

Ethics of quantification

Andrea Saltelli

June 2023

Statistical Data Analysis Module A

&

Project i4Driving



Integrated 4D driver
modelling under
uncertainty

Project started on October 1st, 2022

i4Driving
a EU Horizon Europe R&I project

Where to find this talk: www.andreasaltelli.eu

The screenshot shows a web browser window with the address bar displaying www.andreasaltelli.eu. The page itself is the homepage of Andrea Saltelli's website. It features a teal header with the name "Andrea Saltelli". Below the header is a main content area. On the left side of this area is a large, abstract image of a brain, colored in shades of blue and yellow. To the right of the image, the text "Coming Out Soon: The politics of modelling" is displayed in a large, bold, black font. Below this title, there is a quote in italics: "*A long awaited examination of the role —and obligation —of modeling.*" This quote is attributed to **Nassim Nicholas Taleb**, Distinguished Professor of Risk Engineering, NYU Tandon School of Engineering. He is also mentioned as the author of the 5-volume series *Incerto*. At the bottom of this section, there are three small black asterisks (***). To the right of the main content area, there is a sidebar titled "Mastodon Toots by @AndreaSaltelli". It shows a single post from AndreaSaltelli dated 2023/4/18 17:24, which reads: "Kaufman, who was until recently a senior climate economist in the White House, questioned the need for the government to set a single price. Regulators should stop "pretending we".

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Andrea Saltelli

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Coming Out Soon: The politics of modelling

Praise for the volume

"A long awaited examination of the role —and obligation —of modeling."

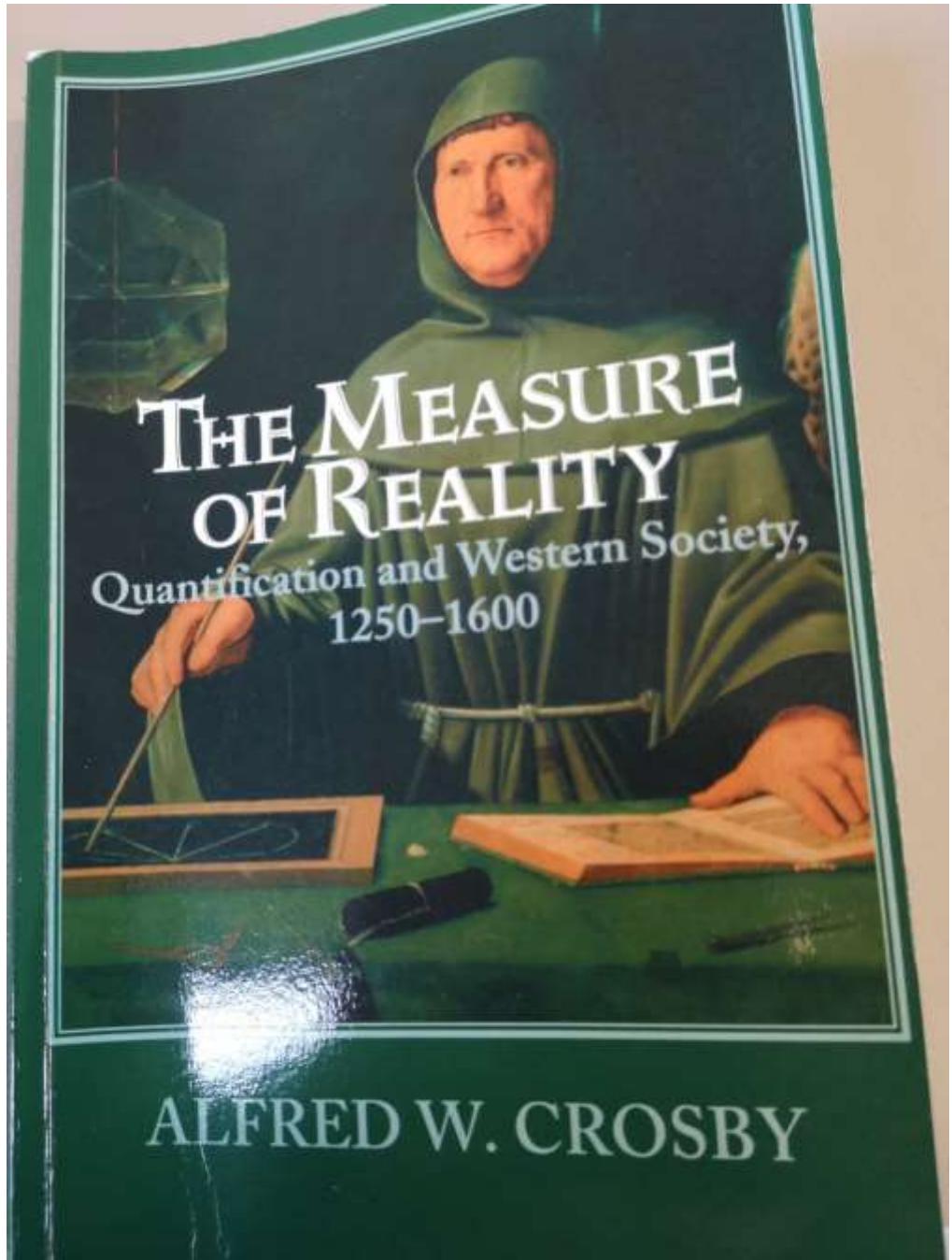
Nassim Nicholas Taleb, Distinguished Professor of Risk Engineering, NYU Tandon School of Engineering. Author, of the 5 -volume series *Incerto*.

"A breath of fresh air and a much needed

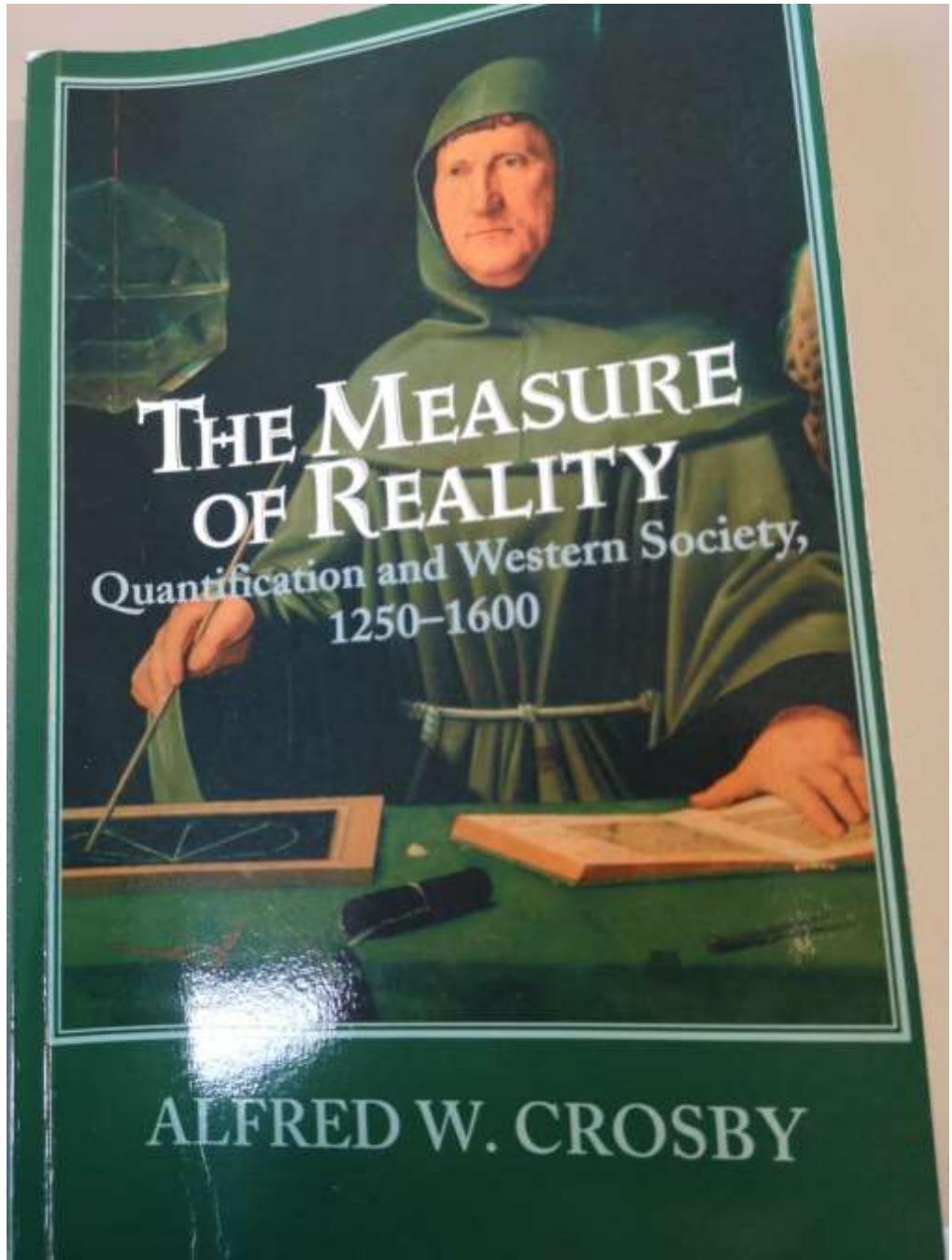
Mastodon Toots by
@AndreaSaltelli

AndreaSaltelli 2023/4/18 17:24
"Kaufman, who was until recently a senior climate economist in the White House, questioned the need for the government to set a single price. Regulators should stop "pretending we"

