

Evidence-based decision making

Rui Mata, FS 2021

EBDM

Welcome to the website for *Evidence-based decision making FS21 (11230-01)*

Instructor: [Rui Mata](#), University of Basel

Contents

Session information

What is this course about?

What can you expect to learn?

By completing the course you can expect to LEARN...
you will NOT, however, receive training in...

How should you use this website?

Video recordings and SWITCHtube

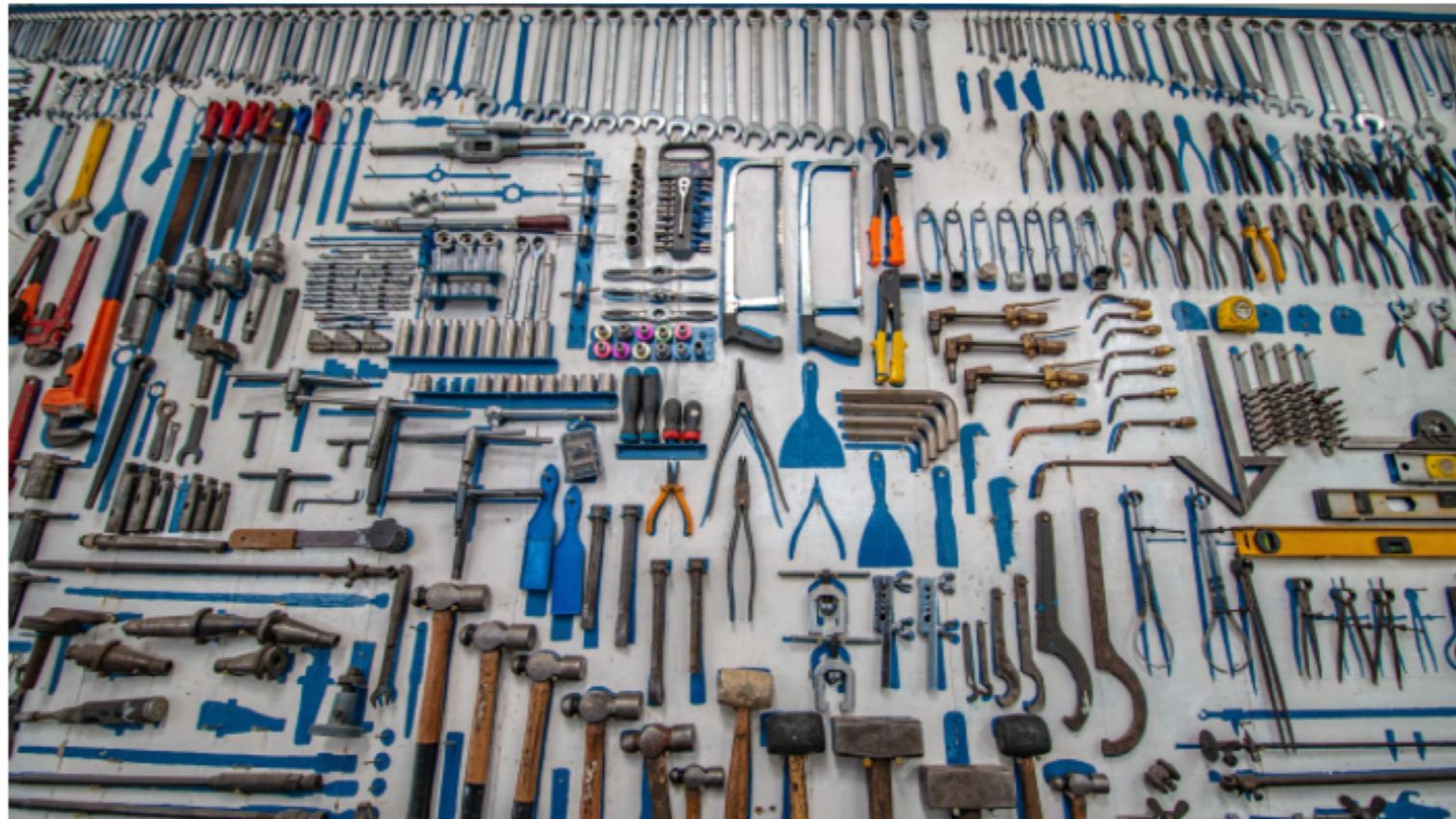


Photo by [Cesar Carlevarino Aragon](#) on [Unsplash](#)

