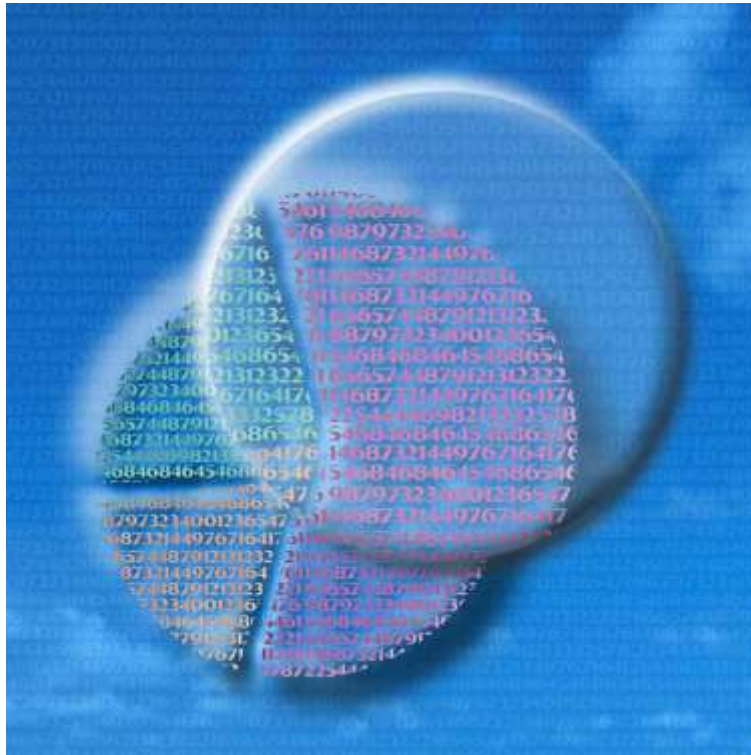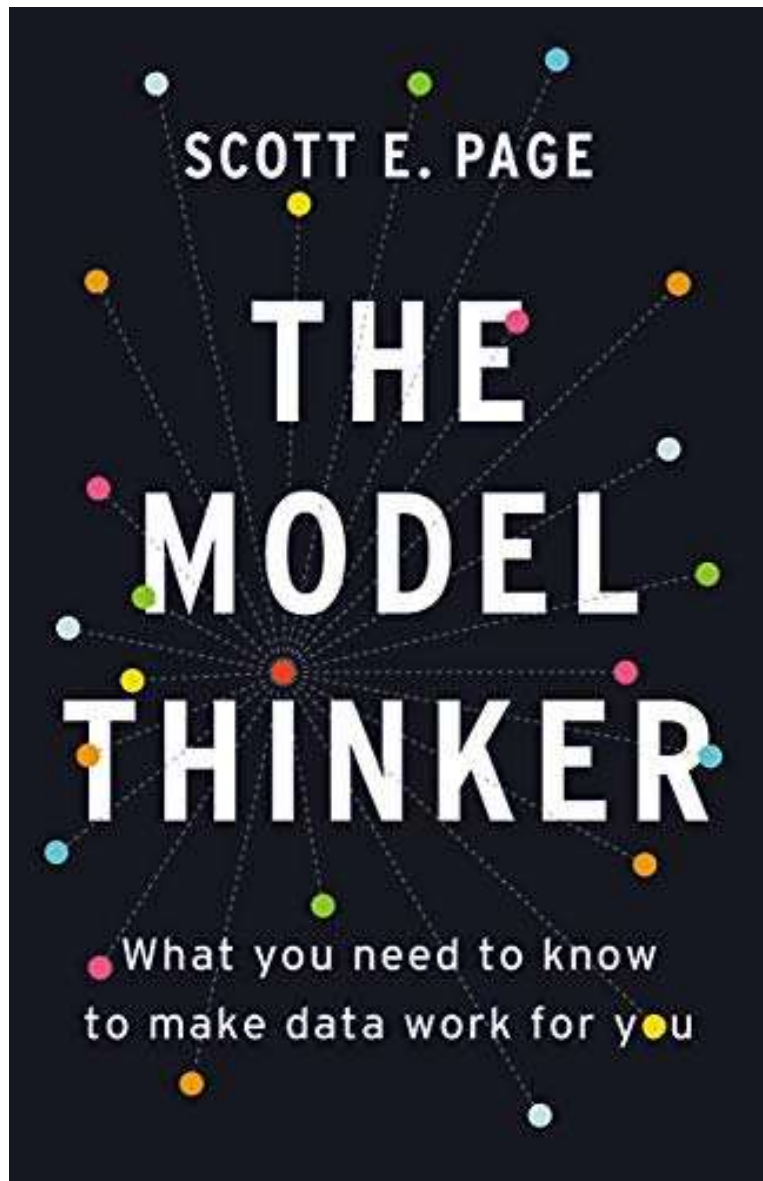# Some thoughts on sensitivity analysis

