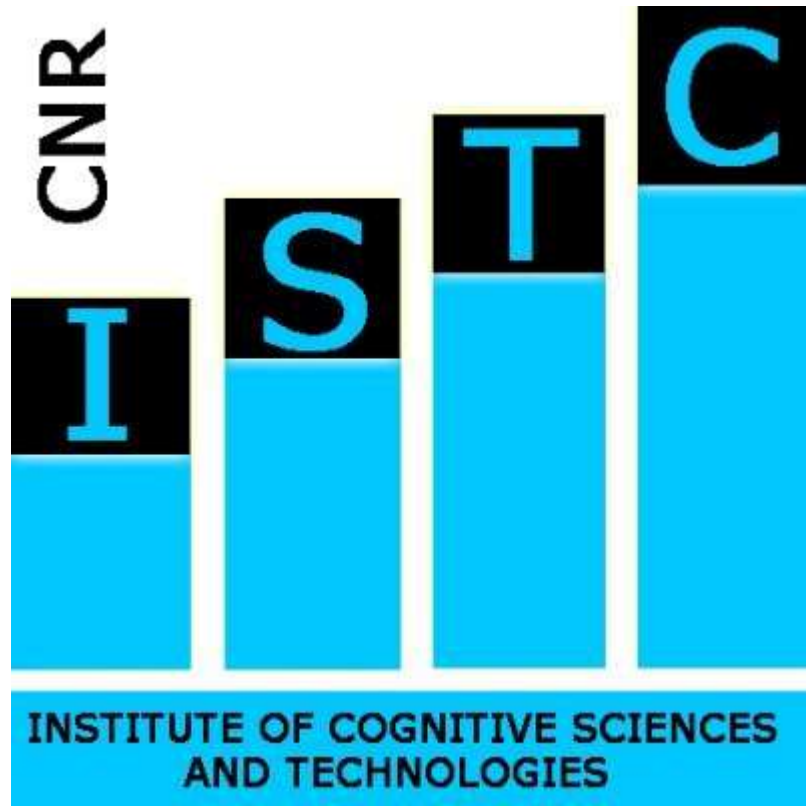


# Ethics of Quantification



← Andrea Saltelli →

and

← Monica Di Fiore



SciDataCon-IDW  
Seoul 2022, June 23



www.andreasaltelli.eu

Find this talk here



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Tweets by @AndreaSaltelli



andrea saltelli  
@AndreaSaltelli

Impressive asymmetry of power in the ongoing battle on social and environmental sustainability... 🤔🤔 <https://twitter.com/marpinoir/status/1409405623725400065>



Jun 28, 2021



andrea saltelli  
@AndreaSaltelli

Replying to @AndreaSaltelli

Should we come to term with the fact that the internet - at the end of the day - proved to be an instrument of oppression and domination rather than one of freedom and emancipation? 🤔



Jun 27, 2021

Embed

View on Twitter

Do we live immersed in  
fantastic numbers?

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

Sept. 17, 2021

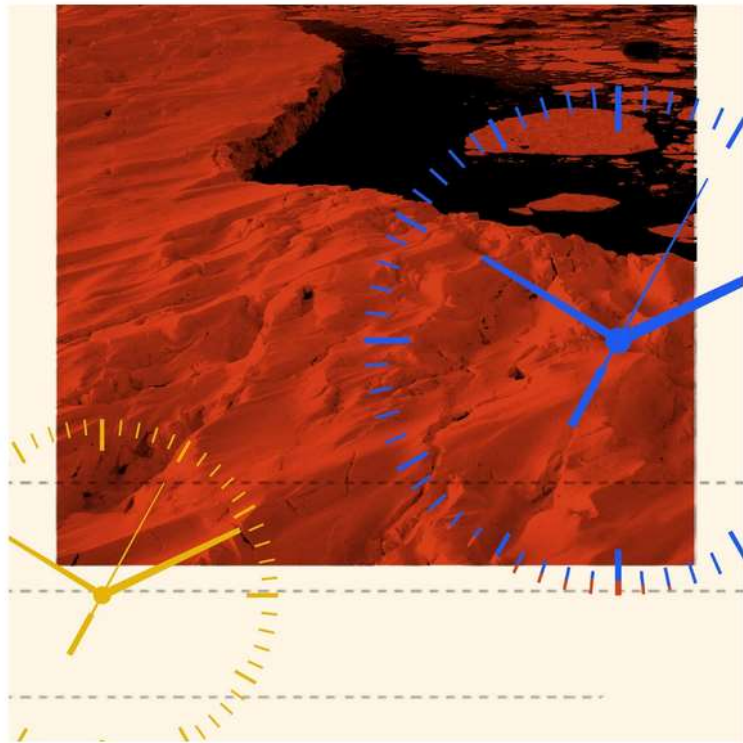


Illustration by Arsh Raziuddin, The New York Times

“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**





# **The Social Cost of Carbon: Advances in Long-Term Probabilistic Projections of Population, GDP, Emissions, and Discount Rates**

Kevin Rennert, Brian C. Prest, William A. Pizer, Richard G. Newell, David Anthoff,  
Cora Kingdon, Lisa Rennels, Roger Cooke, Adrian E. Raftery, Hana Ševčíková,  
and Frank Errickson