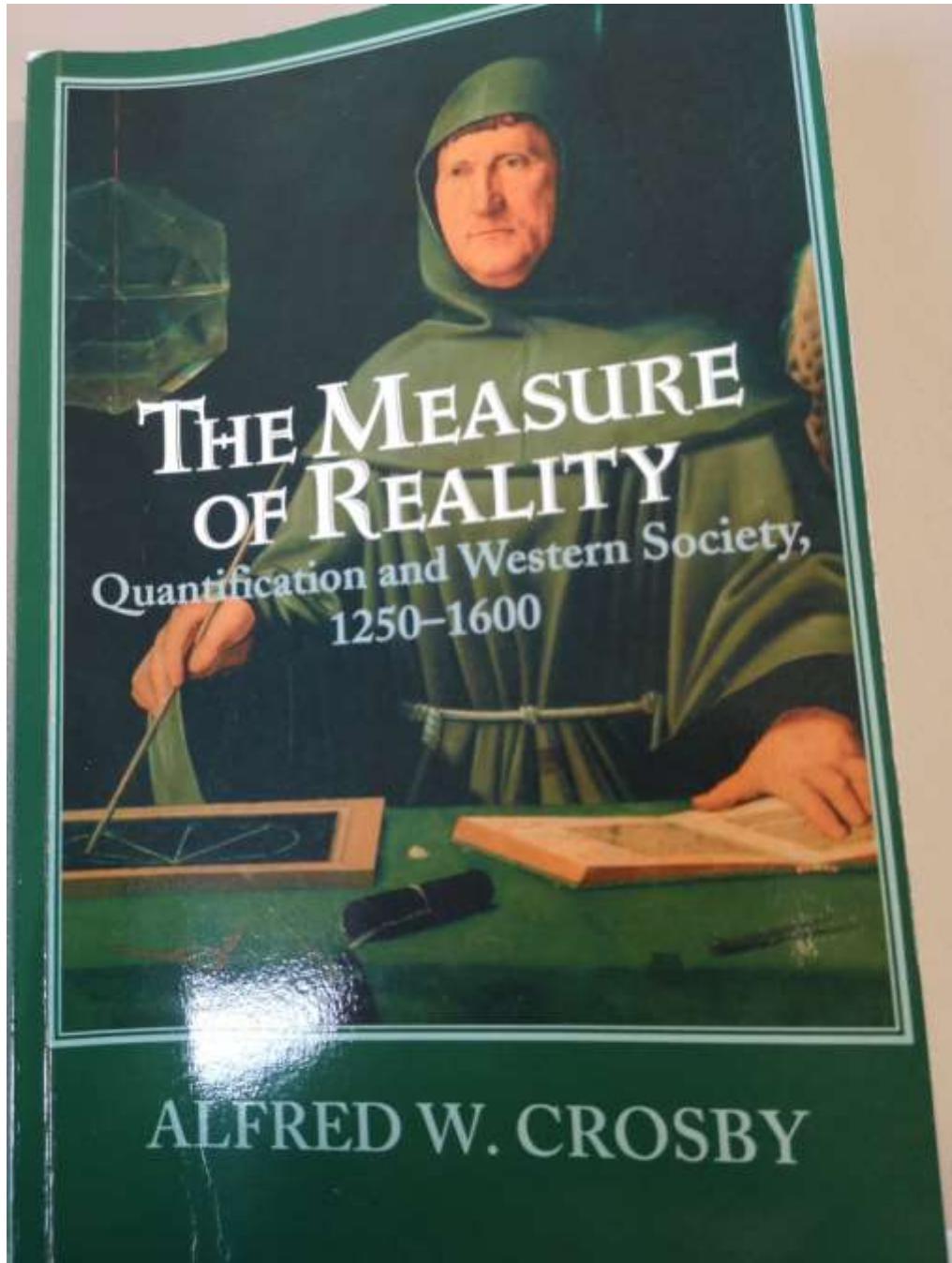
Is quantification important?
Or all-important?



Were quantification and visualization the engine inside the engine of western success and domination?



Quantification and visualization of space and time gave rise in the XIV century to a true revolution, in music, painting, accounting, cartography, astronomy ...



… a revolution that in the following two centuries XV–XVI ensured the epochal success of the West and its domination over the rest of the world

Pieter Bruegel the Elder, Temperance, 1560

Measuring earth and
skies, dispute on a
printed bible,
learning, accounting,
perspective,
polyphonic music, the
windmill, the watch ...

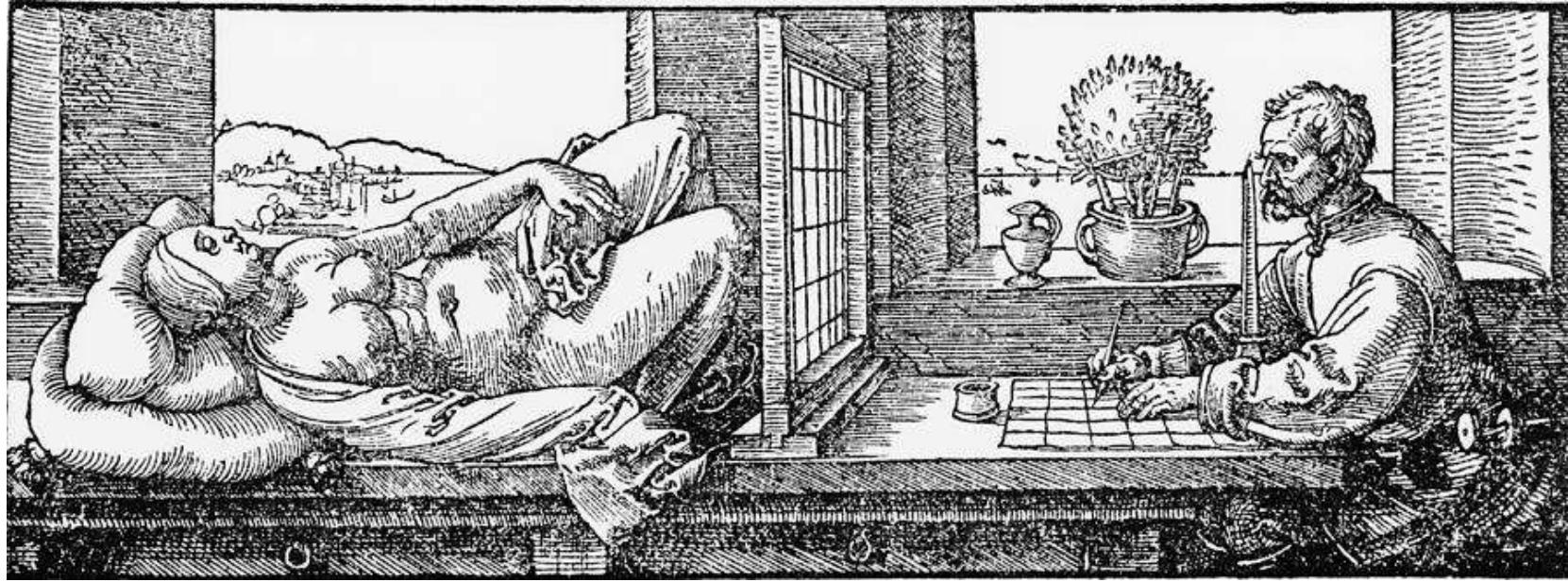




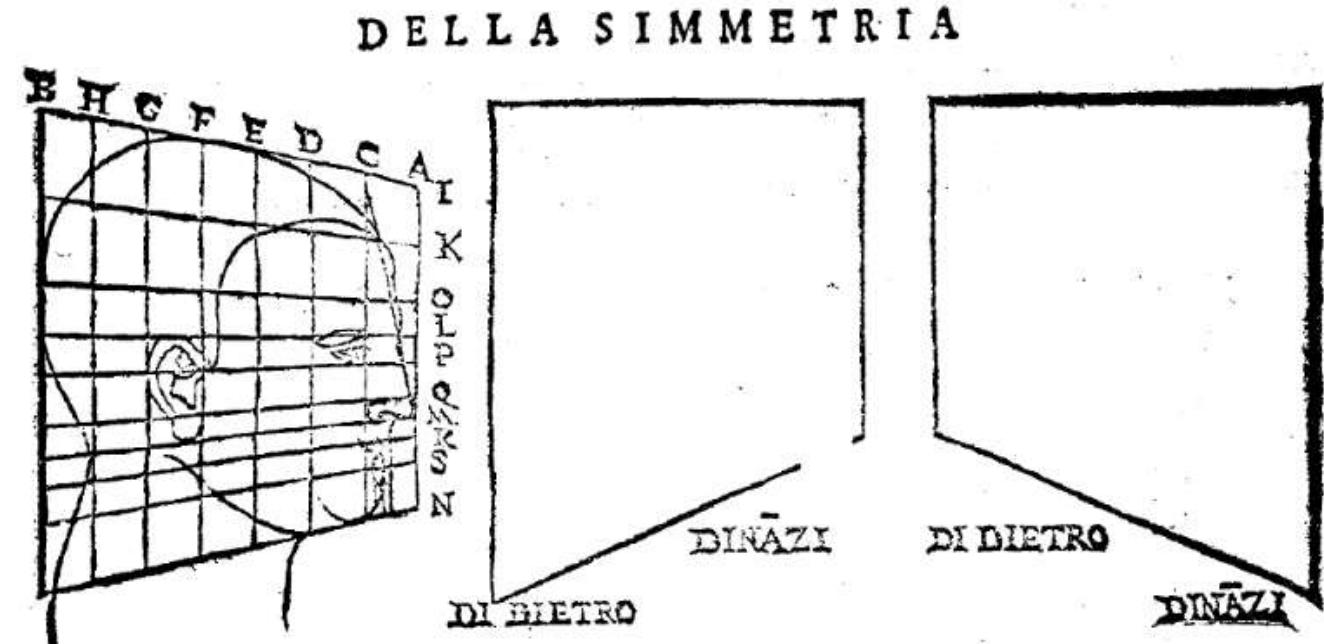
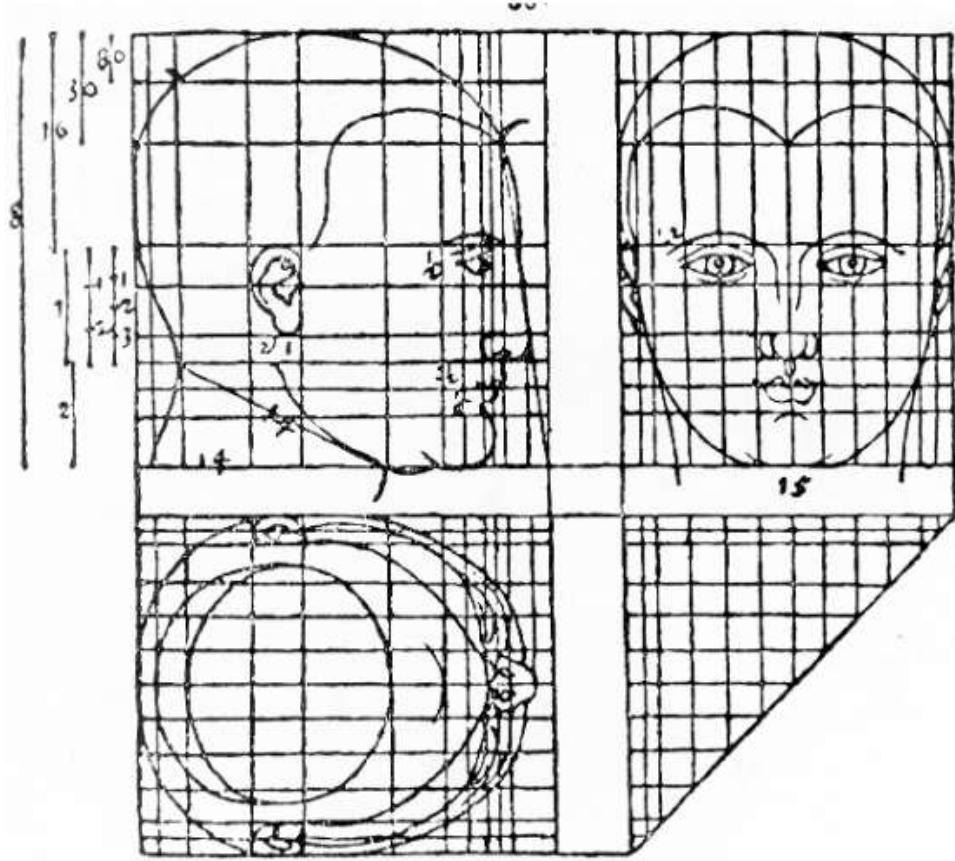
From the abacus
to Arabic
numerals