Andrea Saltelli
University of Bergen

Quarterly iEMSs webcast on "The Future of #Sensitivity_Analysis for #Systems_Modelling and #Policy_Support", November 9 2021

Danger: Provincialism / parochialism / insularism of the sensitivity analysis community?

Way forward: being alert to duplications; utilize new teaching technologies; contextualize sensitivity analysis both among number crunchers and in the context of sociology of quantification

SCOTT E. PAGE

THE MODEL THINKER

What you need to know
to make data work for you

Number crunchers: great book; Shapley values discussed but not for SA

MOOC with Coursera and Stanford

The first offering of Model Thinking drew 60,000 students.

Simulating the pandemic: What COVID forecasters can learn from climate models

Methods that are routine in computation-heavy fields could lead to more reliable pandemic predictions.

David Adam

Duplications: "ensemble modelling ⋯ in which thousands of versions of the model are run with a range of assumptions & inputs, to provide a spread of scenarios with different probabilities"

Sociology of quantification: a recent review

Annual Review of Sociology

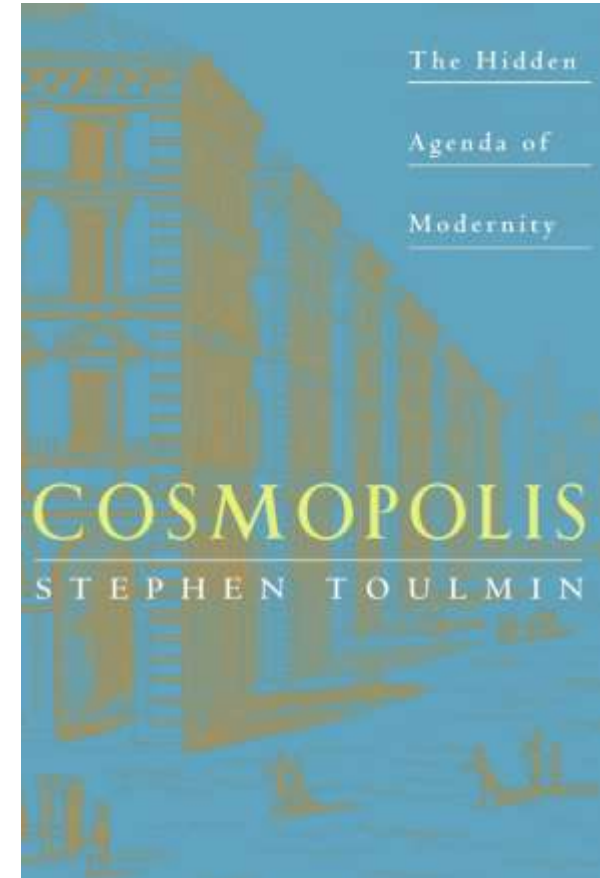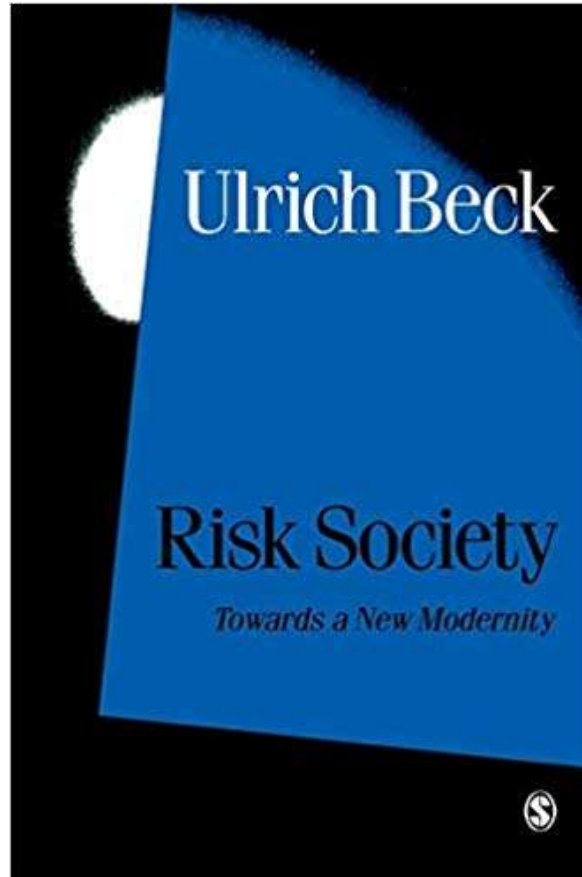# What's New with Numbers? Sociological Approaches to the Study of Quantification