<https://matarui.github.io/ebdm/>

1



naomi oreskes



Naomi Oreskes: Why we should trust scientists

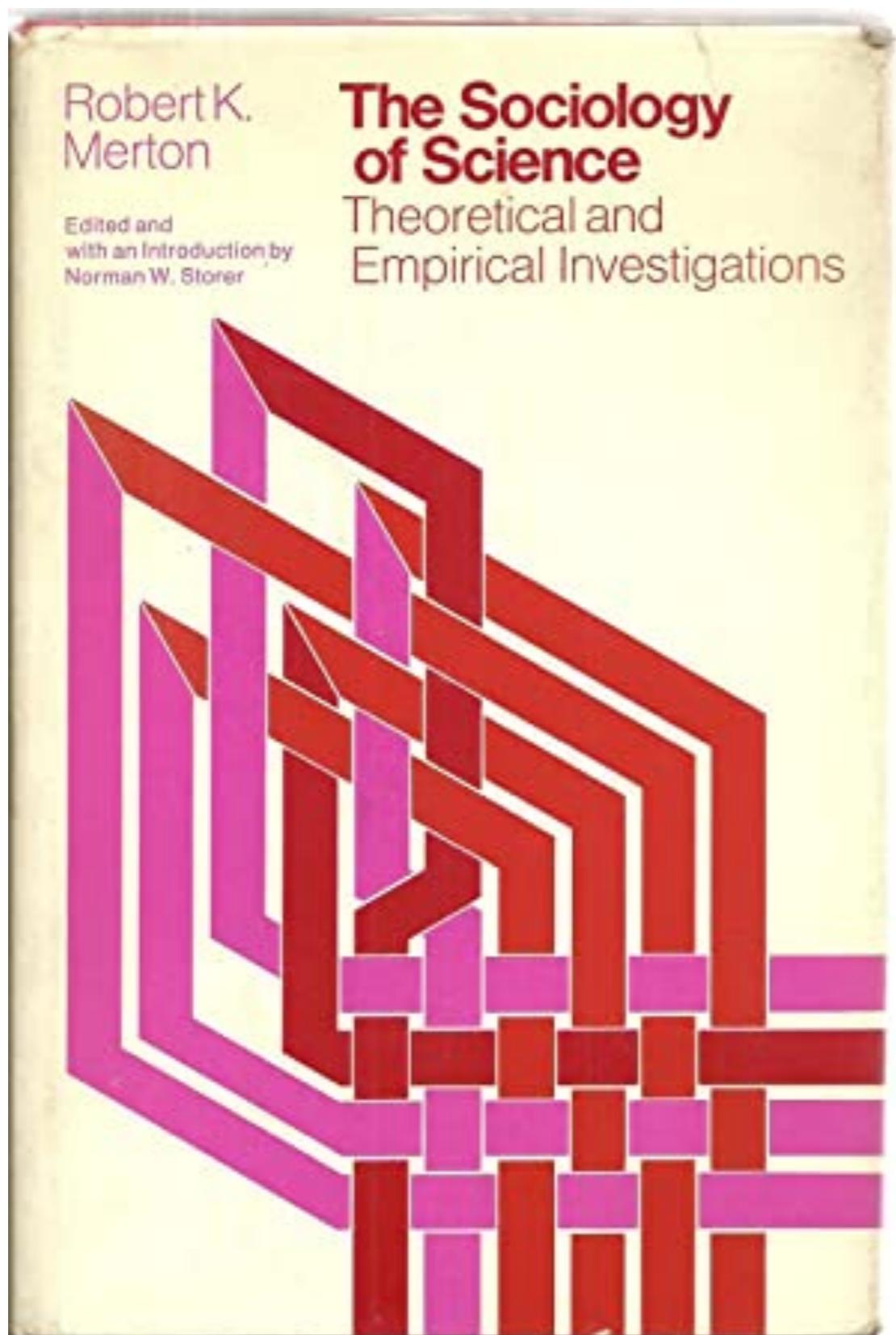
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2.6K 278 SHARE SAVE ...

