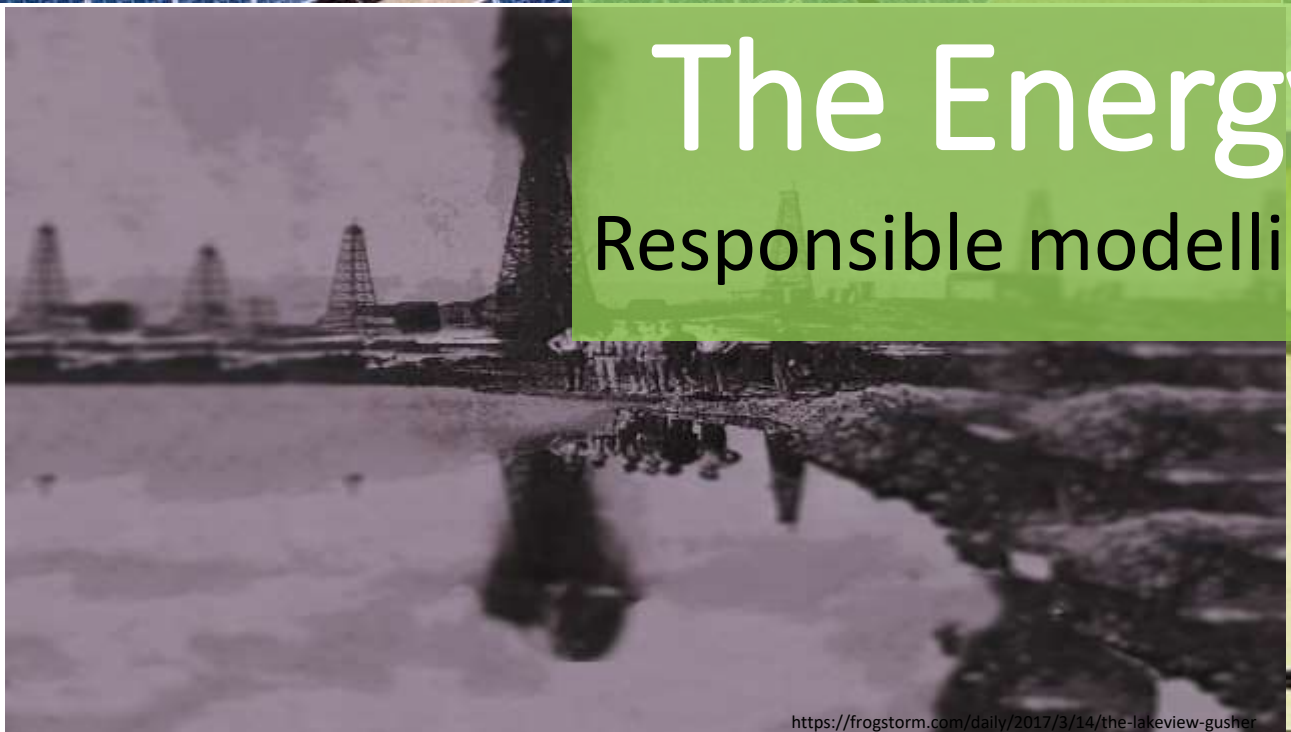
SDG 207

Feukeng, 2019

The Energy Transition

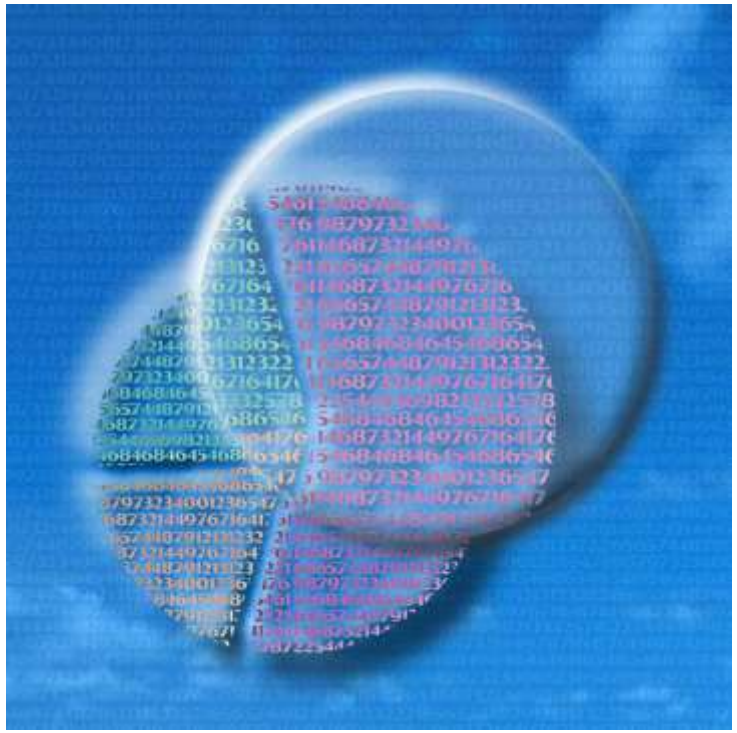
Responsible modelling and forecasting



Andrea Saltelli

- Lecture topics
  - Sociology and ethics of quantification, responsible modelling
- Main competence area
  - Sensitivity analysis, sensitivity auditing, ethics of quantification, science's integrity, science and lobbying

- Background
  - MSc in inorganic chemistry
  - 2005-2015 Head of Econometrics at the European Commission
  - 2016-2020 Professor 2 at UIB-SVT
  - Pompeo Fabra University, Barcelona School of Management



Responsible modelling and forecasting

Andrea Saltelli

SDG 207, Monday, October 17 2022 at 10.15
(Auditorium 4, Realfagbygget, Allegaten 41)

Andrea Saltelli

www.andreasaltelli.eu

HOME ABOUT ME PUBLICATIONS NEWS & VIDEOS RESOURCES

Do we live immersed in fantastic numbers?

OPINION

PETER COY

‘The Most Important Number You’ve Never Heard Of’

Sept. 17, 2021

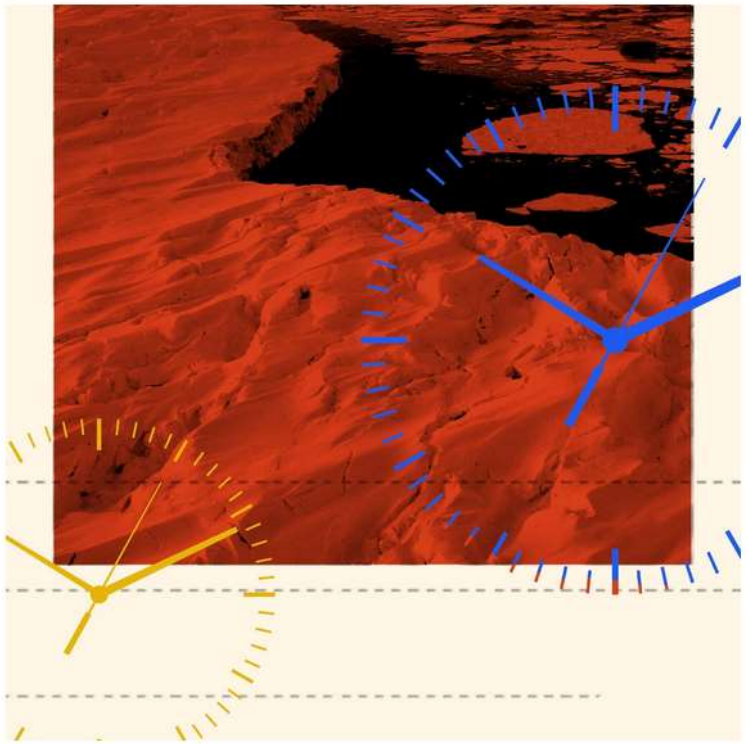


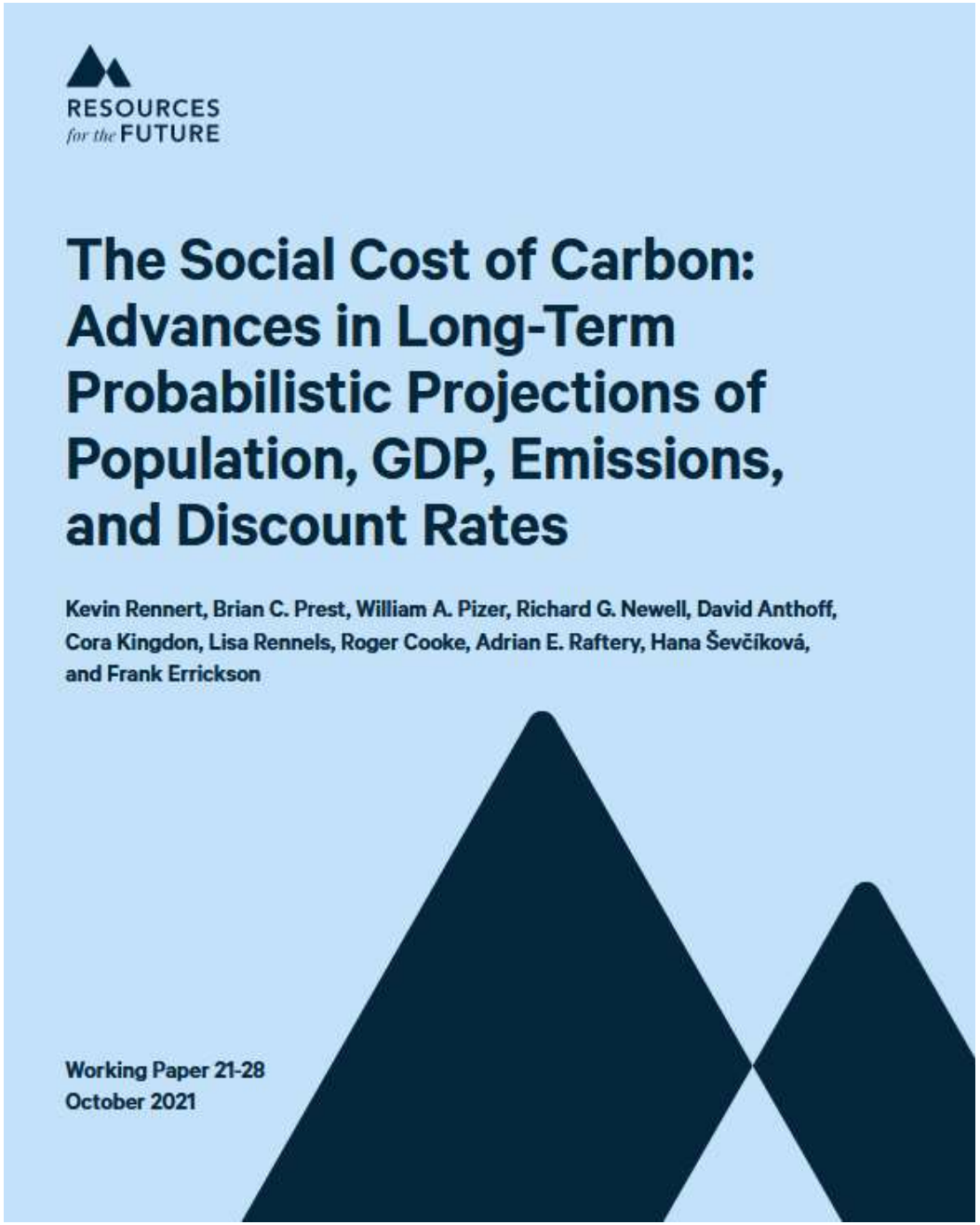
Illustration by Arsh Raziuddin, The New York Times

“social cost of carbon:

=$56 a ton on average at a 3 percent discount rate

=$171 a ton on average at a 2 percent discount rate”

The New York Times



Averaged till year 2300

Feeds into policy design

We have perhaps reached a complex epistemic state, where on the one hand ‘everybody knows’ that some numbers are pseudo-precise and that numbers can be gamed, while the game works only because most people don’t know about it

Jerome R. Ravetz

Statistical and mathematical modelling

Science's ethics and quantification are related

Example: Choosing the significance level in inference testing e.g. with p-test (1%,5%,10%, …)?

From Rudner, R. 1953, The scientist qua scientist makes value judgments, *Philosophy of Science*, **20**(1), 1-6.

Ethical P?

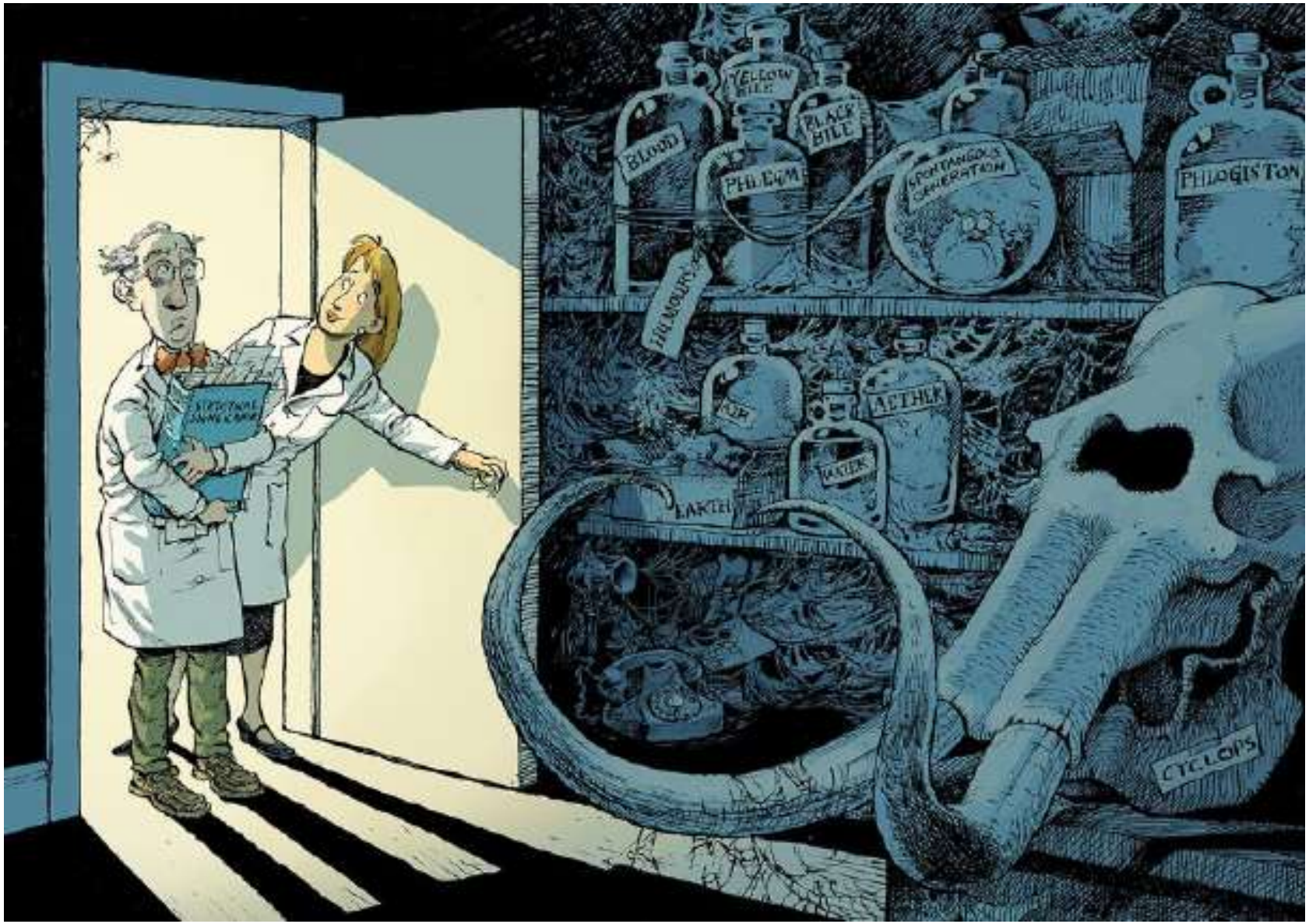
Interestingly, Rudner used this example to make the point that scientists do need to make value judgments

R. Rudner, “The Scientist Qua Scientist Makes Value Judgments,” Philosophy of Science, vol. 20. The University of Chicago Press Philosophy of Science Association, pp. 1–6, 1953. http://www.andreasaltelli.eu/file/repository/00_Rudnerphs53.pdf

“How sure we need to be before we accept a hypothesis will depend on how serious a mistake would be”

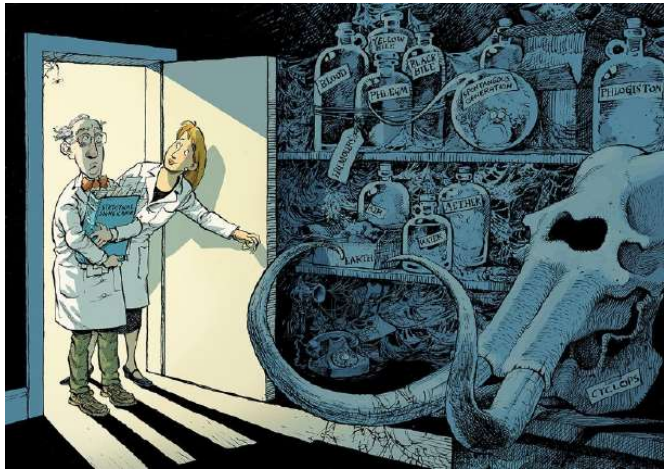
THE SCIENTIST *QUA* SCIENTIST MAKES VALUE JUDGMENTS*

RICHARD RUDNER



Throw away the concept of statistical significance?

nature
International journal of science



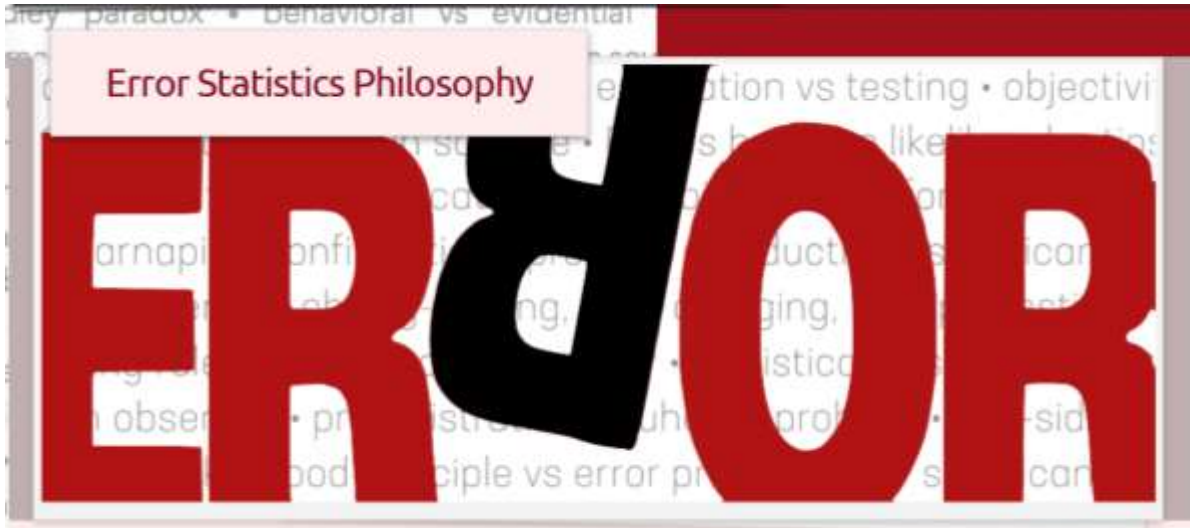
COMMENT · 20 MARCH 2019

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/



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

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.

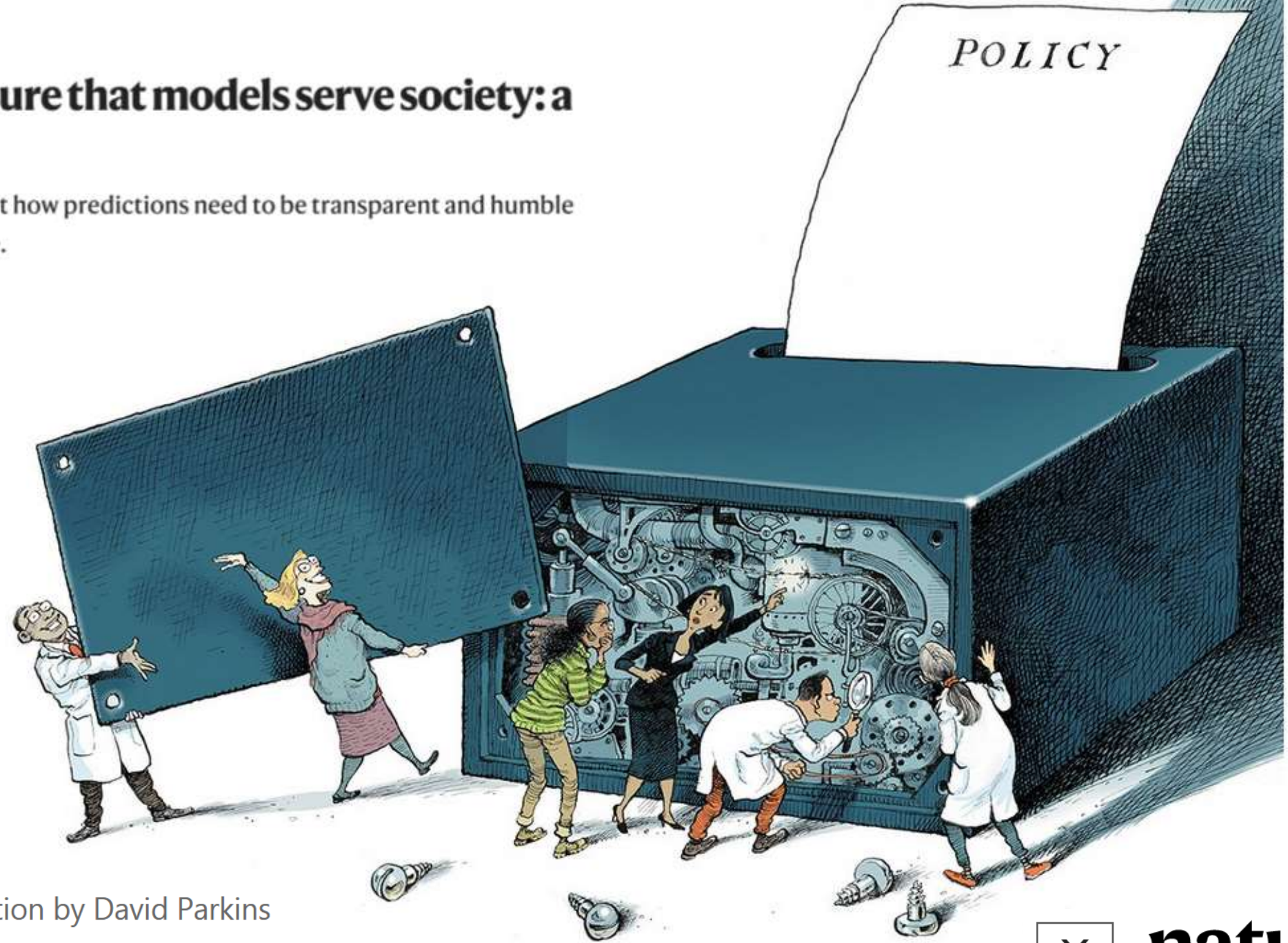


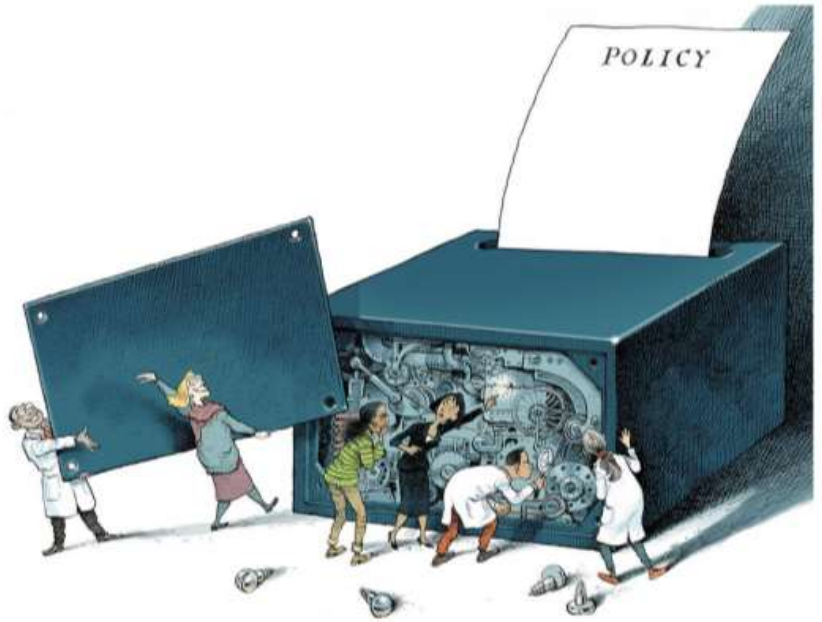
Illustration by David Parkins

nature

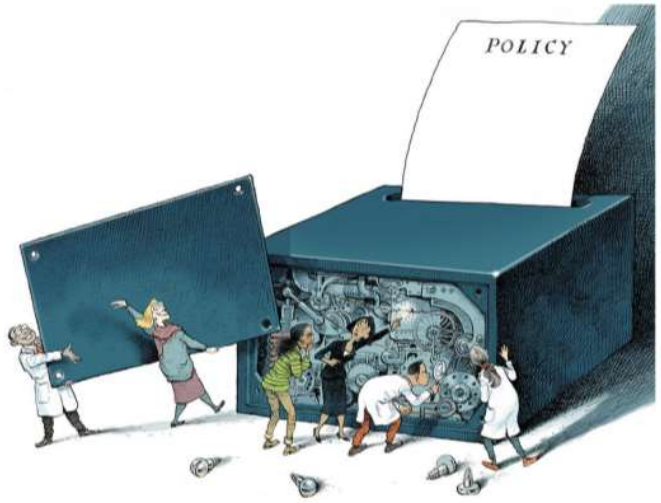
Andrea Saltelli, Gabriele Bammer, Isabelle Bruno, Erica Charters, Monica Di Fiore, Emmanuel Didier, Wendy Nelson Espeland, John Kay, Samuele Lo Piano, Deborah Mayo, Roger Pielke Jr, Tommaso Portaluri, Theodore M. Porter, Arnald Puy, Ismael Rafols, Jerome R. Ravetz, Erik Reinert, Daniel Sarewitz, Philip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