Andrea Mennicken[*,1] and Wendy Nelson Espeland[*,2]

[1]Department of Accounting, London School of Economics and Political Science, London WC2A 2AE, United Kingdom; email: a.m.mennicken@lse.ac.uk

[2]Department of Sociology, Northwestern University, Evanston, Illinois 60208, USA

Danger: cultural obstacles / Cartesian or Ricardian dreams / reductionism

Way forward:

...

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

Five ways to ensure that models serve society: a manifesto

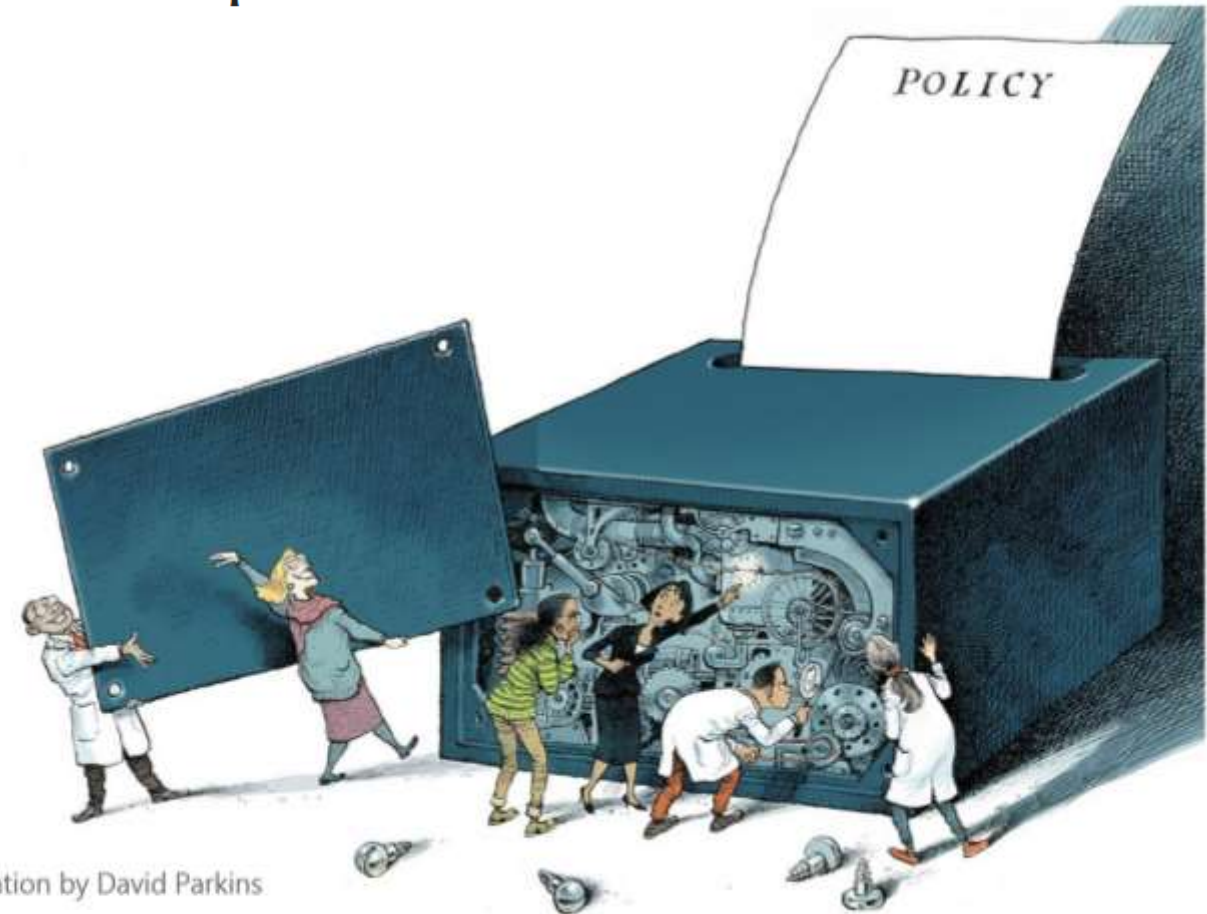Pandemic politics highlight how predictions need to be transparent and humble to invite insight, not blame.

