

Lesson 1

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Introduction to Statistics
March 30, 2023 UPF-BSM



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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

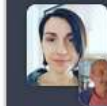
@AndreaSaltelli



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AndreaSaltelli

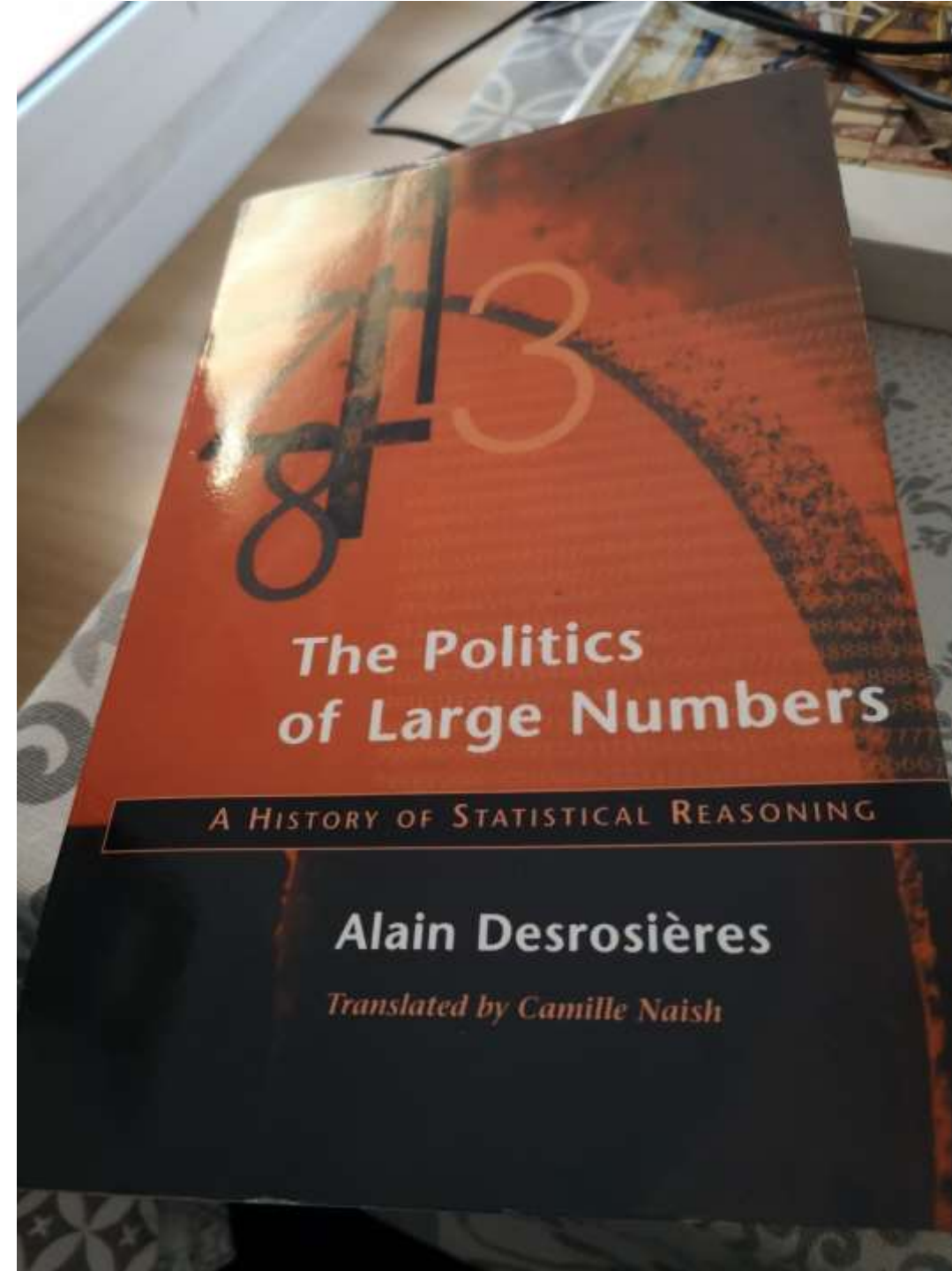
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Fresh from the press

What is statistics?

What is statistics?

Alain Desrosières, The politics of large numbers, Harvard University Press



Different meaning

We lack reliable **statistics** about COVID-19 present infection rate in country X

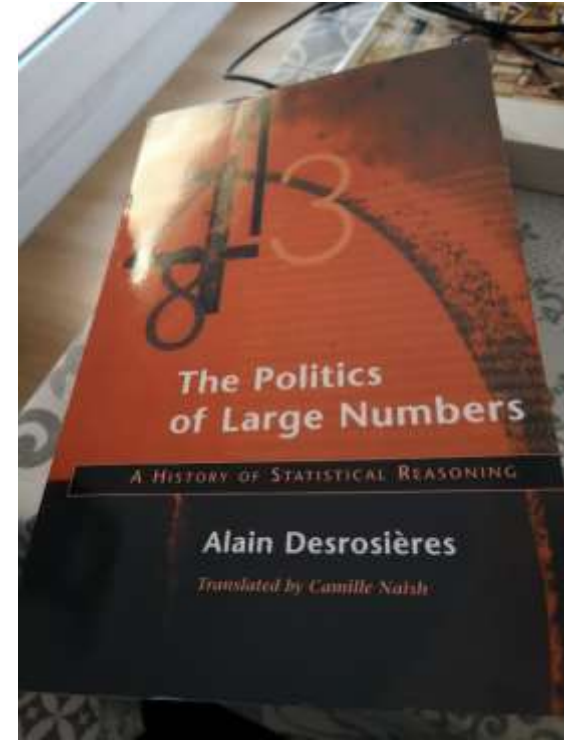
(➔ almost synonymous with data/information)

Statistics developed vigorously in the course of XVIII and XIX centuries

(➔ the discipline, in all its branches)



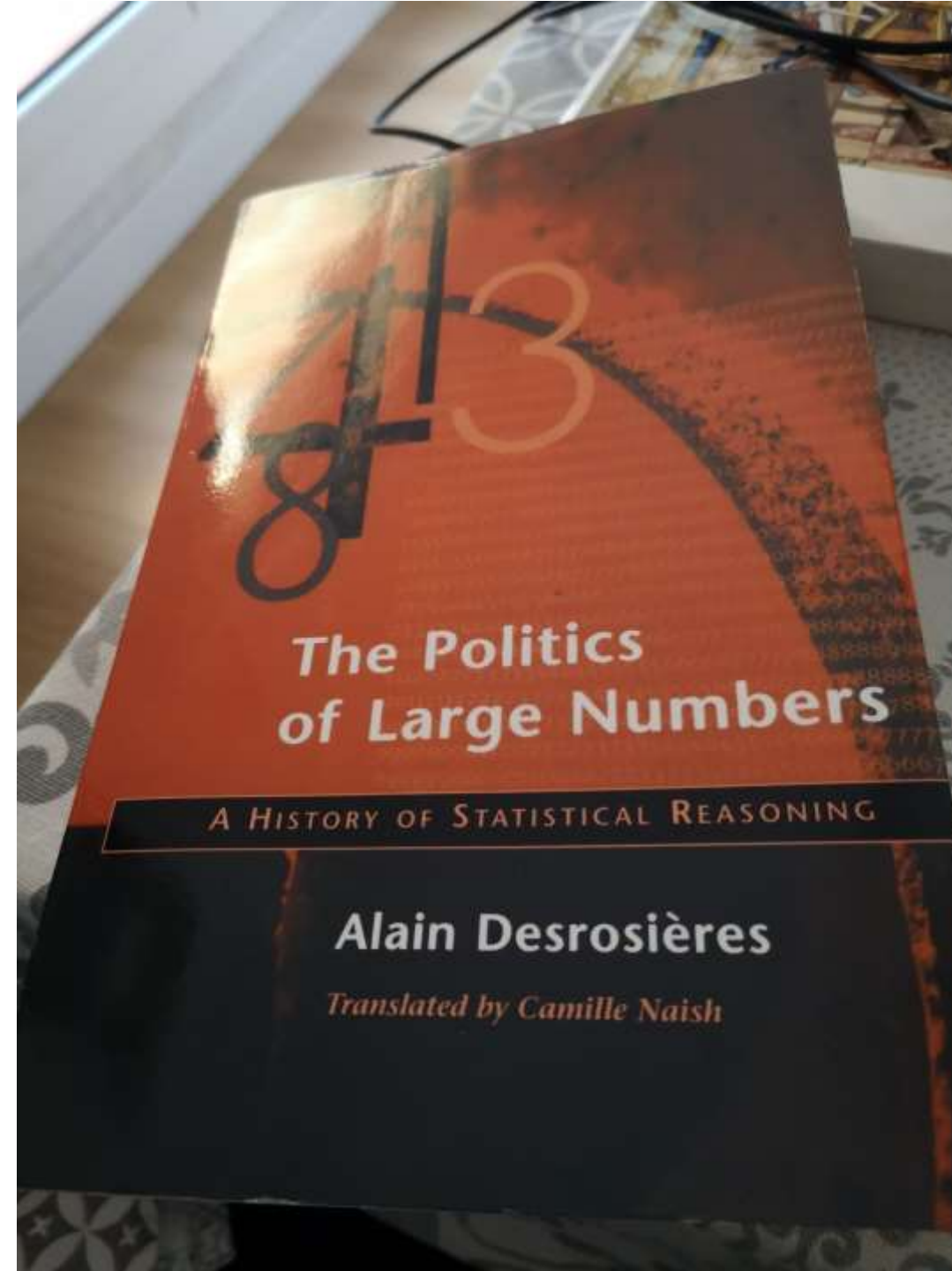
Alain Desrosières
(1940 –2013)