3 modellers Lo Piano, Puy, Saltelli
2 experts models and society Pielke, van der Sluijs
3 statisticians Mayo, Stark, Portaluri
2 statactivistes Bruno, Didier
2 economists Kay, Raynert
1 epidemiologist Vineis

2 sociologists of quantification Espeland, Porter
3 STS scholars Bammer, Sarewitz, Stirling
1 philosopher Ravetz
1 historian Charters
1 political scientists Di Fiore
1 expert RRI - Open Science Rafols

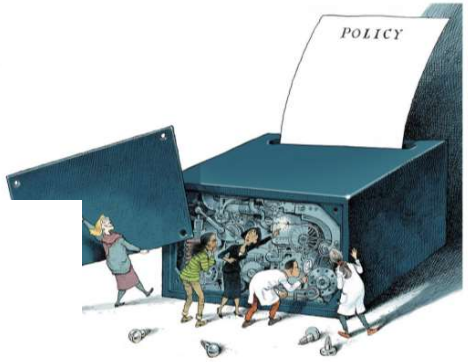


COVID has put mathematical models in the limelight



➔ Power & controversy

Power



The New York Times

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

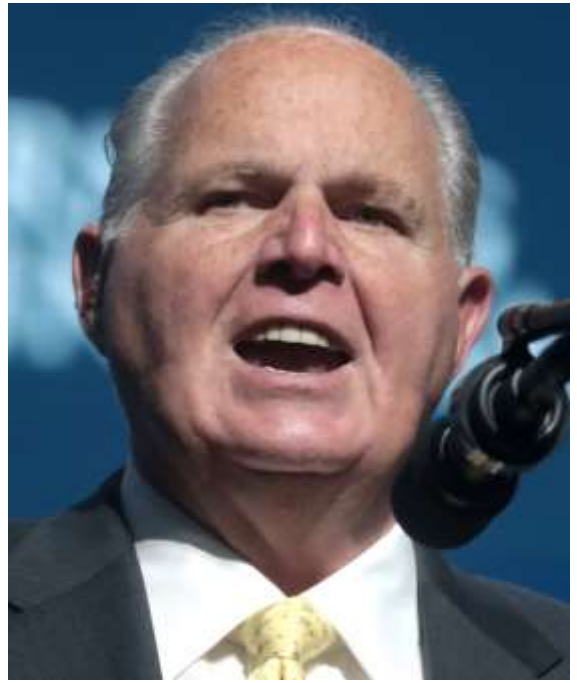
It wasn't so much the numbers themselves, frightening though they were, as who reported them: Imperial College London.

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

Rush Limbaugh

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



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

Mind the assumptions

Assess uncertainty and sensitivity

Mind the hubris

Complexity can be the enemy of relevance

Mind the framing

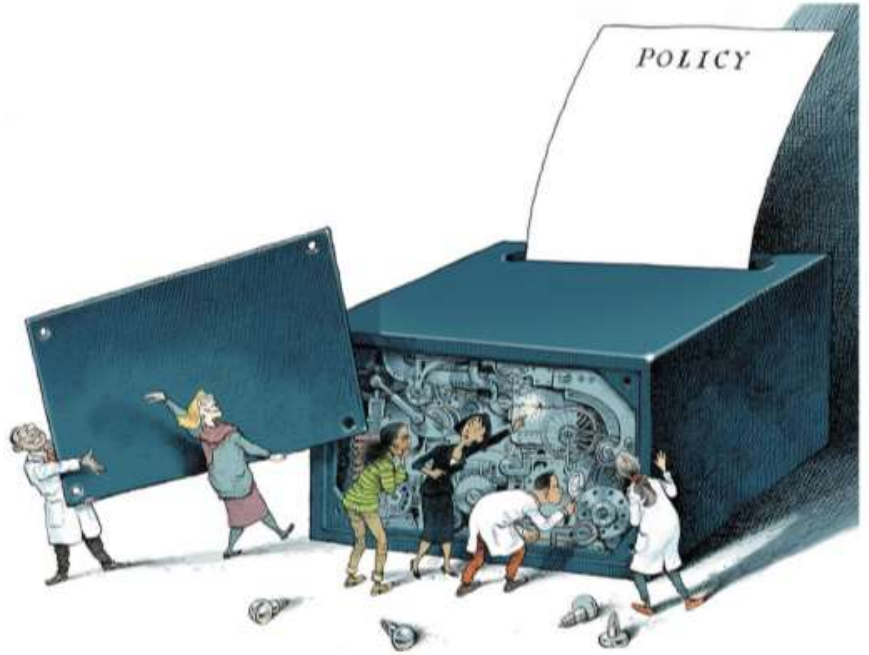
Match purpose and context

Mind the consequences

Quantification can backfire

Mind the unknowns

Acknowledge ignorance



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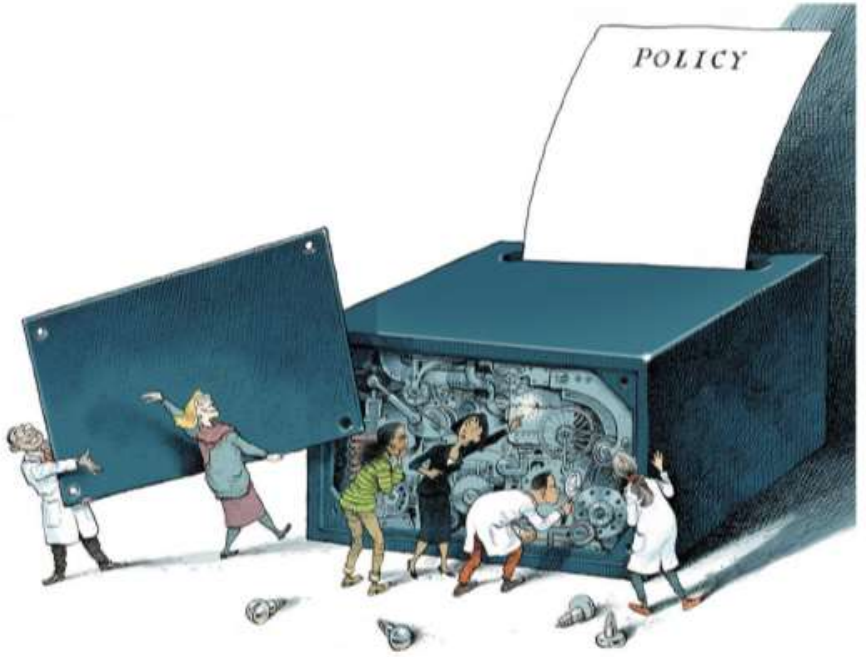
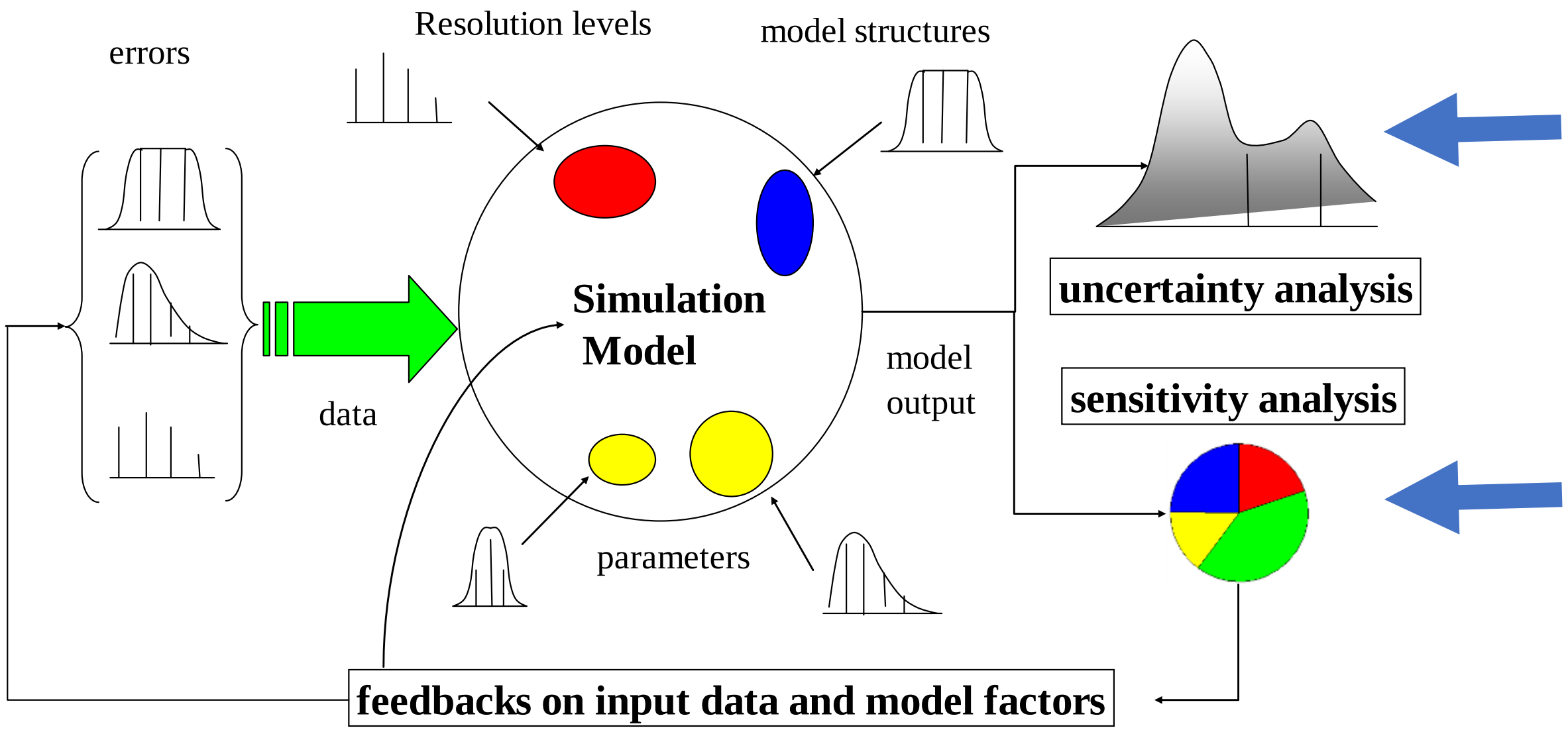


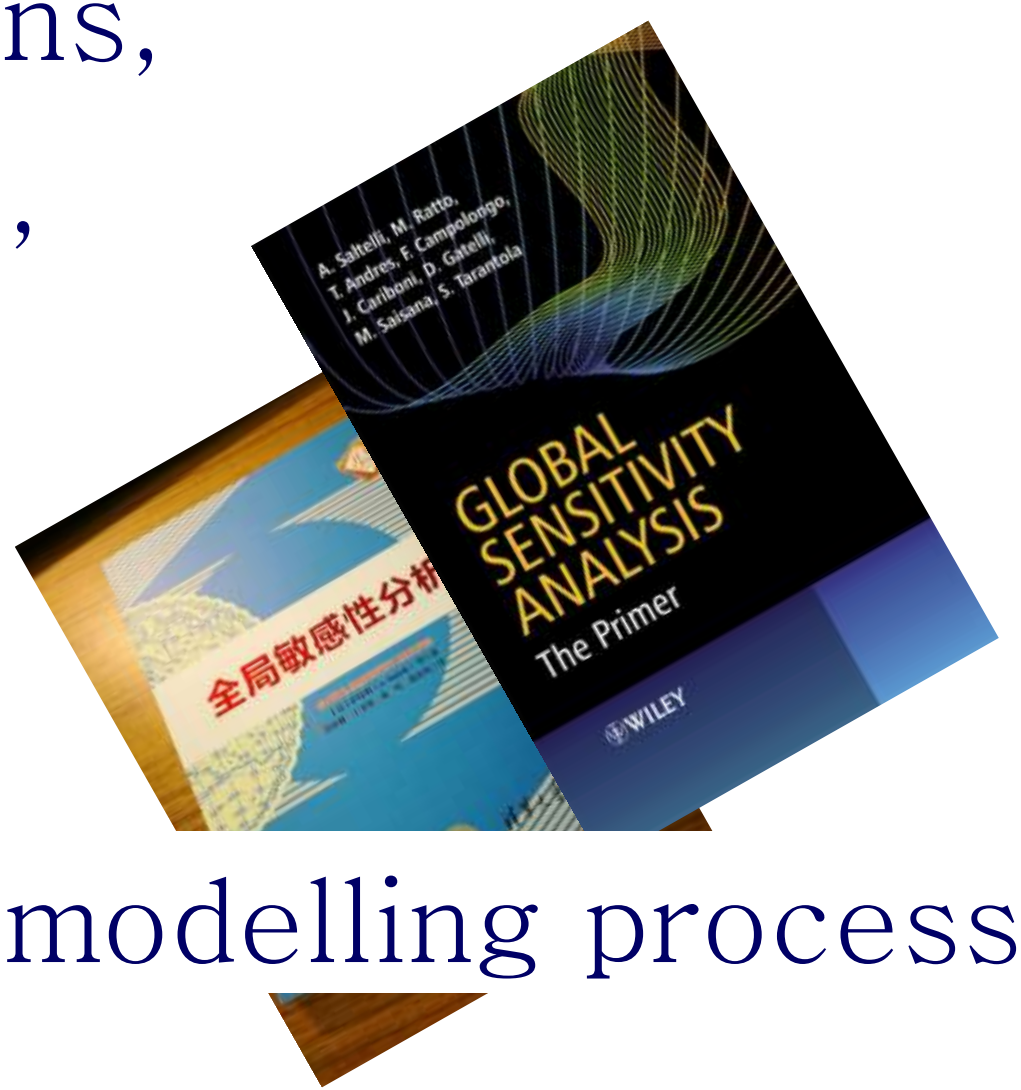
… models require input values for which there is no reliable information…

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


errors
Resolution levels
model structures
Simulation Model
data
parameters
model output
uncertainty analysis
sensitivity analysis
feedbacks on input data and model factors

One can sample more than just factors:

- modelling assumptions,
- alternative data sets,
- resolution levels,
- scenarios …



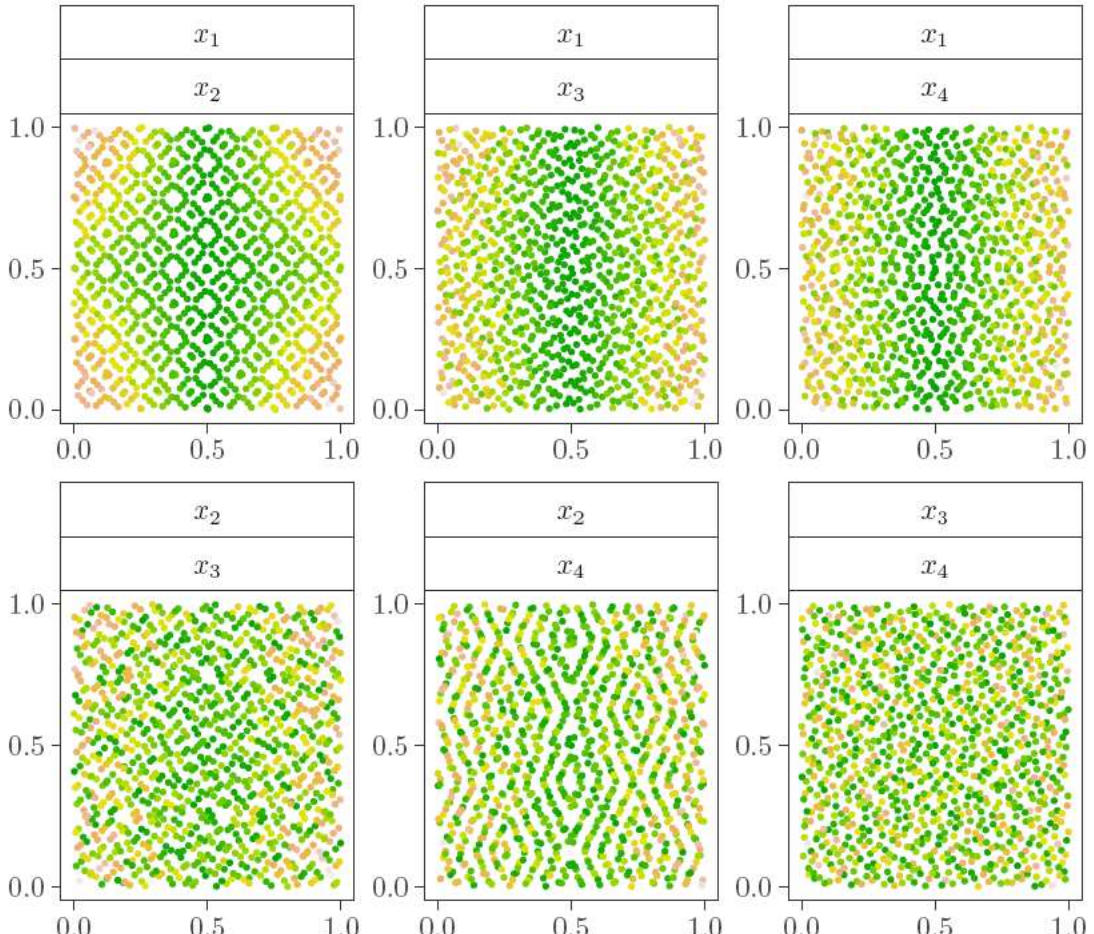
→ Modelling of the modelling process

Journal of Statistical Software

Home / Archives / Vol. 102 (2022) / Issue 5

sensobol: An R Package to Compute Variance-Based Sensitivity Indices

Arnald Puy, Samuele Lo Piano, Andrea Saltelli, Simon A. Levin



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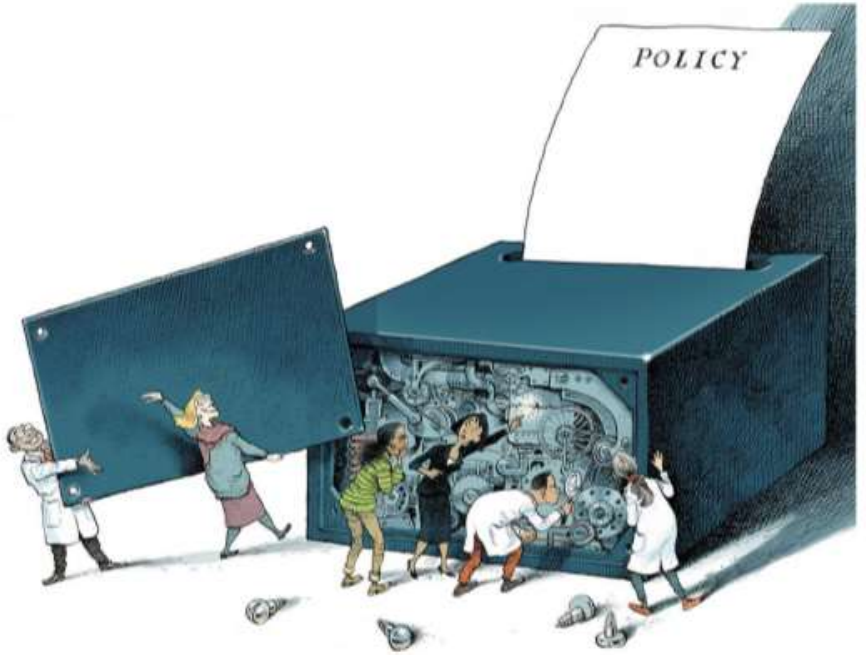
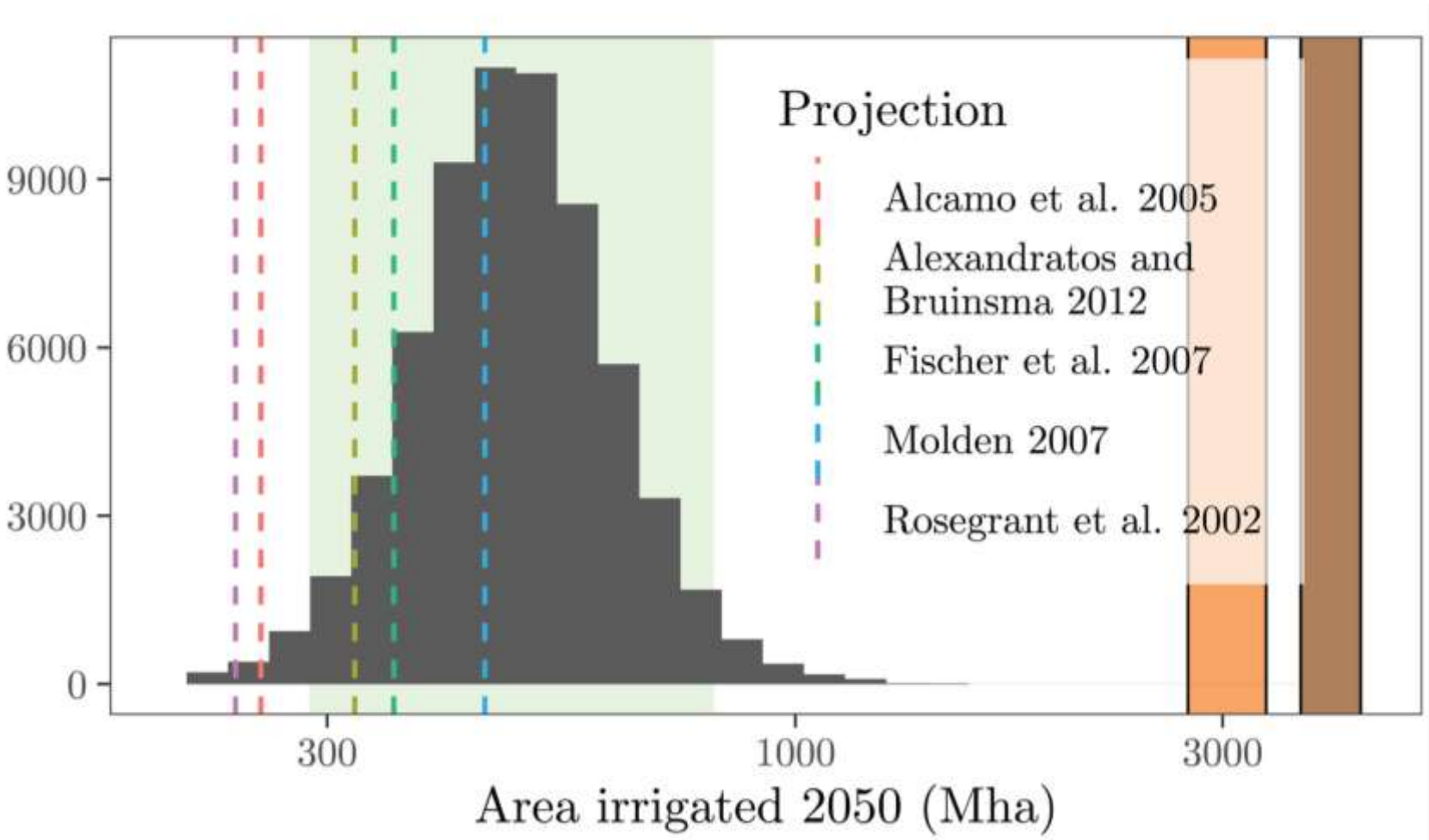


