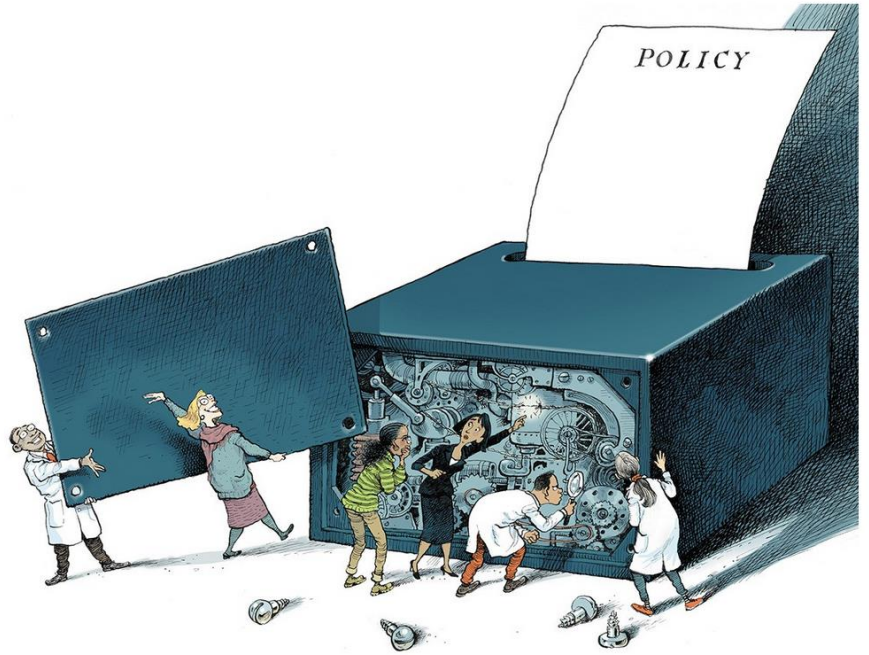


"Modellers must not be permitted to project more certainty than their models deserve;

and politicians must not be allowed to offload accountability to models of their choosing"

Mind the assumptions

Assess uncertainty and sensitivity



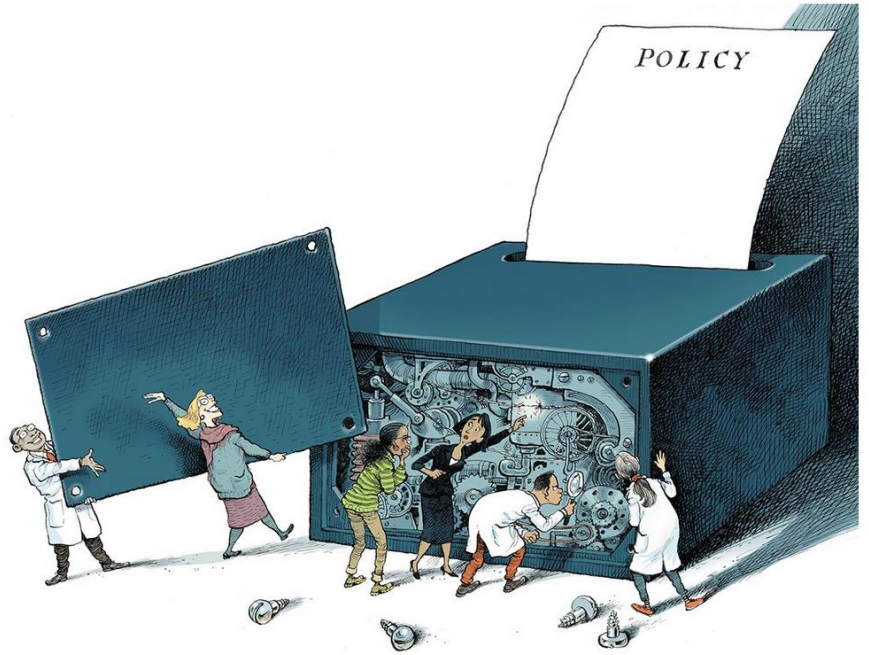
…global uncertainty and sensitivity analyses are often not done. Anyone turning to a model for insight should demand them …