The Annunciation,
Carlo Crivelli
(1435, 1495)



Draftsman Drawing a Reclining Nude
Albrecht Dürer (1471–1528)



From “De Varietate figurarum”
Albrecht Dürer (1471–1528)

Problematic quantification

Blurring lines:

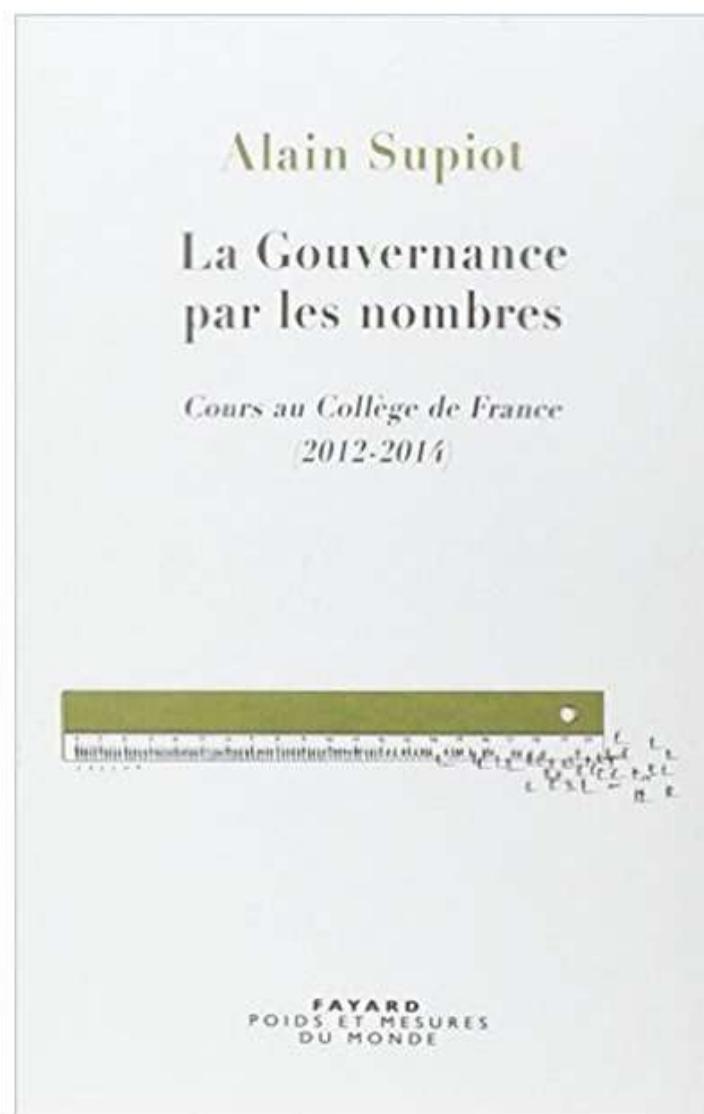
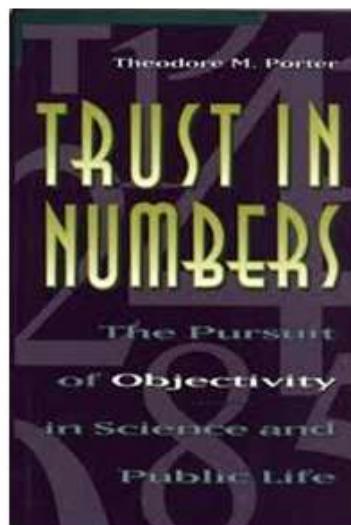
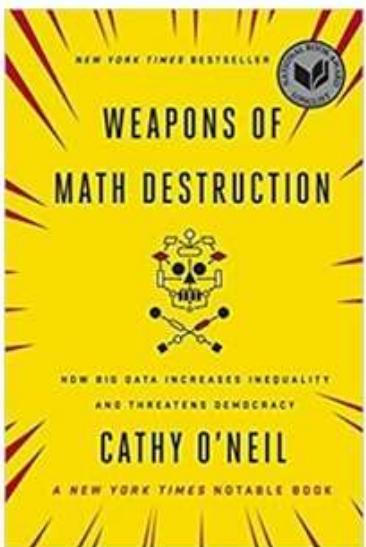
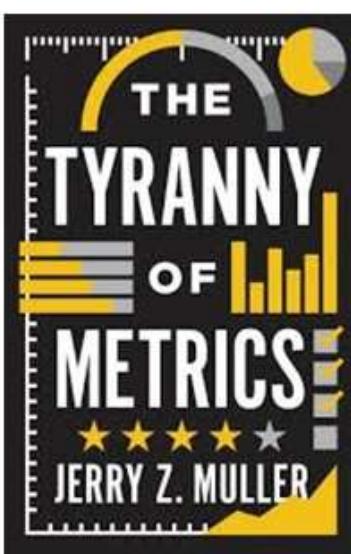
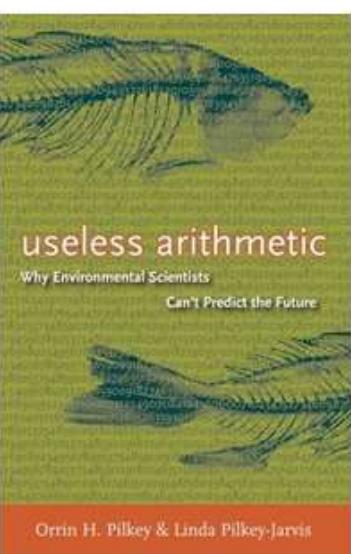
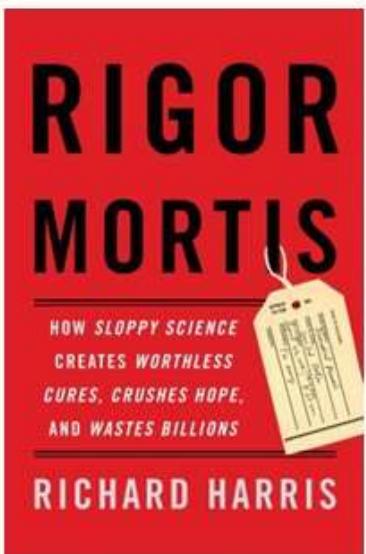
“what qualities are specific
to rankings, or indicators,
or models, or algorithms?”