… this may lead to interesting discoveries …

Geophysical Research Letters

Current Models Underestimate Future Irrigated Areas

A. Puy ✉, S. Lo Piano, A. Saltelli First published: 17 April 2020 https://doi.org/10.1029/2020GL087360 |



Models ask as input information which we don't have – The case of WEBTAG

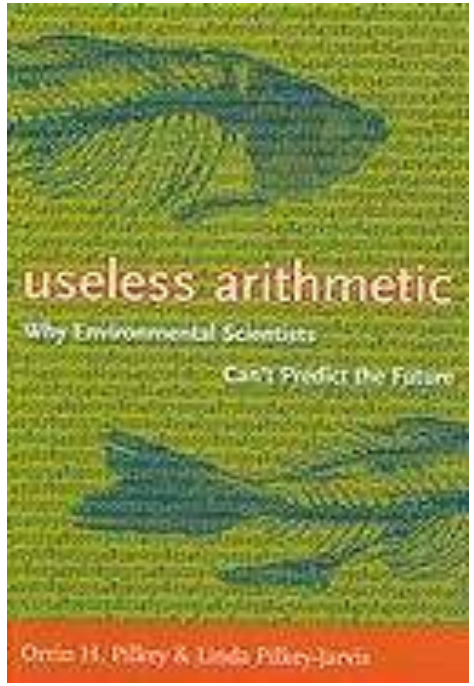
John Kay

J. A. Kay, "Knowing when we don't know," 2012, https://www.ifs.org.uk/docs/john_kay_feb2012.pdf

WebTAG: Annual Percentage Change in Car Occupancy (% pa) up to 2036

Journey Purpose	Weekday					Weekend	All Week
	7am-10am	10am-4pm	4pm-7pm	7pm-7am	Weekday Average		
Work	-0.48	-0.4	-0.62	-0.5	-0.44	-0.48	-0.45
Non - Work (commuting and other)	-0.67	-0.65	-0.53	-0.47	-0.59	-0.52	-0.56

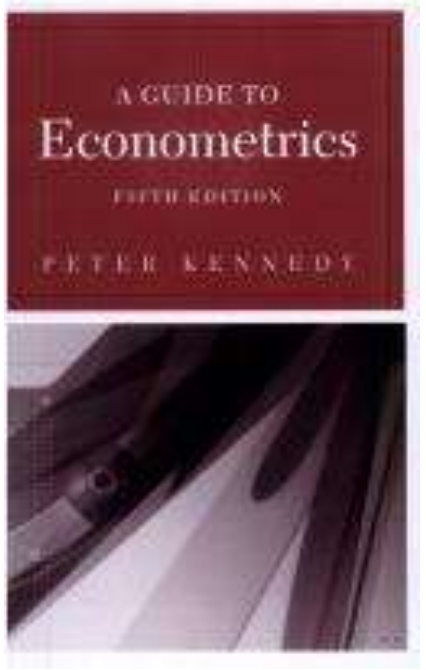
Orrin H. Pilkey



More examples in Useless Arithmetic: Why Environmental Scientists Can't Predict the Future, by Orrin H. Pilkey and Linda Pilkey-Jarvis

Peter Kennedy, A Guide to Econometrics.

One of the ten commandments of applied econometrics according to Peter Kennedy:



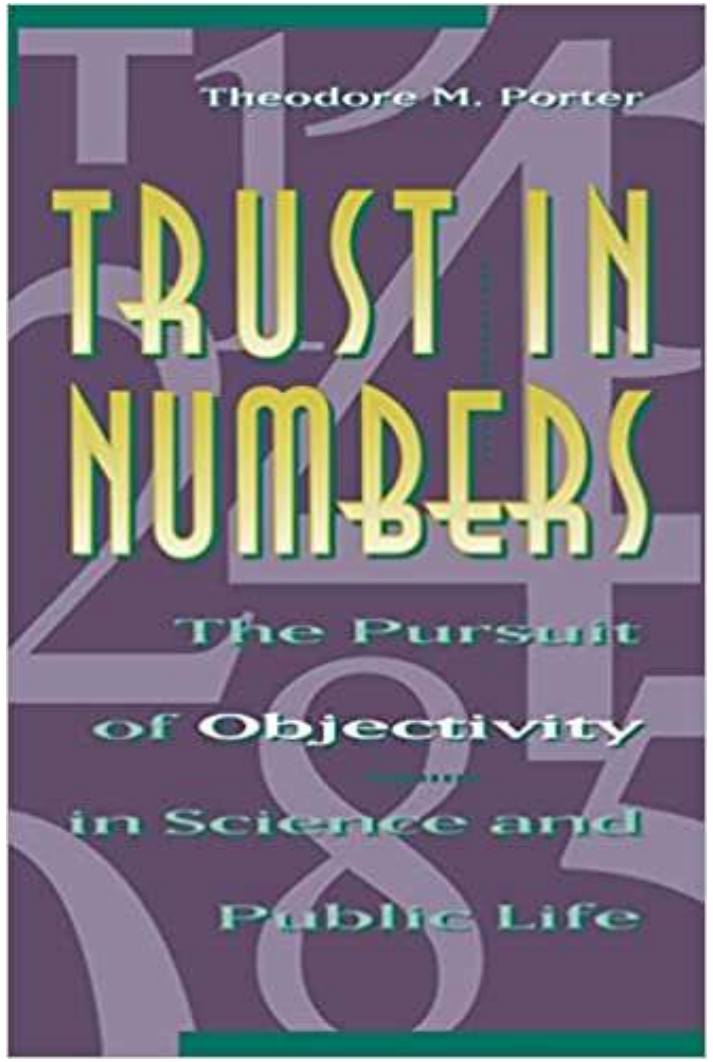
Peter Kennedy

“Thou shall confess in the presence of sensitivity. Corollary: Thou shall anticipate criticism “

"One reason these methods [global sensitivity analysis] are rarely used is their honesty seems destructive;"

"or, to put it another way, a fanatical commitment to fanciful formal models is often needed to create the appearance of progress"

Tantalus on the Road to Asymptopia, Edward E. Leamer, 2010 *Journal of Economic Perspectives*, **24**, (2), 31–46.



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

Theodor Porter

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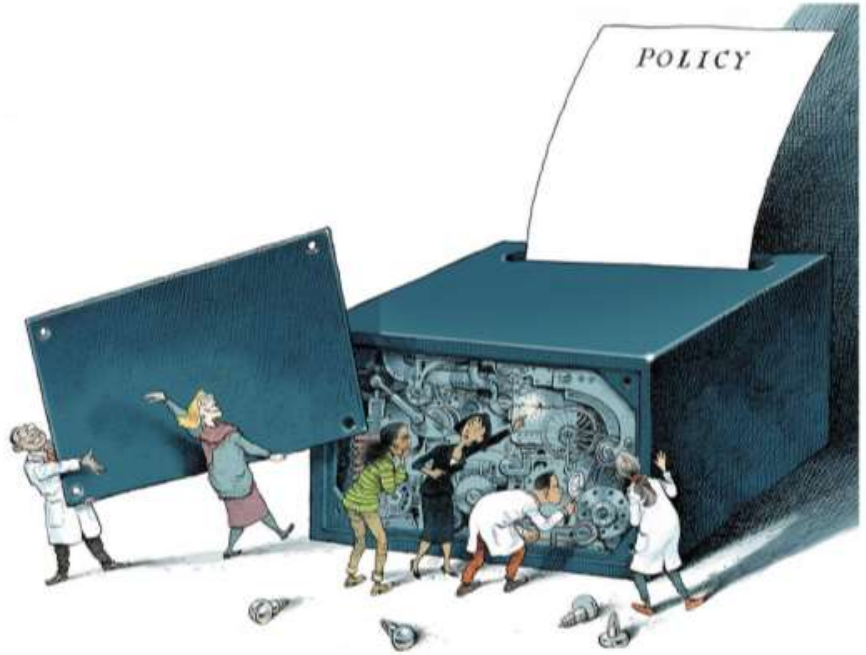
Complexity can be the enemy of relevance



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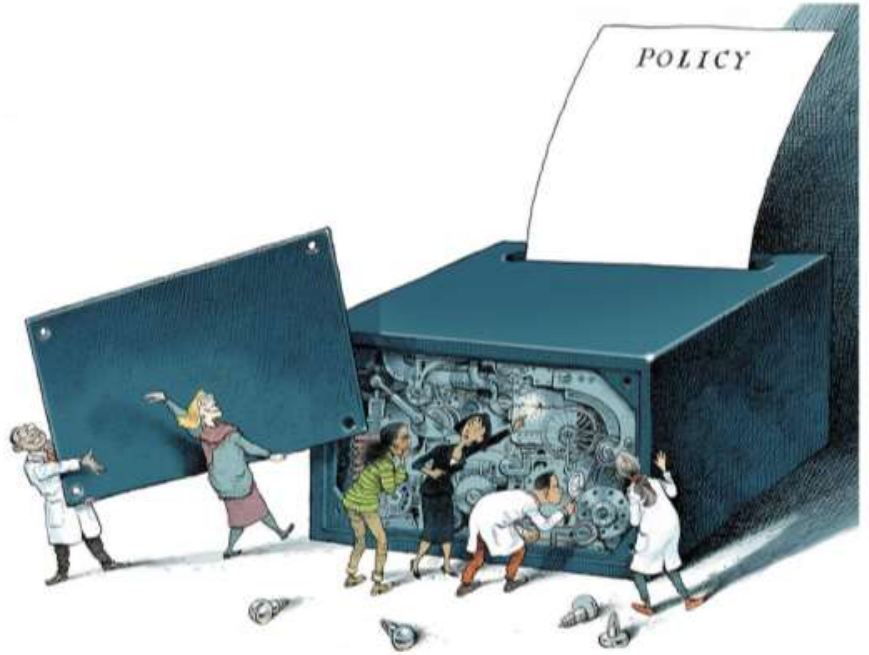
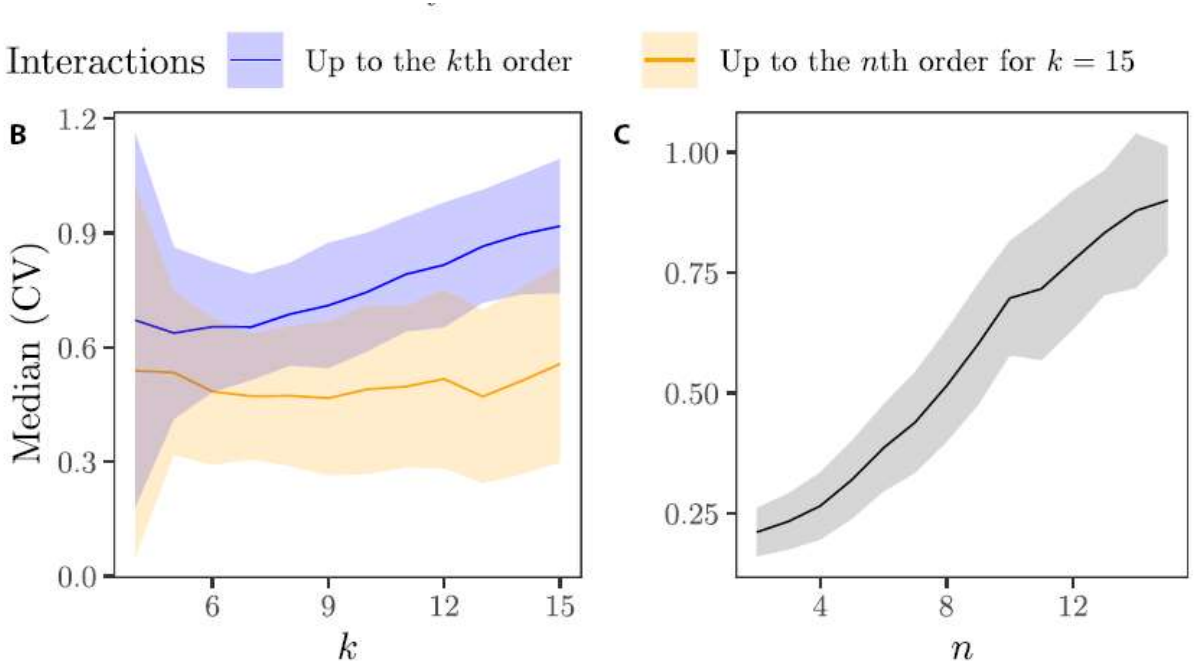


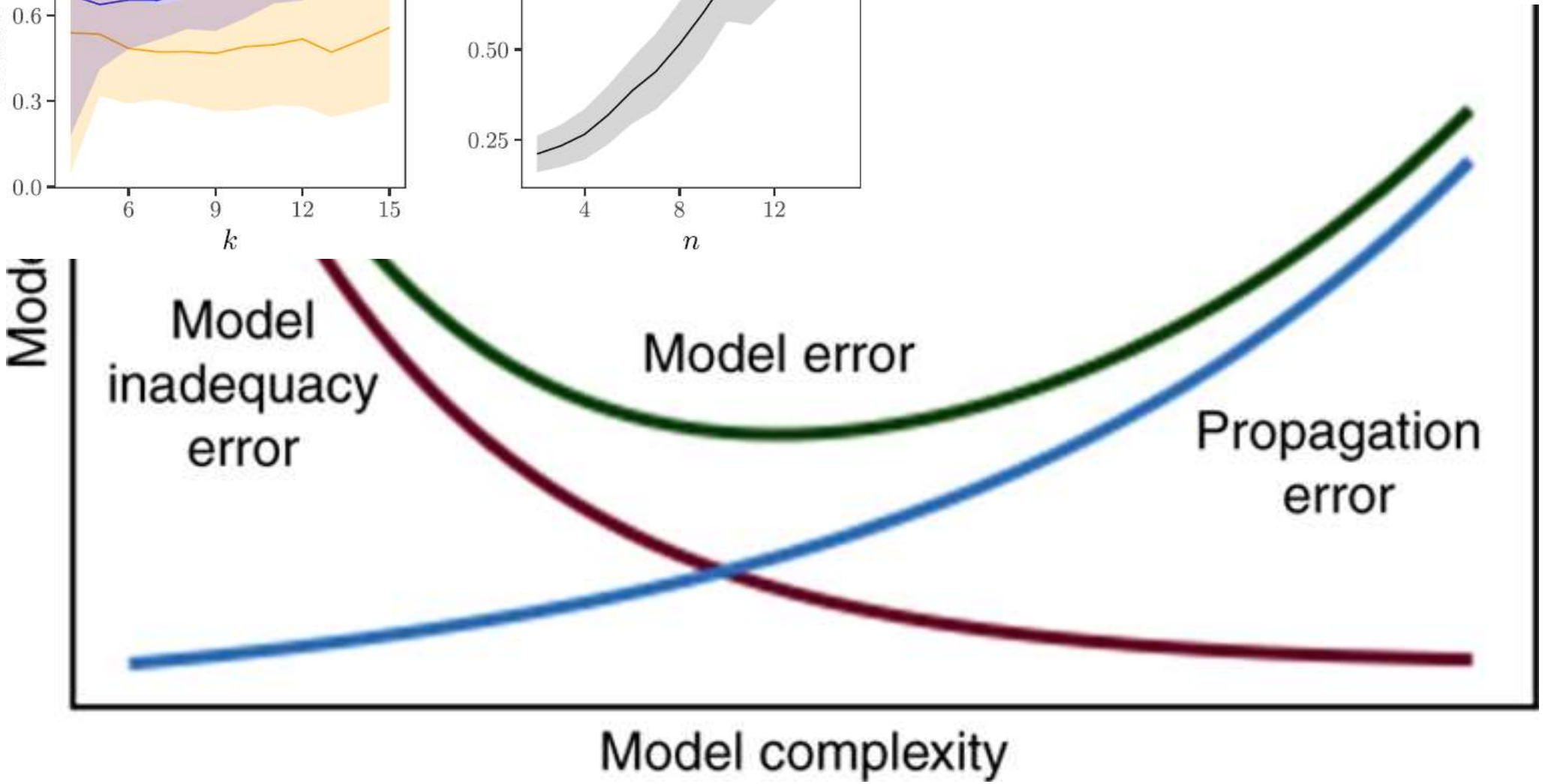
… many are seduced by the idea of adding complexity in an attempt to capture reality more accurately, but…

SUPPLEMENTARY INFORMATION

1. Additional information and references >260 references

Empirical test using the SA-based concept of effective dimension (forthcoming Science Advances online October 20)





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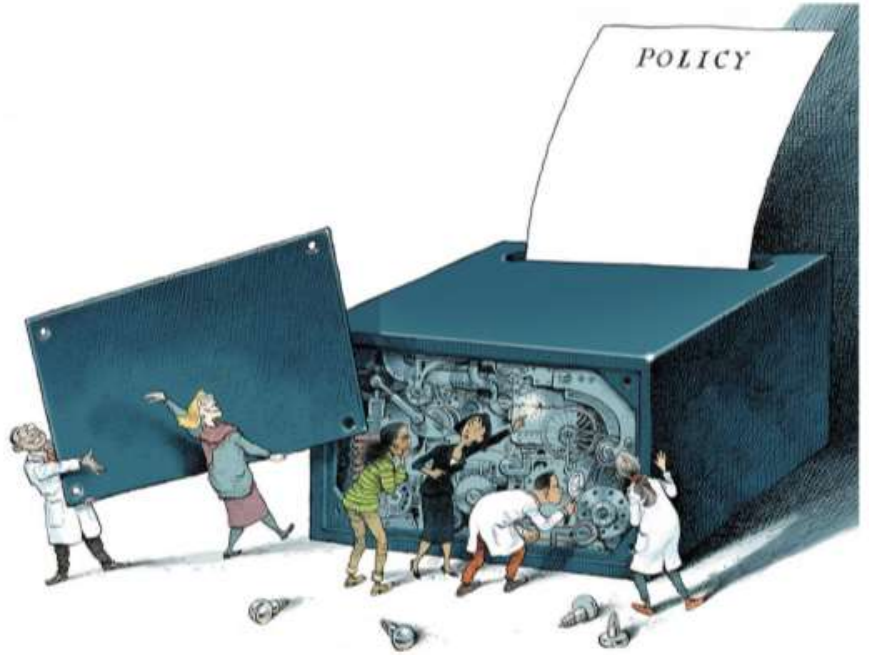

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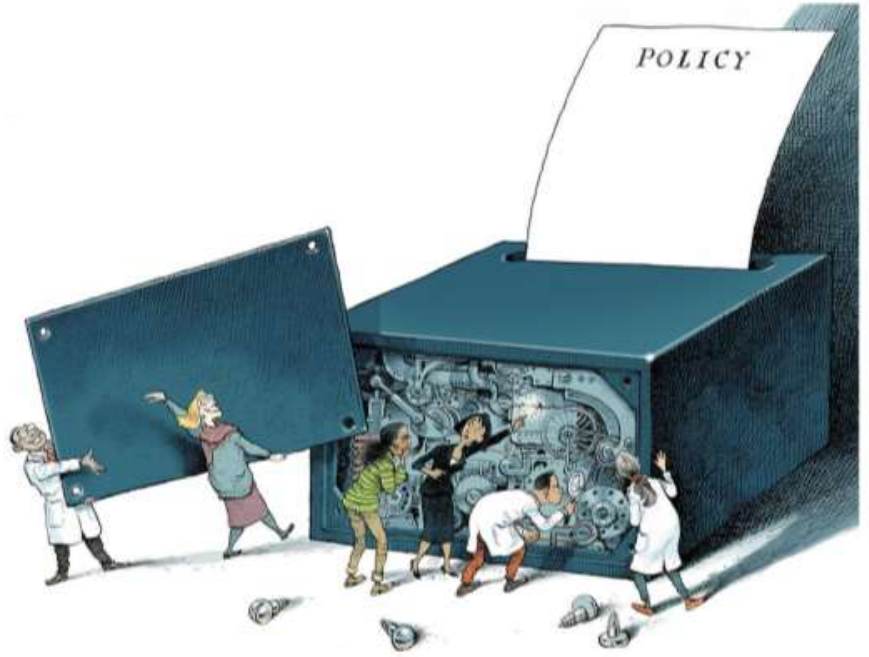