Working Paper 21-28  
October 2021

Averaged till year 2300

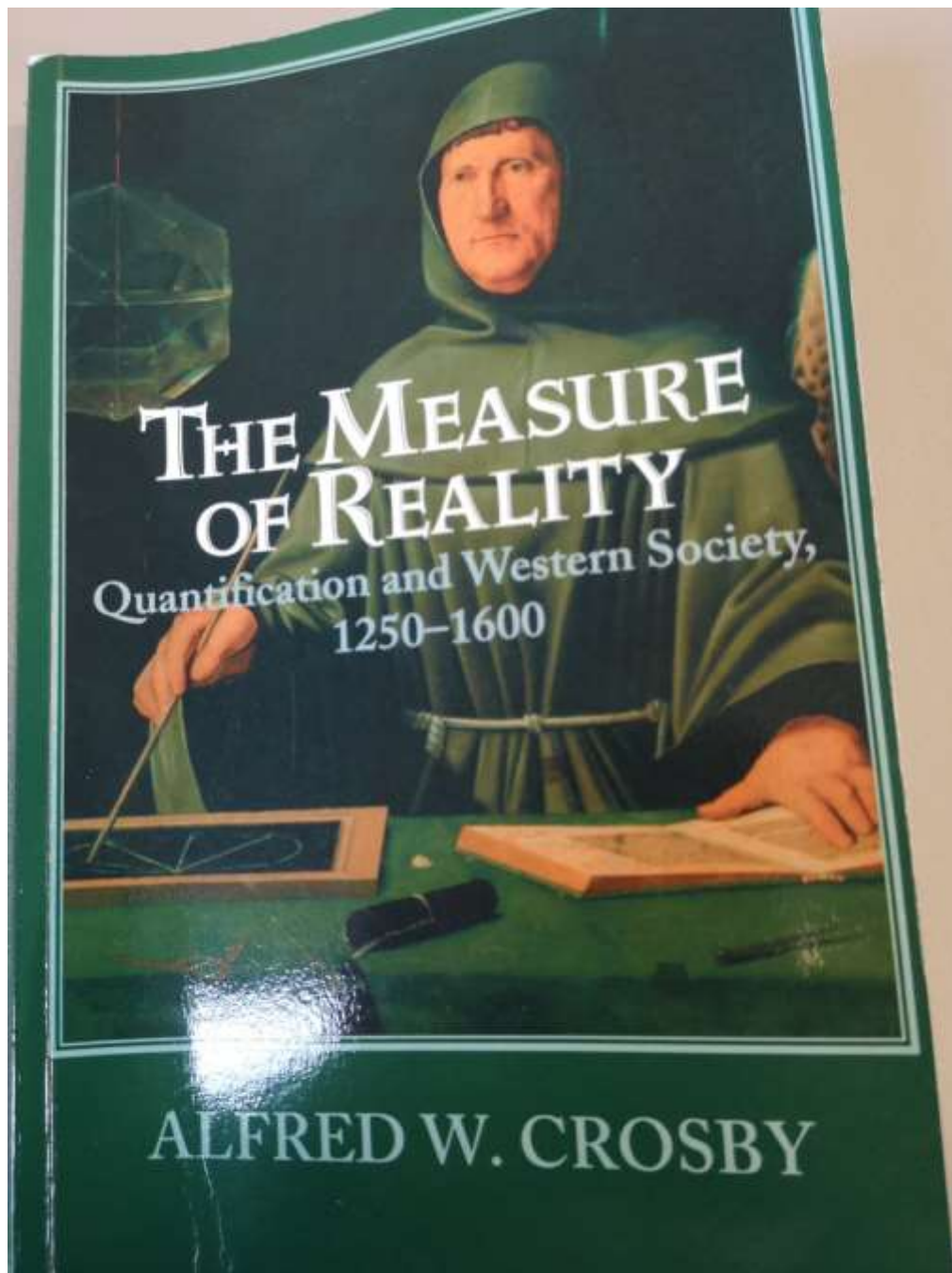
Feeds into policy design

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

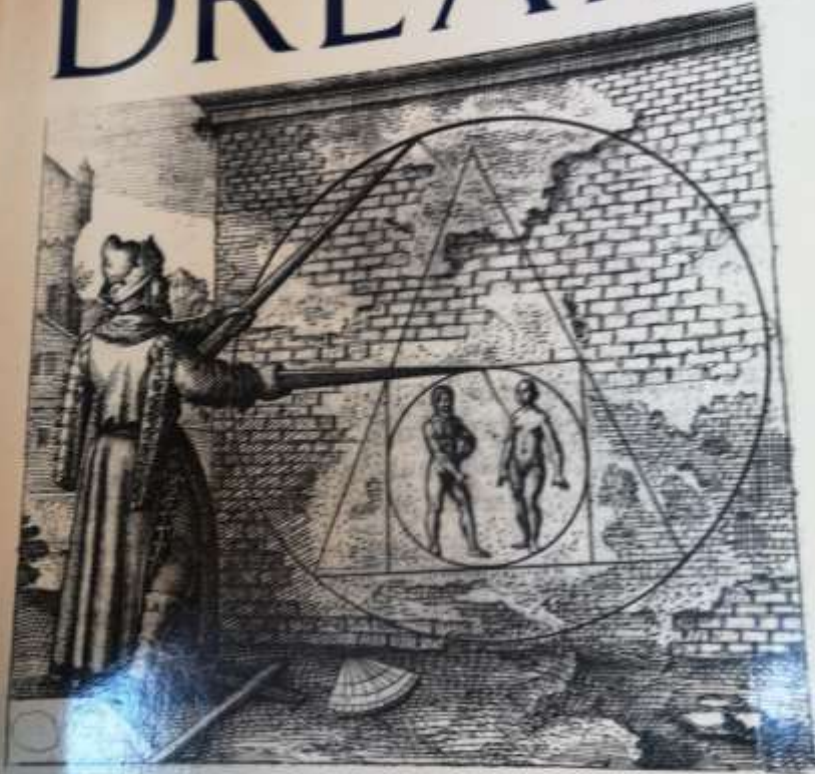
How did we get there?