SUPPLEMENTARY INFORMATION

1. **Additional information and references** >260 references

Mind the hubris

Complexity can be the enemy of relevance



… many are seduced by the idea of adding complexity in an attempt to capture reality more accurately…

SUPPLEMENTARY INFORMATION

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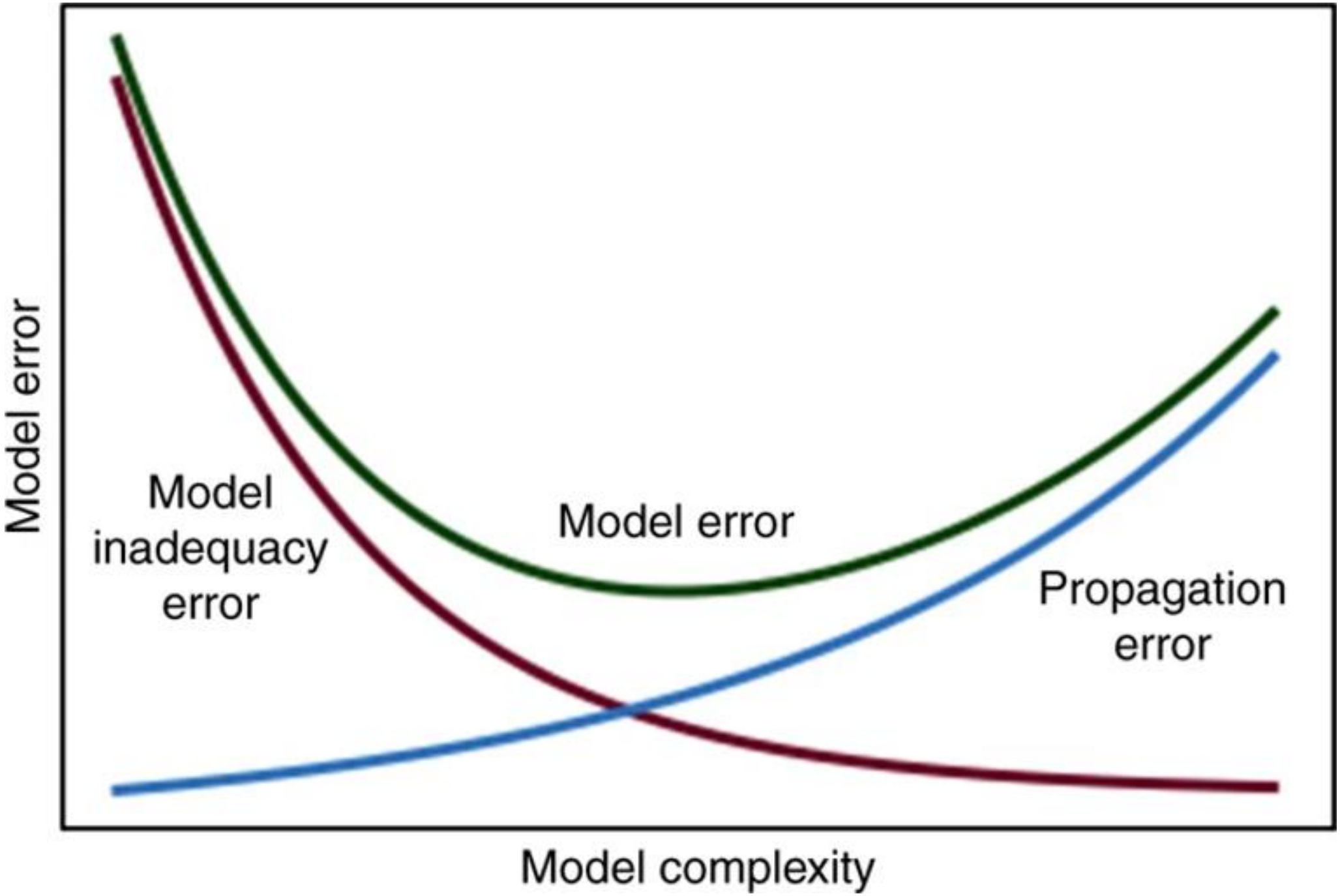
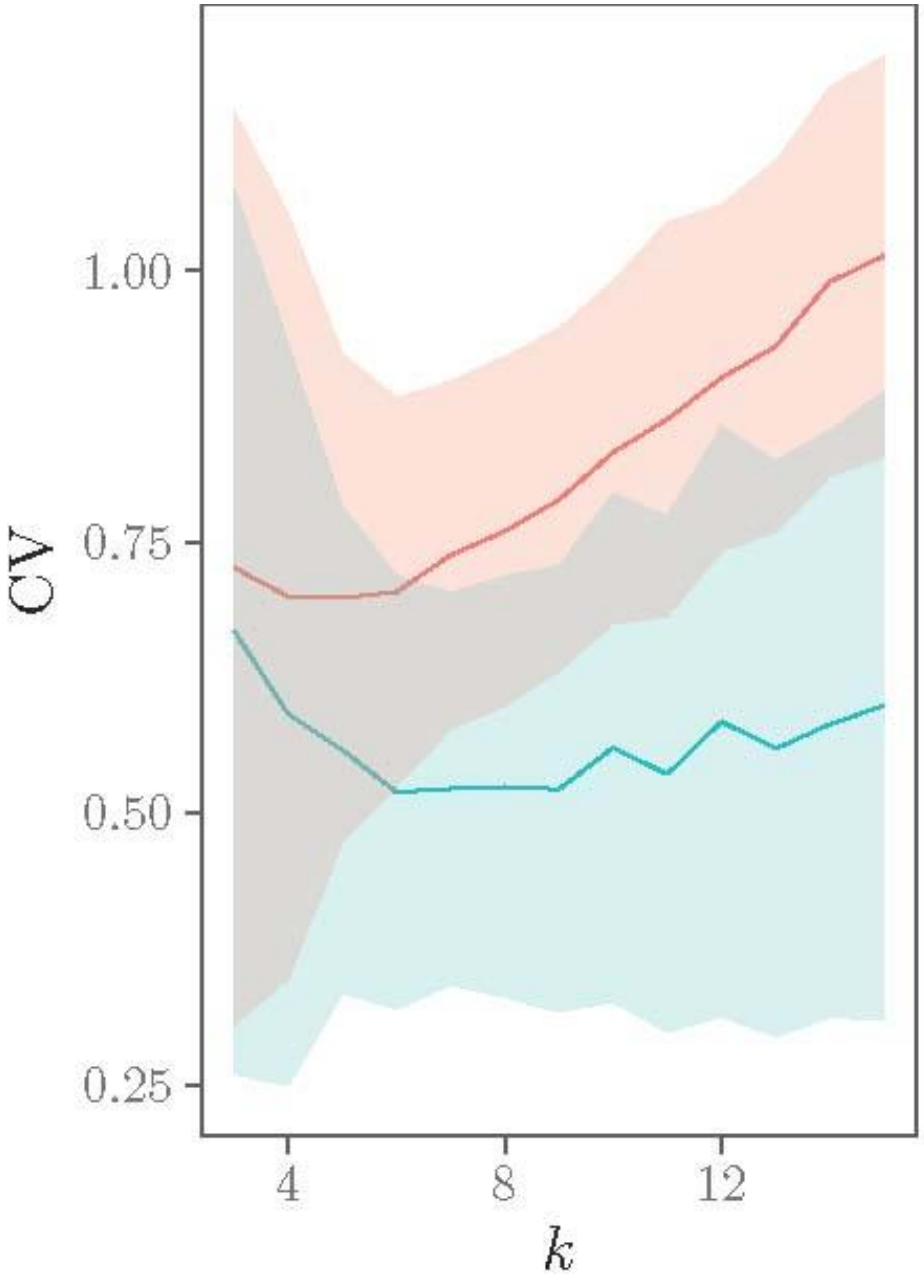