WHY TRUST SCIENCE ? NAOMI ORESKES

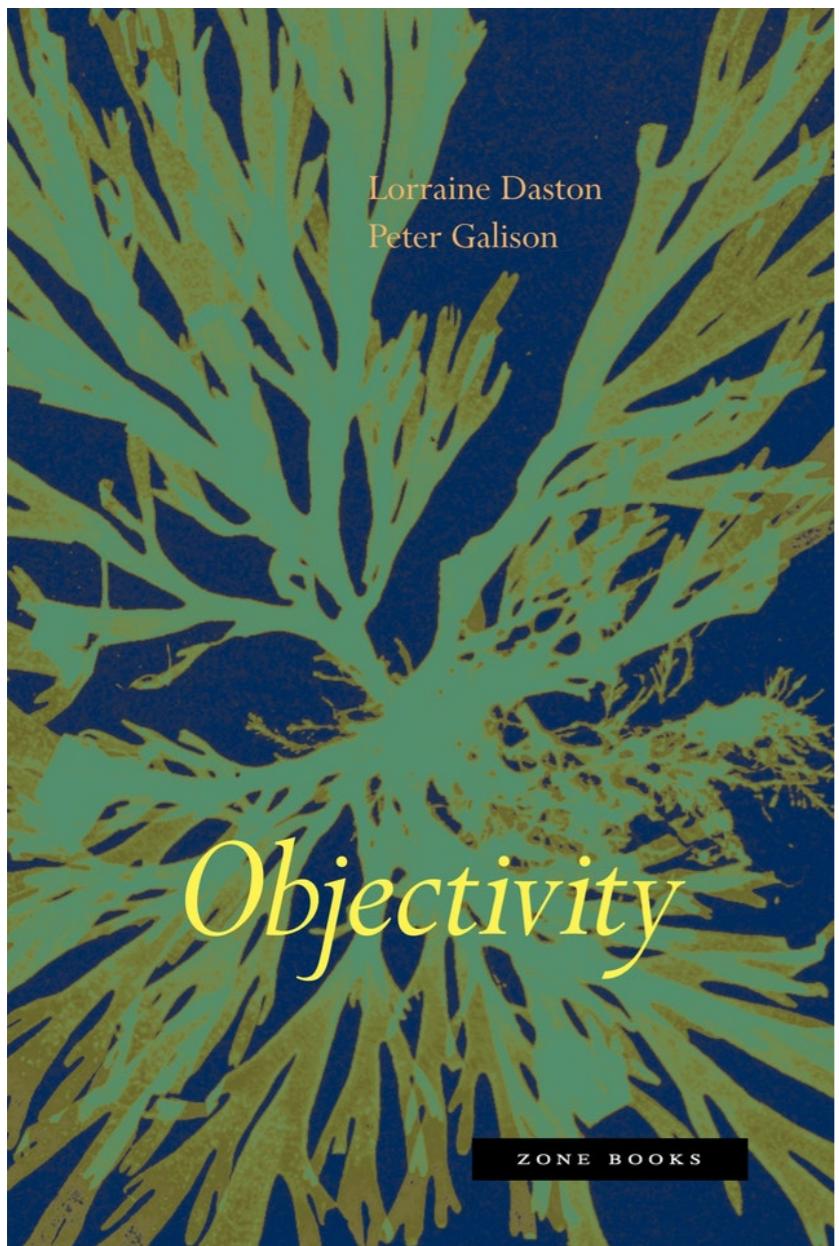
There is no (singular) scientific method...

- scientific practice consists of communities of people, making decisions for reasons that are both empirical and social, using diverse methods
- Two reasons to trust science:
 - 1) its sustained engagement with the world and 2) its social character...



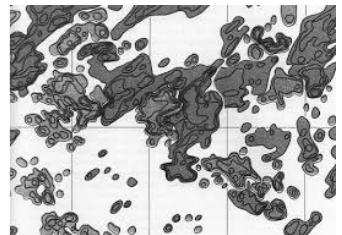
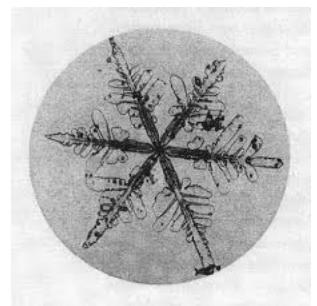
The Ethos of Science (aka, the Mertonian norms):

- Universalism: it's not about who is doing the science
- Communism/Communality: scientists share!
- Disinterestedness: scientists don't have egos or financial interests, only thirst for knowledge (right!?)
- Organized skepticism: no claim is accepted at face value...



Objectivity has a history...

- **truth-to-nature:** aims to extract a universal truth
- **mechanical objectivity:** an automated reproduction of particulars (not universals) that is free of personal opinion
- **trained judgement:** expert identifies meaningful patterns and creates appropriate visualizations to generate insight



<https://press.princeton.edu/books/paperback/9781890951795/objectivity>

Want to read more?