The many souls and histories of statistics

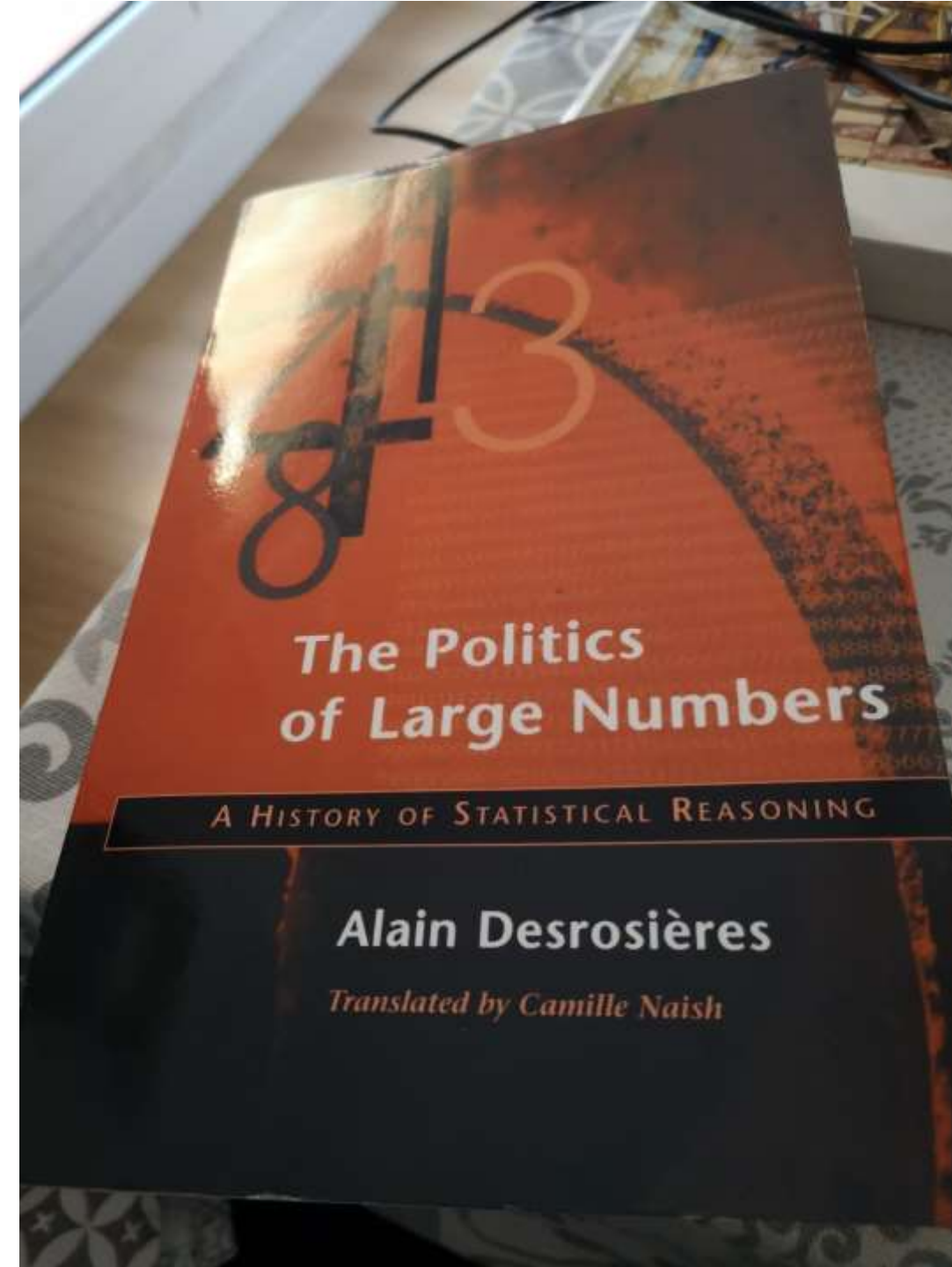
Statistics to

- Administer the state & design its policies
- Compute probabilities
- Ensure that a game is fair
- Describe the real & at the same time create it
- Run scientific experiments
- ...



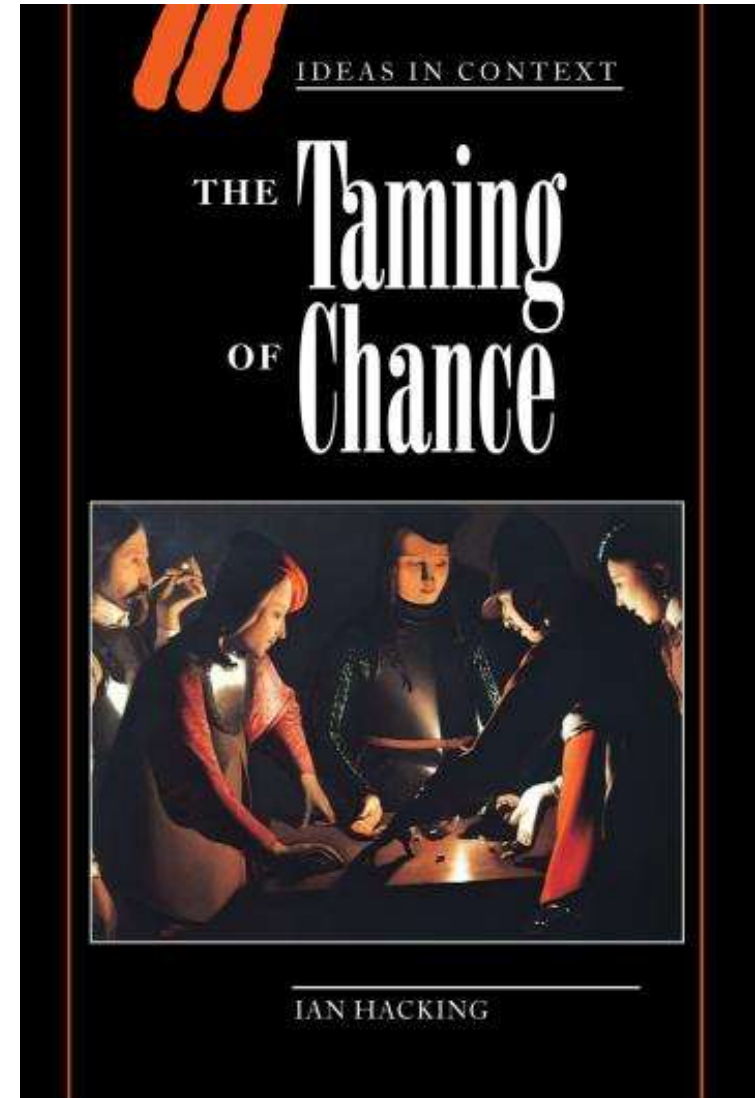
In relation to statistics for the state:

- Making things that ‘hold together’
- Creating categories and filling them with individuals
- Establishing relations between objects
- ...



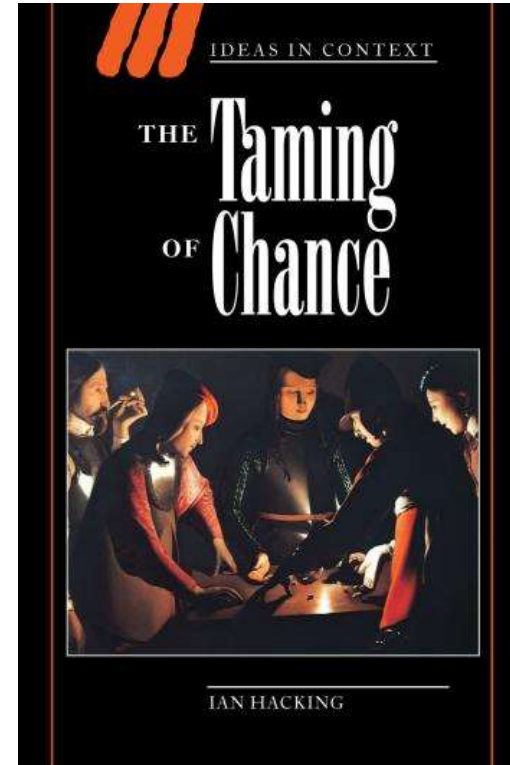
What is statistics?