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



# DESCARTES DREAM



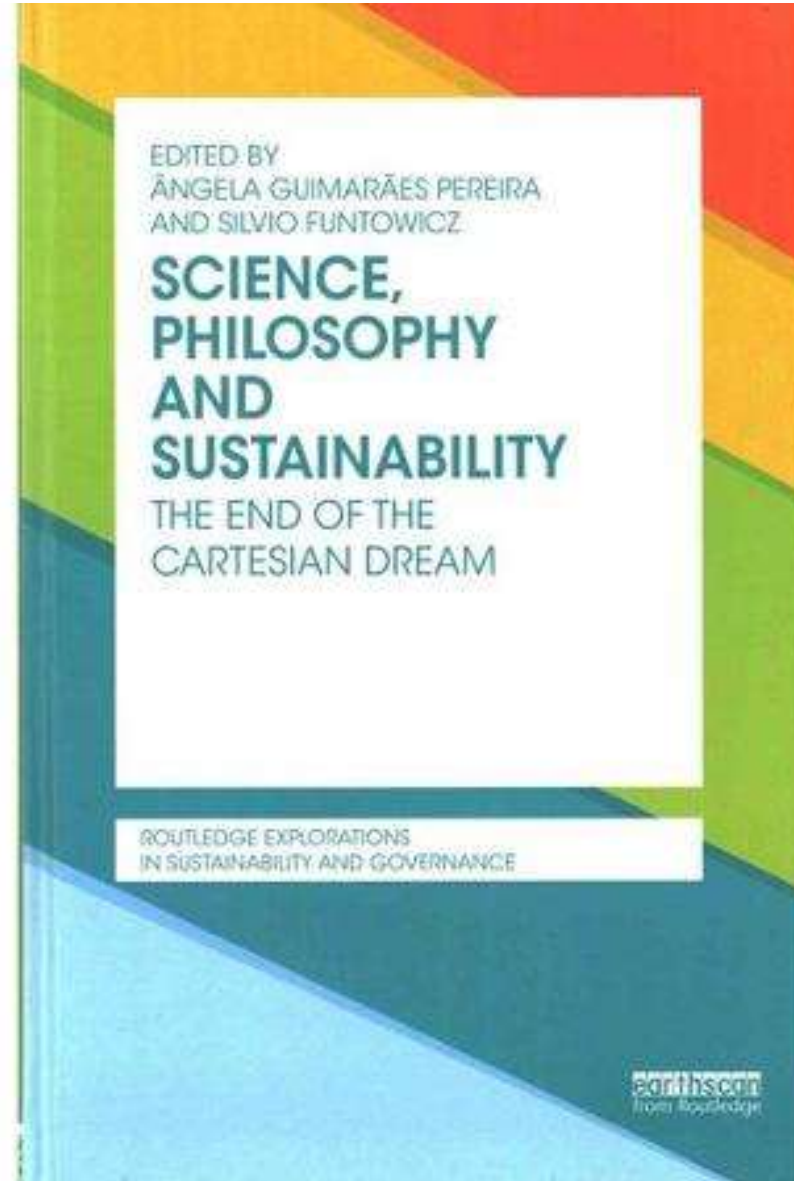
THE WORLD ACCORDING  
TO MATHEMATICS

PHILIP J. DAVIS (S) REUBEN HERSH

Descartes method,  
algebra and geometry,  
were “so fruitful,  
extending to all of  
mathematics and to  
science in general, that it  
would not be a mistake  
to call our age and all its  
scientific aspirations  
Cartesian.” p. 260