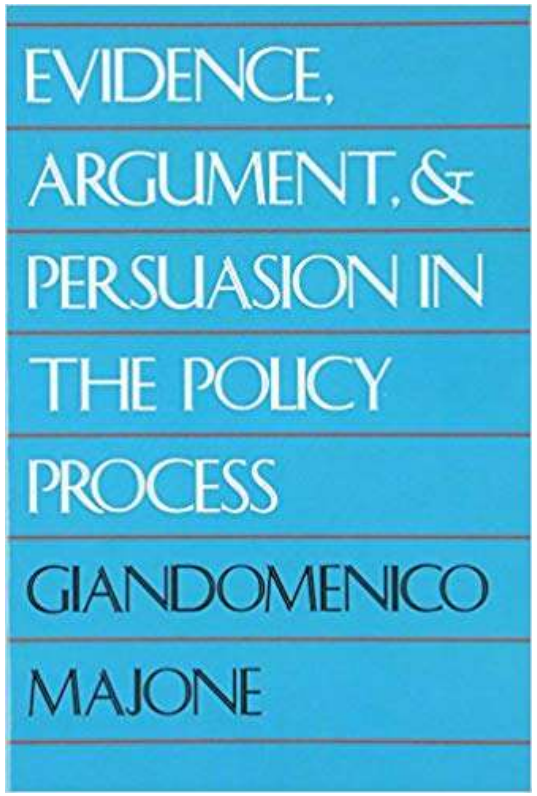
… models will reflect the interests, disciplinary orientations and biases of the developers…

SUPPLEMENTARY INFORMATION

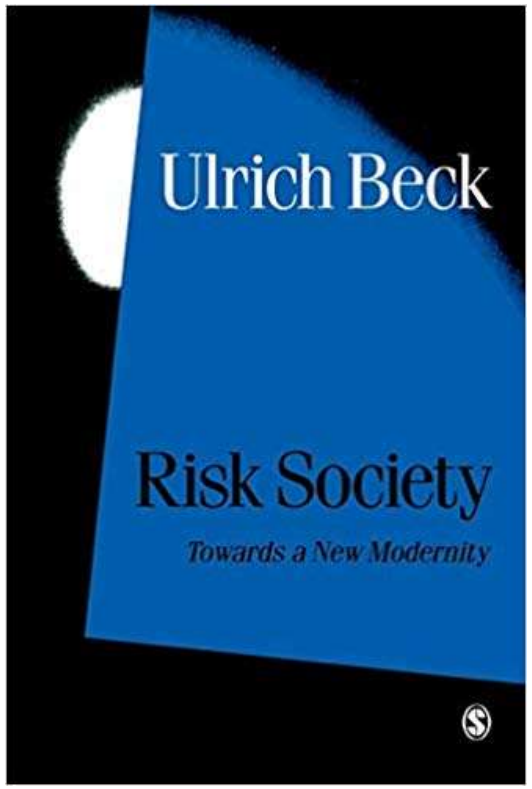
1. Additional information and references >260 references

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

Ulrich Beck
(1944 –2015)



1989



1992 (1986)

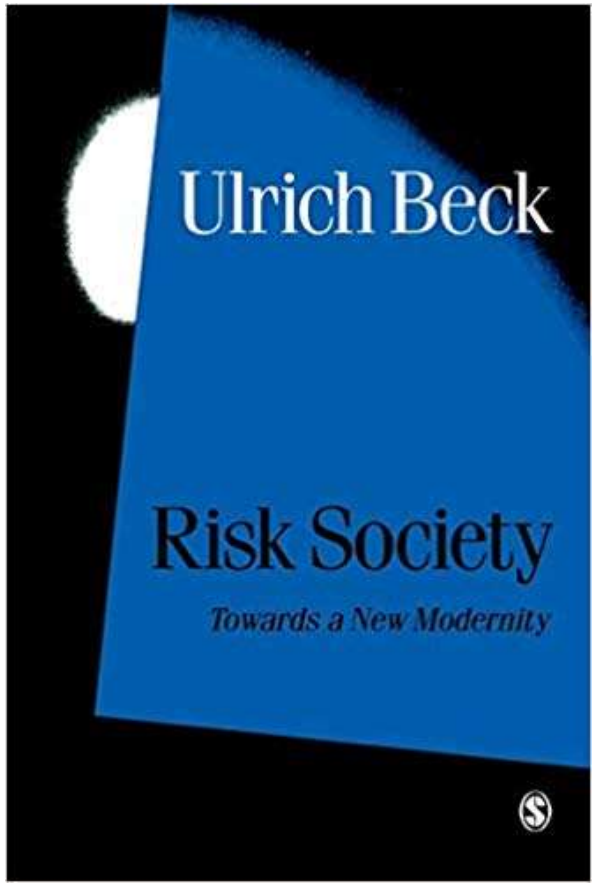
ELSEVIER

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]

“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)

Ulrich Beck
(1944 –2015)

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

Environmental Science & Policy
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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]

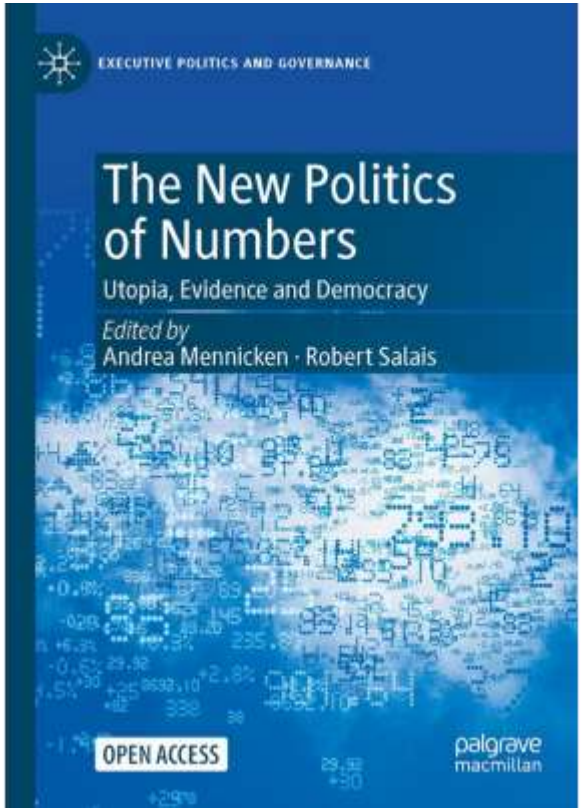
Combine more lenses, including Post-normal science (PNS), Bioeconomics, and Non-Ricardian economics

Since the technique is never neutral a technical proof of quality is illusory without a parallel investigation of normative quality

Technical Quality

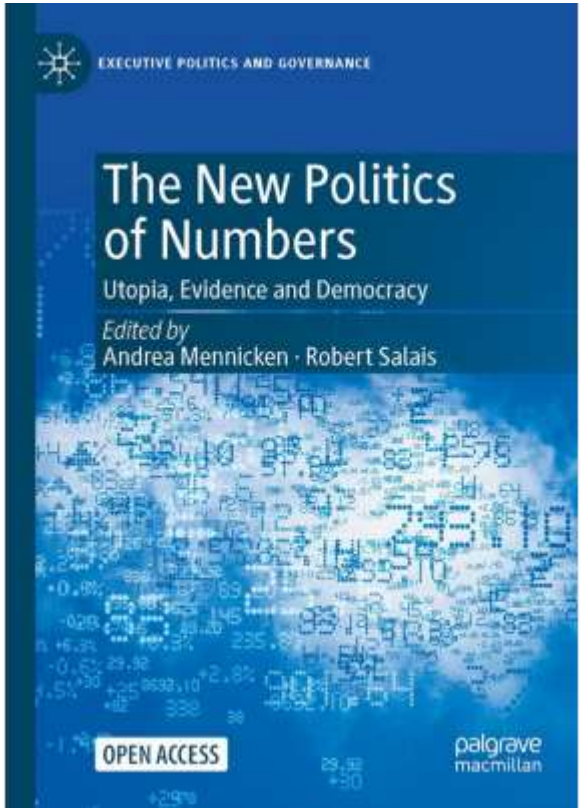
Normative quality

How the numbers of neoliberalism (New Public Management) constitute a regime of a-democracy; the example of indicators of employment

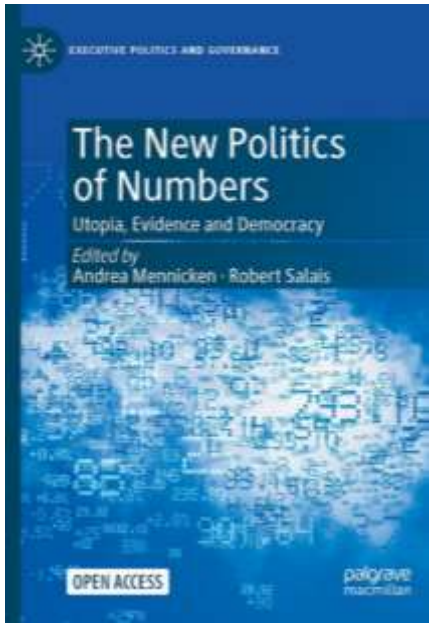


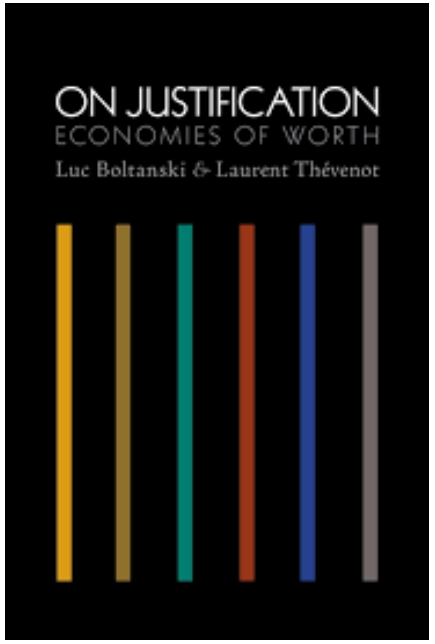
Salais, R. (2022). “La donnée n’est pas un donné”: Statistics, Quantification and Democratic Choice. In *The New Politics of Numbers: Utopia, Evidence and Democracy*, Andrea Mennicken and Robert Salais, Palgrave Macmillan, pp. 379–415.

Normative quality … yes but which norms?



Thévenot, L. (2022). A New Calculable Global World in the Making: Governing Through Transnational Certification Standards. In *The new politics of numbers*, Andrea Mennicken and Robert Salais, Palgrave Macmillan, pp. 197–252.





A New Calculable Global World in the Making: Governing Through Transnational Certification Standards

Laurent Thévenot

critical public debates between conceptions of the **common good**

- collective solidarity social justice
- *Civic* worth
- environmental concern
- *Green* worth
- tradition
- *Domestic* worth

individual consumers' choices between certified **market goods**

market coordination [*market* worth] through certified products & services

- 'Fair-trade'
- 'Organic'
- 'Protected Geographic Indication' (PGI)

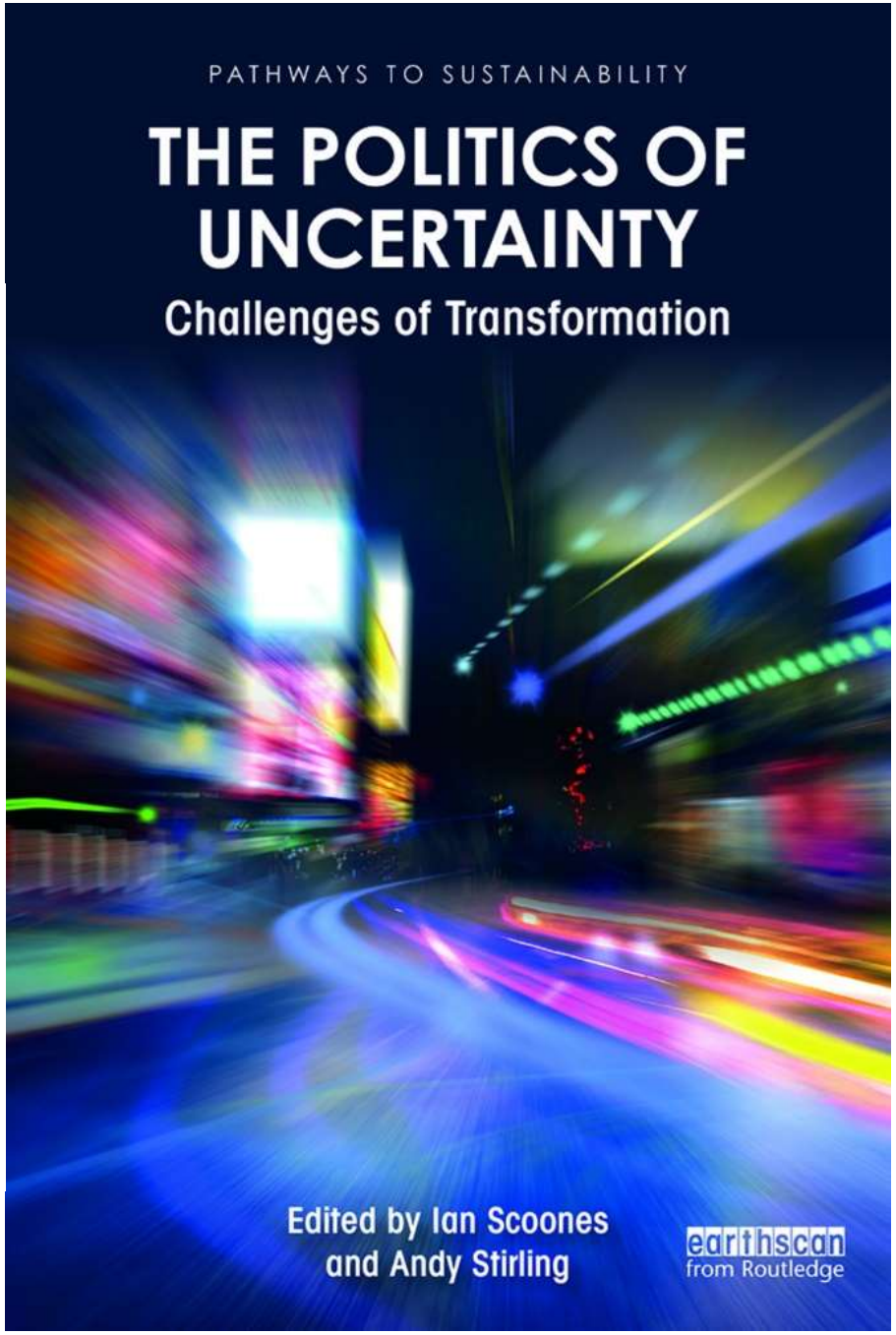
On reductionism

4

THE UNRAVELLING OF TECHNOCRATIC ORTHODOXY?

Contemporary knowledge politics in technology regulation

Patrick van Zwanenberg



Frames as hypocognition & Socially constructed ignorance

Steve Rayner

Rayner, S., 2012, Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourses, Economy and Society, 41:1, 107-125.

Rayner's (2012) strategies to deal with "uncomfortable knowledge".

Denial, Dismissal, Diversion, Displacement

Model based

Rayner, S., 2012, Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourses, Economy and Society, 41:1, 107-125.

Displacement: “The model we have developed tells us that real progress is being achieved” (The focus in now the model not the problem).

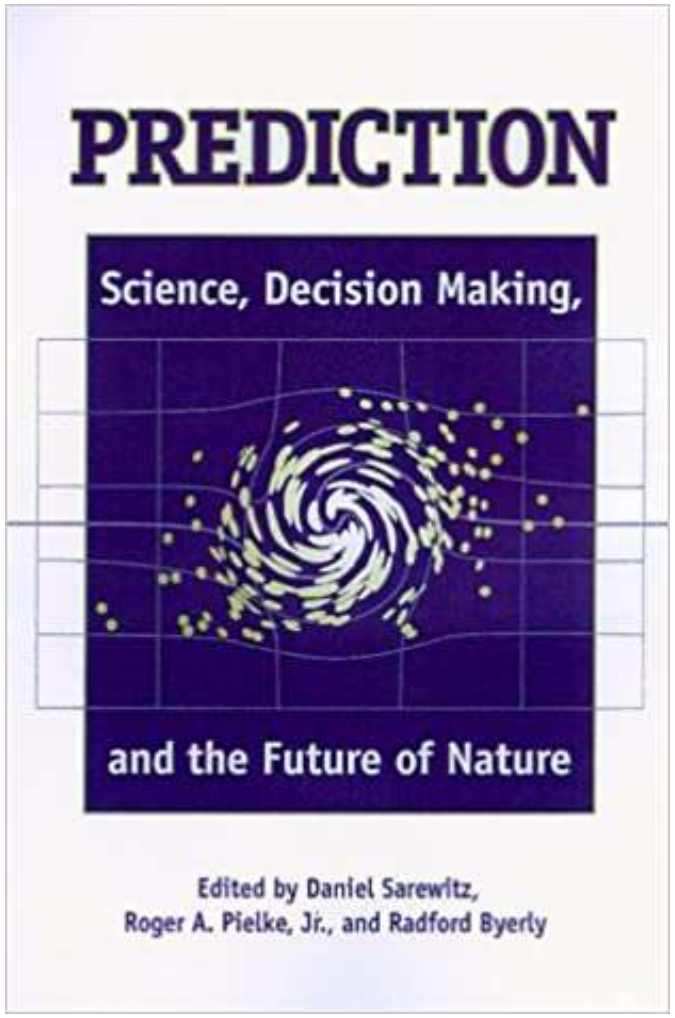
Rayner, S., 2012, Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourses, Economy and Society, 41:1, 107-125.

Example of displacement: Chesapeake Bay Program (CBP) modelling work

"Bay models are used to track nutrient loads to ensure the cap is not exceeded"

➔The model results – rather than the actual measurements, become the substance of use

Rayner, S., 2012, Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourses, Economy and Society, 41:1, 107-125.



Model GENESIS for beach erosion

US Army Corps of Engineers ®

Manipulated to support coastal-engineering projects

It neglected the role of extreme event

Sarewitz, D., Pielke, R. A. & Byerly, R. *Prediction: Science, Decision Making, and the Future of Nature* (Island Press, 2000).

Mind the assumptions

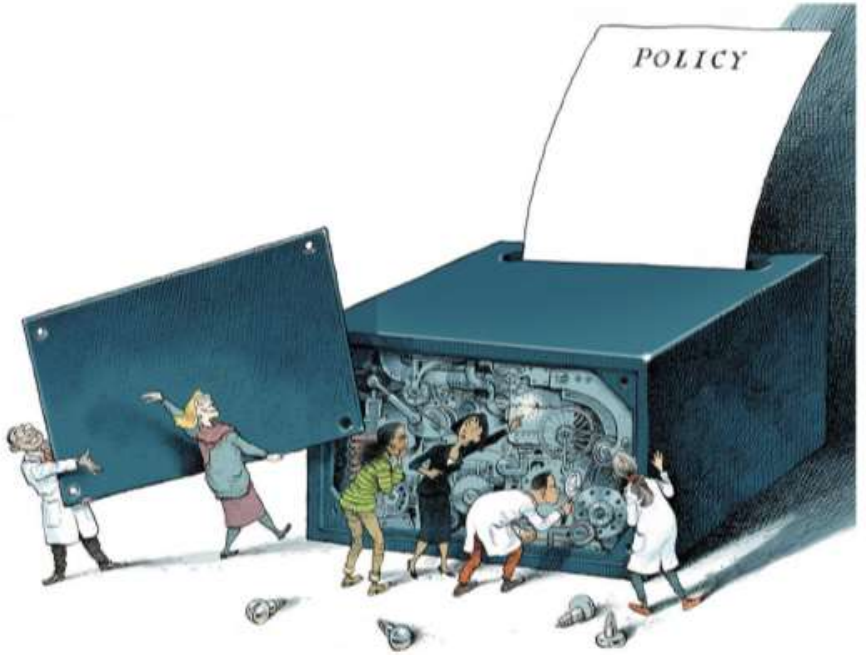
Assess uncertainty and sensitivity

Mind the hubris

Complexity can be the enemy of relevance

Mind the framing

Match purpose and context



Mind the consequences

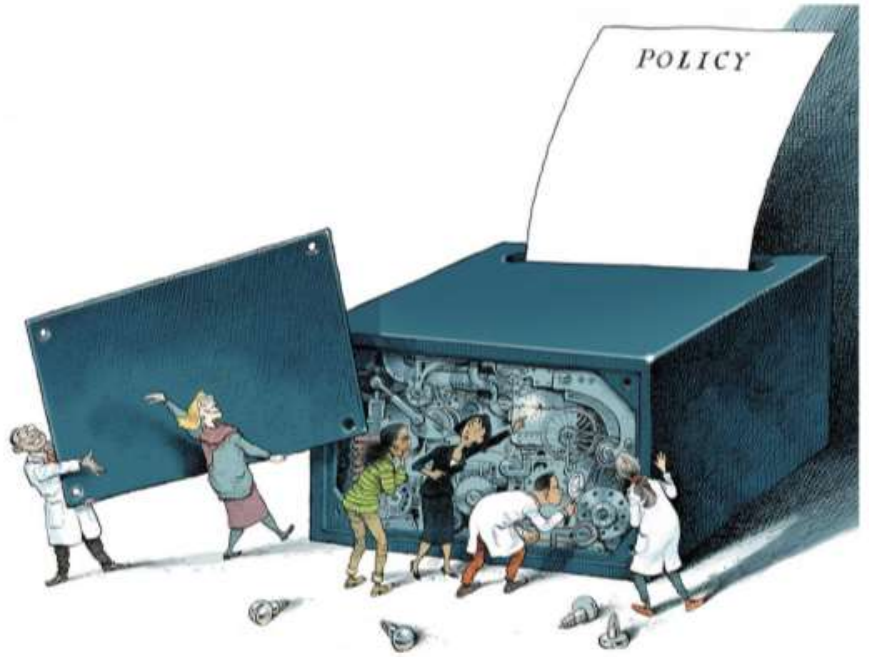
Quantification can backfire

Mind the unknowns

Acknowledge ignorance

Mind the consequences

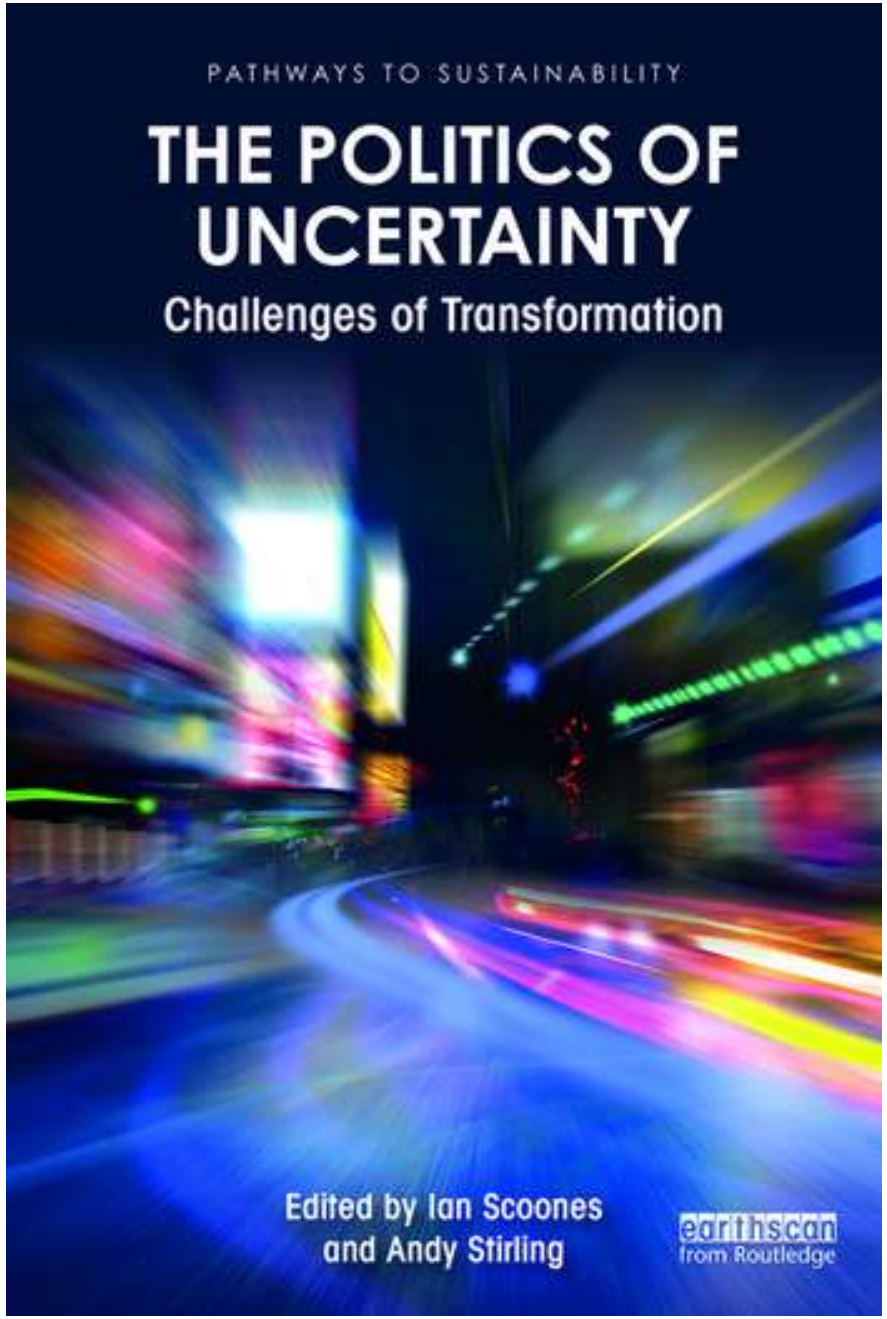
Quantification can backfire



From the risk of financial products to the management of costal 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