Ian Hacking, 1990, The taming of chance,
Cambridge University Press.





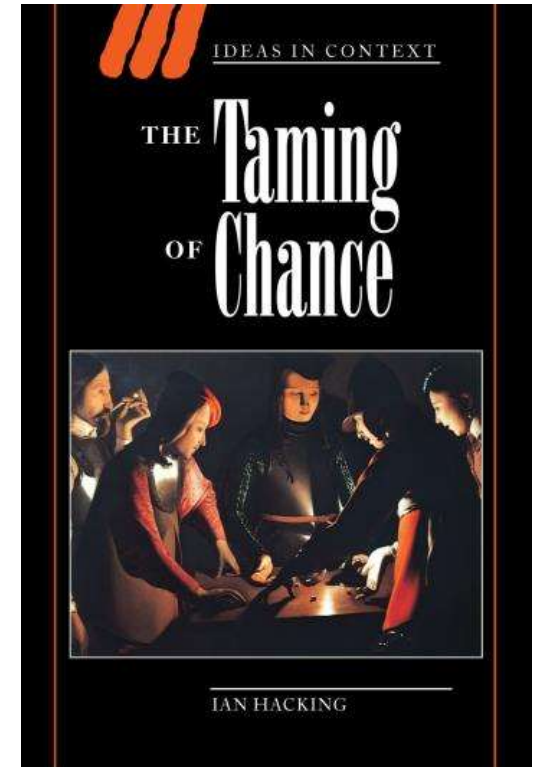
Ian Hacking



Statistics \leftrightarrow nation state \leftrightarrow Modernity

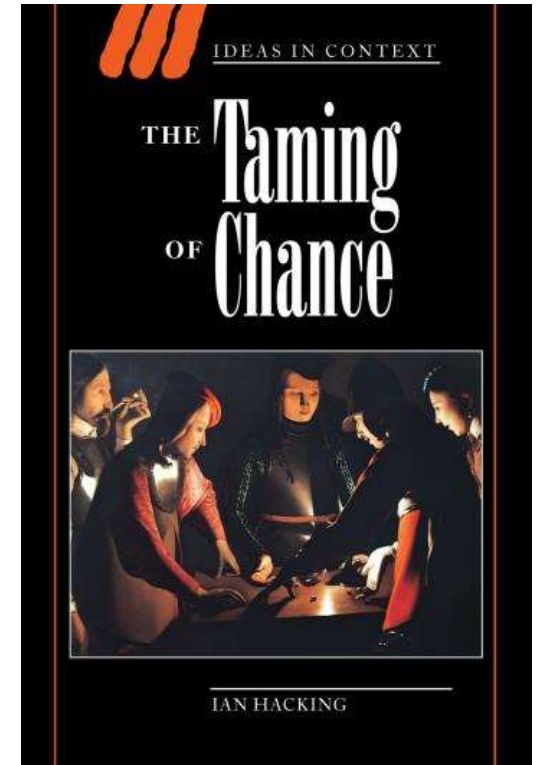
How the world became “numerical”
between the eighteenth and nineteenth
centuries

How, in the nineteenth century,
probability won an epistemological war
(epistemology being, in simplified terms,
the study of how we go about knowing,
and how we decide that we know what
we know)

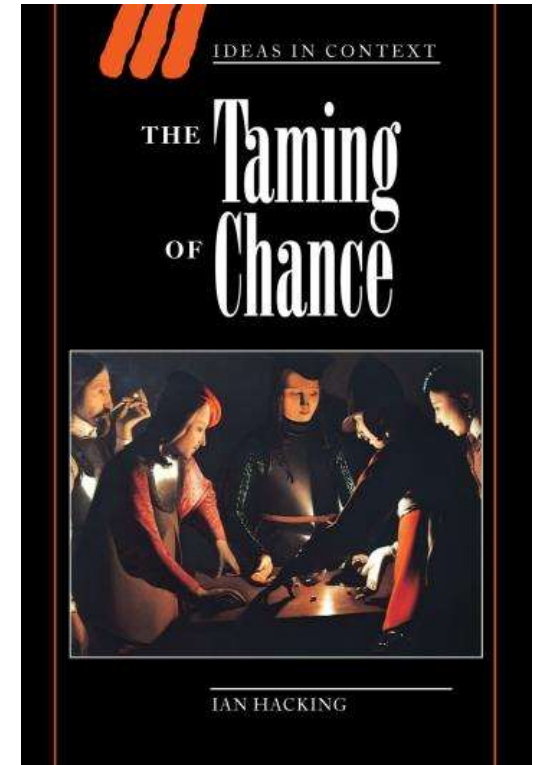


Probability became king in adjudicating on the credibility of evidence

➔ We now look at facts mostly through the lens of statistics, in contrast to earlier, pre-Enlightenment times when chance was equated with superstition.

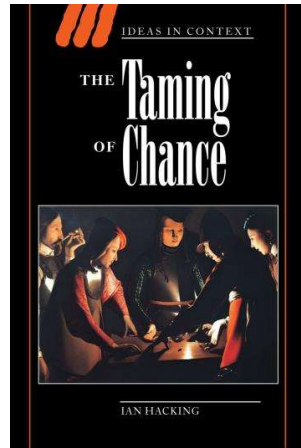


In Hacking's view, the victory of probability was metaphysical, epistemological, logical and ethical – producing the “imperialism of probability”



Leibnitz, ‘philosophical godfather of Prussian official statistics’.

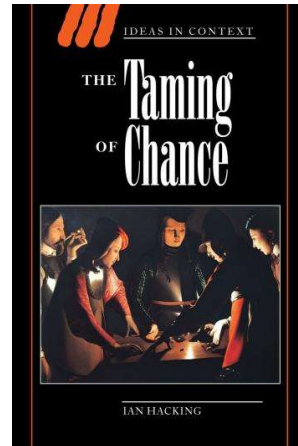
His proposal to the Prince Frederik of Prussia, 1700



Gottfried Wilhelm Leibniz
(1646–1716)

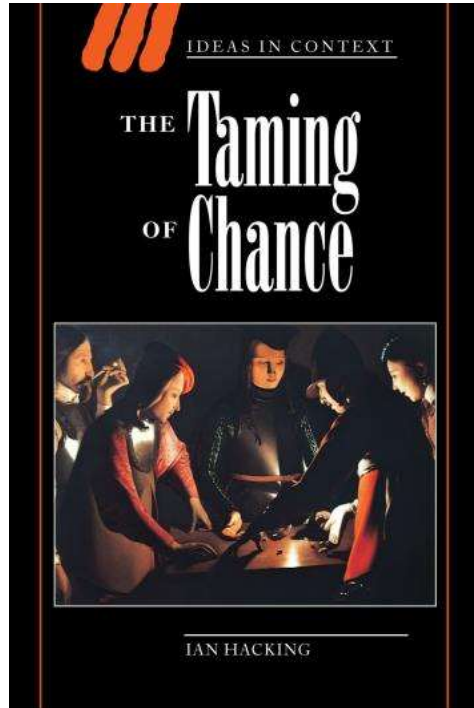
56 categories to ‘measure the power of a state’

- number of marriageable girls,
- able bodied capable to carry arms,
- diseases,
- child mortality,
- ...
- number of Jews



Gottfried Wilhelm
Leibniz (1646–1716)

Leibniz was the first to propose the creation of a statistical office



Gottfried Wilhelm
Leibniz (1646–1716)