Illustration by David Parkins

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

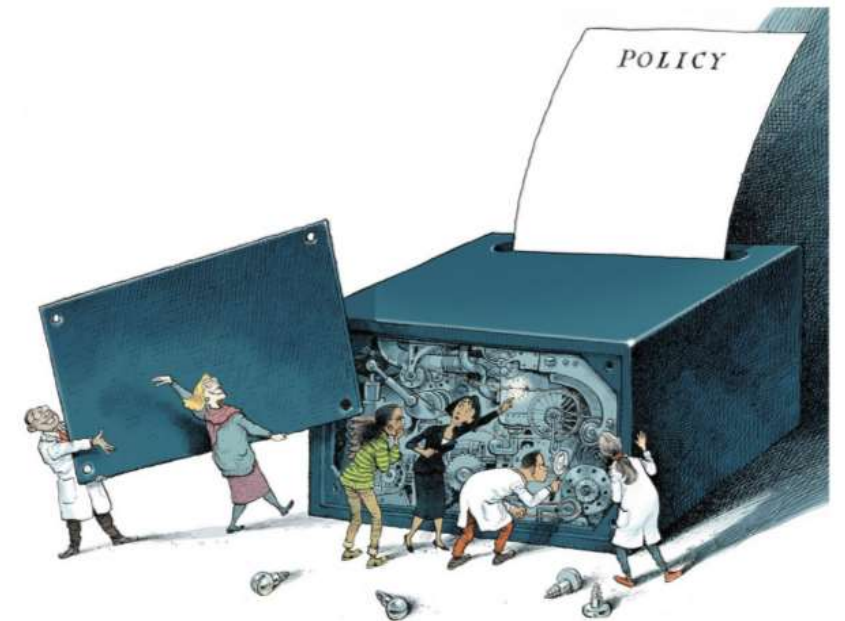2 sociologists of quantification Espeland, Porter

3 STS scholars Bammer, Sarewitz, Stirling

1 philosopher Ravetz

1 historian Charters

1 political scientists Di Fiore
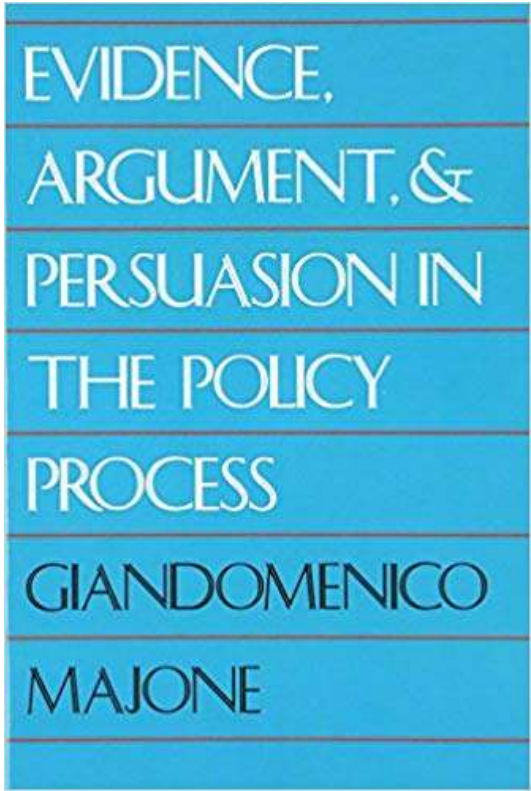
1 expert RRI - Open Science Rafols