Elizabeth
Popp Berman

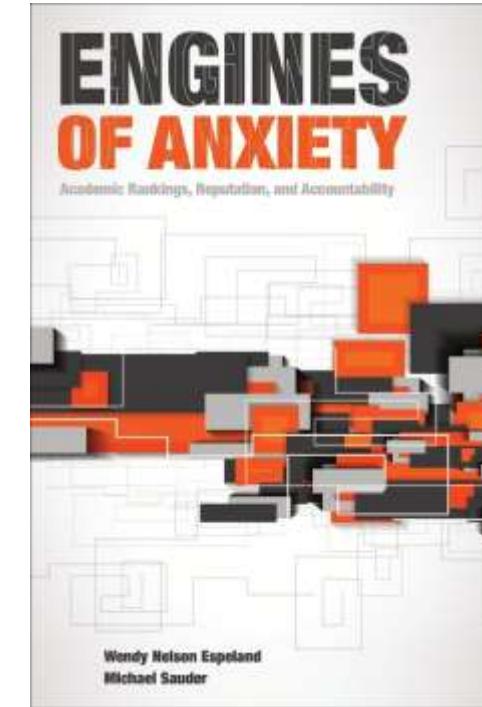
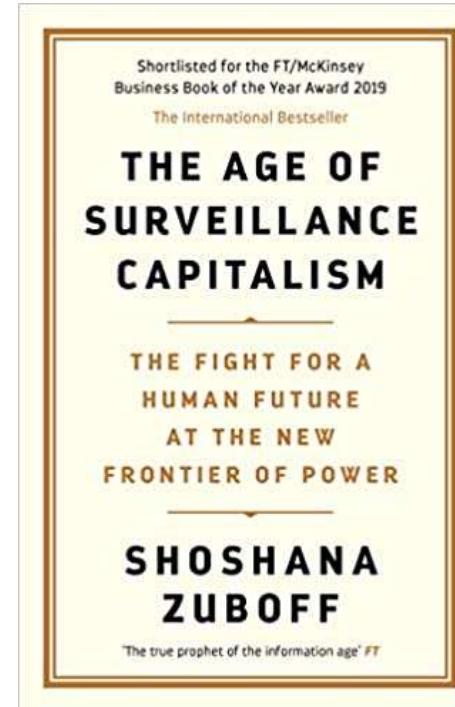
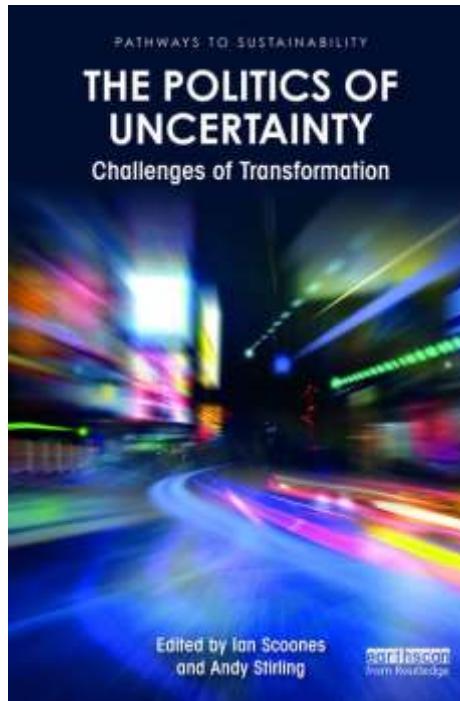
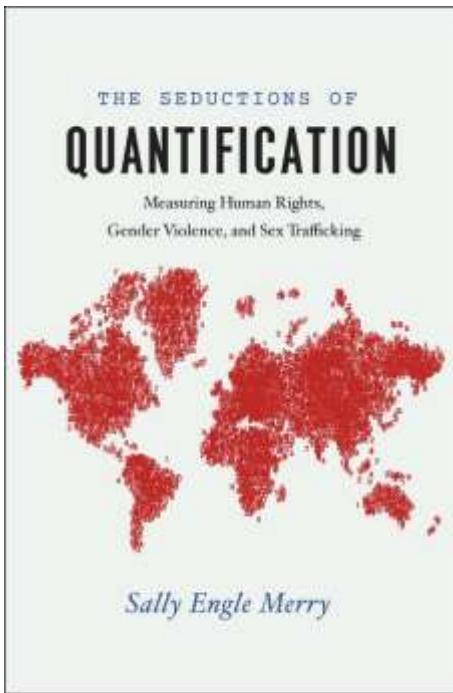
E. Popp Berman and D. Hirschman, *The Sociology of Quantification: Where Are We Now?*, *Contemp. Sociol.*, vol. in press, 2017.

Algorithms, models, metrics, statistics...



FAYARD
POIDS ET MESURES
DU MONDE

Algorithms, models, metrics, statistics...



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

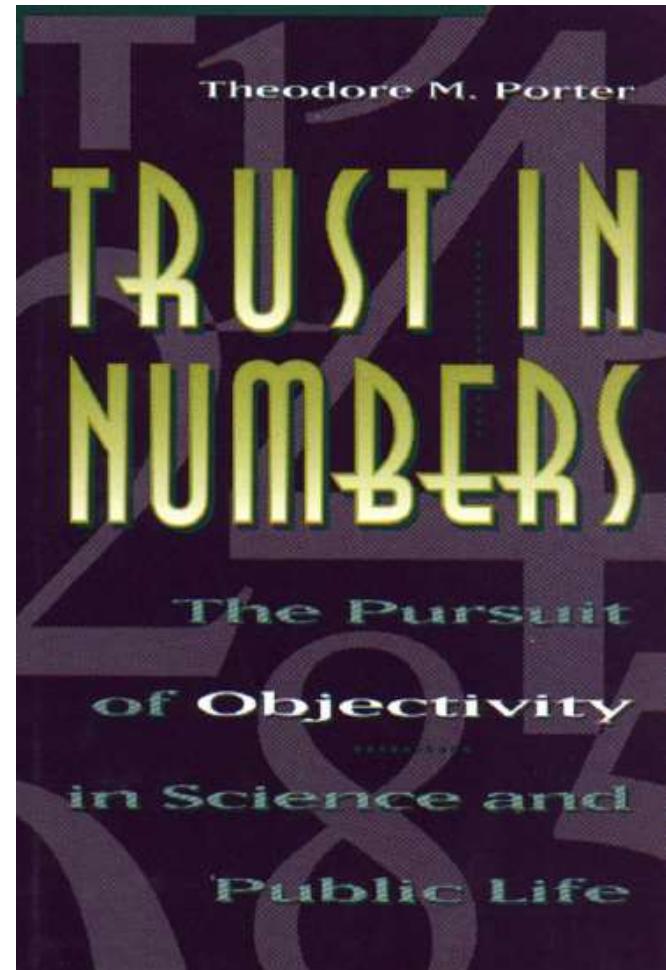
Incumbent numbers affect what society will
measure in the future (Merry 2016)

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

Numbers and
trust

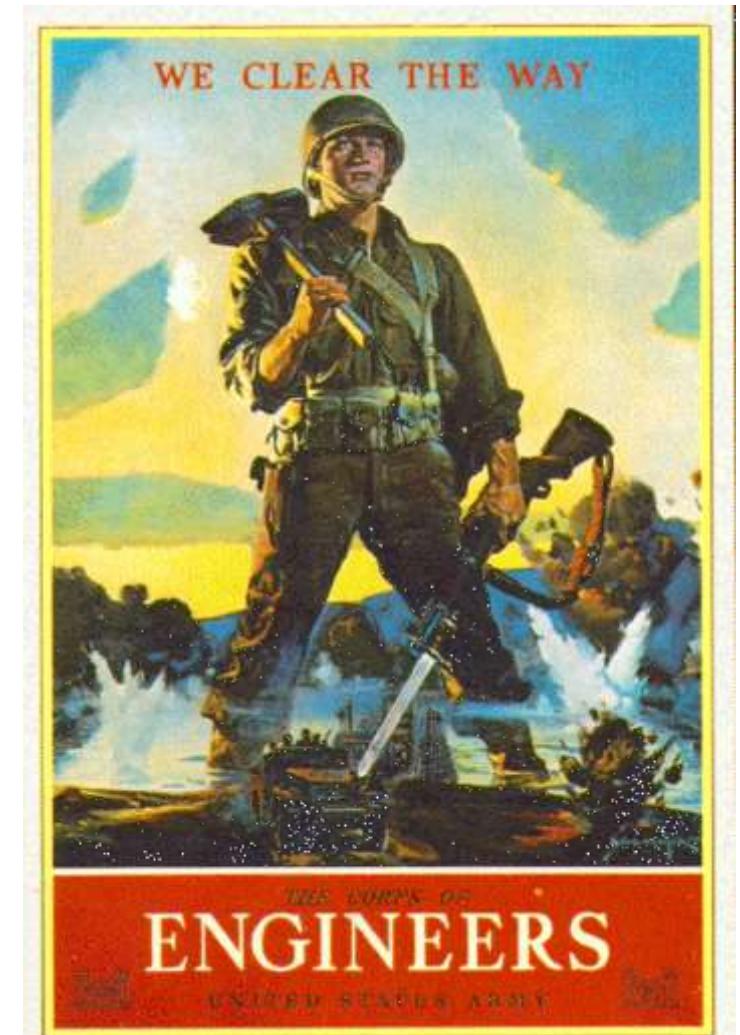


Theodor
M. Porter



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'.