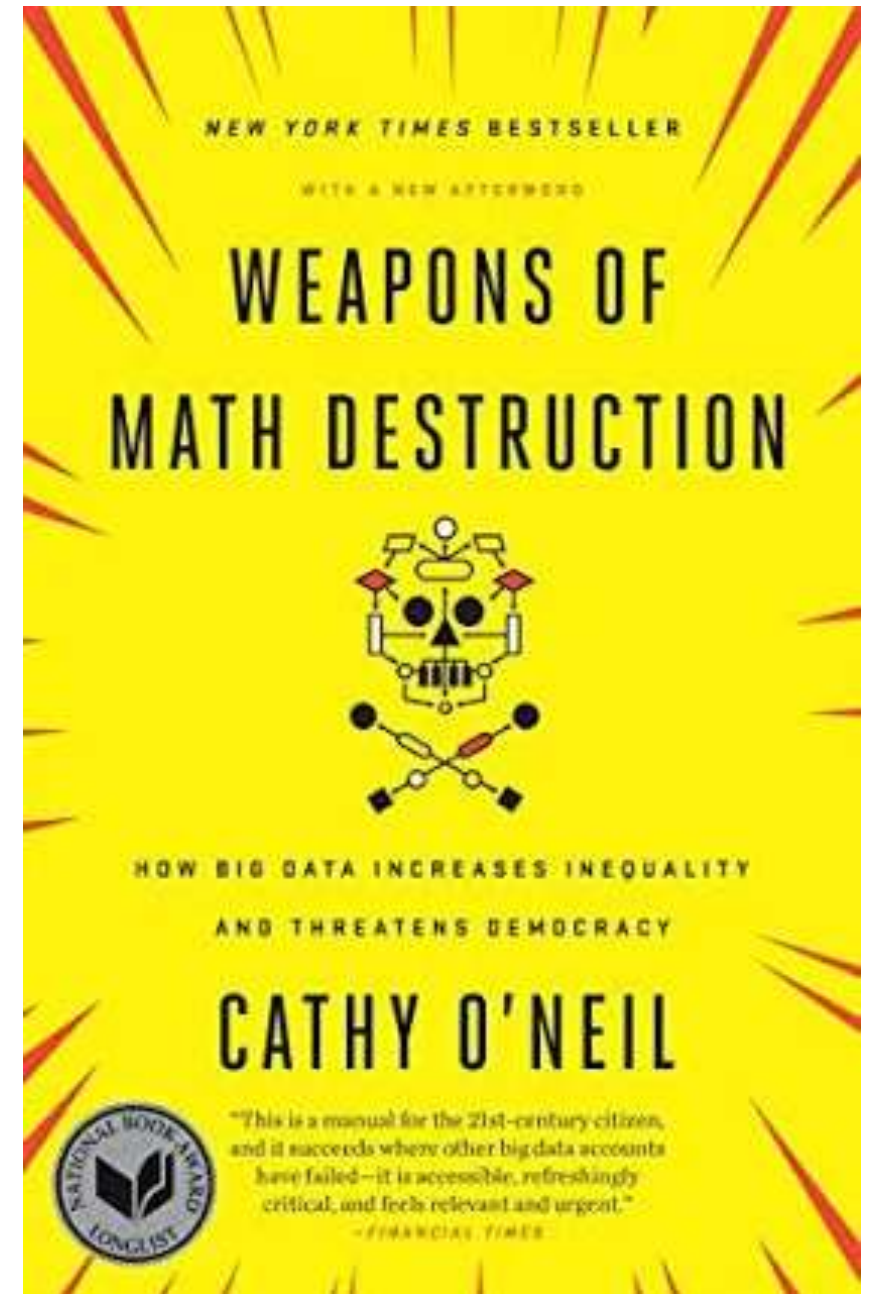
Voltaire praises Louis XIV
(1638 –1715) for having
started the collection of
statistics in France



François–Marie
Arouet (Voltaire)
(1694–1778)

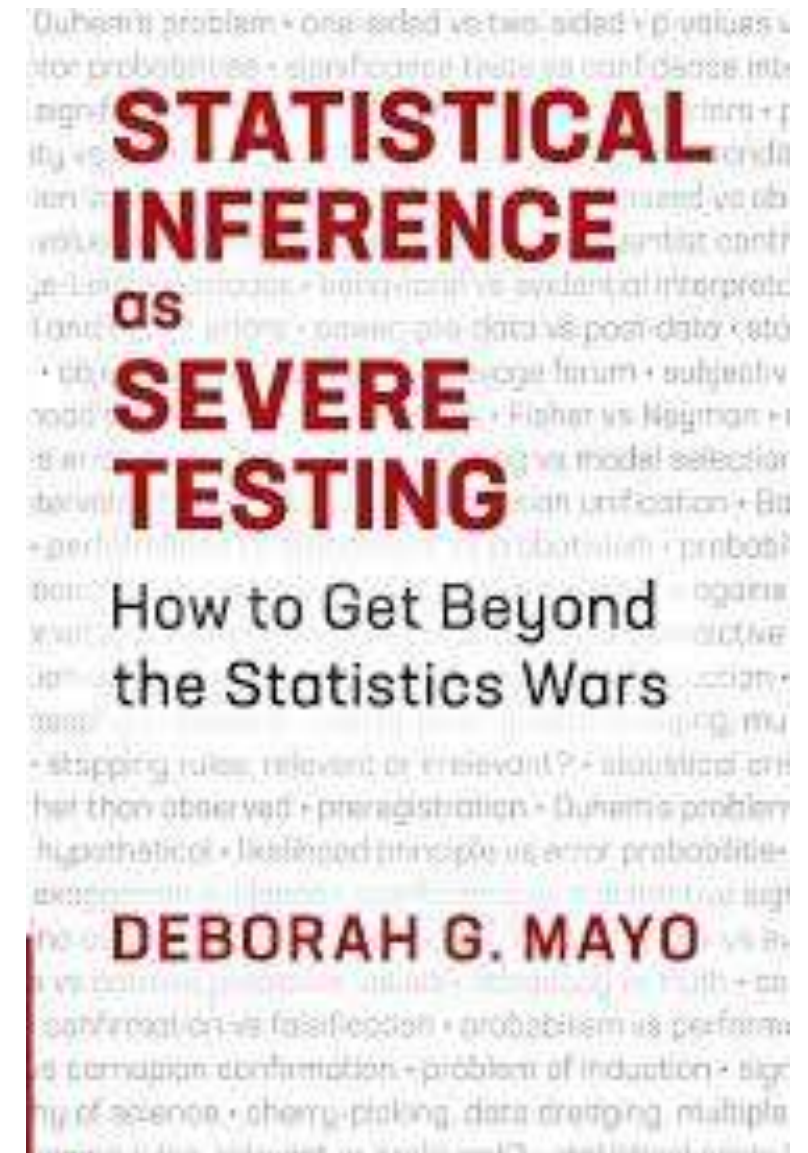
What is statistics?

Statistics is also a
methodological and political
battlefield



Statistical wars among statisticians confronted with the reproducibility crisis

Since scientific results are couched in the language of statistics, when experiments cannot be replicated the problems are brought to the door of statistics



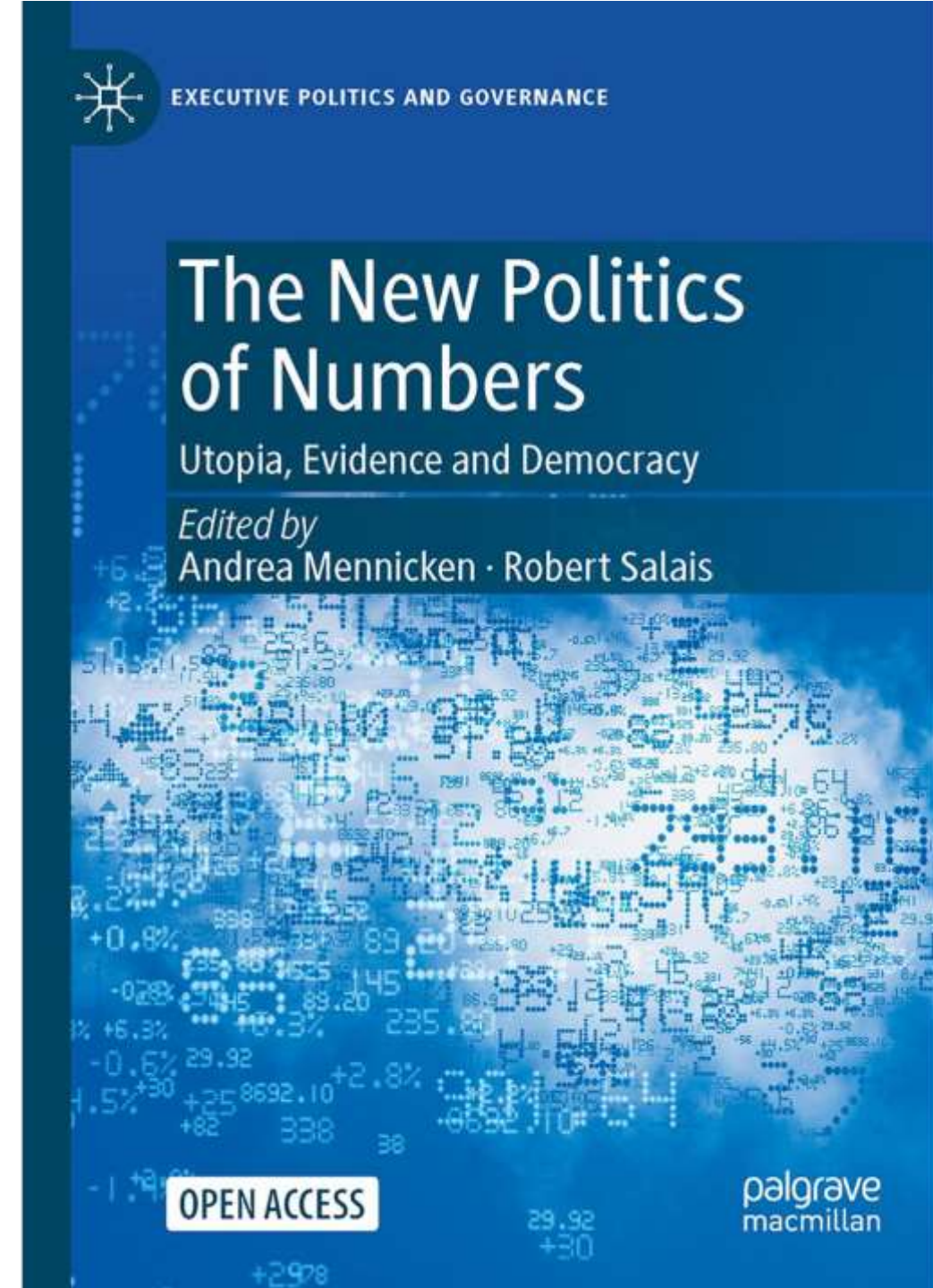
Fighting a number with a number
to advance a social agenda
(‘another number is possible’)