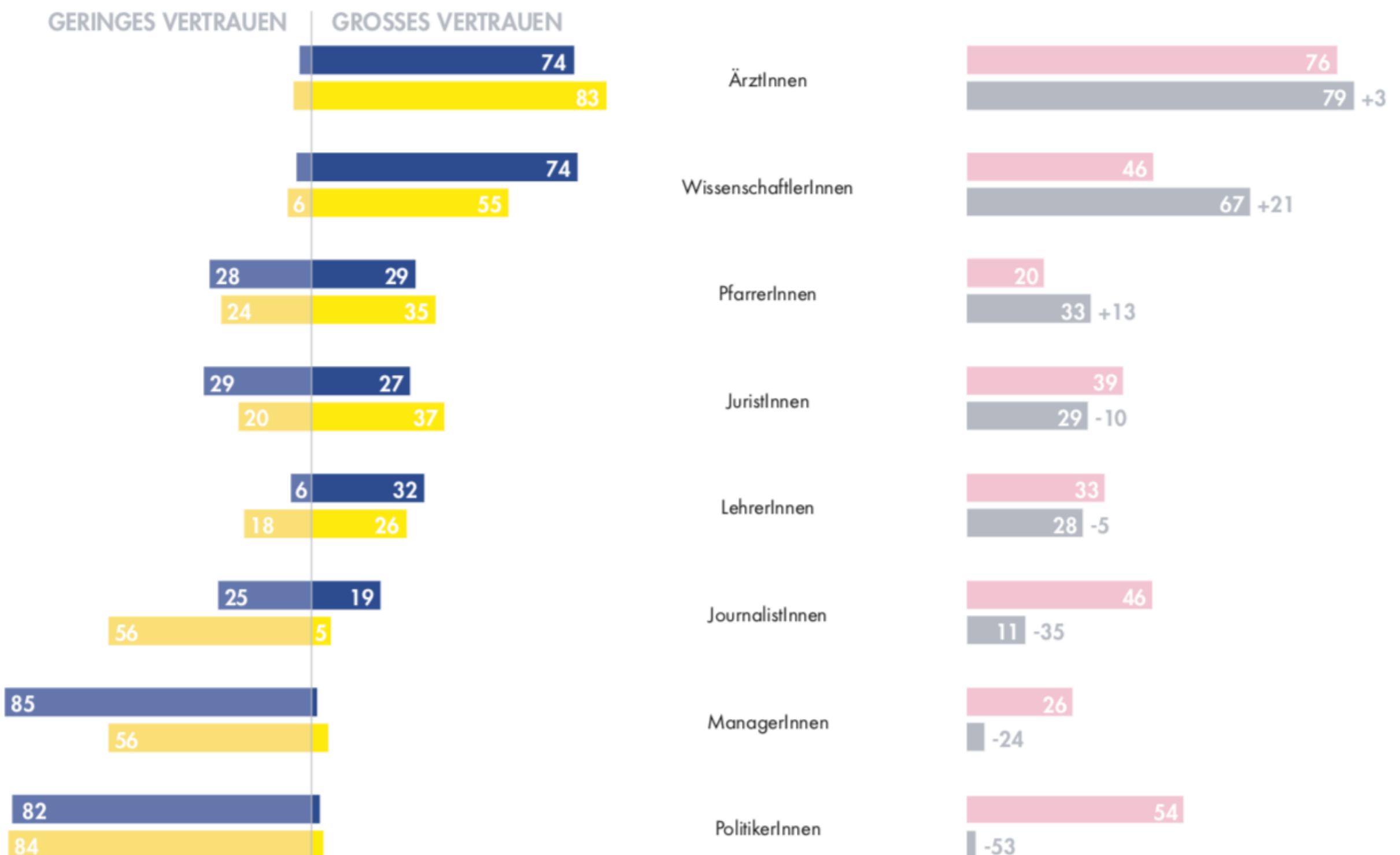
<https://plato.stanford.edu/entries/scientific-objectivity/>