Quantification as a key  
element of the Cartesian  
Dream

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

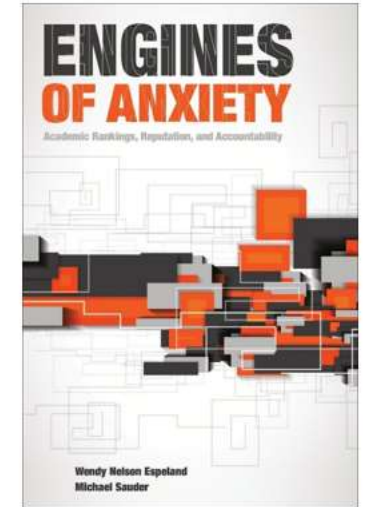
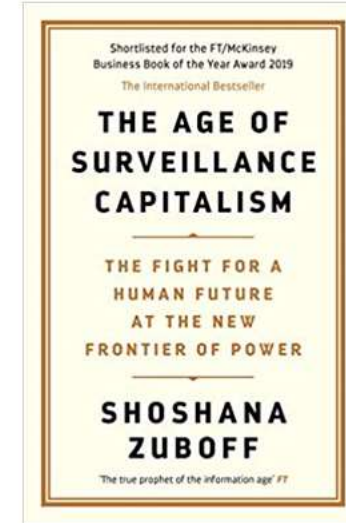
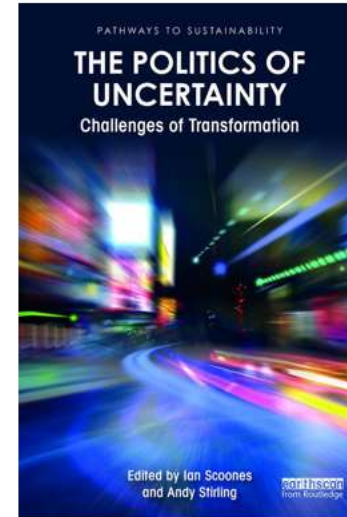
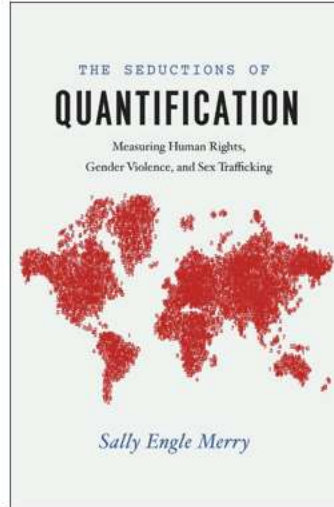
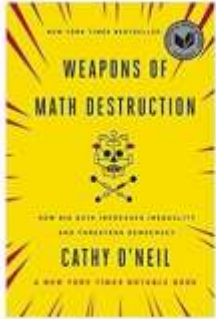
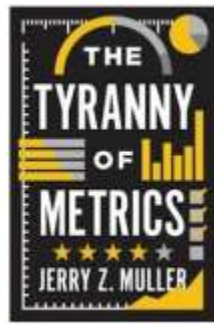
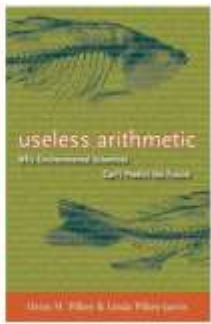
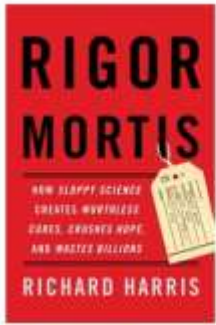


Many voices of  
alarm as to misuse  
of quantification

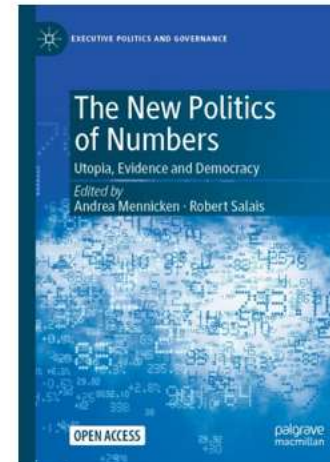
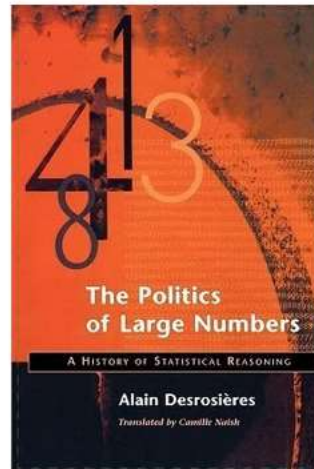
And an explosion of works, from  
within and without, from many  
disciplines



## Sociology of quantification:



a flood of disciplinary work ...



... to the effect that quantifying has consequences



# 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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Innovation and  
Public Purpose



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

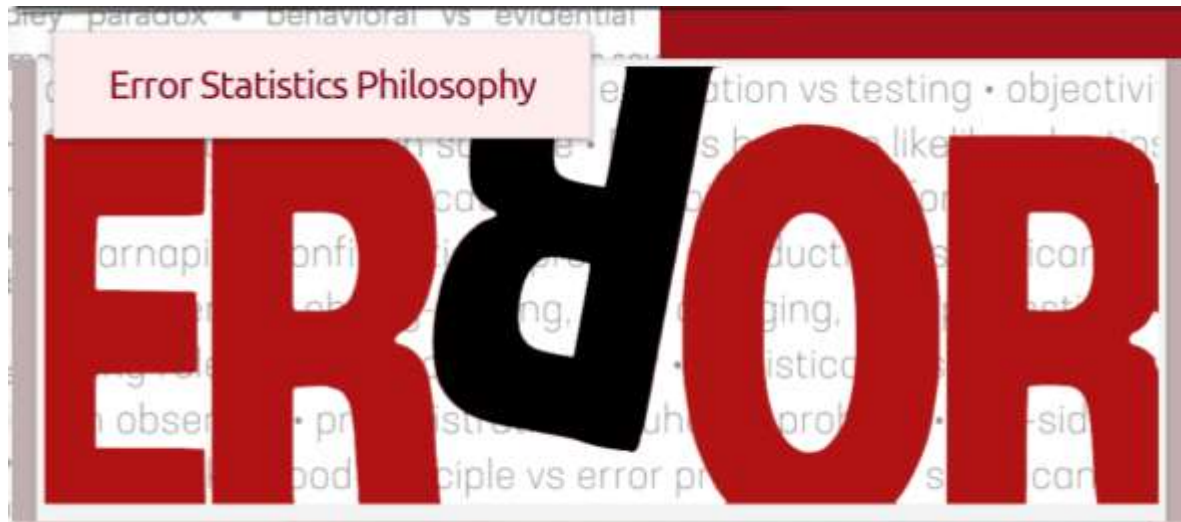
**Andrea Saltelli**

Open Evidence Research, Universitat Oberta de Catalunya (UOC)

**Jerome R. Ravetz**

Institute for Science, Innovation and Society, University of Oxford

# Statistical and mathematical modelling





### 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?*

Parent Comments:



## 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?

Unlike statistics, mathematical modelling is not a discipline...