The role of statistical numbers
in policy

Evidence based policy versus
policy based evidence

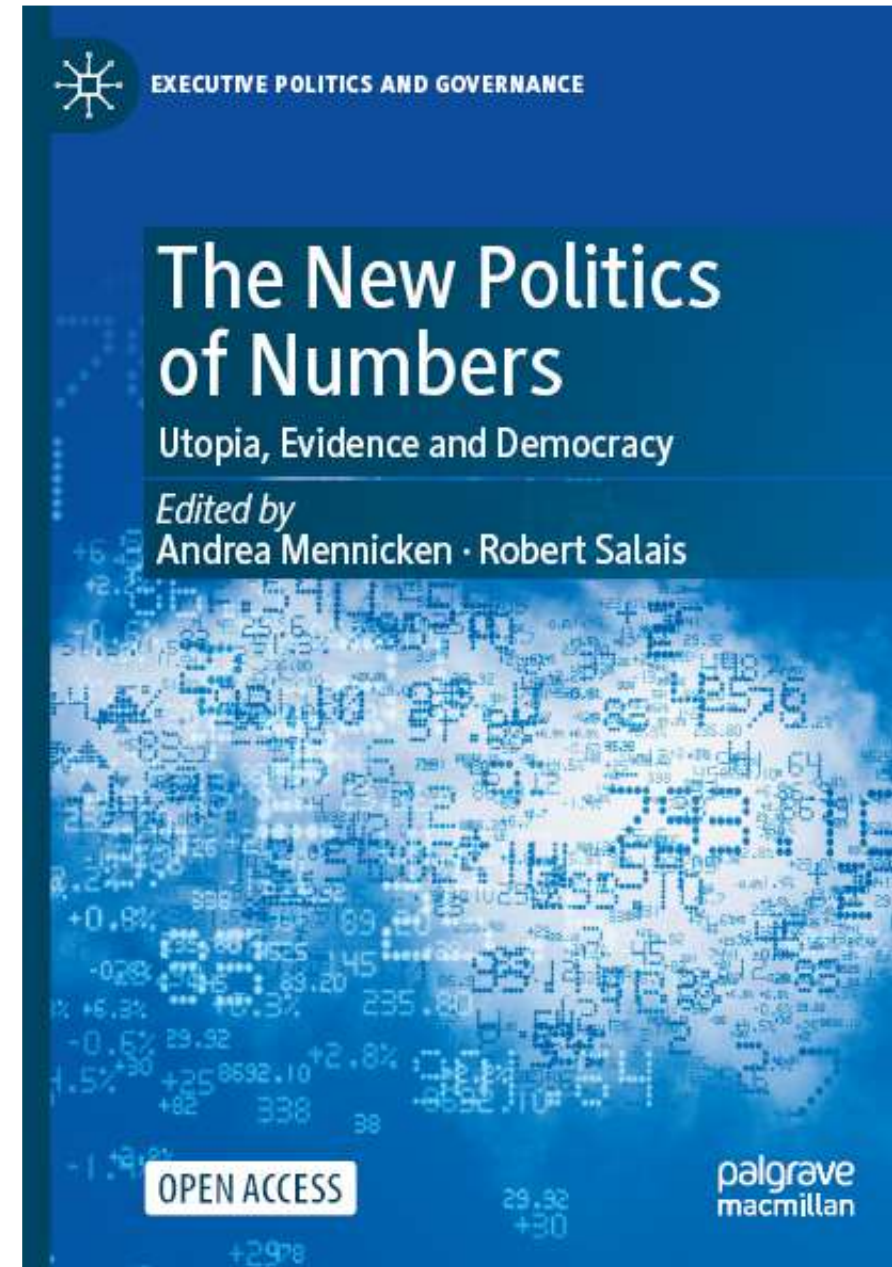
Governance driven
quantification as the ‘nemesis’
of statistics

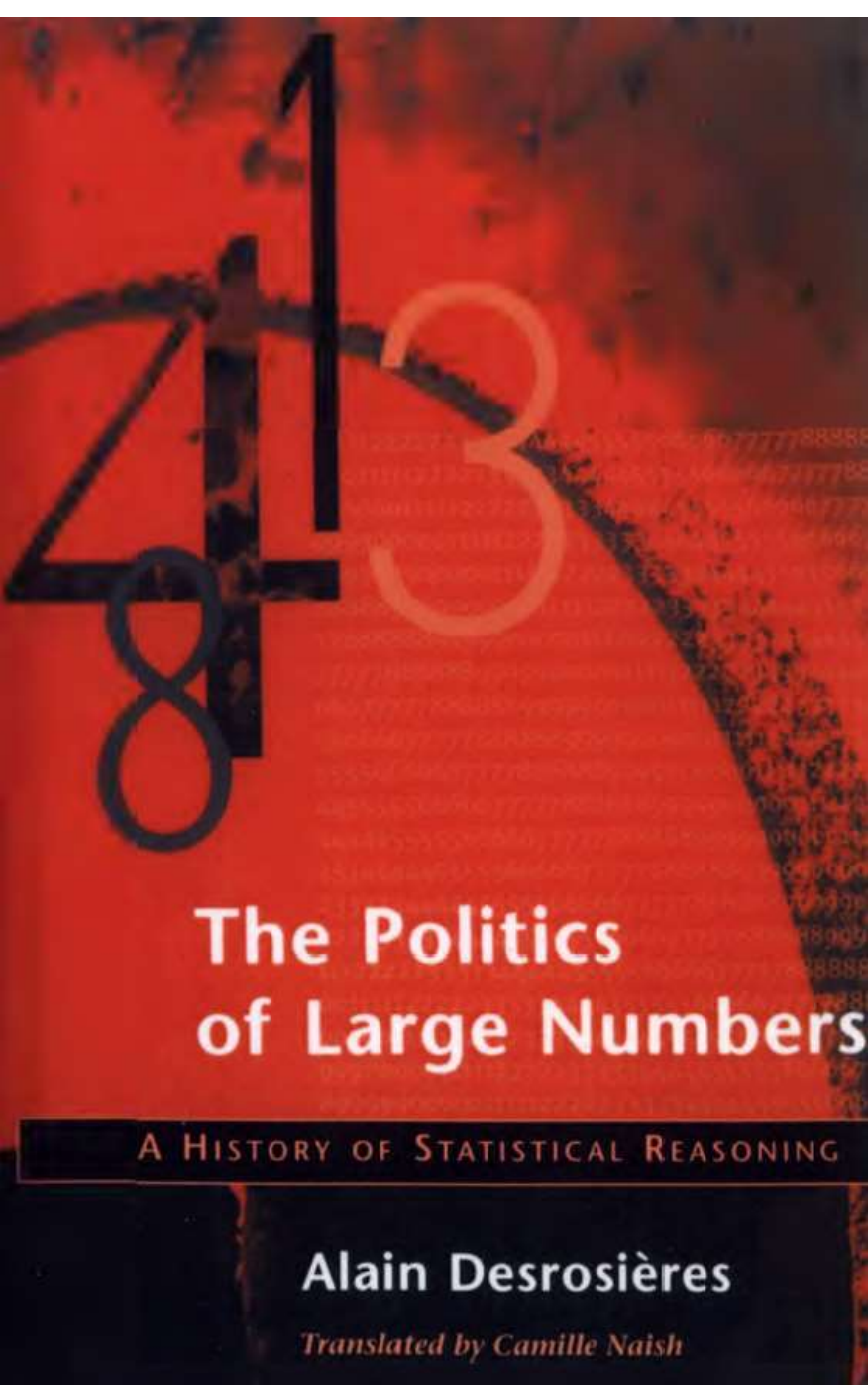


Statistics and democracy

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

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





Alain Desrosières: “Making things that hold”