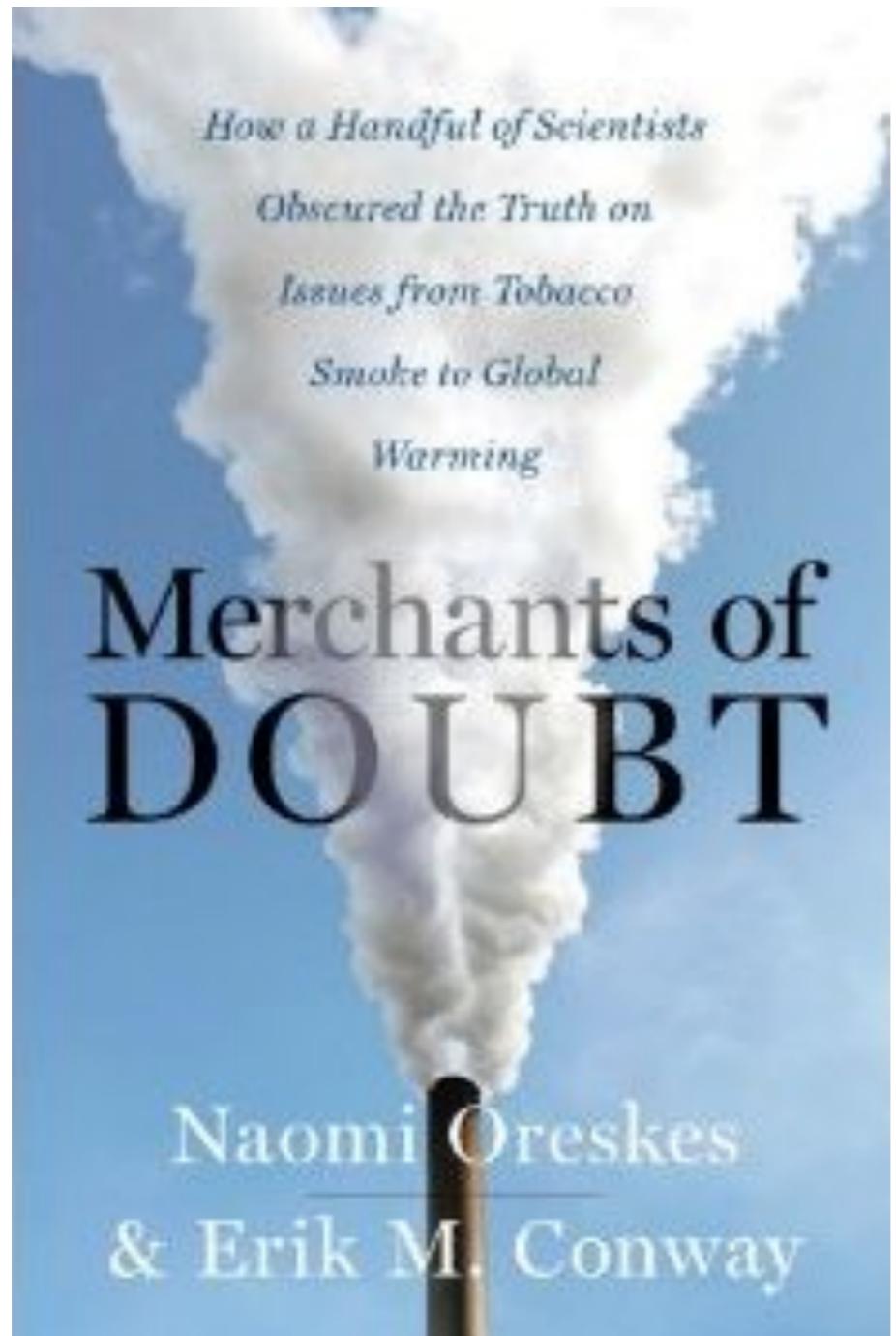
“We have shown that it is hard to define scientific objectivity in terms of a view from nowhere, value freedom, or freedom from personal bias. It is a lot harder to say anything positive about the matter. Perhaps it is related to a thorough critical attitude concerning claims and findings, as Popper thought. Perhaps it is the fact that many voices are heard, equally respected and subjected to accepted standards, as Longino defends. Perhaps it is something else altogether, or a combination of several factors discussed in this article.(...) Work on this problem is an ongoing project, and so is the quest for understanding scientific objectivity.”

Eine Frage des Vertrauens

In welche Berufsgruppen ist Ihr Vertrauen gross,
in welche ist es gering?

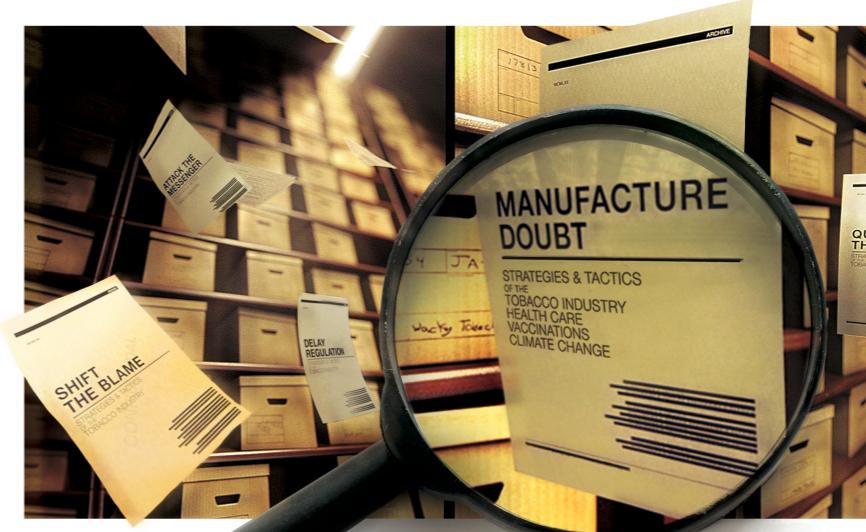
- Politisch links
- Politisch rechts
- Es ist wichtig, dass sie die Wahrheit sagen
- Ich vertraue darauf, dass sie die Wahrheit sagen





prop·a·gan·da

prä-pə-'gan-də noun 1. Derogatory information, especially of a biased or misleading nature, used to promote or publicize a particular political cause or point of view.