Model error
Model inadequacy error
Model error
Propagation error
Model complexity

O'Neil conjecture, uncertainty cascade … several names in the literature

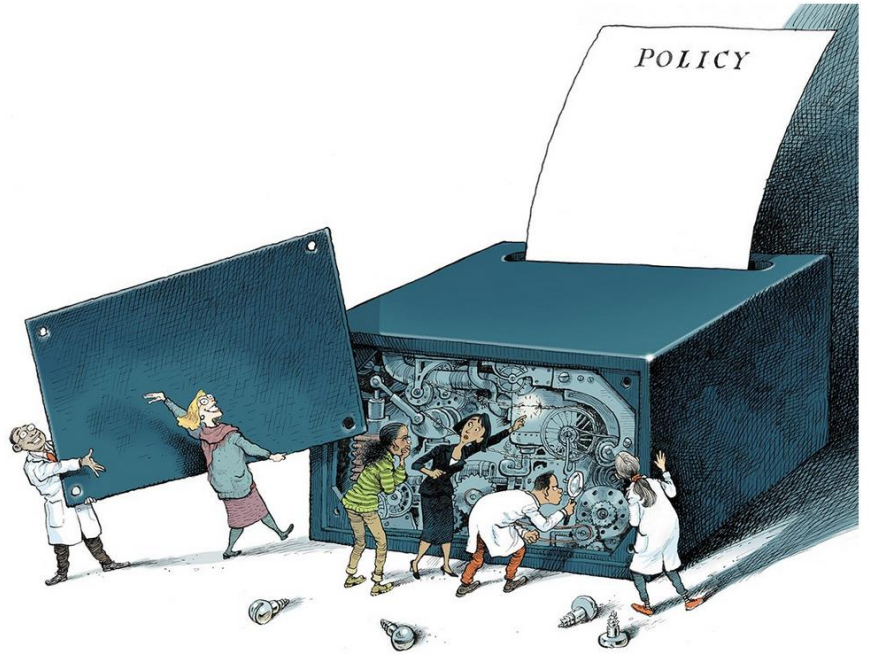


with $n \leq k$

From A. Puy et al., "O'Neil conjecture tested", **paper in progress**

Mind the framing

Match purpose and context



… models will reflect the interests, disciplinary orientations and biases of the developers…

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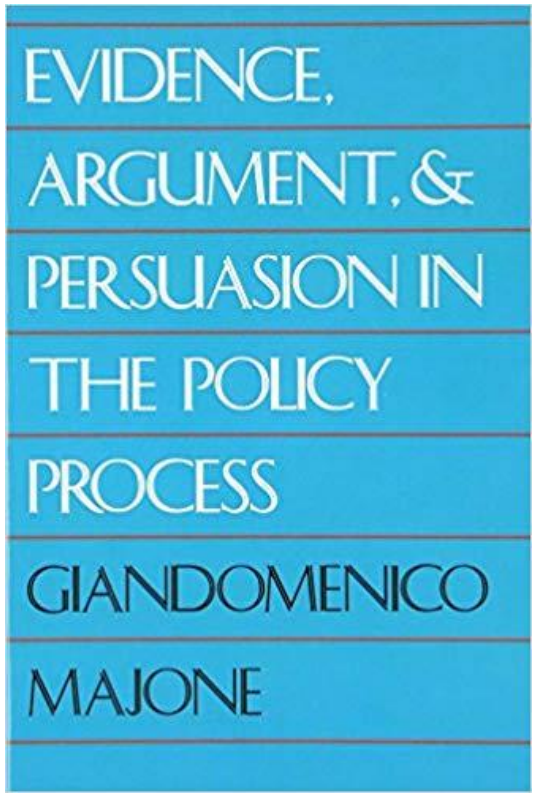
(1944 –2015)