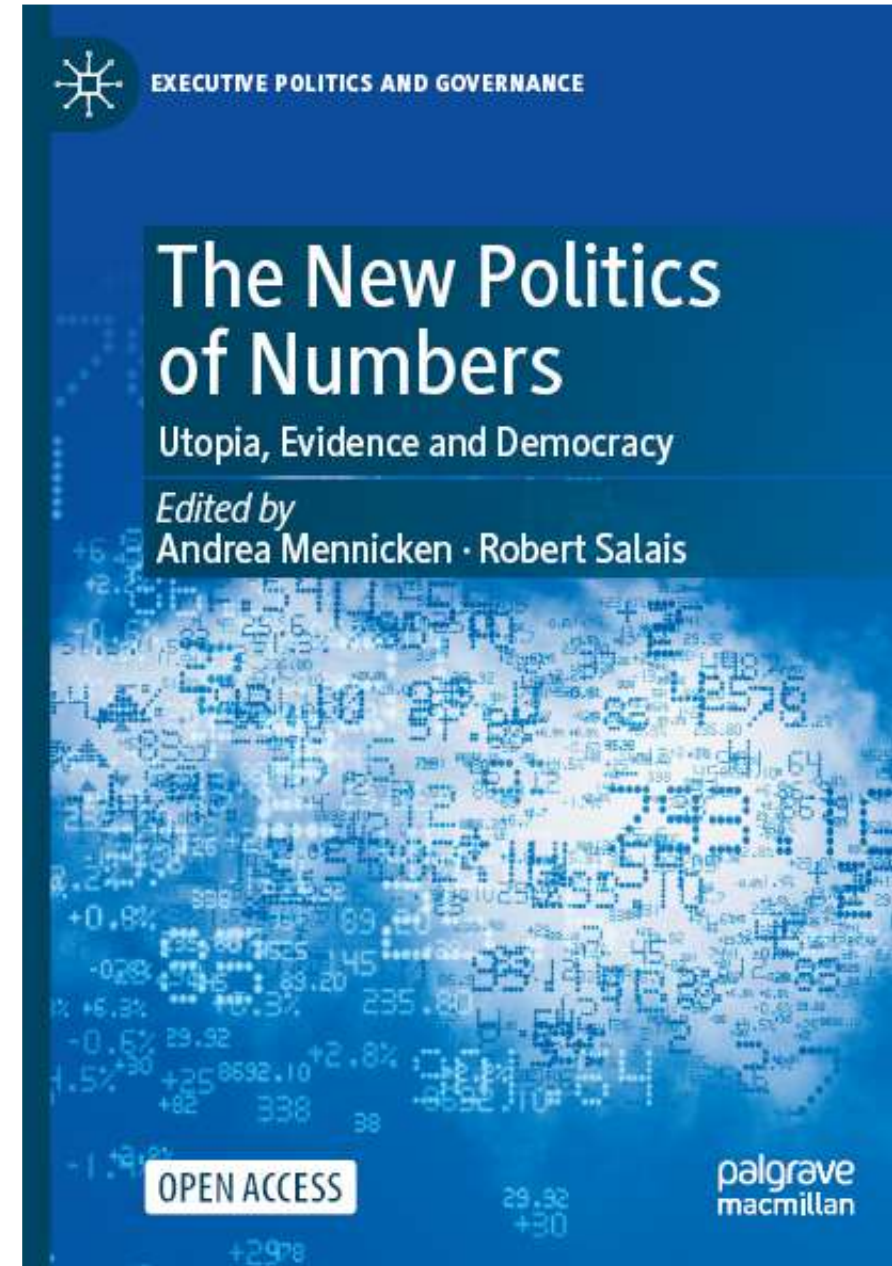
The construction of statistical concepts and categories that can serve for action

BUT

“It is because the moment of objectification can be made autonomous that the moment of action can be based on firmly established objects”

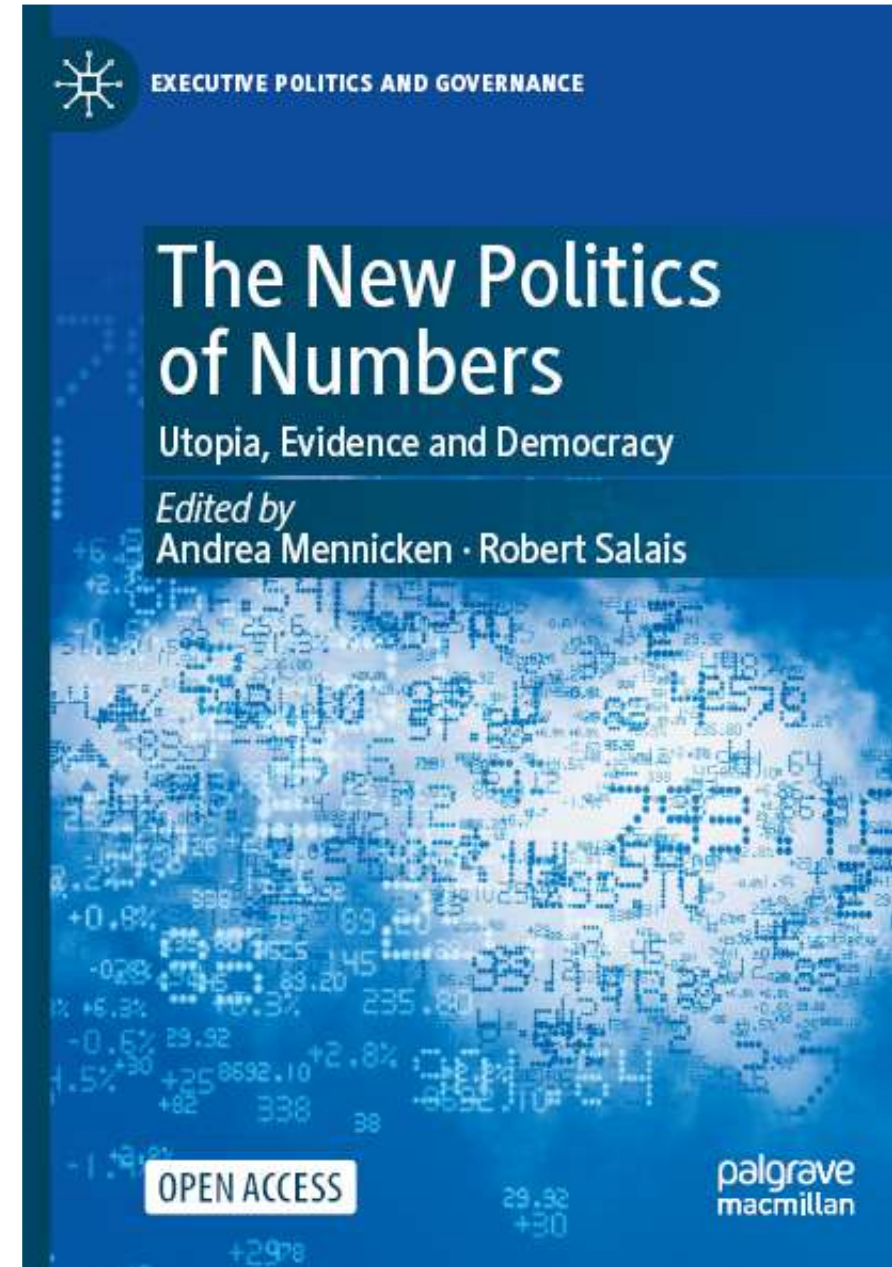
Governance driven
quantification is based on
pretended objectivity
(neutrality), reductionism and
justificationism that contribute
to a loss of democratic agency
(a-democracy)

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



Contesting unjust/unfair governance arrangement is impossible without producing alternative constructions of evidence – that requires muscles not easily available to the lay citizen

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



Do the right sums, not
just the sums right;

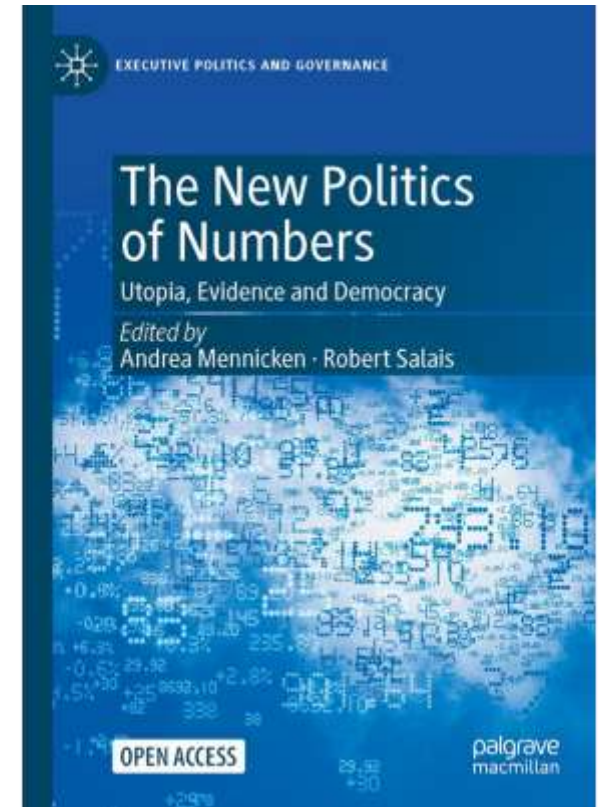
Meaning? 