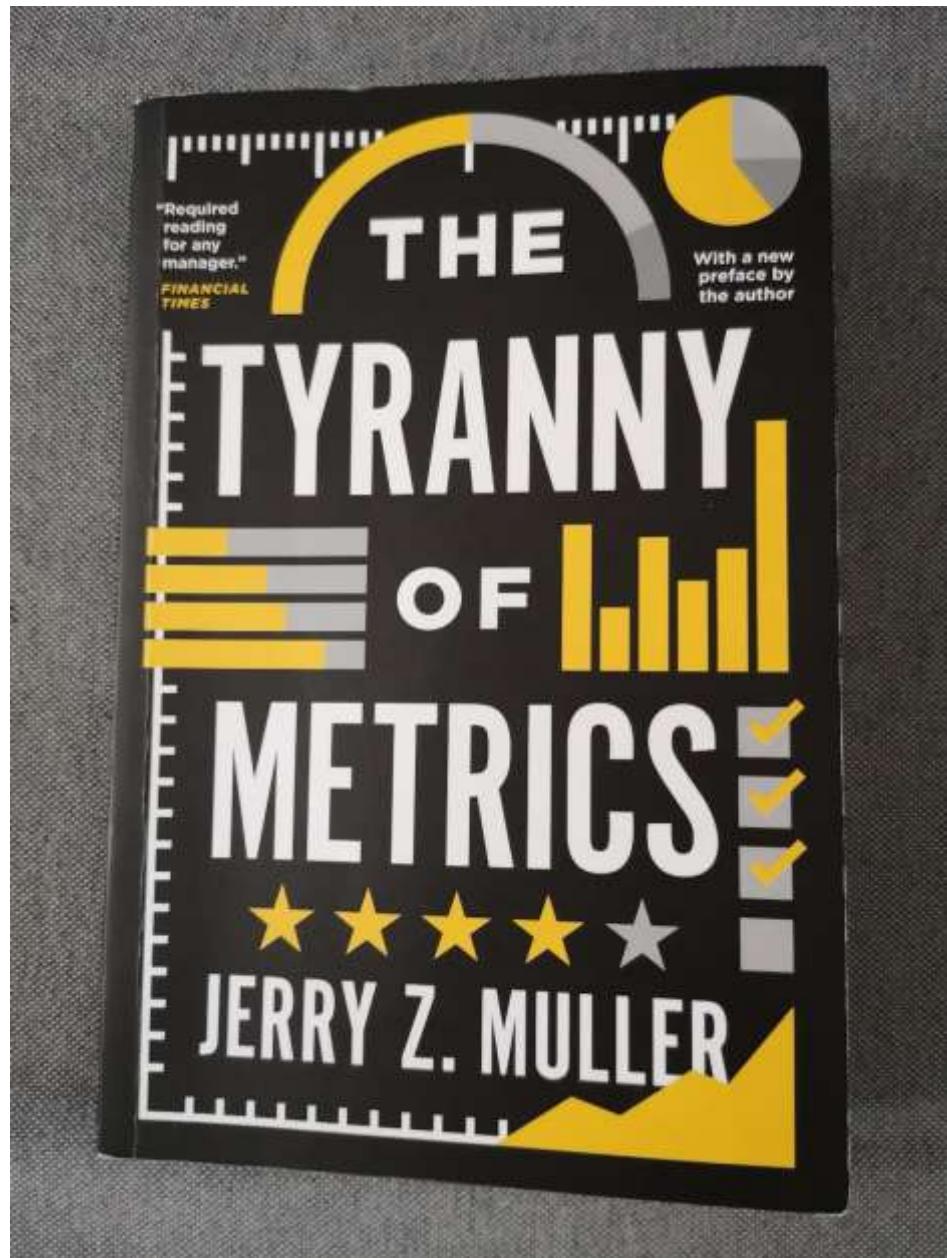


Charles Goodhart

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

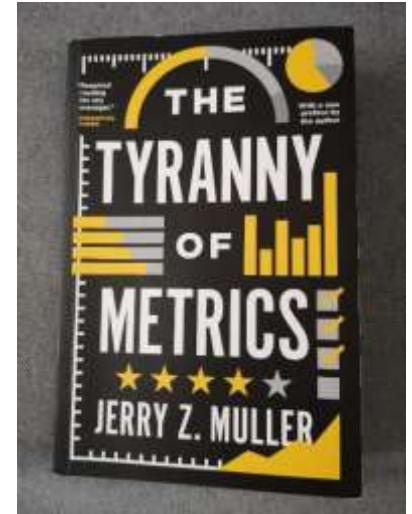


J. Z. Muller, The tyranny
of metrics. Princeton
University Press , 2018.

Metric fixation, or the irresistible pressure to measure performance

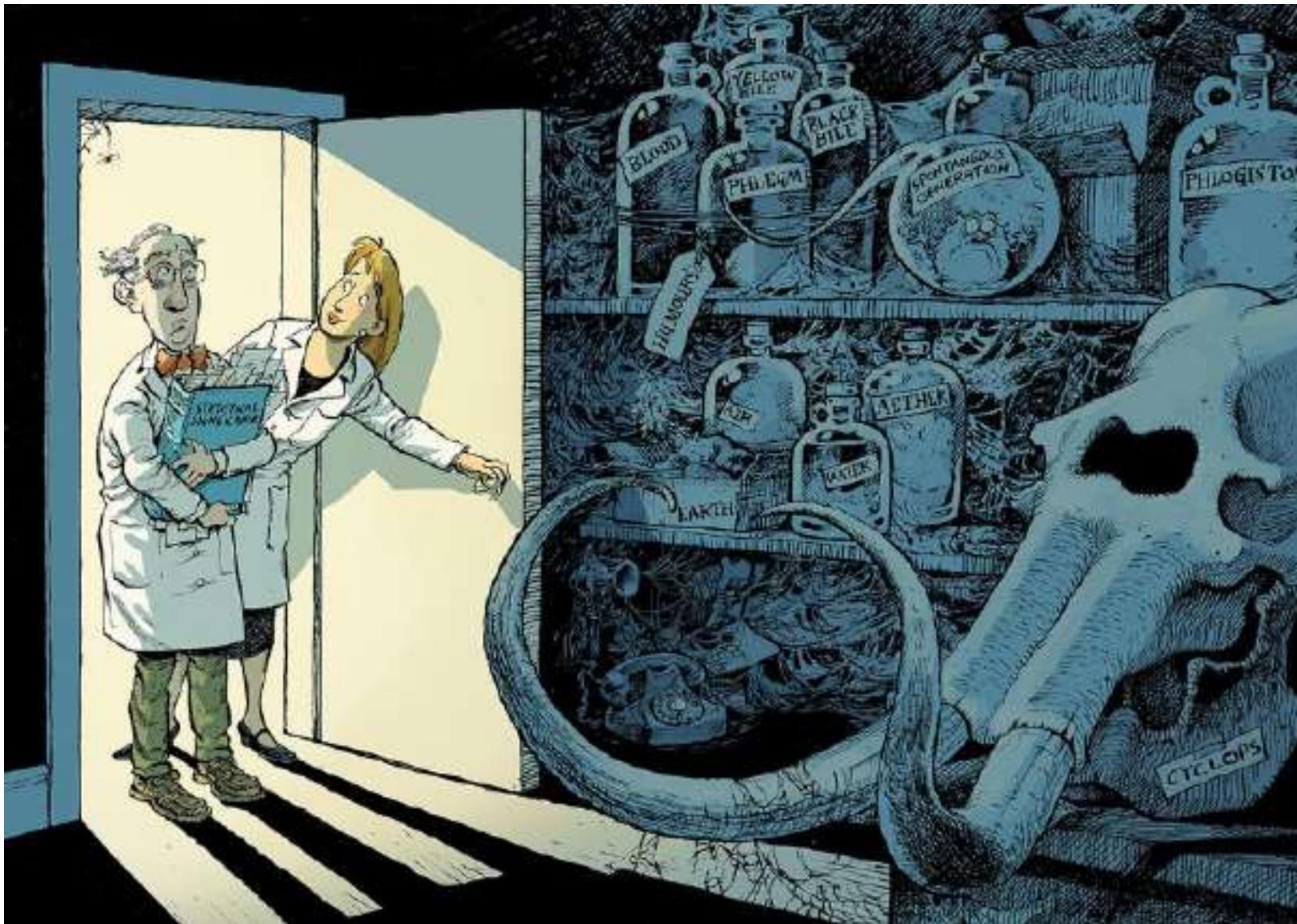
Gaming of metrics (recall Goodhart law)

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



Statistical and
mathematical
modelling

Throw away
the concept of
statistical
significance?





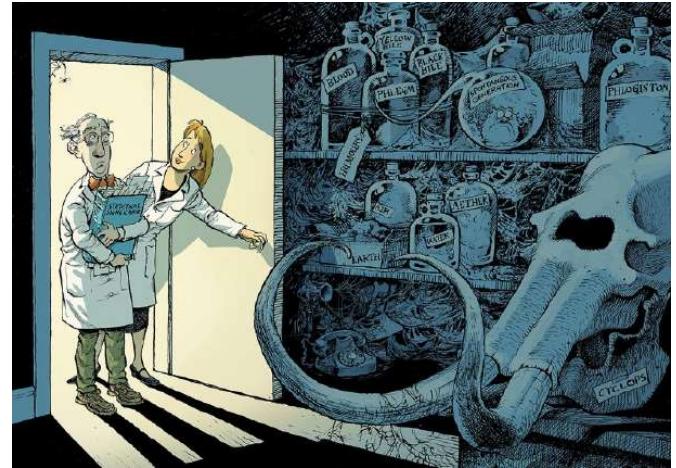
nature
International journal of science

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/>

STATISTICAL INFERENCE AS SEVERE TESTING

How to Get Beyond the Statistics Wars

DEBORAH G. MAYO



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?

Mathematical models

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.