New WHO estimates: Up to 190 000 people could die of COVID-19 in Africa if not controlled

07 May 2020

Brazzaville – Eighty-three thousand to 190 000 people in Africa could die of COVID-19 and 29 million to 44 million could get infected in the first year of the pandemic if containment measures fail, a new study by the World Health Organization (WHO) Regional Office for Africa finds. The research, which is based on prediction modelling, looks at 47 countries in the

Speculative scenario in which ten uncertain input probabilities are increased by an arbitrary 10% — as if they were truly equally uncertain — with no theoretical or empirical basis for such a choice

World Health Organization
REGIONAL OFFICE FOR Africa

Mind the assumptions

Assess uncertainty and sensitivity

Mind the hubris

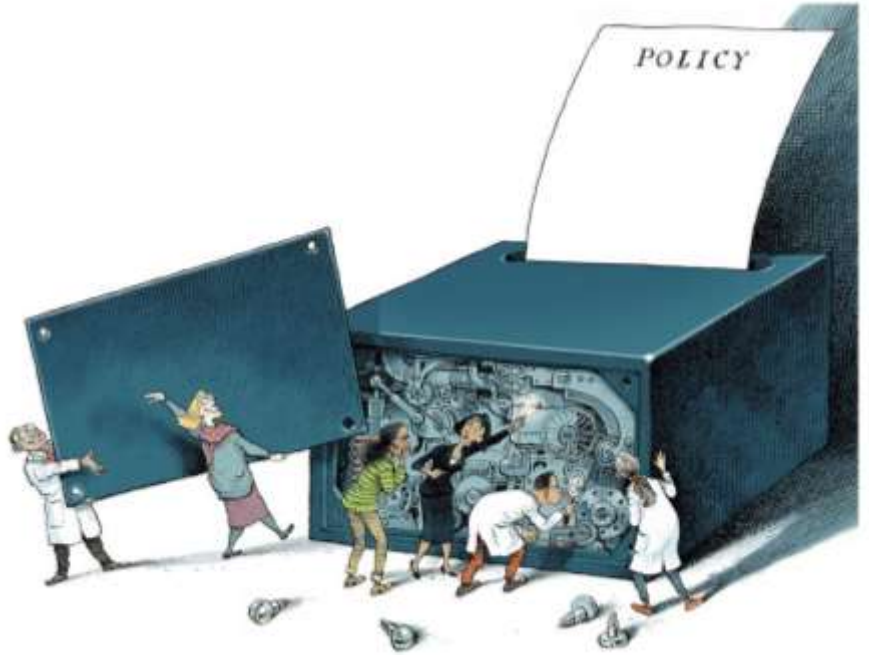
Complexity can be the enemy of relevance

Mind the framing

Match purpose and context

Mind the consequences

Quantification can backfire

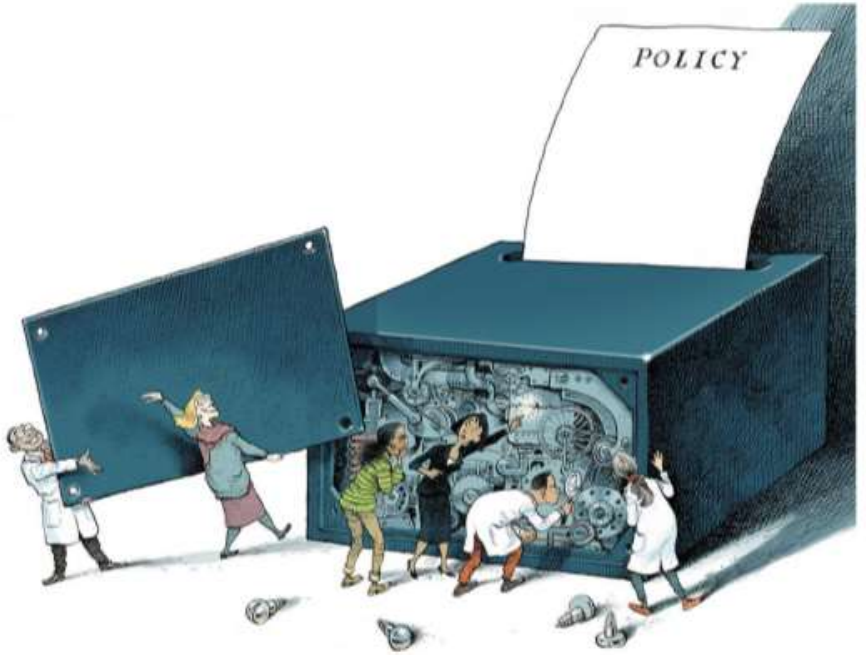


Mind the unknowns

Acknowledge ignorance

Mind the unknowns

Acknowledge ignorance

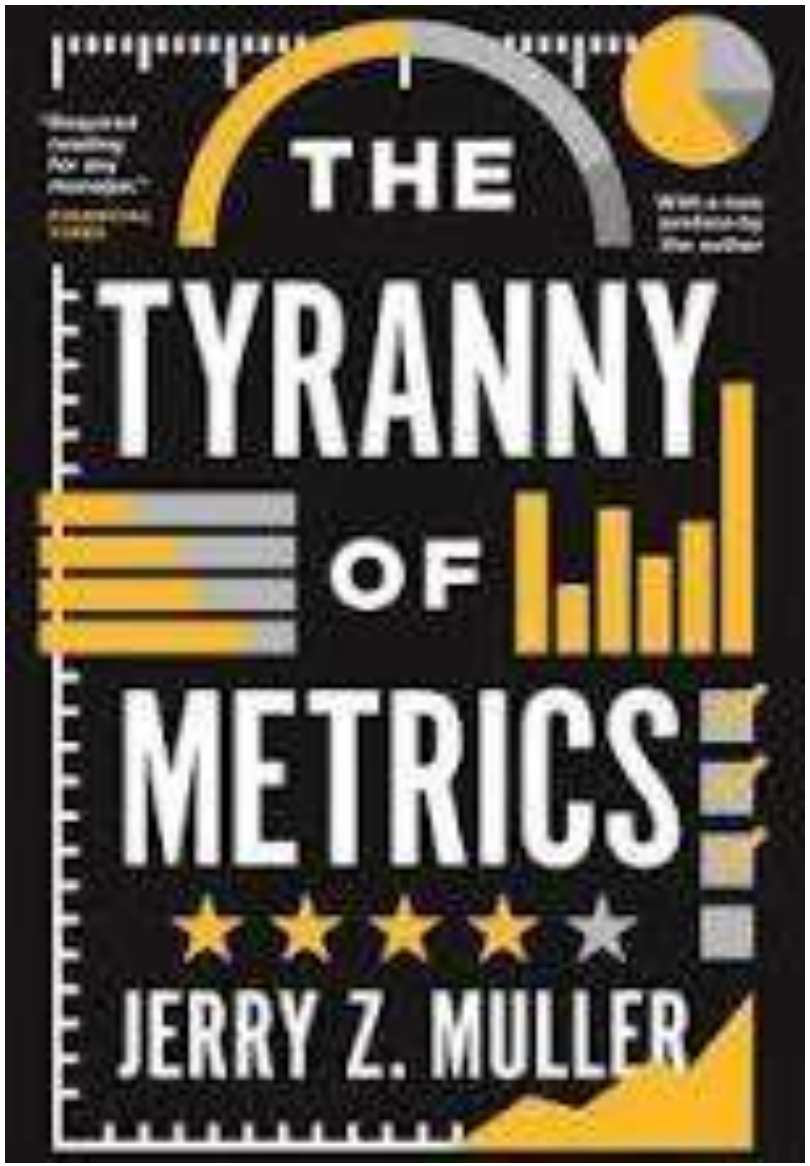


"there is no number-answer to your question"

Anthony Fauci

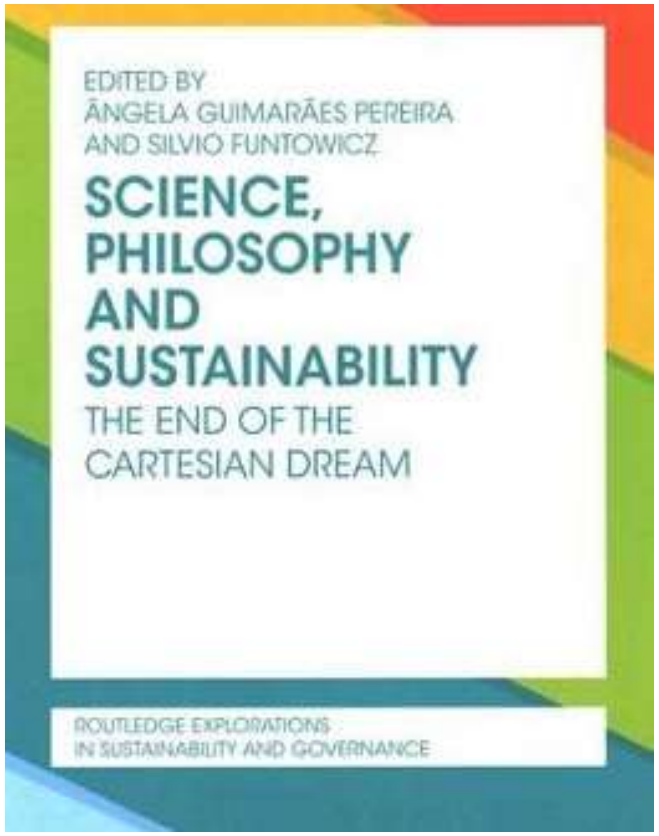
SUPPLEMENTARY INFORMATION

1. Additional information and references >260 references



As already mentioned:

"keep in mind at every step that the best use of metrics may be not to use it at all"



Jerry Ravetz

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.

Ravetz, J., R., 1987, Usable Knowledge, Usable Ignorance, Incomplete Science with Policy Implications, Knowledge: Creation, Diffusion, Utilization, 9(1), 87-116.

ELSEVIER

Futures

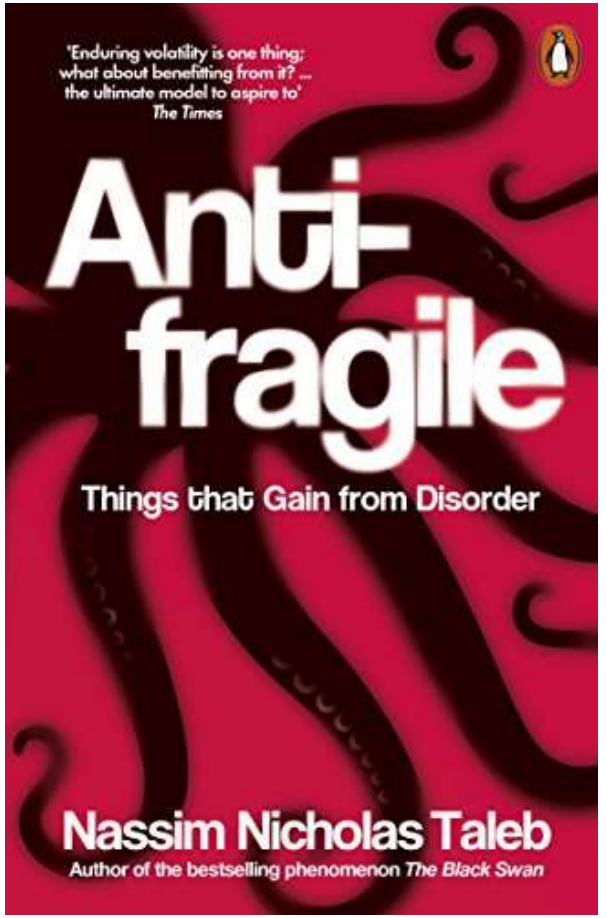
Volume 91, August 2017, Pages 62-71

Original research article

What is wrong with evidence based policy, and how can it be improved?

Andrea Saltelli [a, b, c] ✉, Mario Giampietro [a, c, d]

Responsible use of quantitative information; try via negativa (N. Taleb); instead of proving policy options try to falsify them



ELSEVIER

Futures

Volume 91, August 2017, Pages 62-71

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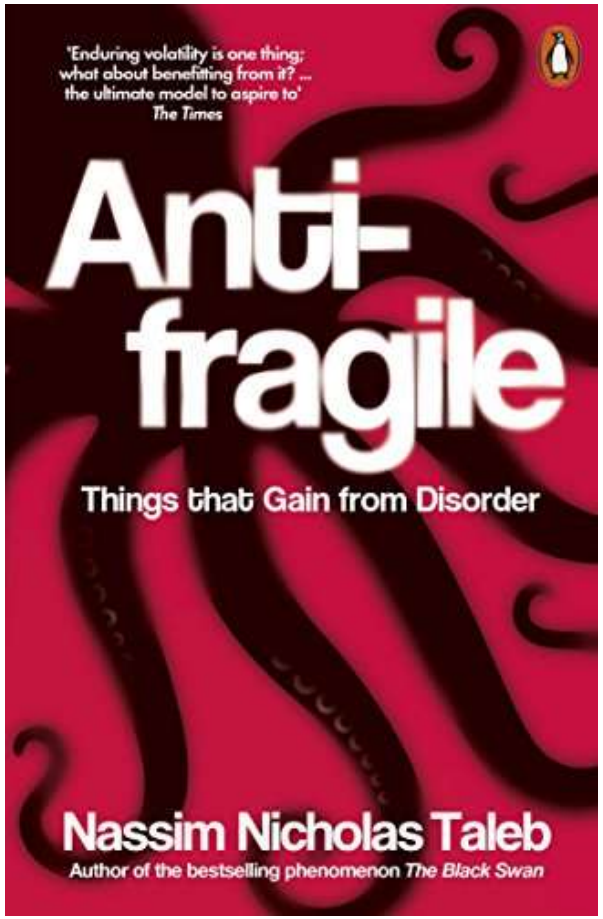
Andrea Saltelli [a, b, c], Mario Giampietro [a, c, d]

"…we know what is wrong with more clarity than what is right, and that knowledge grows by subtraction

… easier to know that something is wrong than to find the fix …

Actions that remove are more robust than those that add because addition may have unseen, complicated feedback loops"



Falsification of the available options based on:

- Feasibility (compatibility with external constraints),
- Viability (compatibility with internal constraints), and
- Desirability (compatibility with normative values adopted in the given society)

nature

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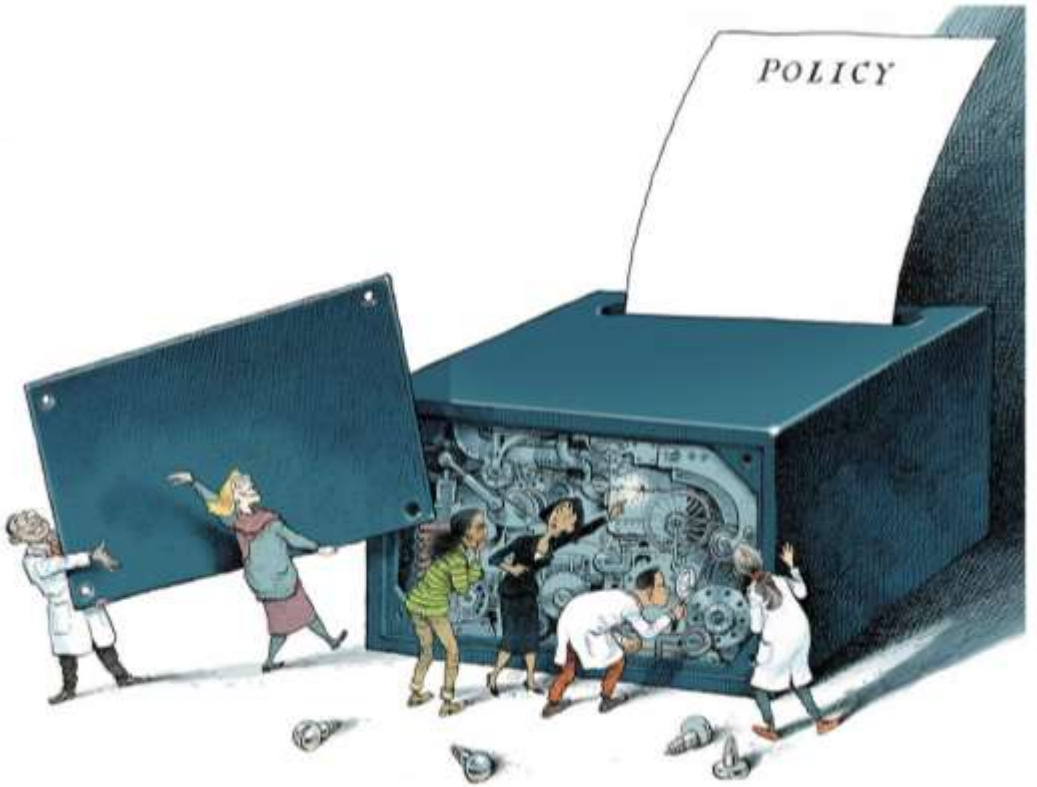
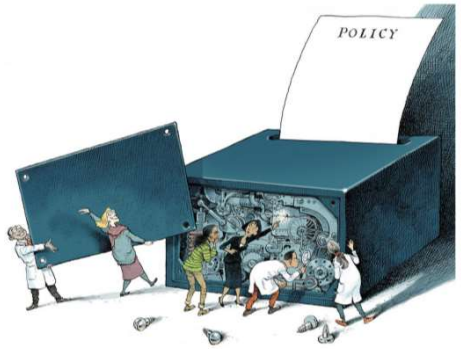
nature › comment › article

COMMENT | 24 June 2020

Five ways to ensure that models serve society: a manifesto



➔ Responsible modelling; reciprocal domestication between models and society



“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”

Many voices of alarm as to misuse of quantification

Numbers, visible and invisible…

Blurring lines:

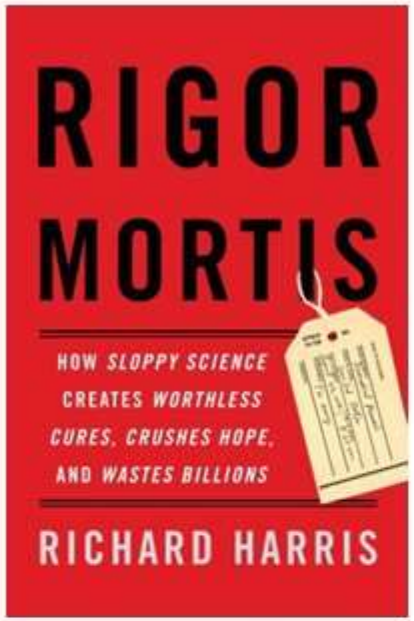
"what qualities are specific to rankings, or indicators, or models, or algorithms?"

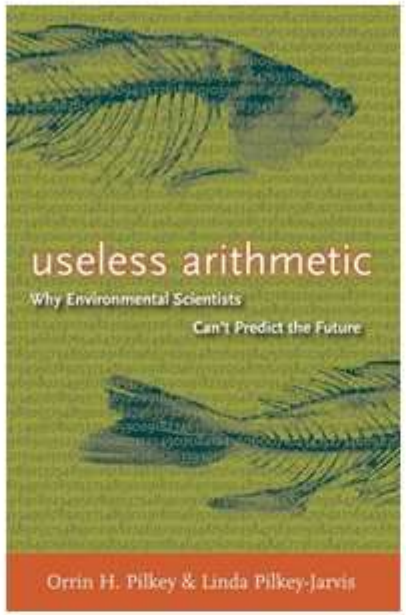
Elizabeth Popp Berman

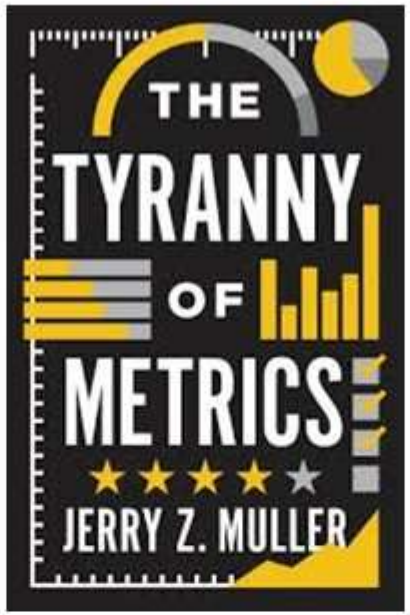
E. Popp Berman and D. Hirschman, The Sociology of Quantification: Where Are We Now?, Contemp. Sociol., vol. in press, 2017.