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

Technical Quality

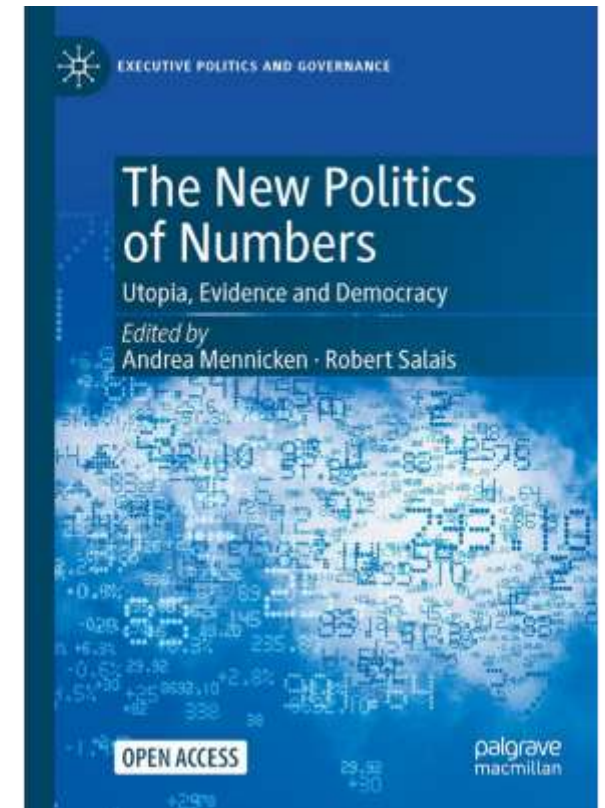
Normative quality

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

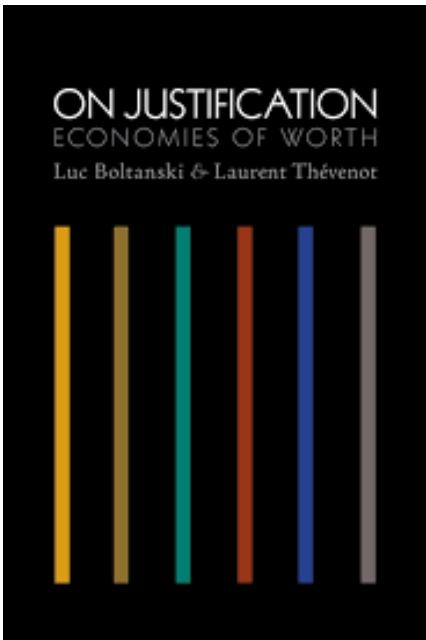
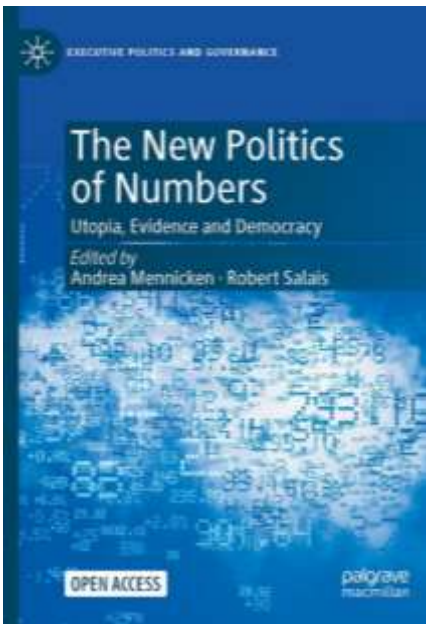


Salais, R. (2022). “La donnée n’est pas un donné”: Statistics, Quantification and Democratic Choice. In *The New Politics of Numbers: Utopia, Evidence and Democracy*, Andrea Mennicken and Robert Salais, Palgrave Macmillan, pp. 379–415.

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



individual consumers' choices
between certified market goods



Too much of a good thing? 🤔

Goodhart's law



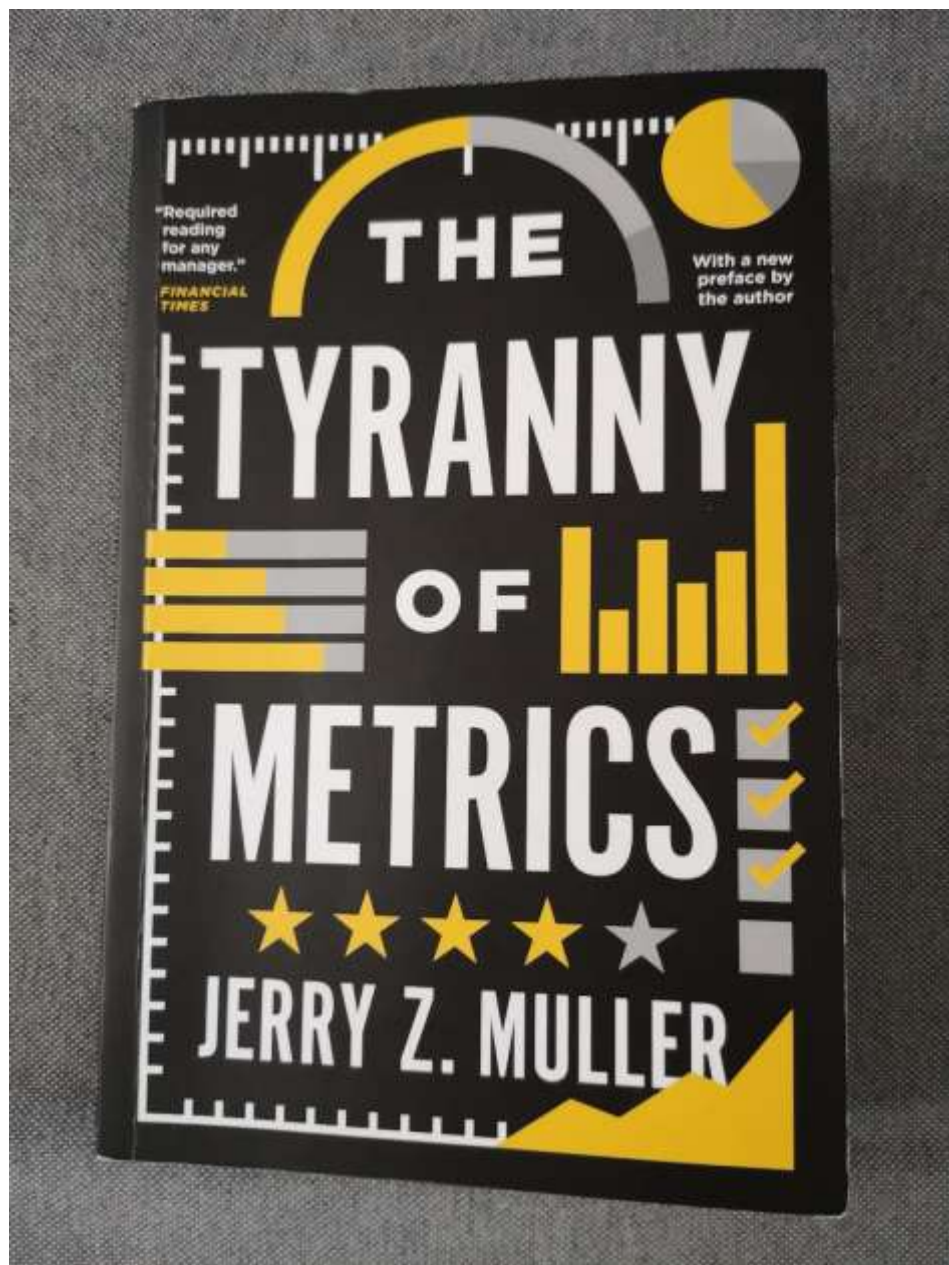
Charles Goodhart

p. 44 “Any ... measures necessarily involve a loss of information ... [and distorts behavior]” (Porter, 1995)

This is what we normally call Goodhart's law, from Charles Goodhart. "When a measure becomes a target, it ceases to be a good measure."