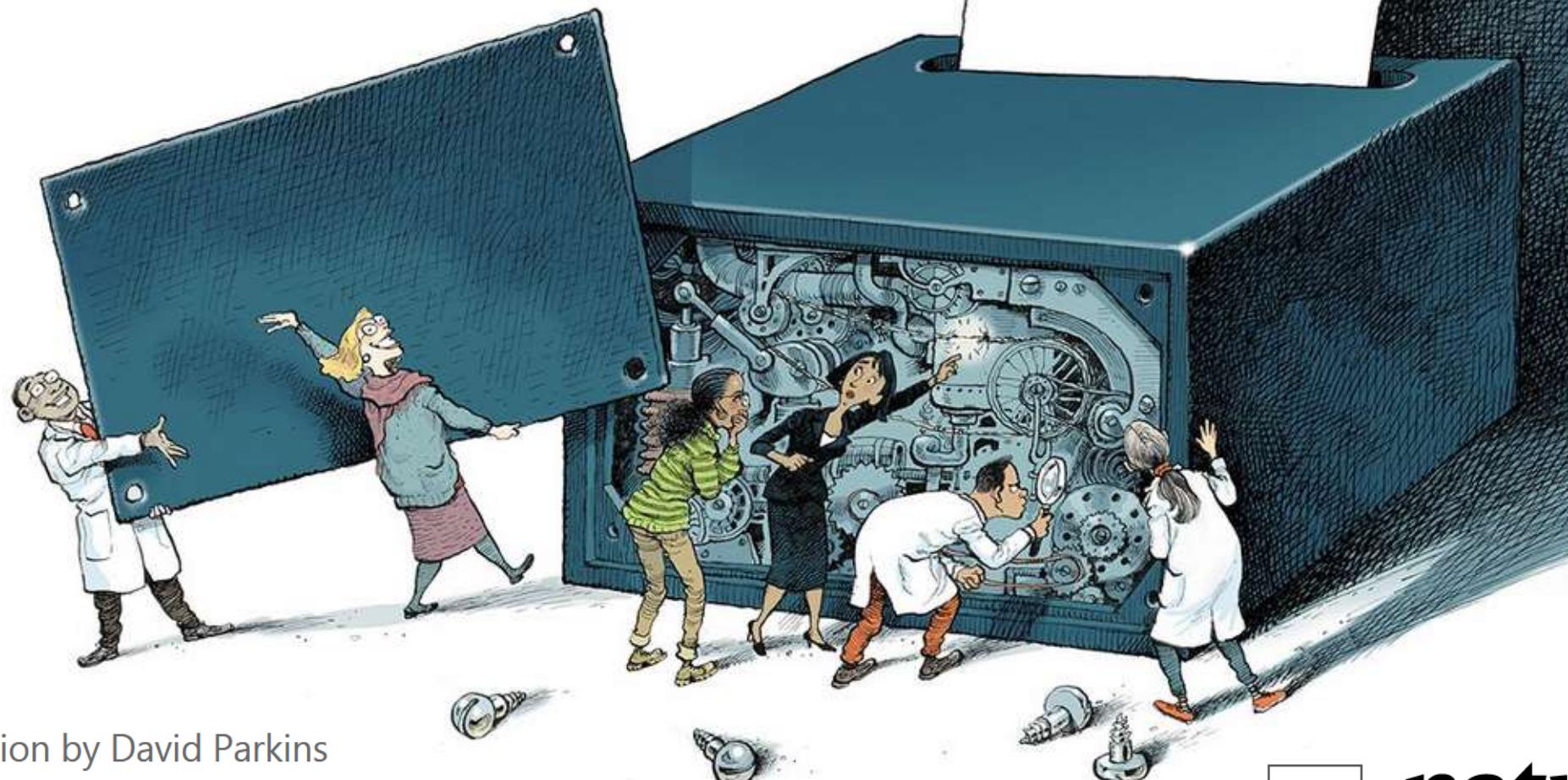


Illustration by David Parkins



nature

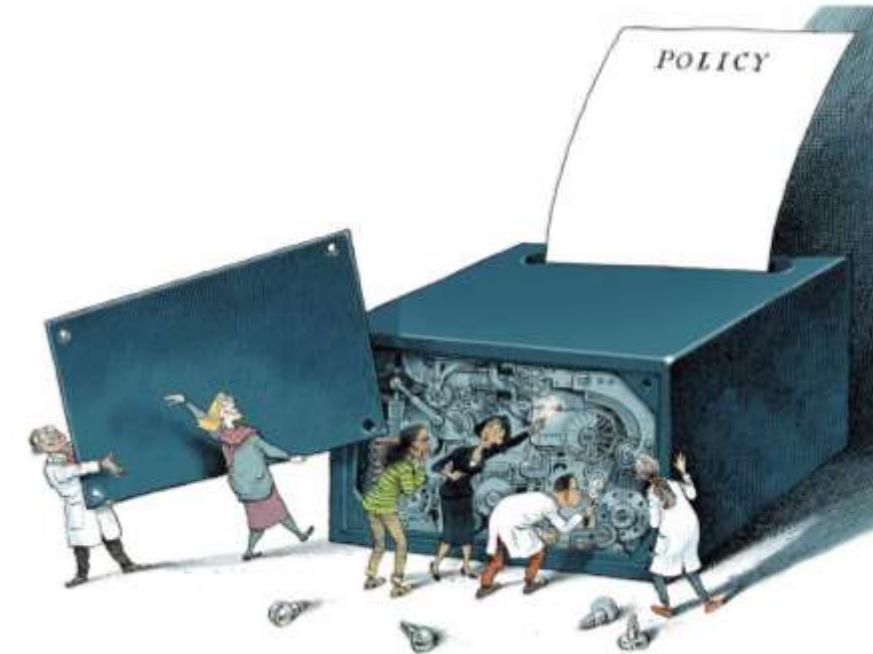
Mind the assumptions

Assess uncertainty and sensitivity



Mind the hubris

Complexity can be the enemy of relevance



Mind the framing

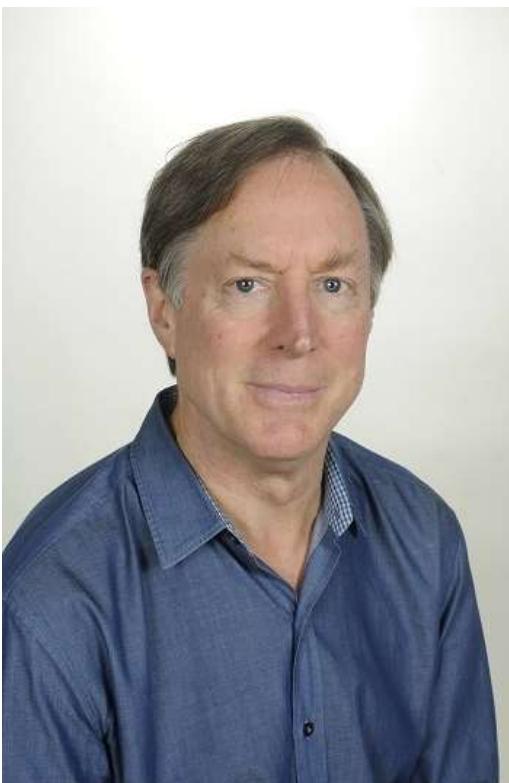
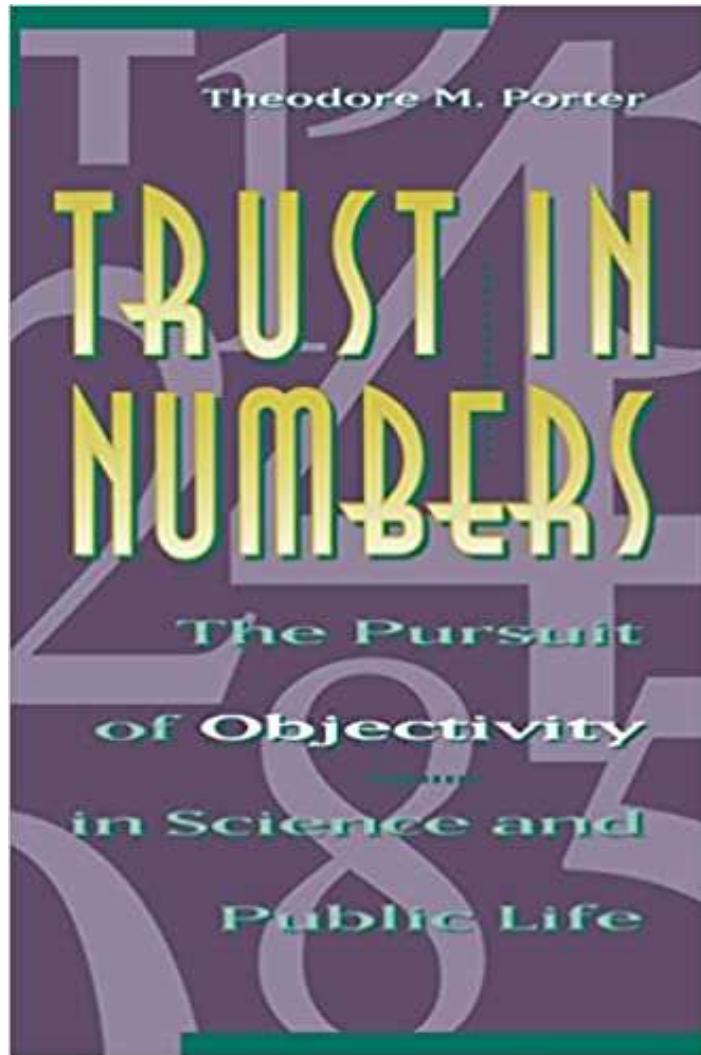
Match purpose and context

Mind the consequences

Quantification can backfire.