A FILM BY
ROBERT KENNER

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FROM THE DIRECTOR OF "FOOD, INC."

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FOR BRIEF STRONG LANGUAGE

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Jahrzehntelange wissenschaftliche Forschung zeigt, dass der Grossteil der schädlichen chemischen Bestandteile, die in Zigarettenrauch nachgewiesen wurden, bei der Verbrennung des Tabaks entsteht. Deshalb ist es unser Ziel, rauchfreie Alternativen anzubieten, die das Potenzial haben, das Risiko von Erkrankungen in Folge regelmässigen Zigarettenkonsums zu reduzieren.

Die neuesten wissenschaftlichen Fortschritte haben zur Entwicklung bahnbrechender Technologien geführt. Jetzt haben erwachsene Raucherinnen und Raucher bessere Alternativen zu Zigaretten. Zum Beispiel Tabakerhitzer. Der Tabak wird erhitzt statt verbrannt, und es entsteht ein nikotinhaltiger Tabakdampf, jedoch kein Rauch.

Und genau so funktionieren die rauchfreien Produkte, in die wir die Forschungsarbeit investiert haben. Sowohl unsere eigene umfangreiche Forschung als auch unabhängige Studien belegen, dass IQOS, wenn auch nicht risikofrei, deutlich weniger schädliche Bestandteile erzeugt als Zigaretten. Dies dank Eliminierung des Verbrennungsprozesses.

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Comment



Consider what information — in what format — would best support your audiences' decisions.

Quick tips for sharing evidence

The aim is to 'inform but not persuade', and — as the philosopher of trust Onora O'Neill says — "to be accessible, comprehensible, usable and assessable".

- Address all the questions and concerns of the target audience.
- Anticipate misunderstandings; pre-emptively debunk or explain them.
- Don't cherry-pick findings.
- Present potential benefits and possible harms in the same way so that they can be compared fairly.
- Avoid the biases inherent in any presentation format (for example, use both 'positive' and 'negative' framing together).
- Use numbers alone, or both words and numbers.
- Demonstrate 'unapologetic uncertainty': be open about a range of possible outcomes.
- When you don't know, say so; say what you are going to do to find out, and by when.
- Highlight the quality and relevance of the underlying evidence (for example, describe the data set).
- Use a carefully designed layout in a clear order, and include sources.

Five rules for evidence communication

Michael Blastland, Alexandra L. J. Freeman, Sander van der Linden, Theresa M. Marteau & David Spiegelhalter

Avoid unwarranted certainty, neat narratives and partisan presentation; strive to inform, not persuade.

Be persuasive", "be engaging", "tell stories with your science". Most researchers have heard such exhortations many times, and for good reason. Such rhetorical devices often help to land the message, whether that message is designed to sell a product or win a grant. These are the traditional techniques of communications applied to science.

This approach often works, but it comes with danger.

There are myriad examples from the current pandemic of which we might ask: have experts always been explicit in acknowledging unknowns? Complexity? Conflicts of interest? Inconvenient data? And, importantly, their own values? Rather than re-examine those cases, we offer ideas to encourage reflection, based on our own research.

Our small, interdisciplinary group at the University of Cambridge, UK, collects empirical data on issues such as how to communicate uncertainty, how audiences decide