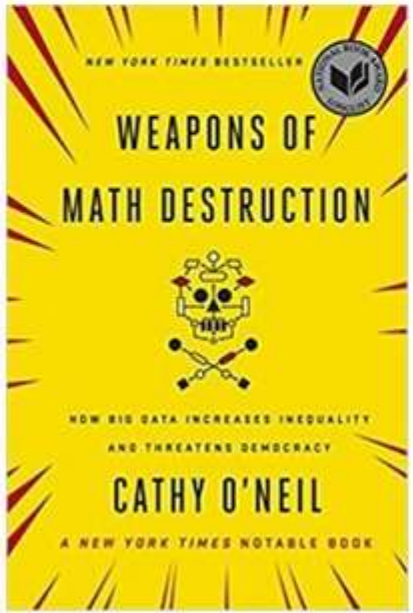
And an explosion of works, from within and without, from many disciplines

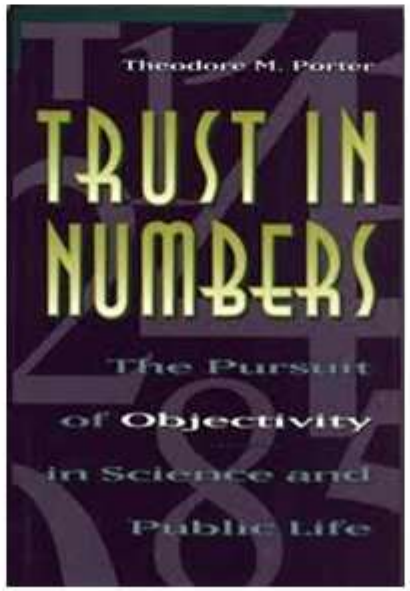
Algorithms, models, metrics, statistics…



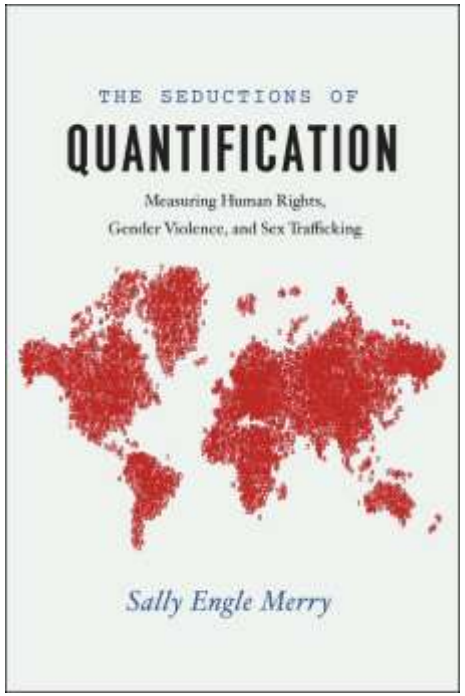


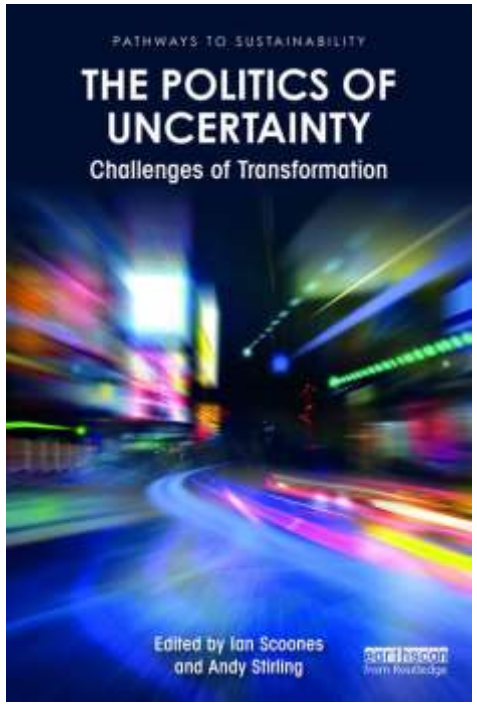


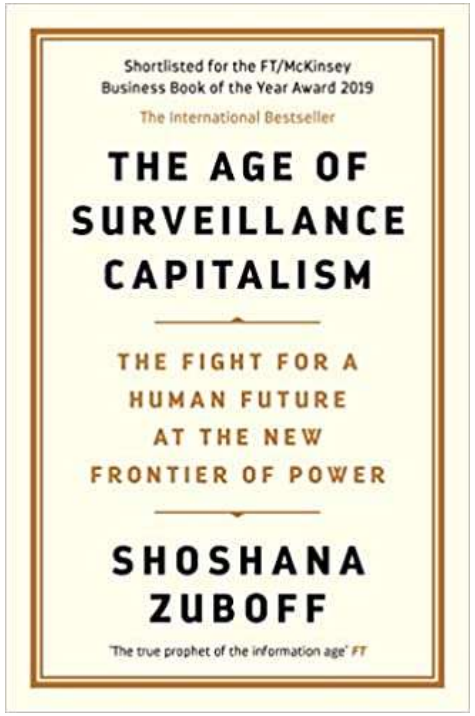


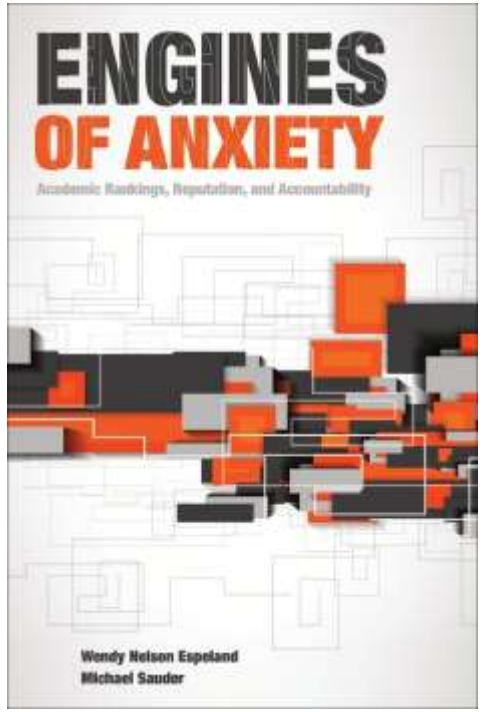


Algorithms, models, metrics, statistics…









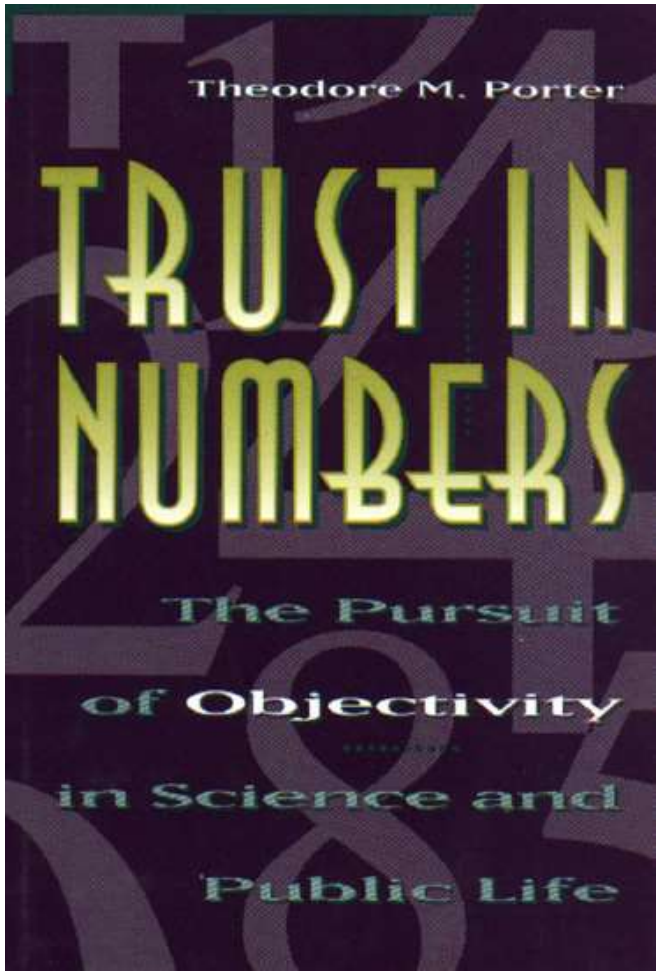
Numbers and their ‘reactivity’
(Espeland and Sauder, 2016)

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

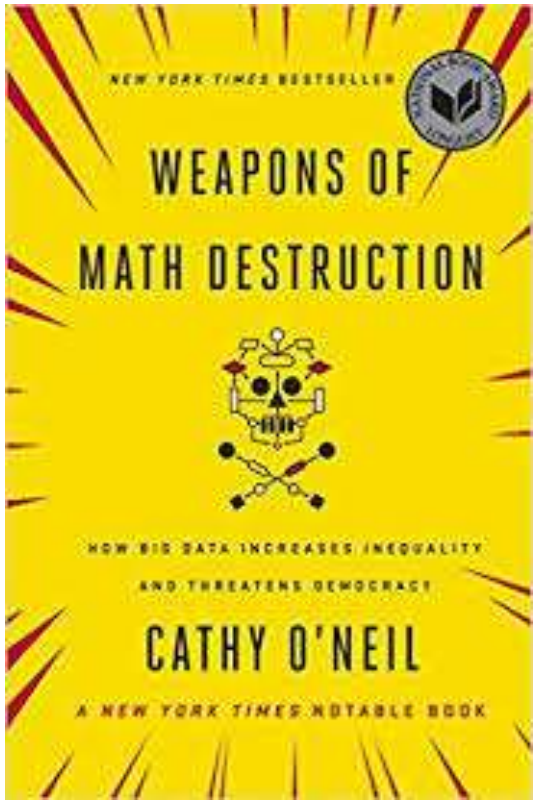


Theodore M. Porter, Trust in Numbers,
The Pursuit of Objectivity in Science and Public Life, Princeton 1995

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

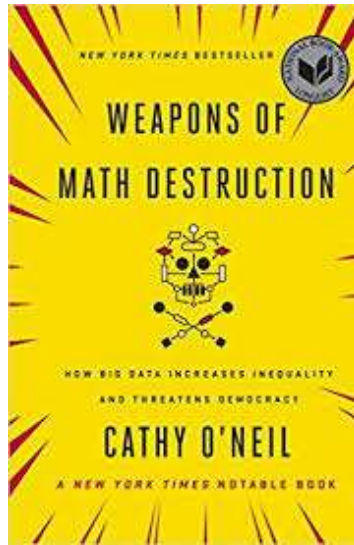


O'Neil, C. (2016). Weapons of math destruction : how big data increases inequality and threatens democracy. Random House Publishing Group.

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…

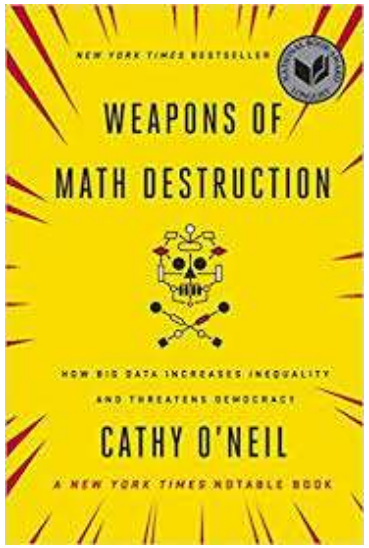
O'Neil, C. (2016). Weapons of math destruction : how big data increases inequality and threatens democracy. Random House Publishing Group.

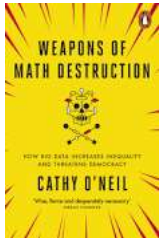
Brauneis, R., & Goodman, E. P. (2018). Algorithmic Transparency for the Smart City. Yale Journal of Law & Technology, 20, 103–176. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3012499

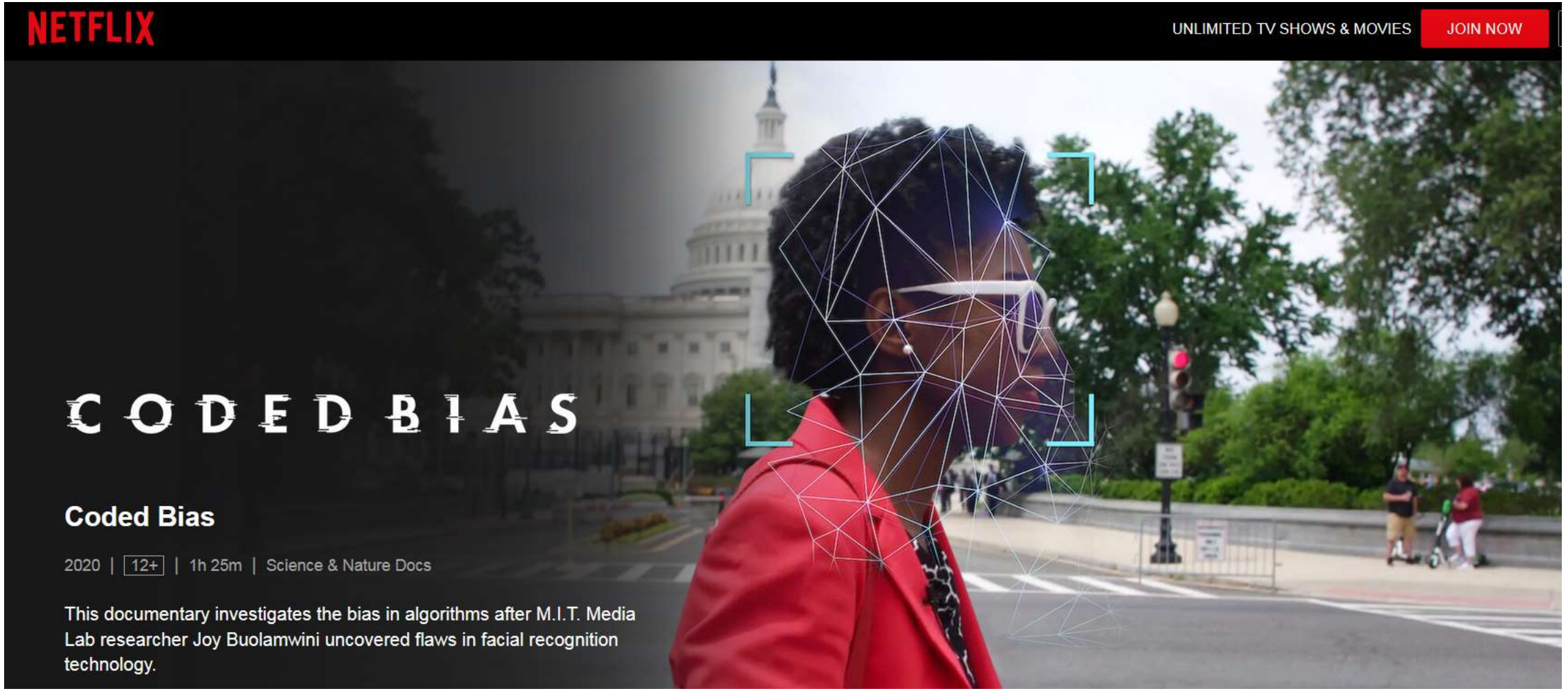


Opacity coupled with opportunity for scale and damage and with non-appealability make them an instrument of oppression & inequality

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




WEAPONS OF
MATH DESTRUCTION
CATHY O'NEIL


NETFLIX
UNLIMITED TV SHOWS & MOVIES
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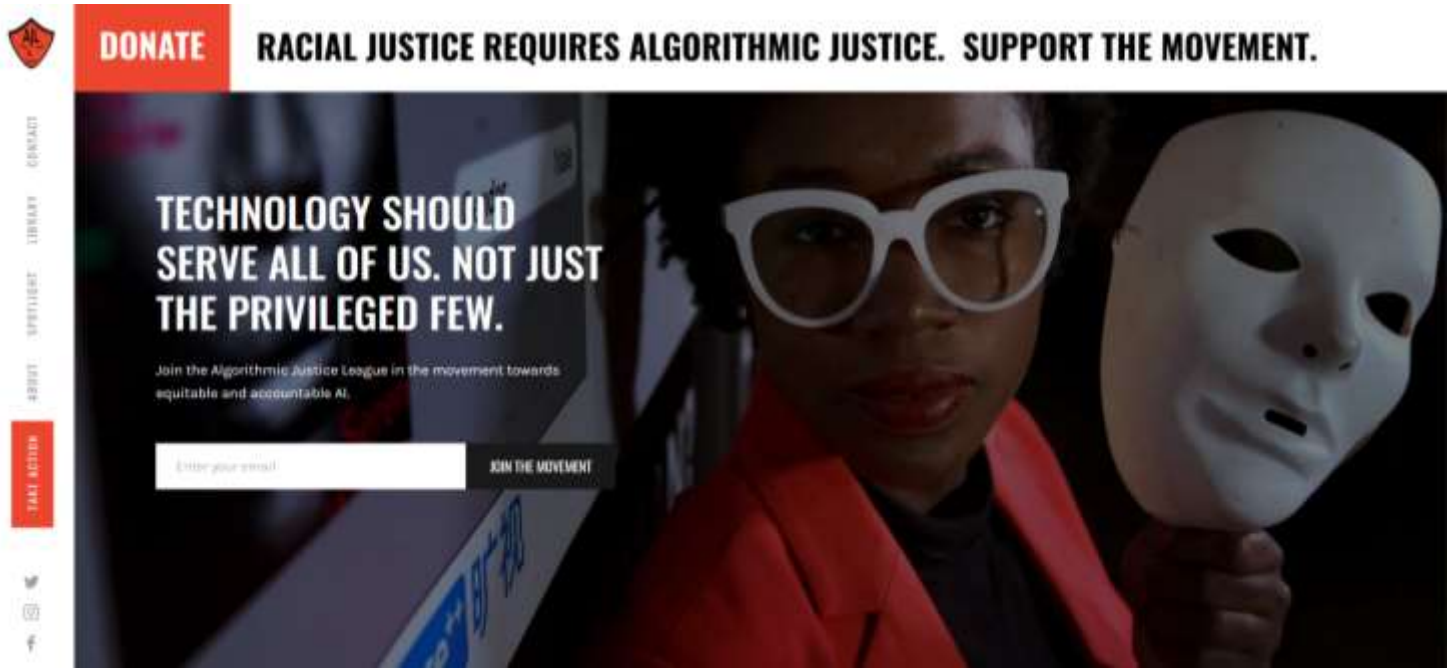
CODED BIAS
Coded Bias
2020 | 12+ | 1h 25m | Science & Nature Docs
This documentary investigates the bias in algorithms after M.I.T. Media Lab researcher Joy Buolamwini uncovered flaws in facial recognition technology.



Algorithmic Justice League

https://www.ajl.org/

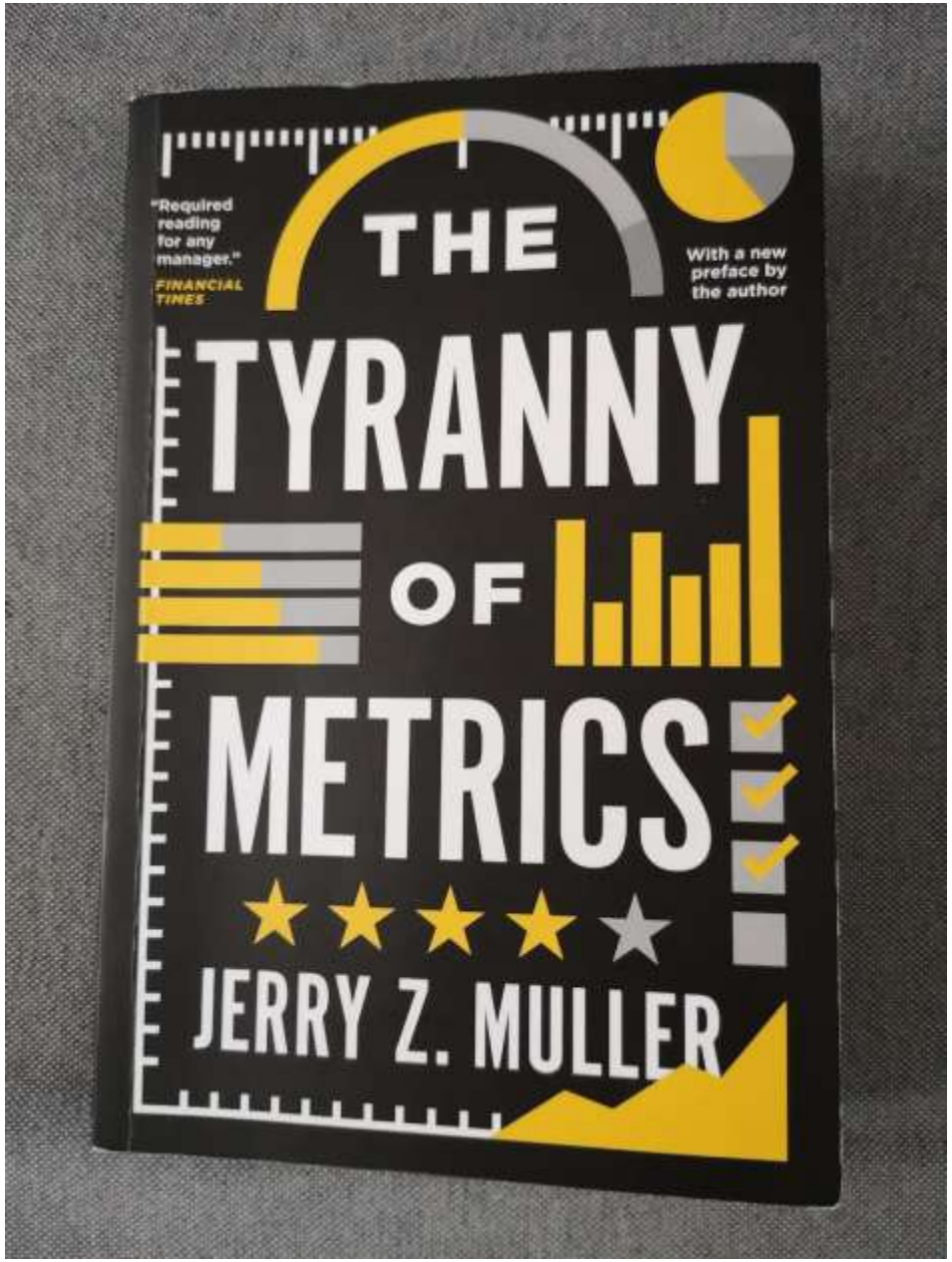
The New York Times
Bloomberg Business
Forbes
TIME
FORTUNE
TED
WIRED
The Telegraph