Mind the unknowns

Acknowledge ignorance

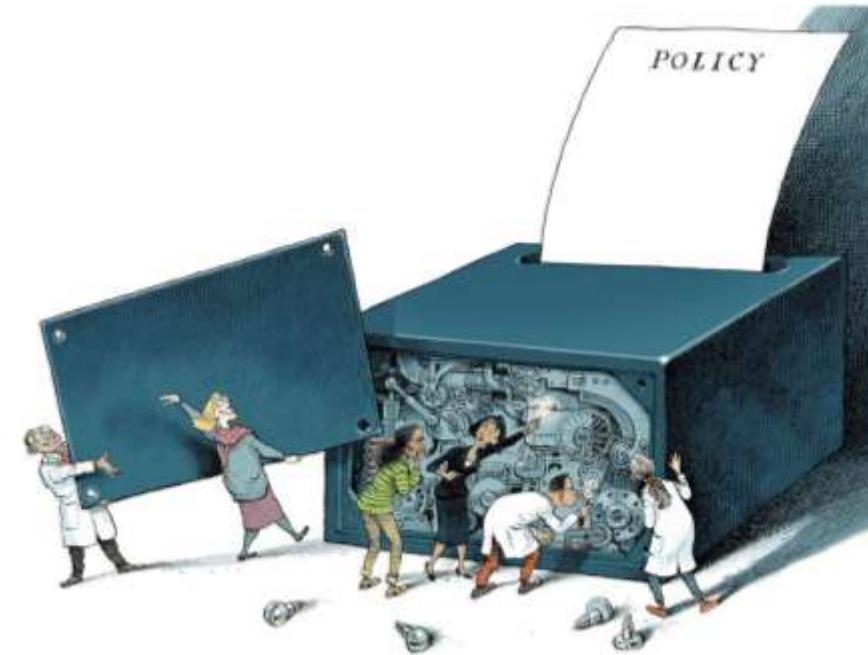


Cost benefit analysis: chapter 7 in
Porter's book "Trust in Numbers",
Princeton, 1995

Theodor Porter

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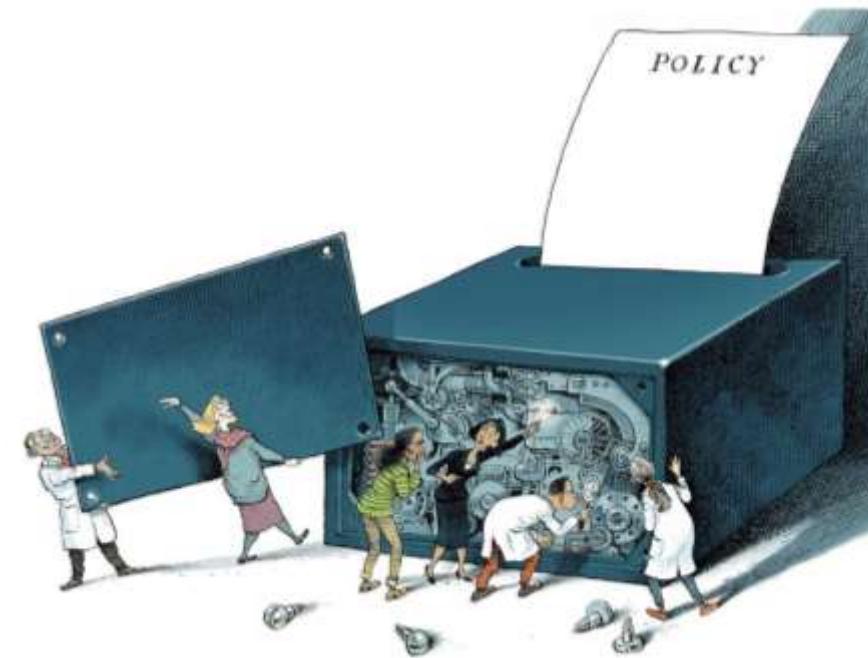
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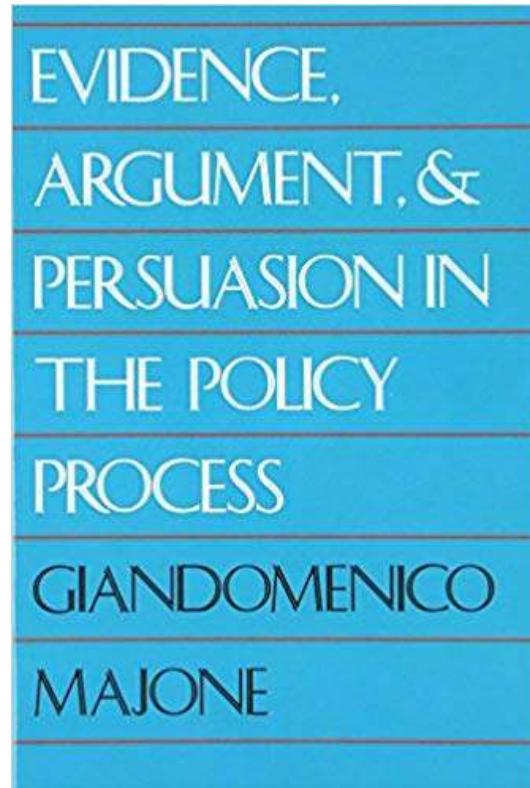
… models will reflect the interests, disciplinary orientations and biases of the developers…

SUPPLEMENTARY INFORMATION

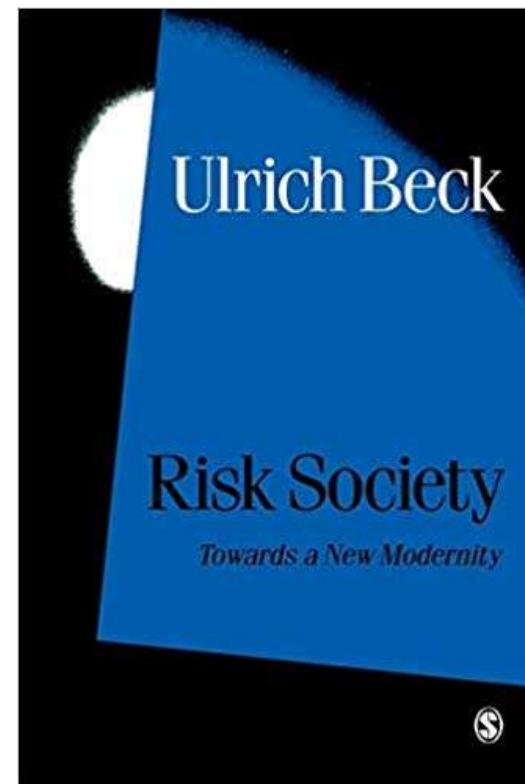
[1. Additional information and references](#)

>260 references

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



1989



1992 (1986)



Ulrich Beck
(1944 –2015)



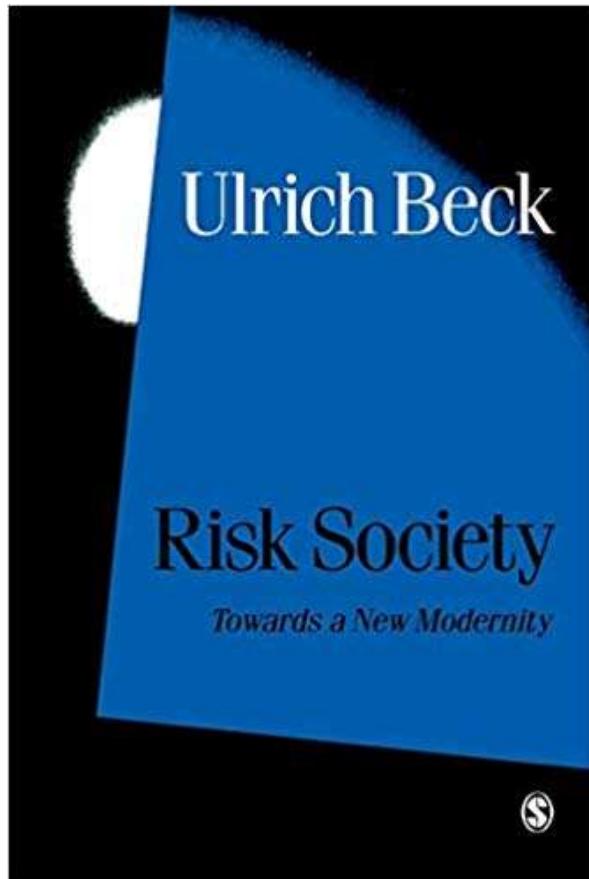
Environmental Science & Policy
Volume 106, April 2020, Pages 87–98



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}

“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.”



1992 (1986)