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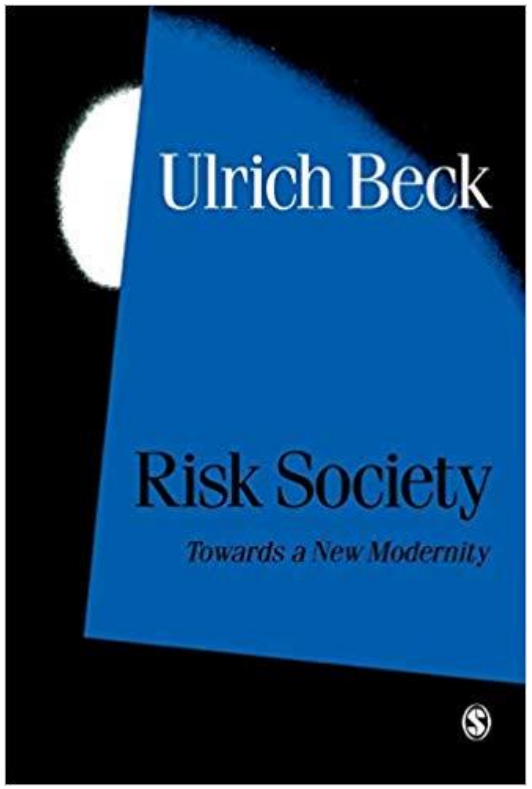

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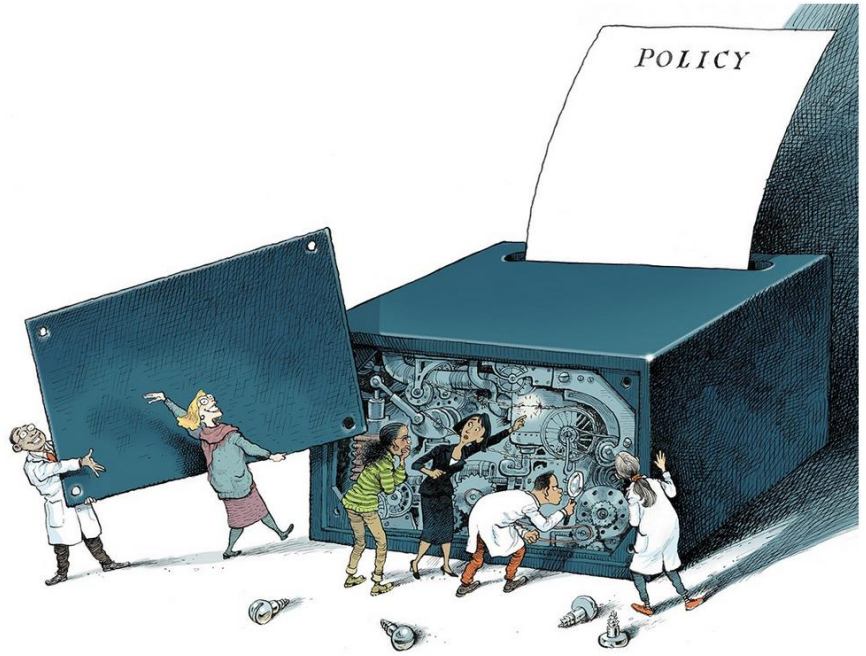
Mind the consequences

Quantification can backfire.



From the risk of financial products to the management of costal zones bad modelling may lead to wrong decisions

SUPPLEMENTARY INFORMATION

1. **Additional information and references** >260 references

Why ethics of quantification is needed now

Andrea Saltelli
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Ismael Rafols
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Erik S. Reinert
Tallinn University of Technology, Estonia;
UCL Institute for Innovation and Public Purpose

Andy Stirling
Science Policy Research Unit, University of Sussex

Ting Xu
School of Law at the University of Essex

IIPP UCL Institute for Innovation and Public Purpose

WORKING PAPER
WP 2021/05

UCL

… our world is structured by numbers, visible and invisible, where truth is conveyed and reality constructed

Numbers are seductive, performative, confer to their masters' epistemic power and legitimacy