A manifesto for reproducible science

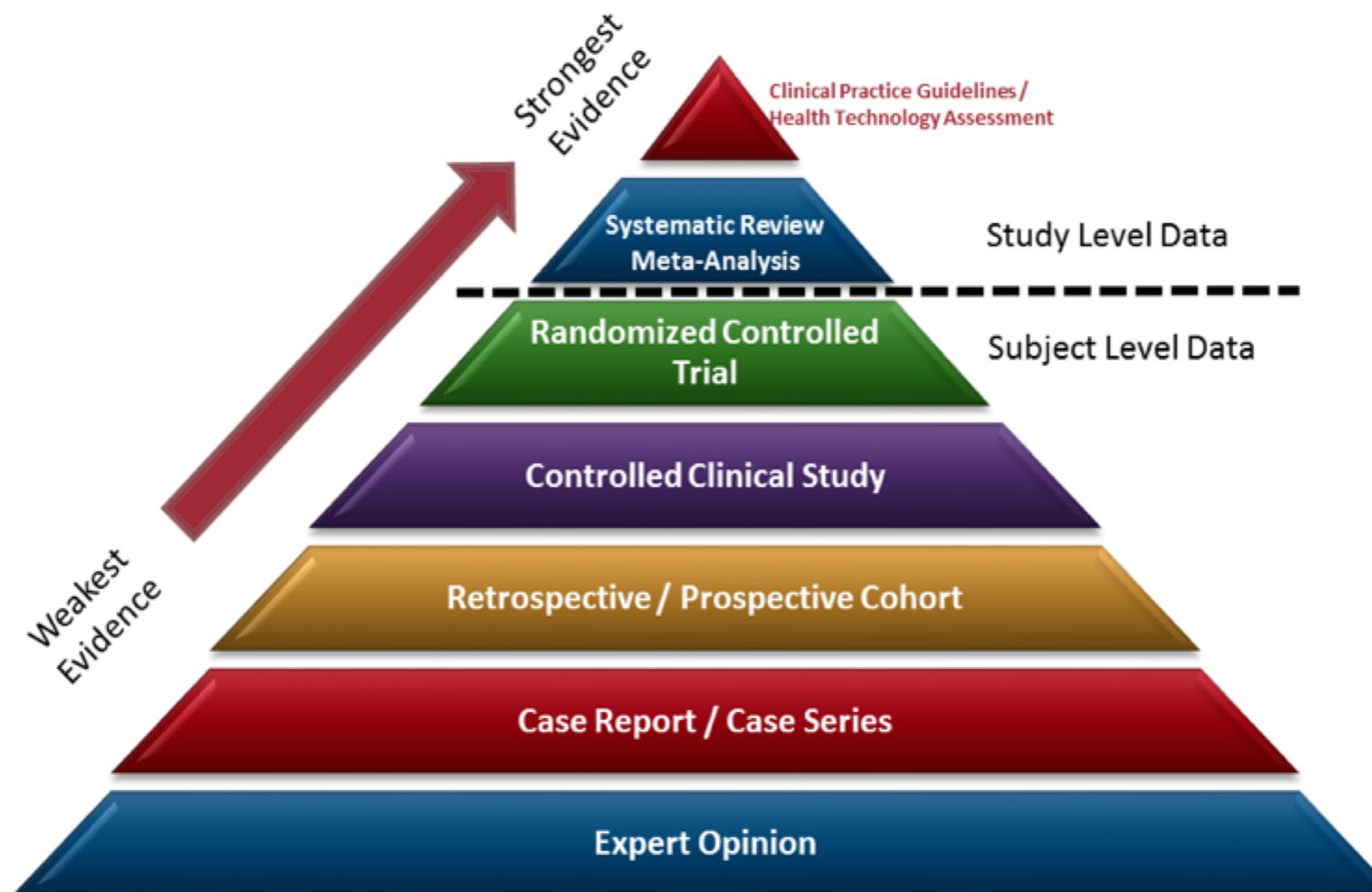
Marcus R. Munafò^{1,2*}, Brian A. Nosek^{3,4}, Dorothy V. M. Bishop⁵, Katherine S. Button⁶, Christopher D. Chambers⁷, Nathalie Percie du Sert⁸, Uri Simonsohn⁹, Eric-Jan Wagenmakers¹⁰, Jennifer J. Ware¹¹ and John P. A. Ioannidis^{12,13,14}

Improving the reliability and efficiency of scientific research will increase the credibility of the published scientific literature and accelerate discovery. Here we argue for the adoption of measures to optimize key elements of the scientific process: methods, reporting and dissemination, reproducibility, evaluation and incentives. There is some evidence from both simulations and empirical studies supporting the likely effectiveness of these measures, but their broad adoption by researchers, institutions, funders and journals will require iterative evaluation and improvement. We discuss the goals of these measures, and how they can be implemented, in the hope that this will facilitate action toward improving the transparency, reproducibility and efficiency of scientific research.