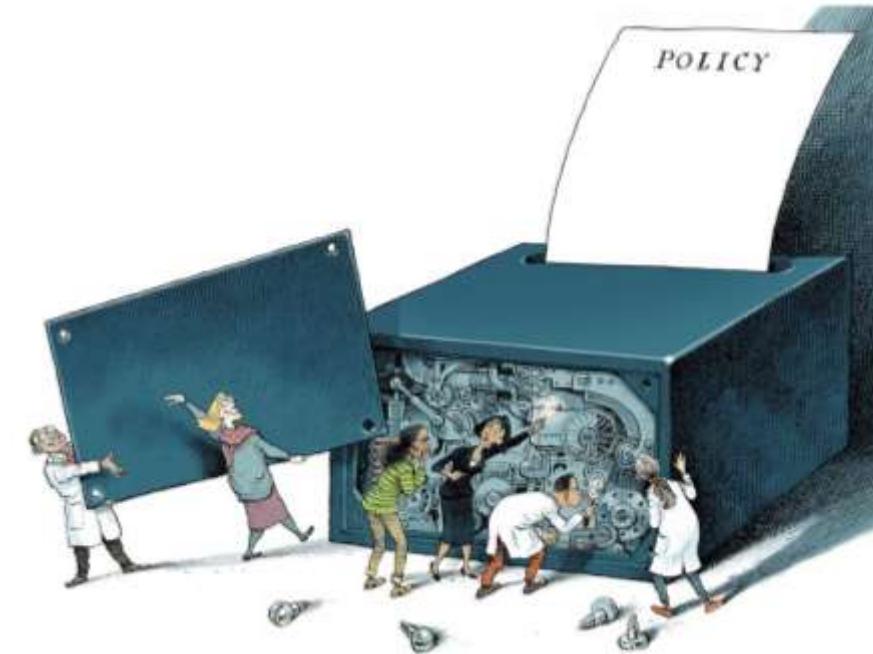
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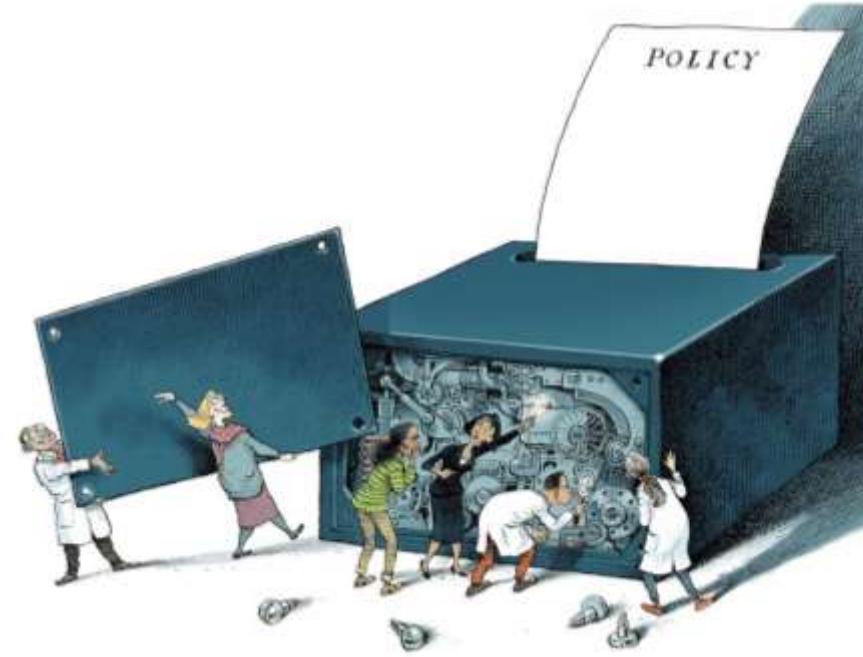
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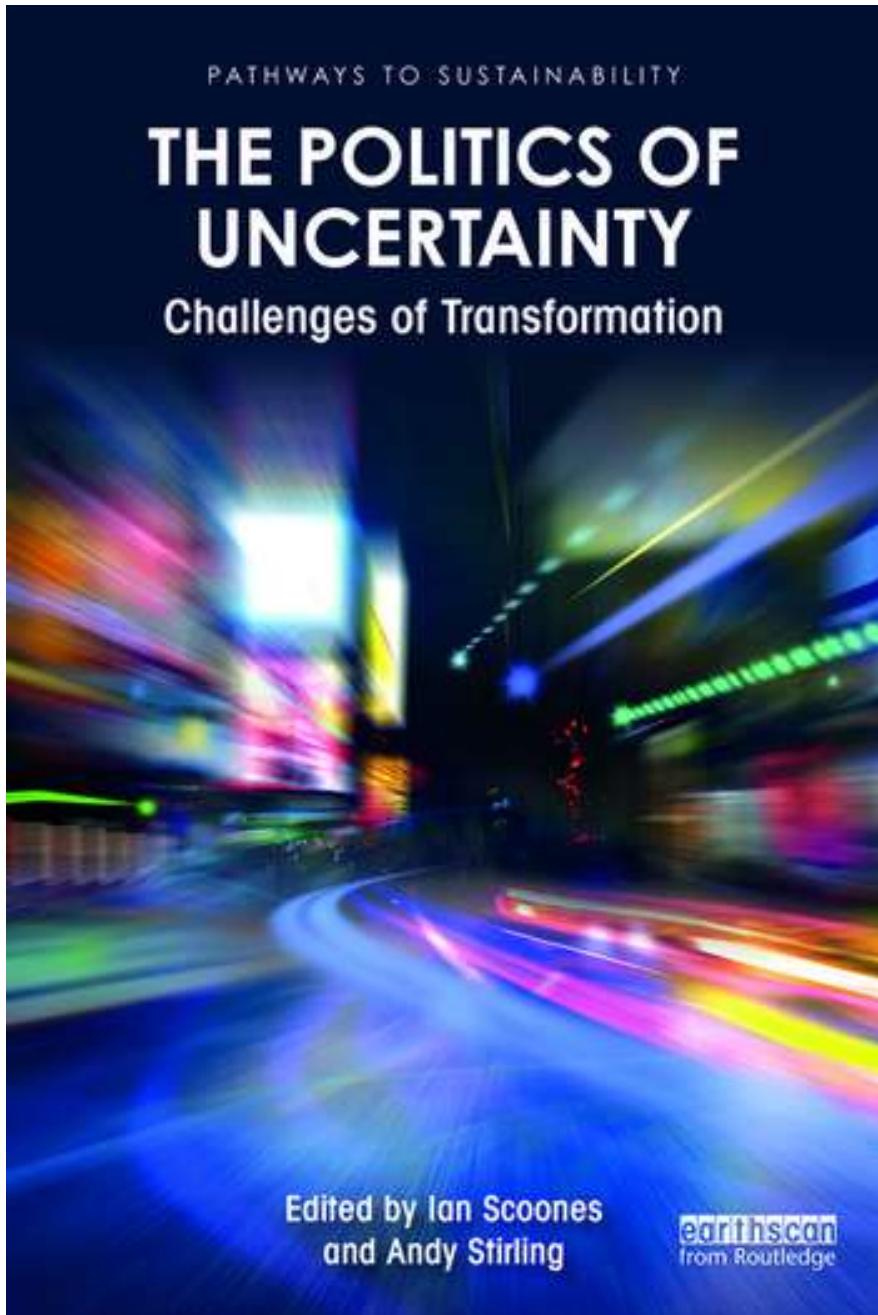


From the risk of financial products to the management of coastal zones to the models for disaster insurance bad modelling may lead to wrong decisions

SUPPLEMENTARY INFORMATION

[1. Additional information and references](#)

>260 references



3

SHARING RISKS OR PROLIFERATING UNCERTAINTIES?

Insurance, disaster and development

Leigh Johnson

Model-based parametric insurance led to dramatic consequences for developing countries experiencing draughts

Open access: <https://www.taylorfrancis.com/books/politics-uncertainty-ian-scoones-andy-stirling/e/10.4324/9781003023845>

Beyond models

Why ethics is needed now

of quantification

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South African Research Chair in Industrial
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Davis Center at Harvard University, United States

Jayati Ghosh

University of Massachusetts Amherst, United
States;
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Rainer Kattel

UCL Institute for Innovation and Public Purpose

Ingrid H. Kvangraven

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Ismael Rafols

Centre for Science and Technology Studies,
Leiden University, the Netherlands

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



**UCL Institute for
Innovation and
Public Purpose**

WORKING PAPER
WP 2021/05



… 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

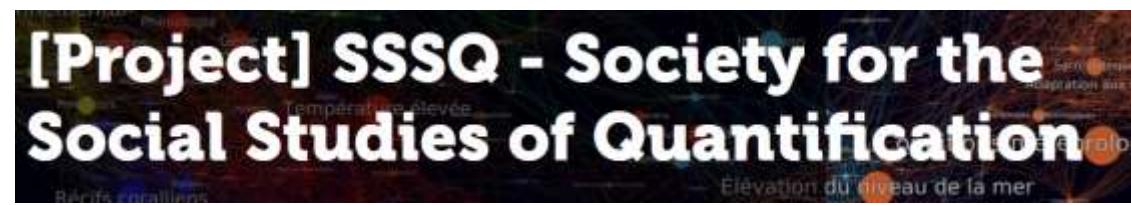
Numbers are the prevalent means to express value in our societies
… Access & production of numbers reflect and reinforce power imbalances

Numbers capture our attention; they illuminate the part of reality which is being numerified, and fatally push those parts into the background which come without the clothing of ...

... numbers are so deeply entrenched in our existence that we barely reflect on them critically them anymore — too close to us, they have become part of the very lens through which we attend to and comprehend the world.

Existing initiatives looking at quantification

• • • Data
• — • Justice
• — • Lab



Radical Statistics Group

Using statistics to support progressive social change



THE ALGORITHMIC JUSTICE LEAGUE

Reading material

Di Fiore, Monica, Marta Kuc Czarnecka, Samuele Lo Piano, Arnald Puy, and Andrea Saltelli. 2022. “The Challenge of Quantification: An Interdisciplinary Reading.” *Minerva* 61 (December): 53–70. <https://doi.org/10.1007/s11024-022-09481-w>.

Mennicken, Andrea, and Wendy Nelson Espeland. 2019. “What’s New with Numbers? Sociological Approaches to the Study of Quantification.” *Annual Review of Sociology* 45 (1): 223–45. <https://doi.org/10.1146/annurev-soc-073117-041343>.

Mennicken, Andrea, and Robert Salais. 2022. “The New Politics of Numbers: An Introduction.” In *The New Politics of Numbers. Utopia, Evidence and Democracy*, Andrea Mennicken and Robert Salais, 1–44. Palgrave Macmillan.

Porter, Theodore M. 1995. *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*. Princeton University Press. <https://books.google.es/books?id=oK0QpgVfIN0C>.

Porter, Theodore M. 2012. “Funny Numbers.” *Culture Unbound* 4: 585–98.

Saltelli, Andrea, A. Andreoni, Wolfgang Drechsler, J. Ghosh, Rainer Kattel, I. H. Kvamraven, Ismael Rafols, Erik S. Reinert, A. Stirling, and T. Xu. 2021. “Why Ethics of Quantification Is Needed Now. UCL Institute for Innovation and Public Purpose.” WP 2021/05. London: UCL Institute for Innovation and Public Purpose.

Saltelli, Andrea, and Monica Di Fiore, eds. 2023. *The Politics of Modelling. Numbers between Science and Policy*. Oxford: Oxford University Press.

Saltelli, Andrea, and Arnald Puy. 2023. “What Can Mathematical Modelling Contribute to a Sociology of Quantification?” *Humanities and Social Sciences Communications* 10 (213). <https://doi.org/10.2139/ssrn.4212453>.

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Andrea Saltelli

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Coming Out Soon: The politics of modelling



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AndreaSaltelli 2023/4/18 17:24

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