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

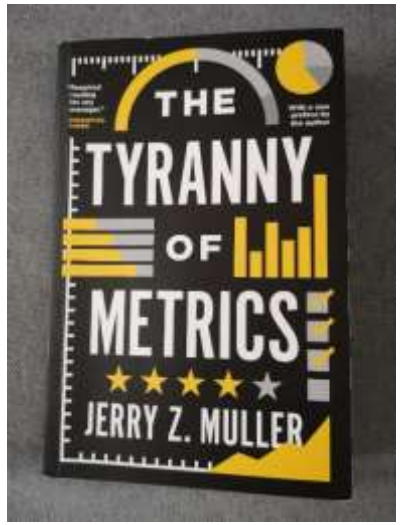


J. Z. Muller, The tyranny of metrics. Princeton University Press , 2018.

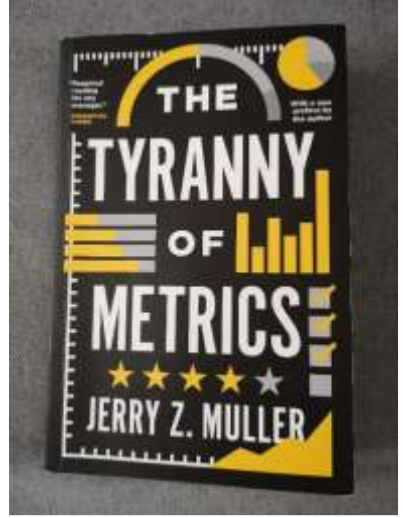
Metric fixation, or the irresistible pressure to measure performance

Gaming of metrics (Goodhart law)

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



Unintended consequences



- Goal disp
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Discouraging cooperation and common purpose

k
cooperation
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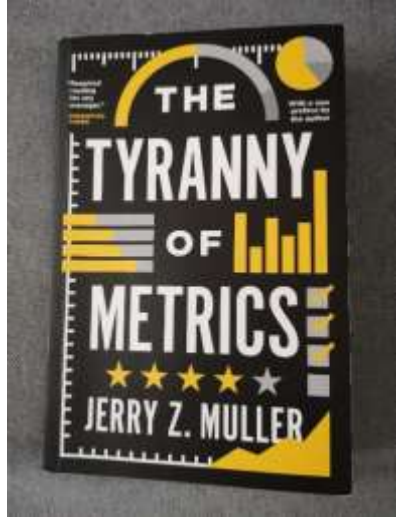
A concluding remark of Muller



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”

↓

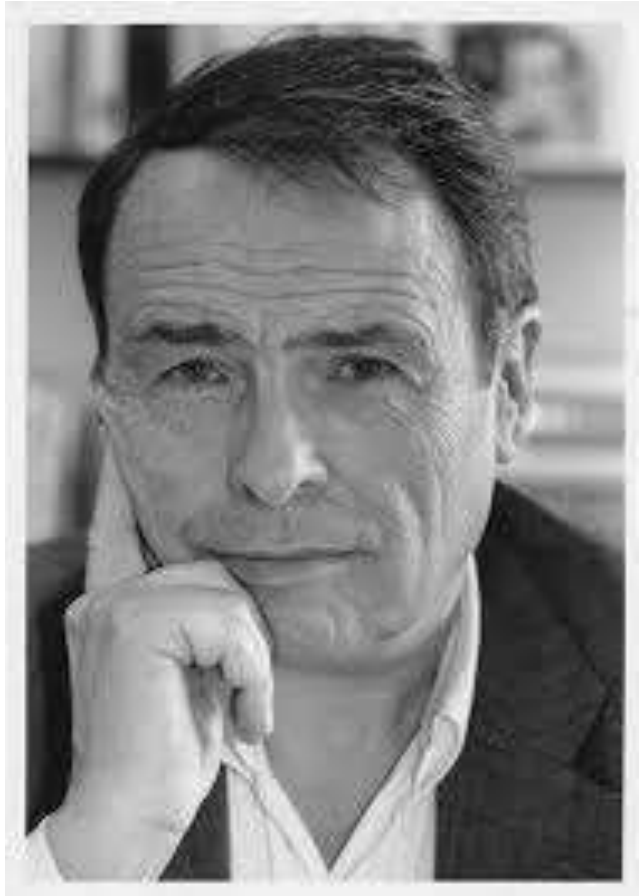
The ‘licence not to quantify’ of the French engineers

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

How to be a "statactiviste"?

1. Deconstruct existing metrics, including using irony (Pierre Bourdieu, *Les héritiers*).



La sociologie, ça doit être rigolo

(Sociology must be fun)

How to be a "statactiviste"?

2. Gaming metrics (statistical judo) – use Goodhart's law to your advantage – or make the ruse public.

- Police statistics in NY

How to be a "statactiviste"?

3. Bring to the surface what is hidden / unsaid/ excluded – new social classes, marginalization, minorities:

- ‘Creative class’ or ‘precarious intellectuals’?

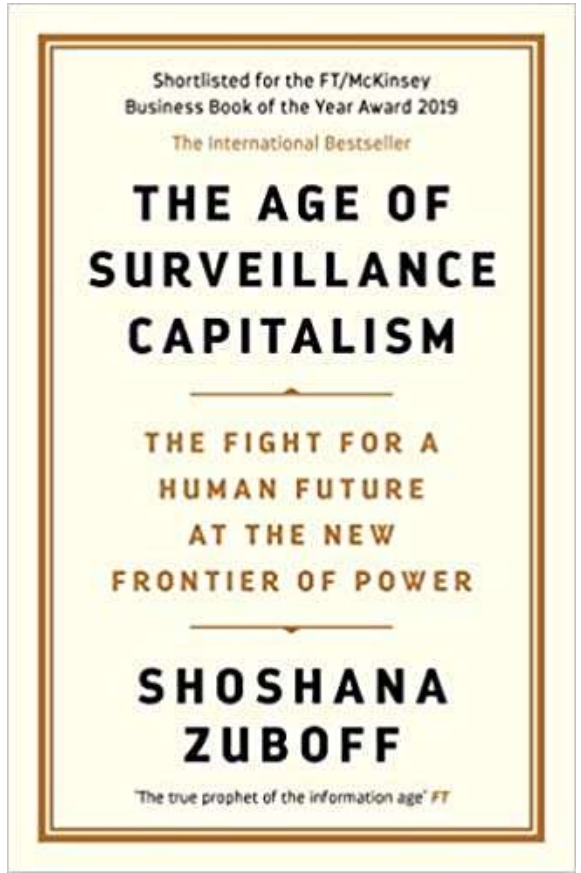
How to be a "statactiviste"?

4. Measure something different.

- Suicides at France Telecom;
- BIP 40, a new French measure of poverty/inequality

Important:

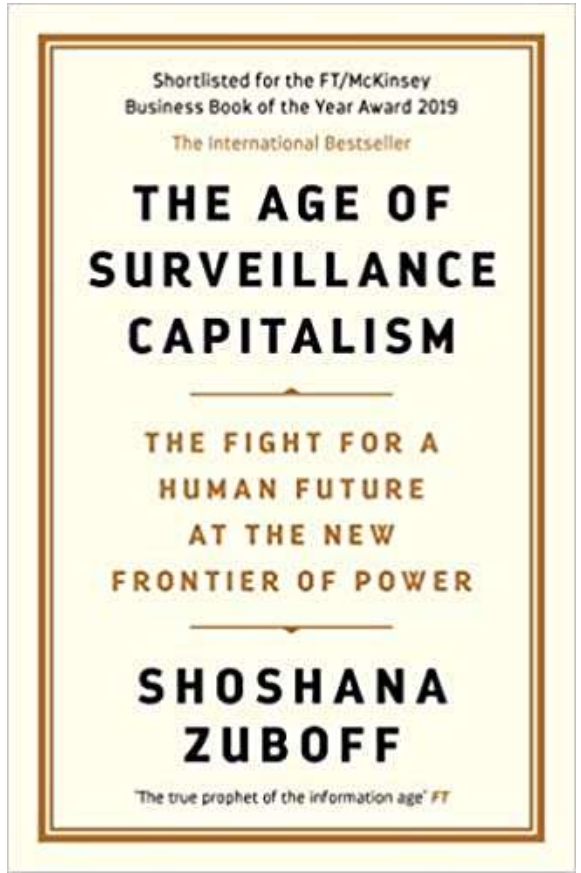
"Quantification should not be abandoned to the advantage of exalting qualities, singularities, and the incommensurable. Such an abandon would be a tactical error"



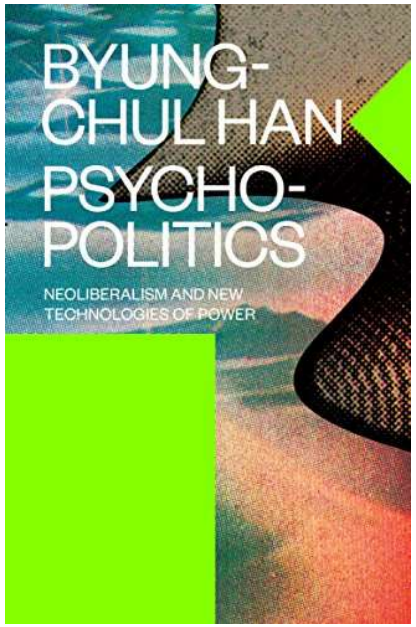
A project of domination of consumers and voters is made possible by artificial intelligence, big data & cognitive psychology

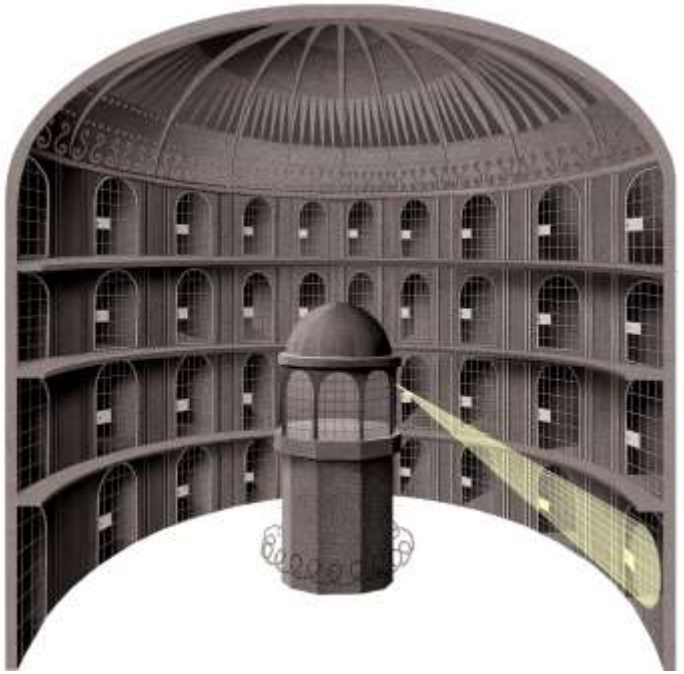
Inequality, power asymmetries and the world of surveillance capitalism

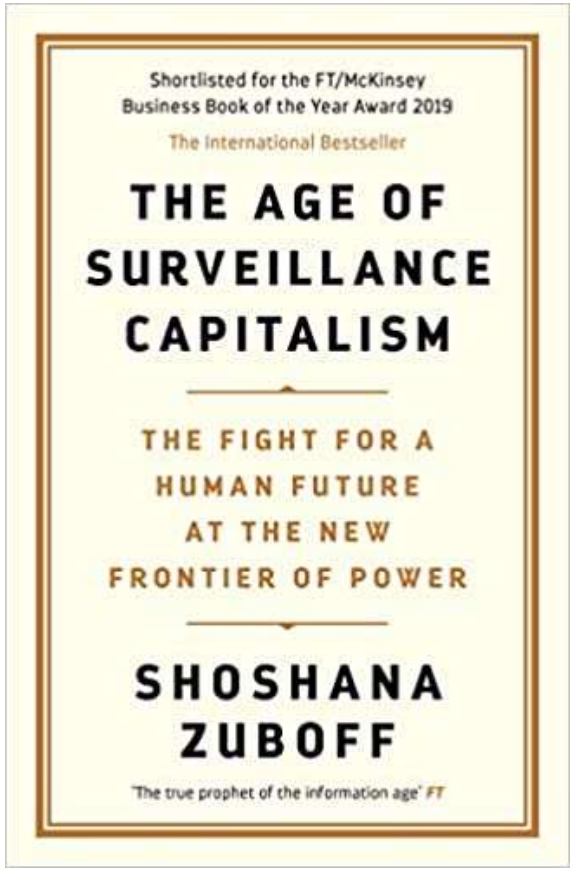
… and the surveillance is voluntarily accepted



Byung Chul Han 'virtual panopticon'

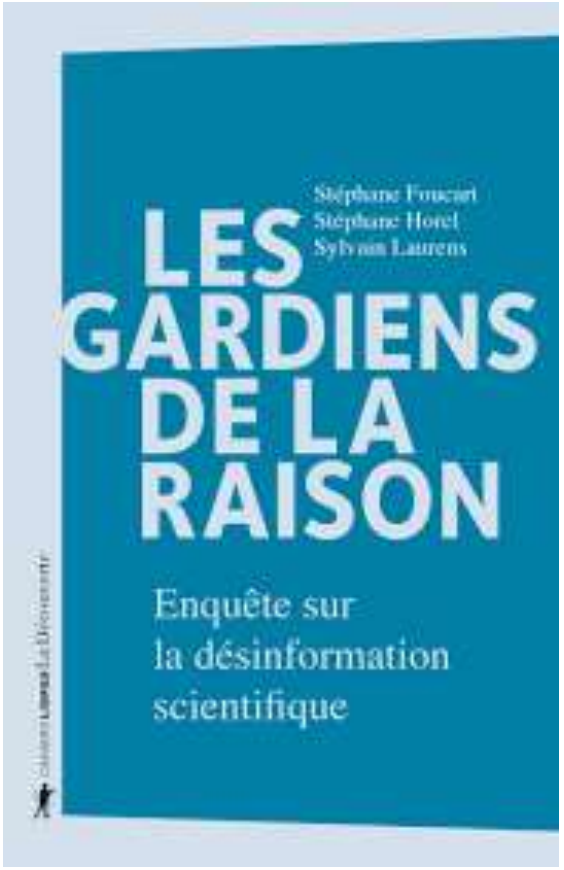






Chapters 11 & 12

Instrumentarian power



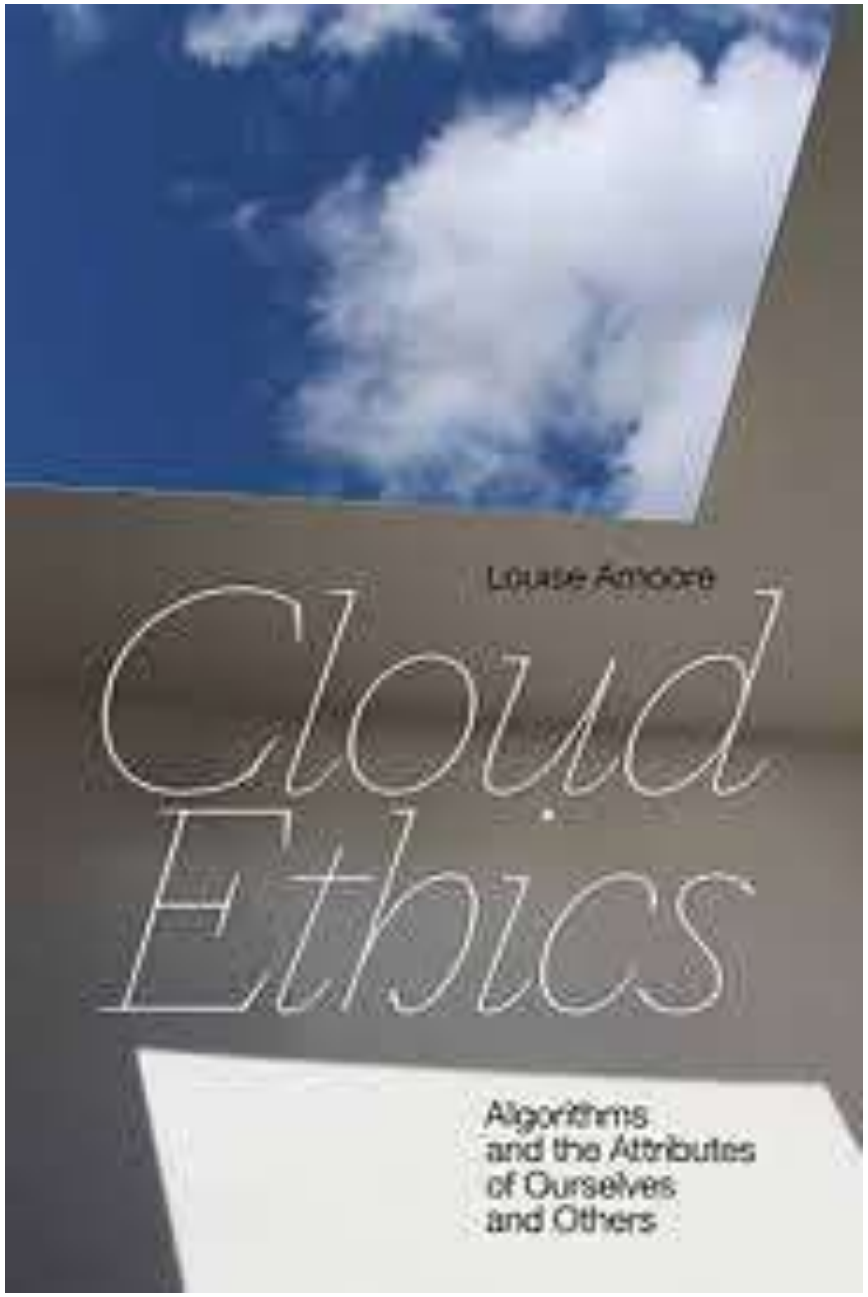
Chapter 10

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

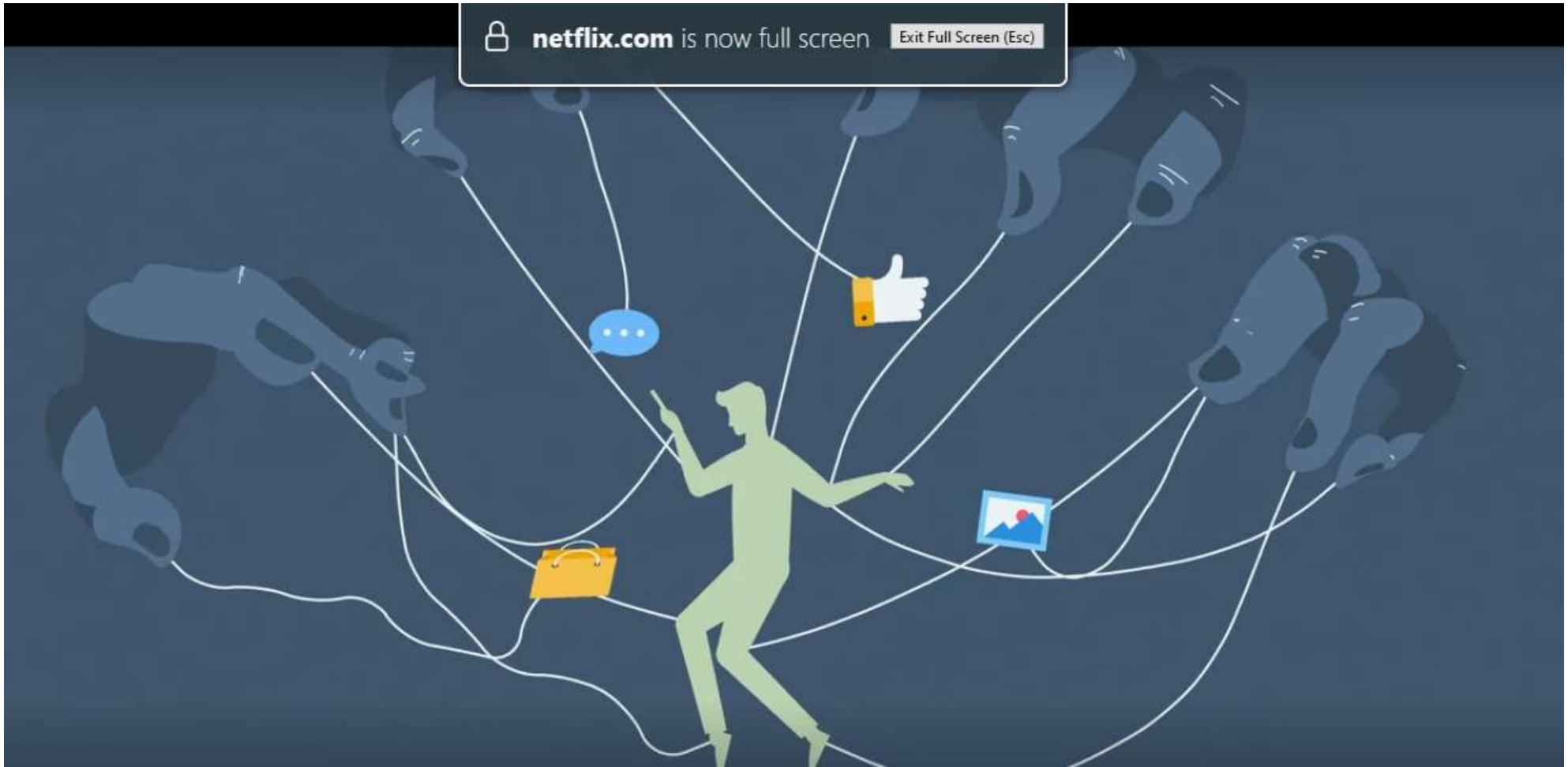
Nick Couldry and Ulises Mejias

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

Couldry, Nick and Mejias, Ulises (2018) Data colonialism: rethinking big data's relation to the contemporary subject. Television and New Media, vol. 20, 4: pp. 336-349.