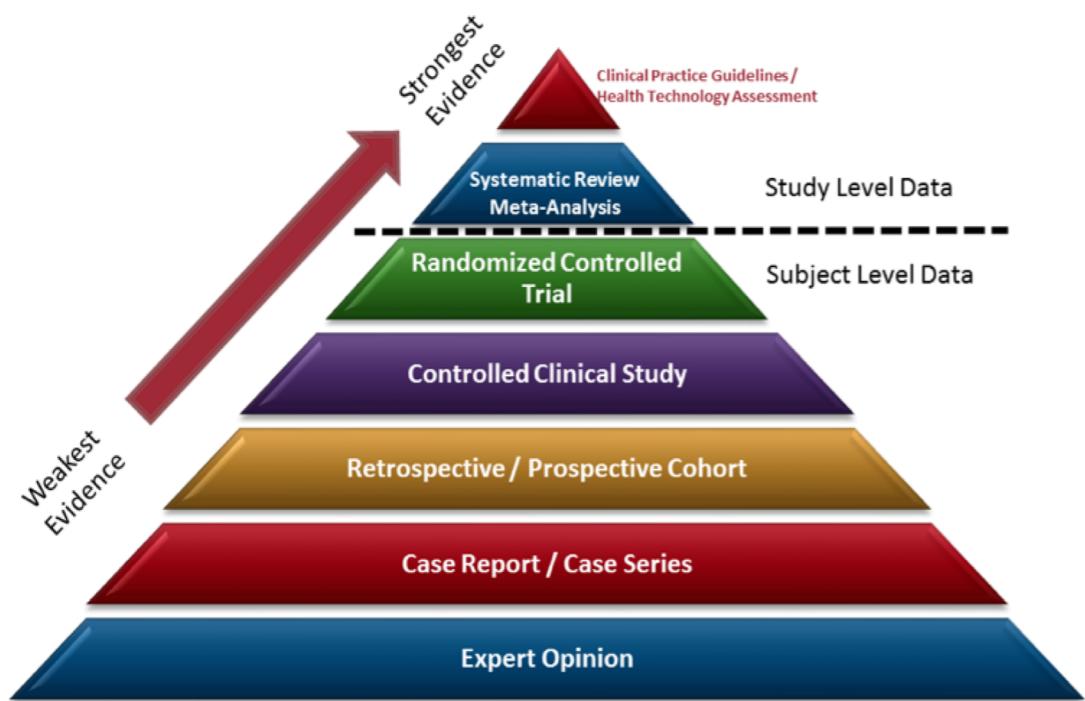
Table 1 | A manifesto for reproducible science.

Theme	Proposal	Examples of initiatives/potential solutions (extent of current adoption)	Stakeholder(s)
Methods	Protecting against cognitive biases	All of the initiatives listed below (* to ****) Blinding (**)	J, F
	Improving methodological training	Rigorous training in statistics and research methods for future researchers (*) Rigorous continuing education in statistics and methods for researchers (*)	I, F
	Independent methodological support	Involvement of methodologists in research (**) Independent oversight (*)	F
	Collaboration and team science	Multi-site studies/distributed data collection (*) Team-science consortia (*)	I, F
Reporting and dissemination	Promoting study pre-registration	Registered Reports (*) Open Science Framework (*)	J, F
	Improving the quality of reporting	Use of reporting checklists (**) Protocol checklists (*)	J
	Protecting against conflicts of interest	Disclosure of conflicts of interest (***) Exclusion/containment of financial and non-financial conflicts of interest (*)	J
Reproducibility	Encouraging transparency and open science	Open data, materials, software and so on (* to **) Pre-registration (**** for clinical trials, * for other studies)	J, F, R
Evaluation	Diversifying peer review	Preprints (* in biomedical/behavioural sciences, **** in physical sciences) Pre- and post-publication peer review, for example, Publons, PubMed Commons (*)	J
Incentives	Rewarding open and reproducible practices	Badges (*) Registered Reports (*) Transparency and Openness Promotion guidelines (*) Funding replication studies (*) Open science practices in hiring and promotion (*)	J, I, F

Estimated extent of current adoption: *, <5%; **, 5–30%; ***, 30–60%; ****, >60%. Abbreviations for key stakeholders: J, journals/publishers; F, funders; I, institutions; R, regulators.



https://en.wikipedia.org/wiki/Hierarchy_of_evidence



#	Date	Topic
1	02.03.2021	<u>Introduction</u>
2	09.03.2021	<u>The Scientific Method(s)</u>
3	16.03.2021	<u>Algorithms</u>
4	23.03.2021	<u>Algorithms</u>
5	30.03.2021	<u>Consensus</u>
6	06.04.2021	<u>Consensus</u>
7	13.04.2021	<u>Counterfactuals</u>
8	20.04.2021	<u>Counterfactuals</u>
9	27.04.2021	<u>Synthesis</u>
10	04.05.2021	<u>Synthesis</u>
11	11.05.2021	<u>Interventions</u>
12	18.05.2021	<u>Interventions</u>
13	25.05.2021	<u>Exam</u>

https://en.wikipedia.org/wiki/Hierarchy_of_evidence