Comment

Open Access

Published: 27 August 2019

# A short comment on statistical versus mathematical modelling

Andrea Saltelli 



# 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

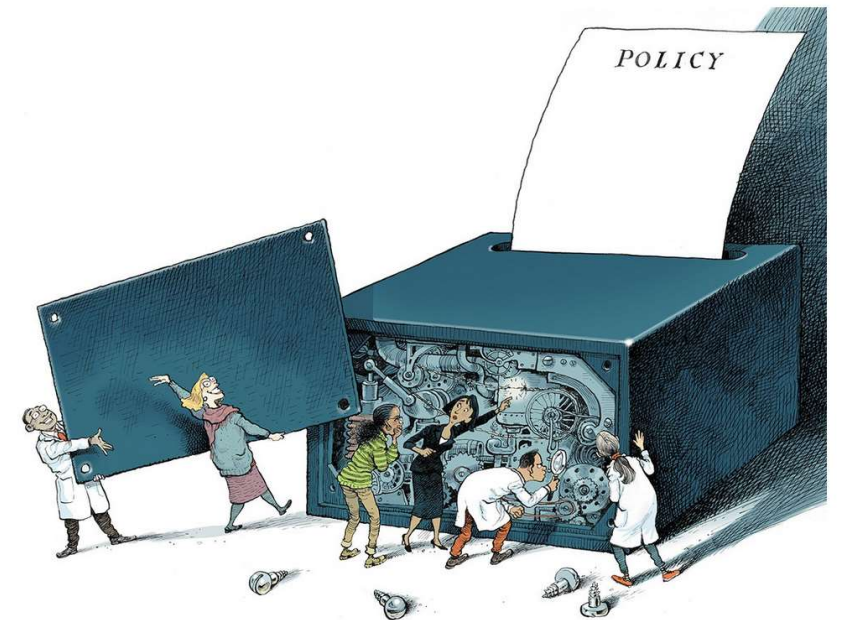
**3 STS scholars** Bammer, Sarewitz, Stirling

**1 philosopher** Ravetz

**1 historian** Charters

**1 political scientists** Di Fiore

**1 expert RRI - Open Science** Rafols





# Mind the assumptions

Assess uncertainty and sensitivity

# Mind the hubris

Complexity can be the enemy of relevance

# Mind the framing

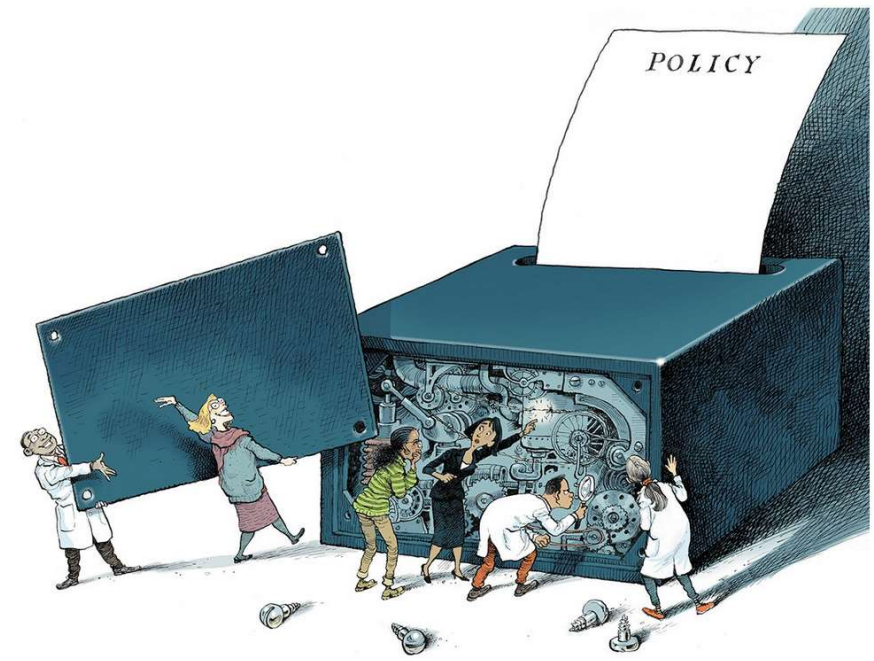
Match purpose and context

# Mind the consequences

Quantification can backfire.

# Mind the unknowns

Acknowledge ignorance



Results confirmed by more recent work (June 2022)

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# The delusive accuracy of global irrigation water withdrawal estimates

[Arnald Puy](#) , [Razi Sheikholeslami](#), [Hoshin V. Gupta](#), [Jim W. Hall](#), [Bruce Lankford](#), [Samuele Lo Piano](#), [Jonas Meier](#), [Florian Pappenberger](#), [Amilcare Porporato](#), [Giulia Vico](#) & [Andrea Saltelli](#)

[Nature Communications](#) **13**, Article number: 3183 (2022) | [Cite this article](#)

[Metrics](#)

# Why ethics of quantification is needed now

---

**Andrea Saltelli**

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

---

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South African Research Chair in Industrial Development, University of Johannesburg, South Africa

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UCL Institute for Innovation and Public Purpose;  
Davis Center at Harvard University, United States

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**Jayati Ghosh**

University of Massachusetts Amherst, United States;  
UCL Institute for Innovation and Public Purpose

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**Rainer Kattel**

UCL Institute for Innovation and Public Purpose

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**Ingrid H. Kvangraven**

Department of Politics, University of York

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Leiden University, the Netherlands

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**Erik S. Reinert**

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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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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



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WP 2021/05

# THE SEDUCTIONS OF QUANTIFICATION

Measuring Human Rights,  
Gender Violence, and Sex Trafficking



*Sally Engle Merry*

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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WP 2021/05



Numbers capture our attention; they illuminate the part of reality which is being numerified, and push back those parts that come without numbers





Numbers are too close to us, they have become part of the very lens through which we attend to and comprehend the world.