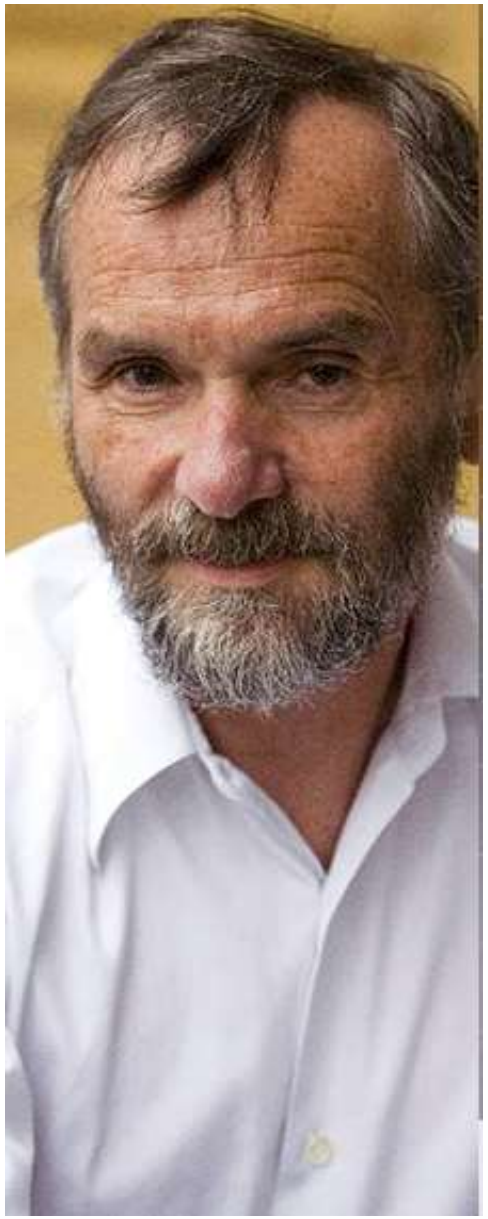
A useful illustration of strategies of capture, starring O'Neil, Zuboff, Lanier, and GAFA technologists…

… such as Tristan Harris, former design ethicist at Google, explaining from inside how social media pursue addiction to maximize profit and manipulates people's behaviour



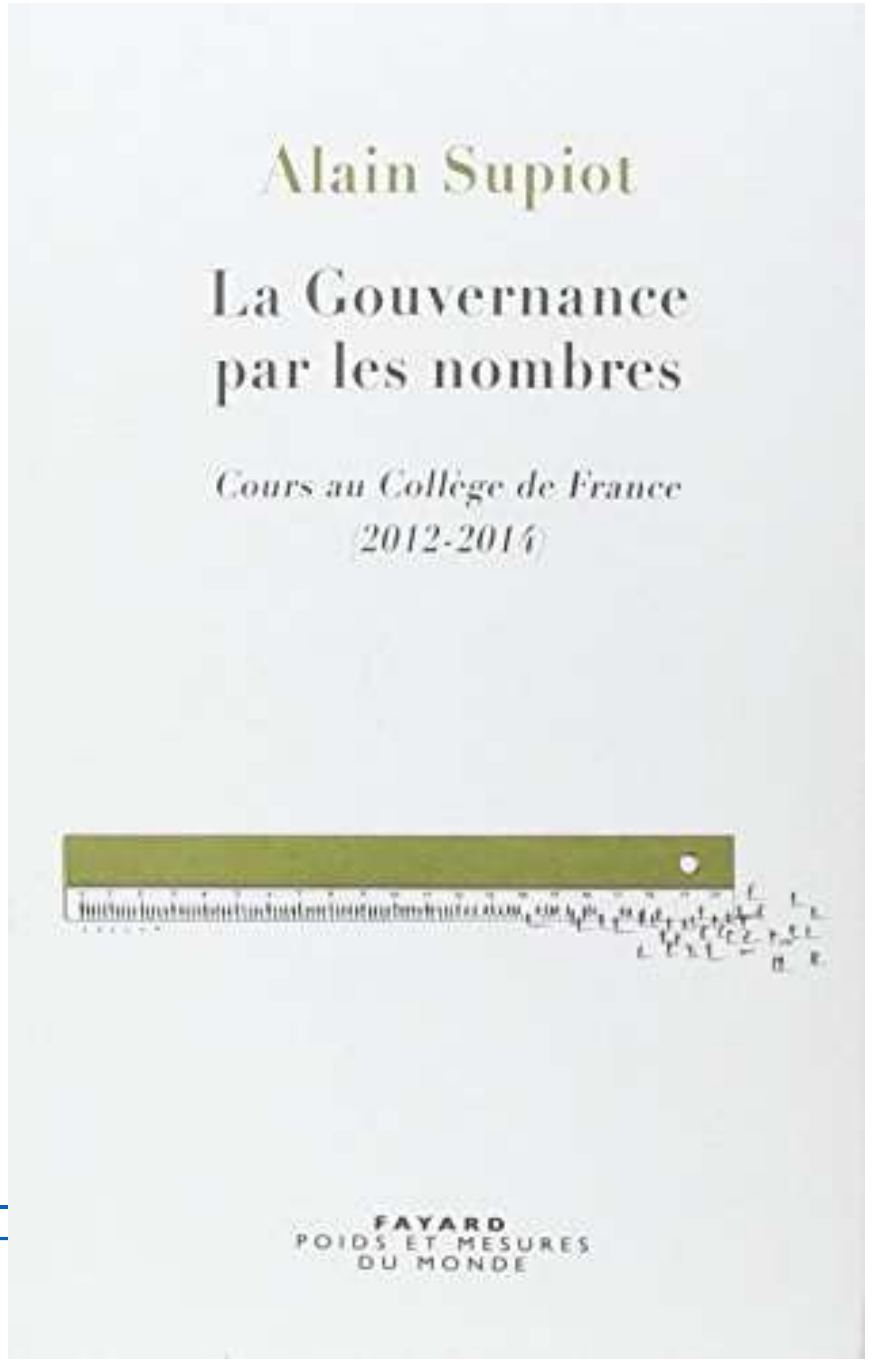
The vision of a jurist

Alain Supiot

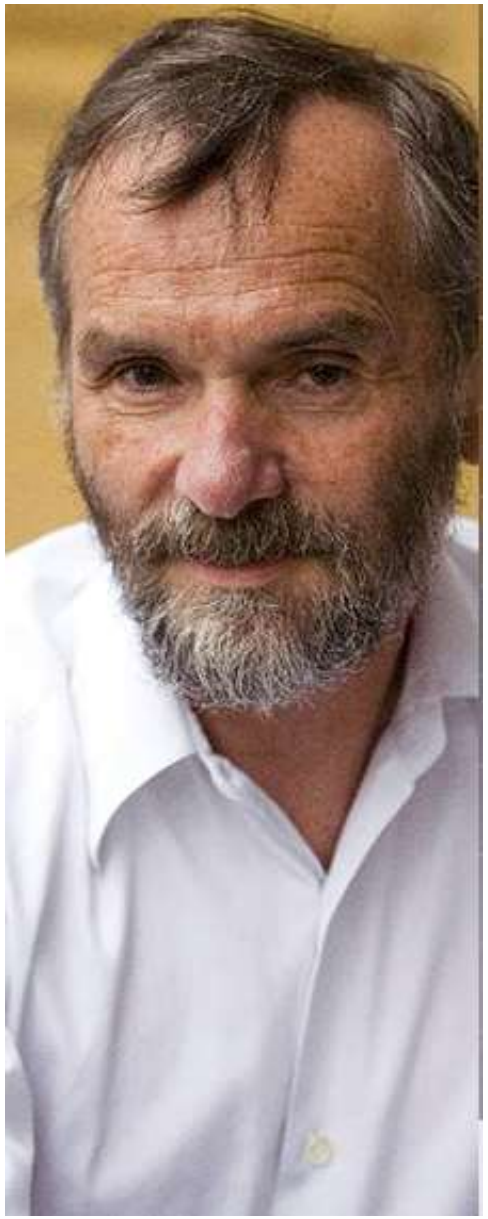


An indictment of the Total Market and the normative uses of economic quantification

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



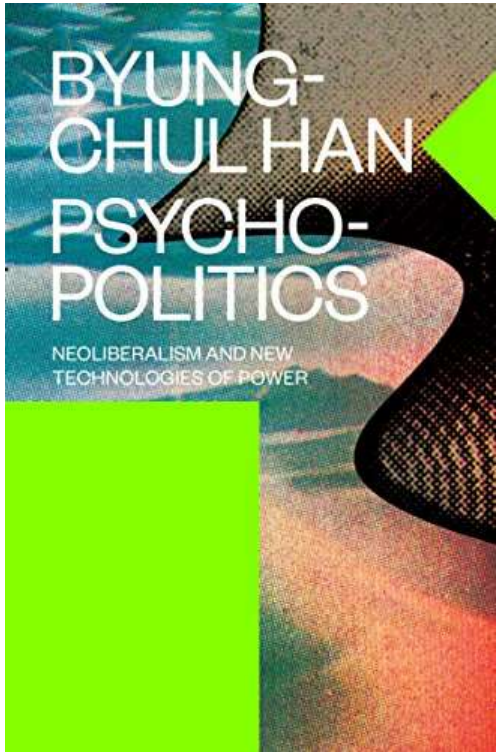
Alain Supiot



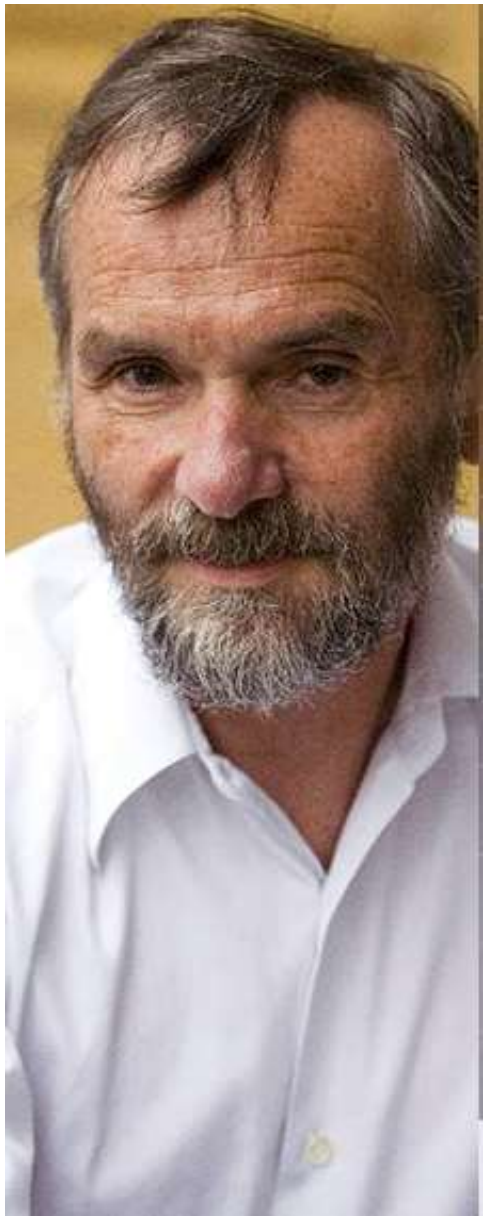
…we have entered the era of the cybernetic imaginary, which revives the West's age-old dream of grounding social harmony in calculations.

Same diagnosis about the neoliberal ‘exploitation of freedom’ from Byung Chul Han, we are

“Slave of ourselves”

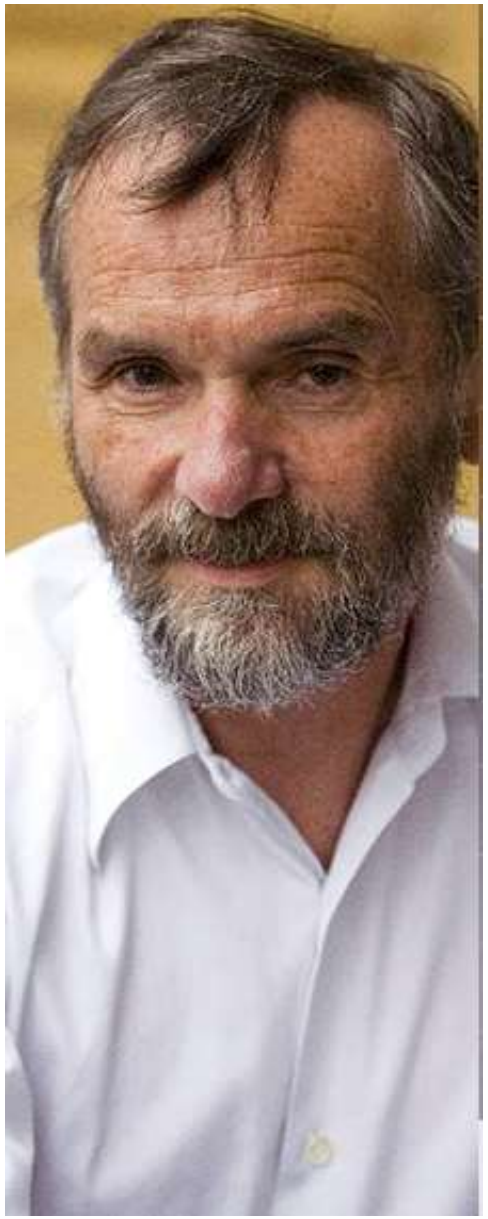


Alain Supiot



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.

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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

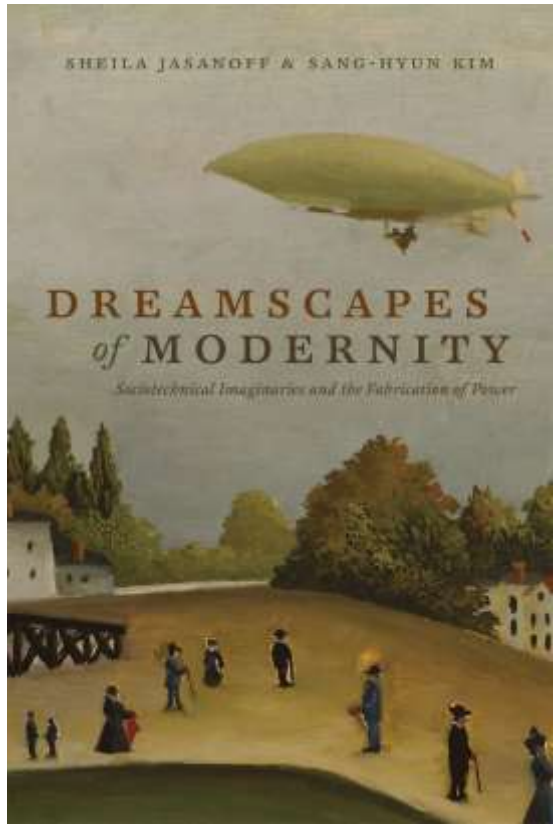
Monica di Fiore
Institute for Cognitive Sciences and Technologies, Consiglio Nazionale delle Ricerche

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

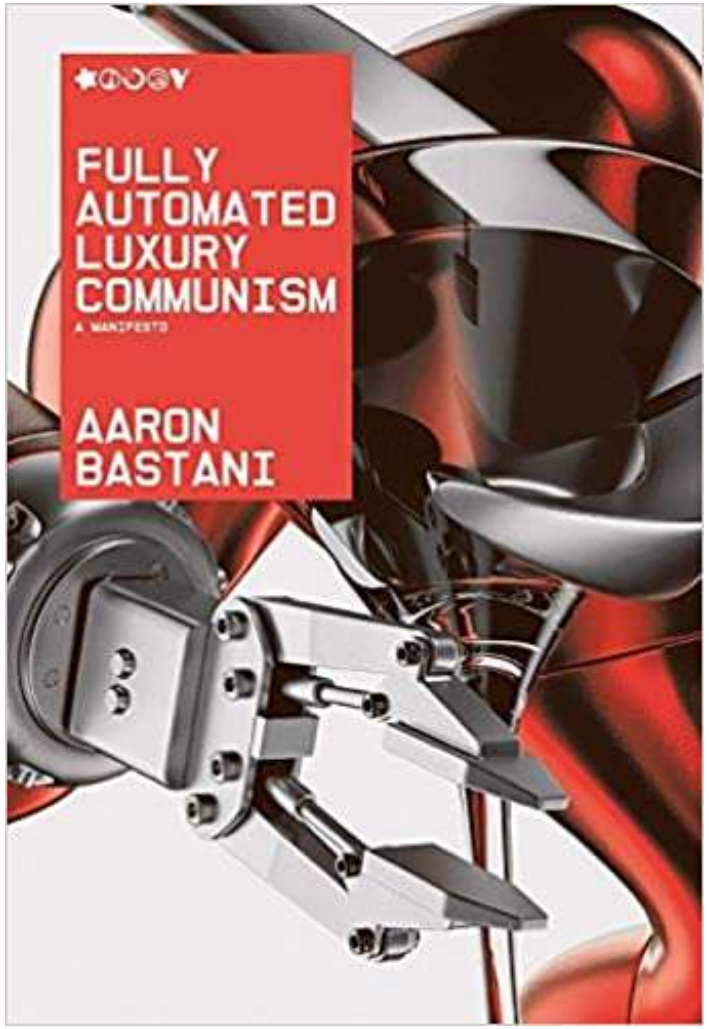
Jerome R. Ravetz
Institute for Science, Innovation and Society, University of Oxford

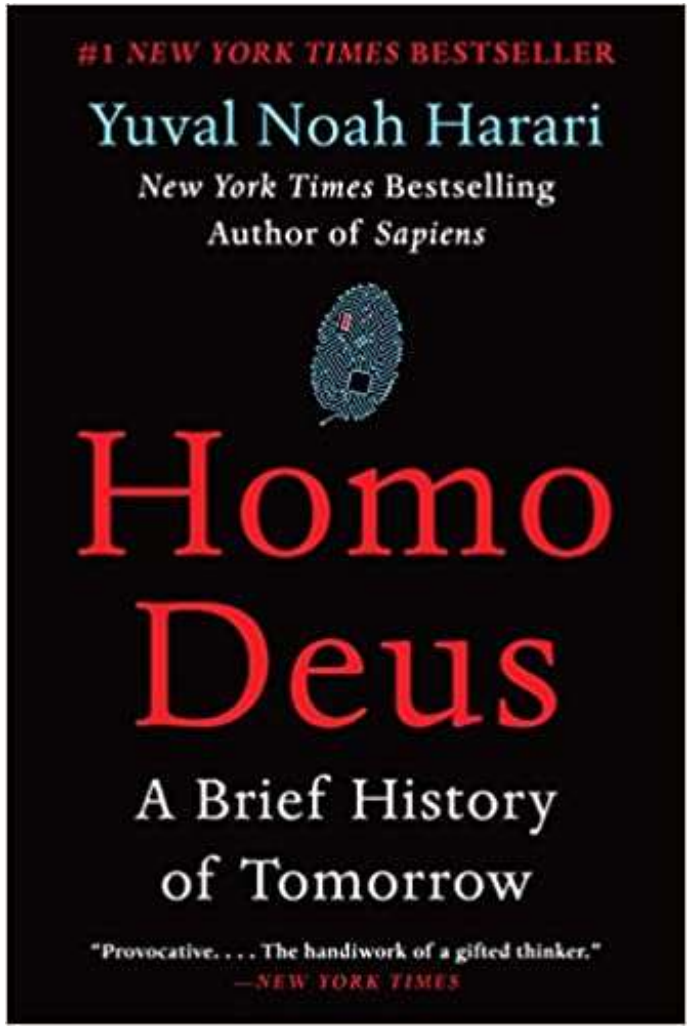
And yet …which is the prevailing sociotechnical imaginary ?

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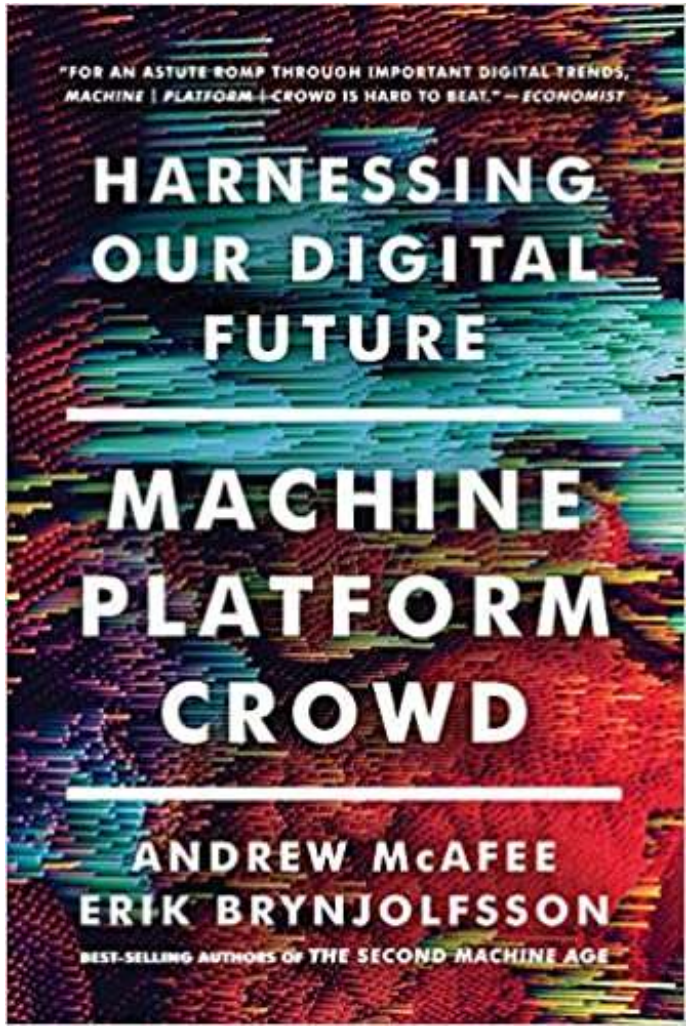
Yuval Noah Harari
New York Times Bestselling
Author of Sapiens
Homo Deus
A Brief History of Tomorrow
"Provocative. . . . The handiwork of a gifted thinker."
—NEW YORK TIMES


"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!

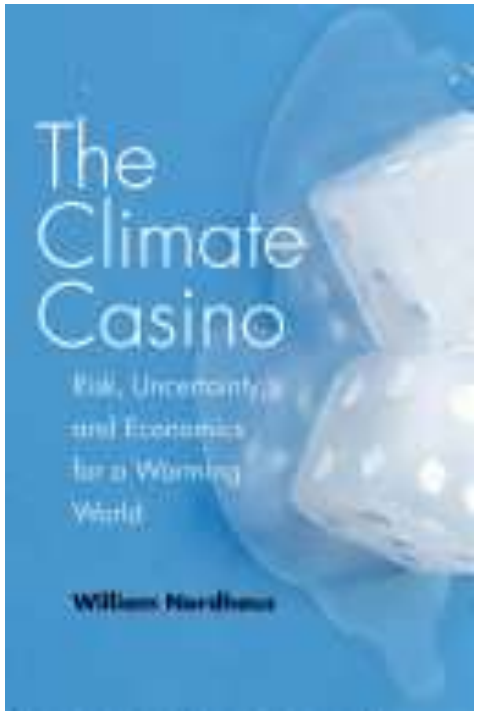
Which is the prevailing sociotechnical imaginary for quantification?

‘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.



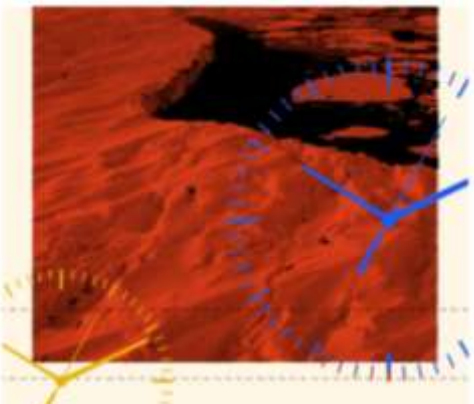
Cost benefit analysis to the year 2100?

OPINION

PETER COY

‘The Most Important Number You’ve Never Heard Of’

Sept. 17, 2021



Ethics of quantification?

Why ethics of quantification is needed now

Andrea Saltelli
Open Evidence Research, Universitat Oberta de Catalunya, Barcelona, Spain

Antonio Andreoni
UCL Institute for Innovation and Public Purpose; South African Research Chair in Industrial Development, University of Johannesburg, South Africa

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Andy Stirling
Science Policy Research Unit, University of Sussex

Ting Xu
School of Law at the University of Essex

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… 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

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Numbers capture our attention; they illuminate the part of reality which is being numerified, and hide that which is not

… 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

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Scope for harm from 'wrong numbers'

- Medical research
- Higher education
- Governance of science
- Finance
- Numbers from international organizations
  - Food and Agriculture Organization
  - The World Bank
  - OECD
  - …
- …

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‘Trendy’ methods may also harm

- Randomized control trials) may be misused to suggest more general conclusions that may not be valid

- Sophisticated statistical/econometric techniques that can be designed in ways that promote particular policy conclusions reflecting researchers’ biases

Existing initiatives looking at quantification

Radical Statistics Group

Using statistics to support progressive social change

THE ALGORITHMIC JUSTICE LEAGUE

The End

@andreasaltelli