Also known as Campbell's law (1976);

https://en.wikipedia.org/wiki/Goodhart%27s_law

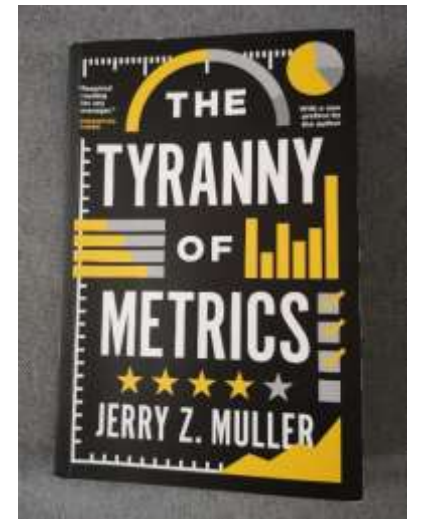


J. Z. Muller, The tyranny of metrics. Princeton University Press , 2018.

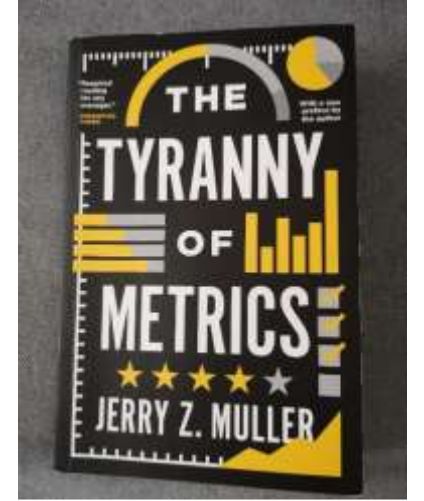
Metric fixation, or the irresistible pressure to measure performance

Gaming of metrics (recall Goodhart law)

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



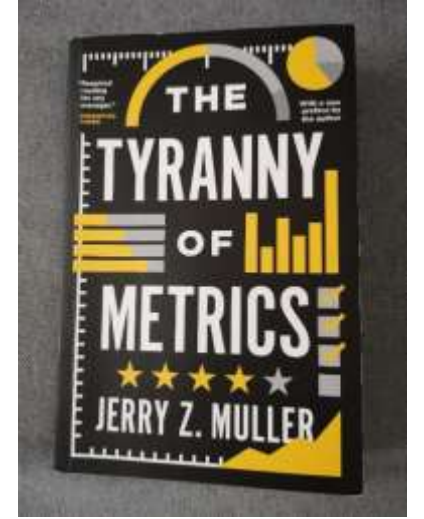
Unintended consequences



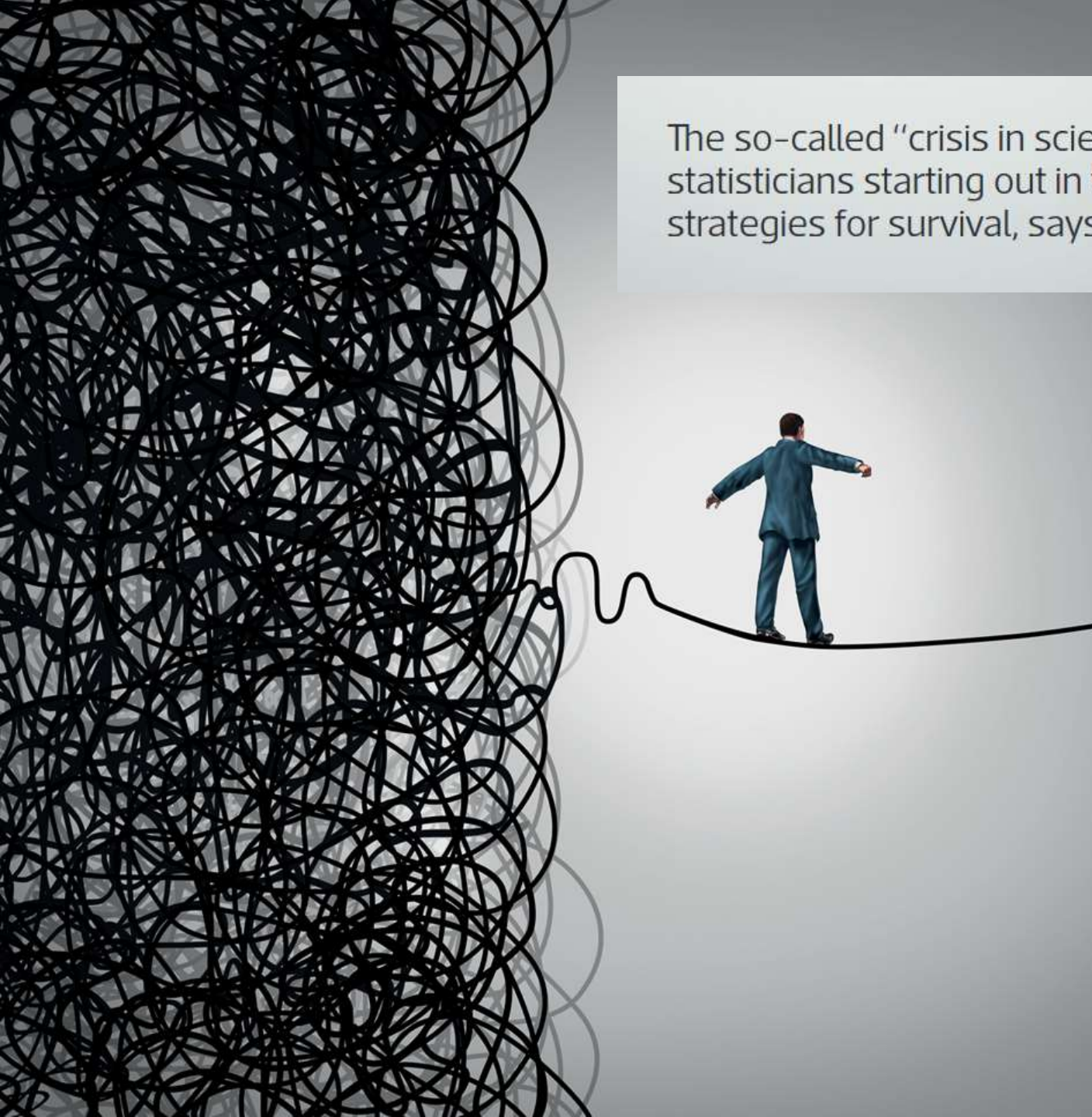
- Goal displacement
 - Diminishing utility
 - ➔ Rule cascade
 - ...
- Rewarding luck
 - Discouraging cooperation and common purpose
 - ...

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”



More facultative reading from
your teacher & colleagues on
statistical wars and sociology of
quantification

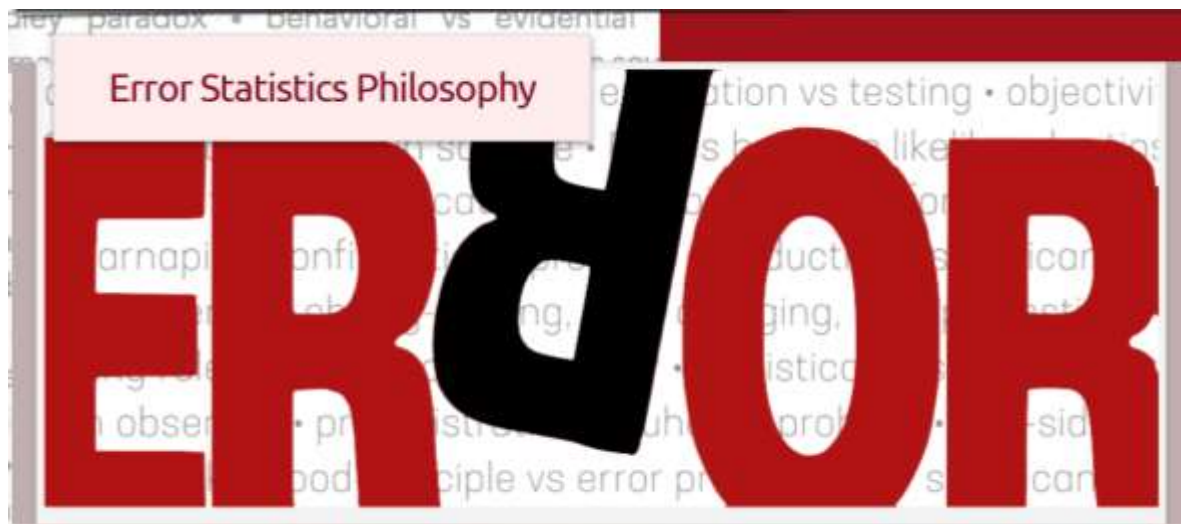
A man in a blue suit is walking a tightrope. To his left is a large, dark, tangled mass of lines, resembling a complex web or a large, dark, tangled ball of yarn. The background is a light gray gradient.

The so-called “crisis in science” presents challenges for statisticians starting out in their career. But there are strategies for survival, says **Andrea Saltelli**

Young Statistician, You shall live adventurous times

SIGNIFICANCE (The Royal Statistical Society)

December 2016, Volume 13,
Issue 6, pages 38–41





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?

Recent 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?

Article | [Open Access](#) | [Published: 19 August 2020](#)

From sociology of quantification to ethics of quantification

[Andrea Saltelli](#) ✉ & [Monica Di Fiore](#) ✉

[Humanities and Social Sciences Communications](#) **7**, Article number: 69 (2020) | [Cite this article](#)

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[Open Access](#) | [Published: 21 December 2022](#)

The Challenge of Quantification: An Interdisciplinary Reading

[Monica Di Fiore](#) ✉, [Marta Kuc-Czarnecka](#) ✉, [Samuele Lo Piano](#) ✉, [Arnald Puy](#) & [Andrea Saltelli](#) ✉

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The End



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