Source: 123RF

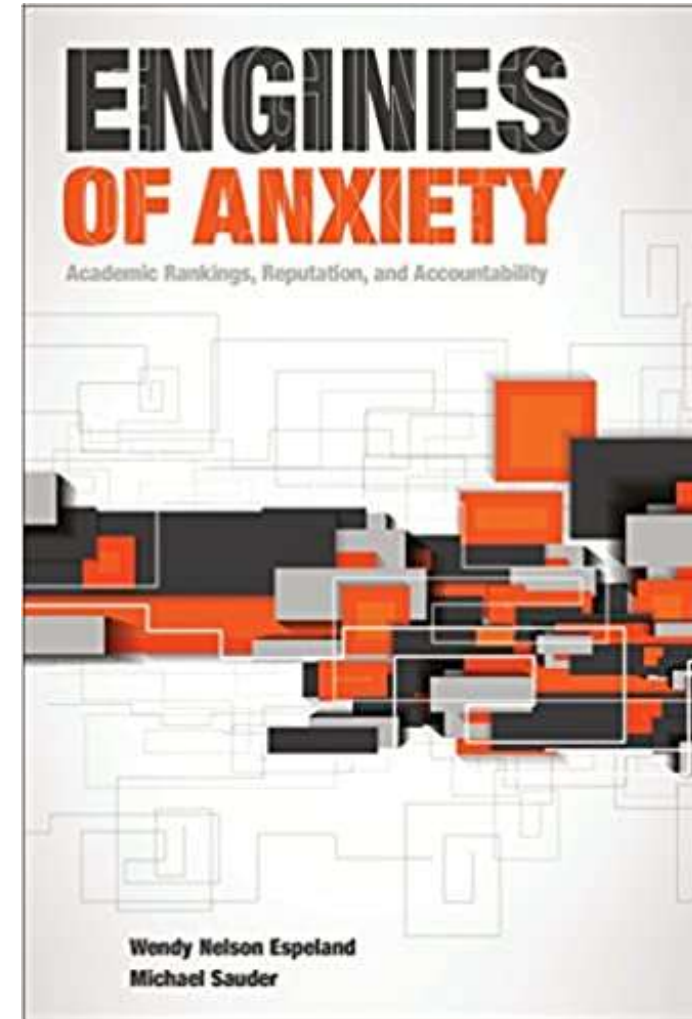
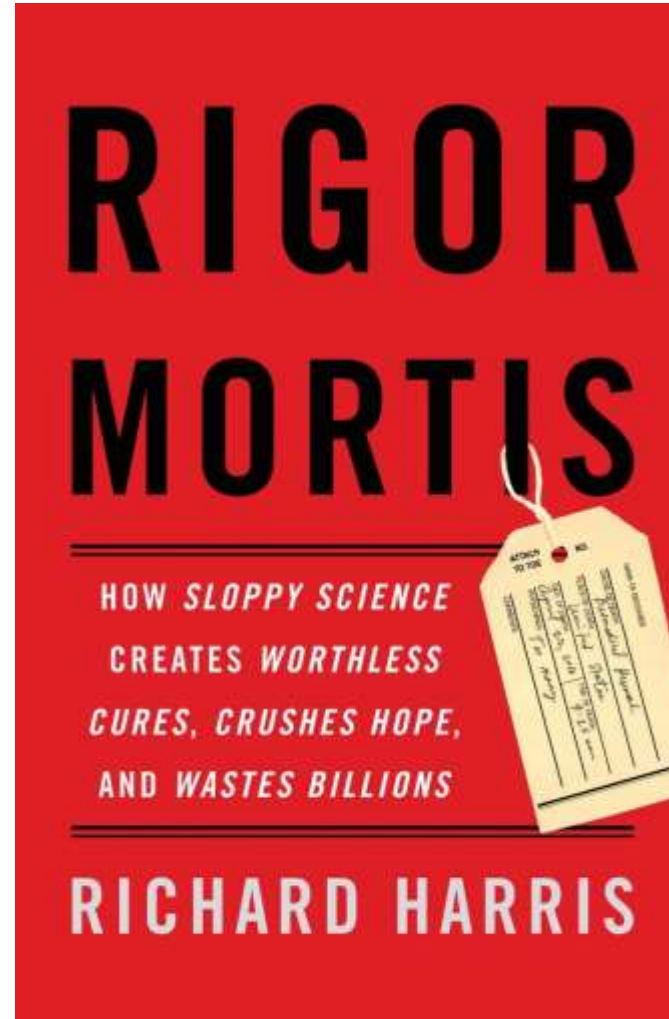


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# Scope for harm from ‘wrong numbers’:

- Medical research
- Higher education
- ...