Danger: Technicism / neutrality

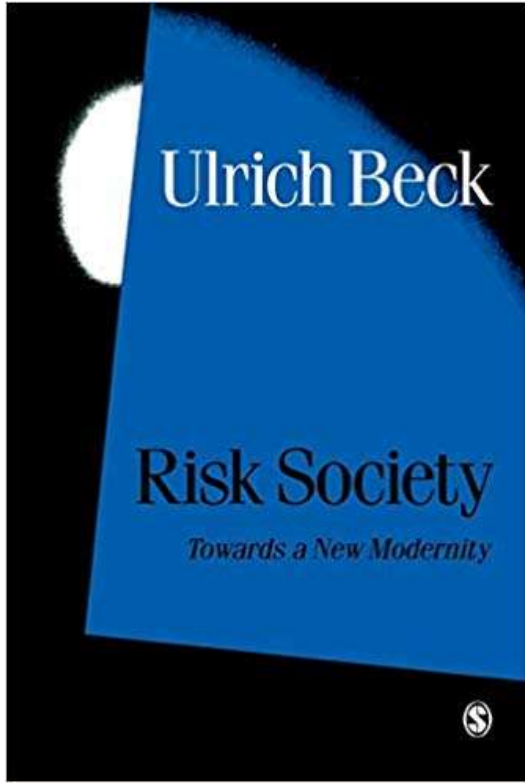**Way forward:** using SA to engage with fantastic and 'funny' numbers; monitoring, vigilance, deconstruction

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

Ulrich Beck
(1944 –2015)

EVIDENCE, ARGUMENT, & PERSUASION IN THE POLICY PROCESS

GIANDOMENICO MAJONE

1989

Ulrich Beck

Risk Society

Towards a New Modernity

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]

Funny Numbers

Theodore M. Porter

University of California, Los Angeles, USA

the modern reverence for quantitative evidence has enabled funny numbers to achieve primacy. The ascendancy of cost-benefit analysis, risk analysis, and statistical tests of significance stands in tribute to this ideal.

Mind the assumptions

Assess uncertainty and sensitivity

Mind the hubris

Complexity can be the enemy of relevance
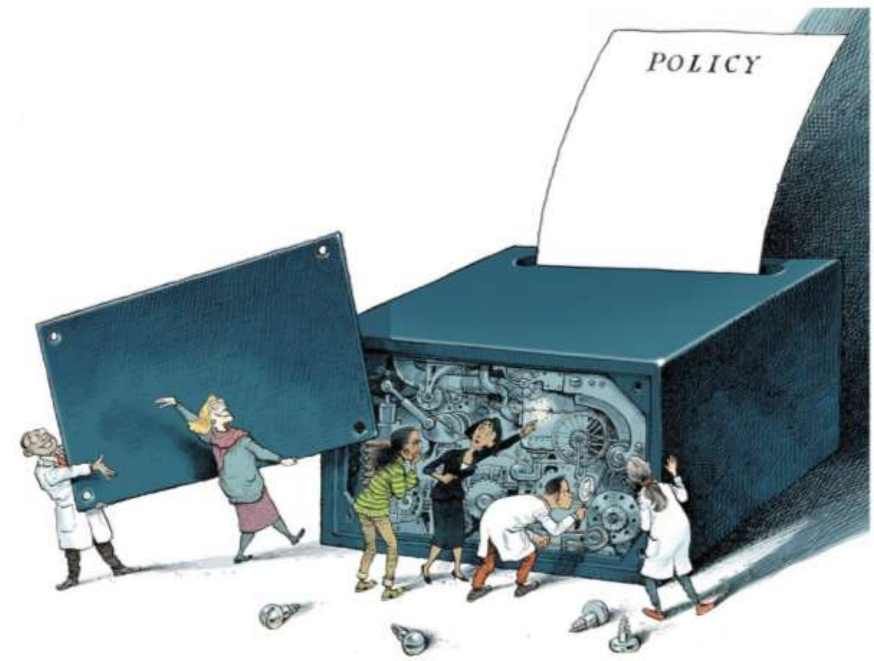
Mind the framing

Match purpose and context

Mind the consequences

Quantification can backfire.

Mind the unknowns

Acknowledge ignorance

The epistemic community built around

can play a useful (lead?) role in the monitoring of funny numbers, provided it succeeds in establishing itself as an authoritative interlocutor

The End

@andreasaltelli