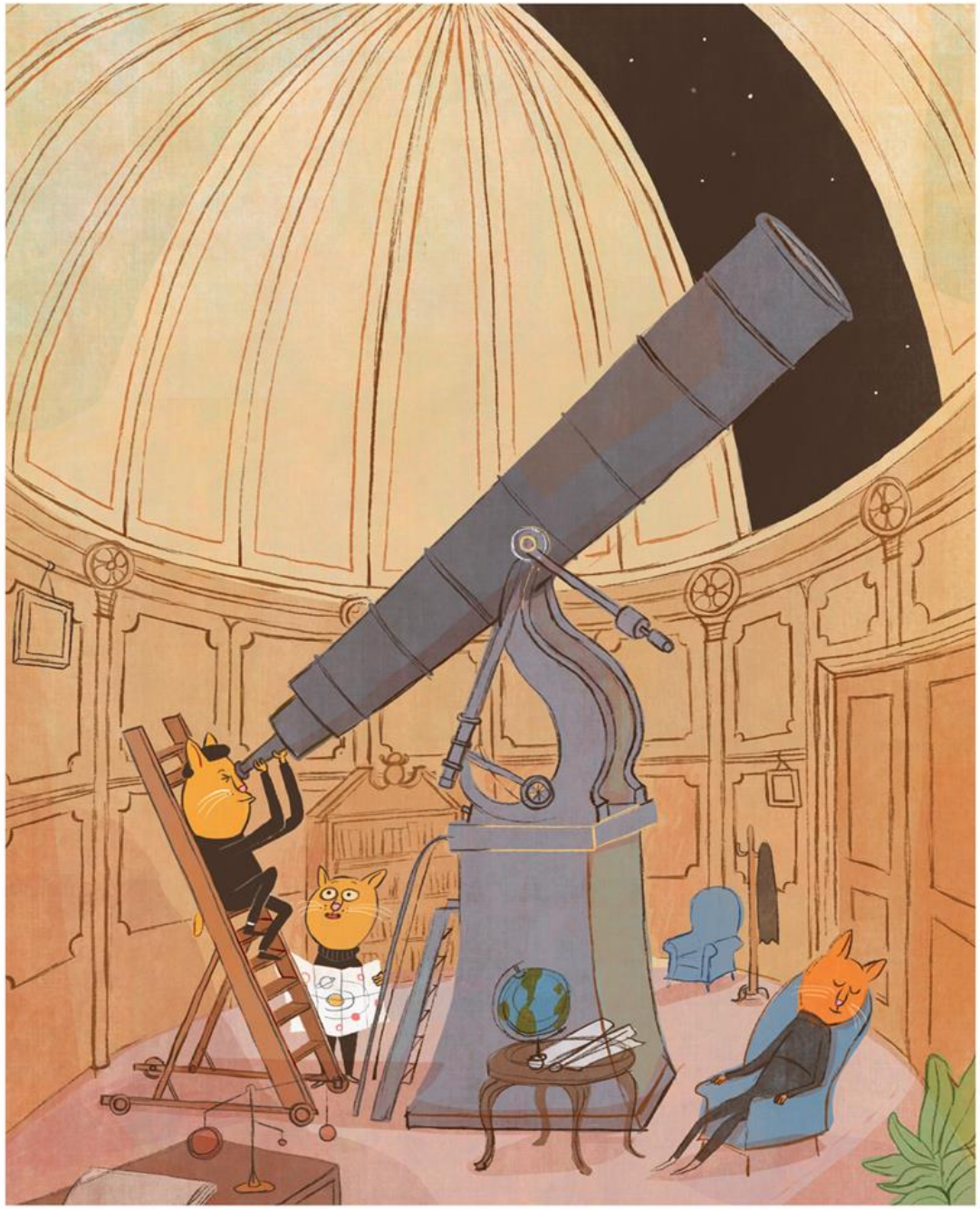
Governing the modern state, or even contesting it, without numbers is impossible

Numbers are the prevalent means to express value in our societies … Access & production of numbers reflect and reinforce power imbalances

IIPP UCL Institute for Innovation and Public Purpose

WORKING PAPER
WP 2021/05

An observatory?



Source: Tor Freeman, http://tormalore.blogspot.com/

The End

@andreasaltelli