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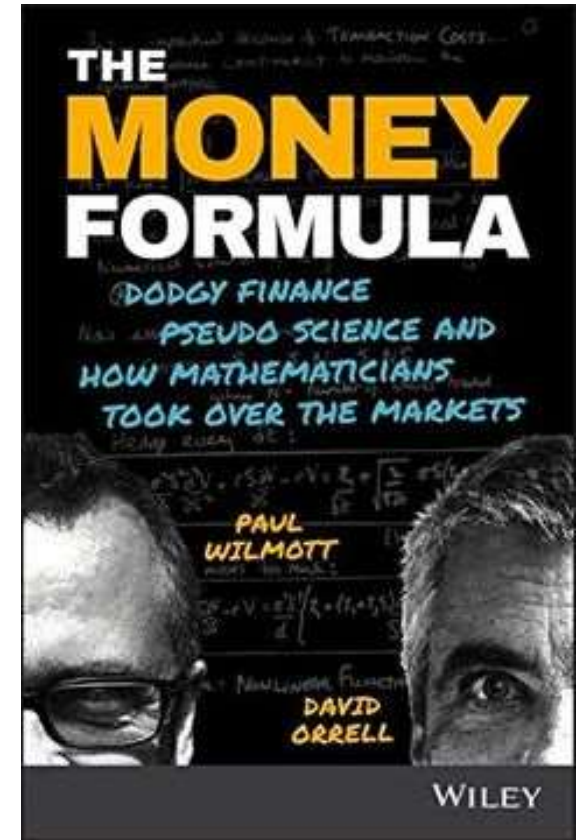


# Scope for harm from ‘wrong numbers’:

The New York Times

**Inquiry finds World Bank officials, including now-I.M.F. chief, pushed staff to inflate China data.**

- ...
- Finance
- Numbers from international organizations (The World Bank, OECD...)



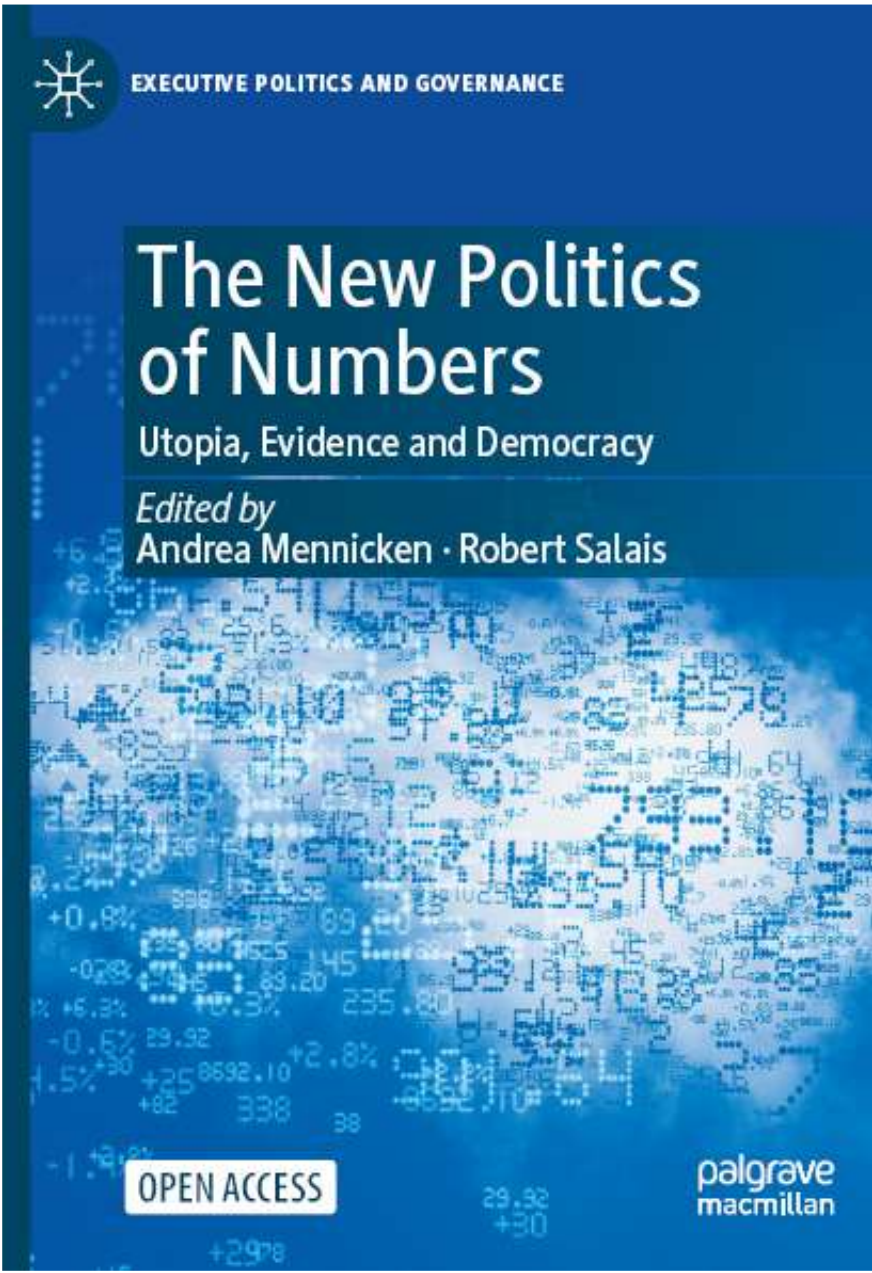
‘Trendy’ methods may also harm

- Randomized control trials) may be misused to suggest more general conclusions that may not be valid
- Statistical/econometric techniques that can be designed in ways that promote particular policy conclusions reflecting researchers’ biases

Numbers and  
democracy  
(or a-democracy?)

<b>Evidence based policy</b>	<b>Statistics (creating things that hold together for the solution of practical problems)</b>
<b>Policy based evidence</b>	<b>Governance driven quantification (a reversal of the statistical pyramid)</b>

CHAPTER 12, “La donnée n’est pas un  
donné”: Statistics, Quantification and  
Democratic Choice, *Robert Salais*



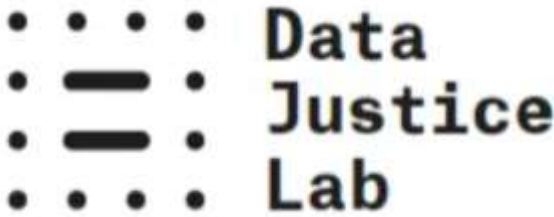


Existing initiatives  
looking at  
quantification



Radical Statistics Group

Using statistics to support progressive social change



THE ALGORITHMIC JUSTICE LEAGUE

## A global observatory for gene editing

Sheila Jasanoff and J. Benjamin Hurlbut call for an international network of scholars and organizations to support a new kind of conversation.

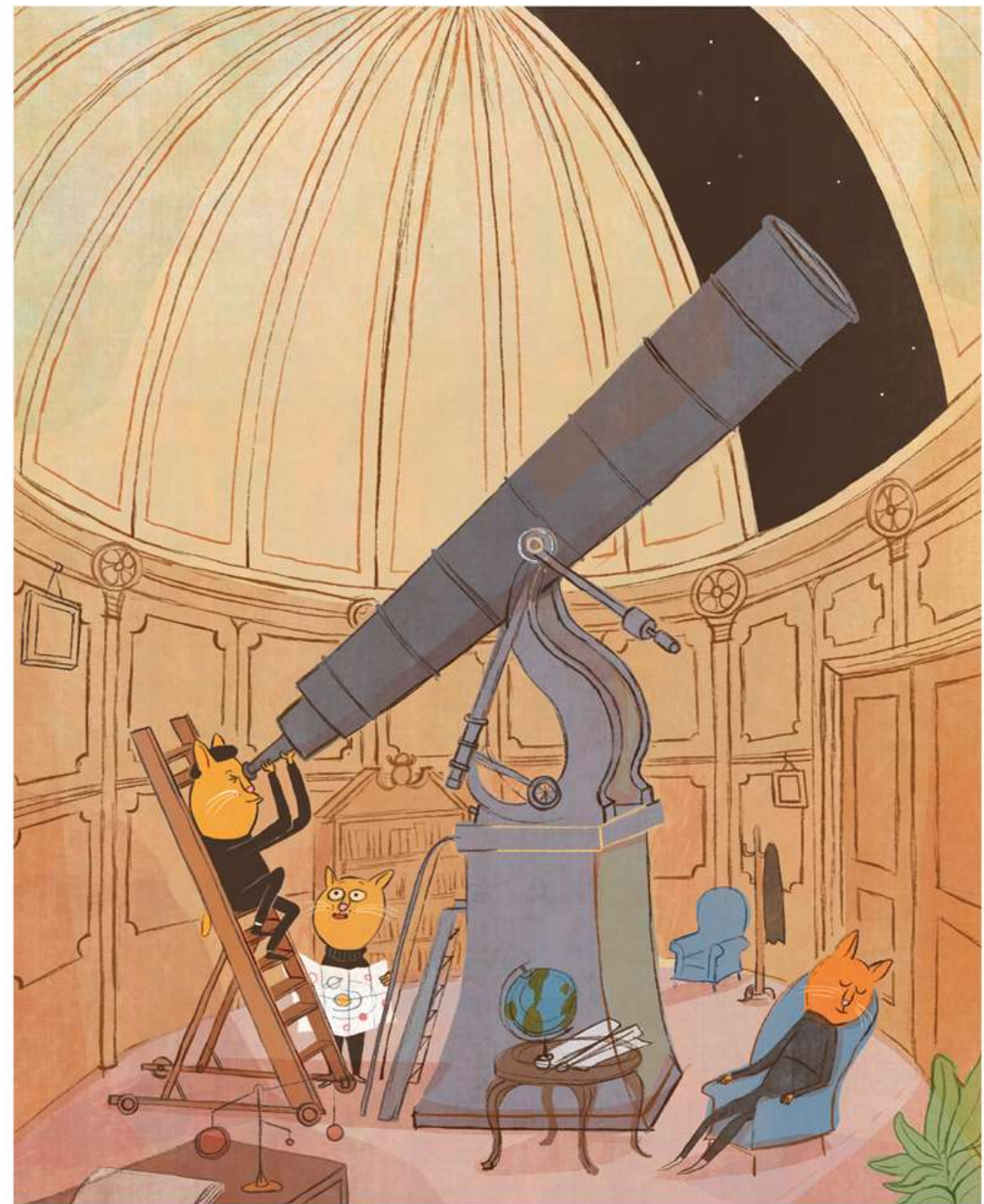
Sheila Jasanoff & J. Benjamin Hurlbut



Illustration by Marina Muun

... the potential of numbers to inflict harm is on par or superior to those of biotechnologies

... then how about an observatory for visible and invisible numbers ?



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



# The End



@andreasaltelli