



“The old is dying and  
the new cannot be born”

Andrea Saltelli and  
Silvio Funtowicz

Centre for the Study of the  
Sciences and the Humanities  
(SVT), University of Bergen  
(UIB)

London, November 10,  
Anticipation 2017

Where to find this talk: [www.andreasaltelli.eu](http://www.andreasaltelli.eu)

The image shows a browser window displaying the website [www.andreasaltelli.eu](http://www.andreasaltelli.eu). The browser's address bar shows the URL and search results for "quaderni dal carcere GRAMSCI". The website header features a teal logo with the name "Andrea Saltelli" and a navigation menu with the following items: HOME, ABOUT ME, PUBLICATIONS, NEWS & VIDEOS, and RESOURCES. A red arrow points from the search bar area down to the "RESOURCES" menu item. A dropdown menu is open under "RESOURCES", listing "PRESENTATIONS" and "OTHER RESOURCES". The main content area has a background image of terraced rice fields with the text "CAETERIS ARE NEVER PARIBUS" overlaid. A tweet overlay is visible on the right side of the page, showing a tweet by @AndreaSaltelli about a science credibility crisis, including a link to an article and a photo of a microscope.



ANTONIO GRAMSCI

## QUADERNI DEL CARCERE

PRIMO QUADERNO

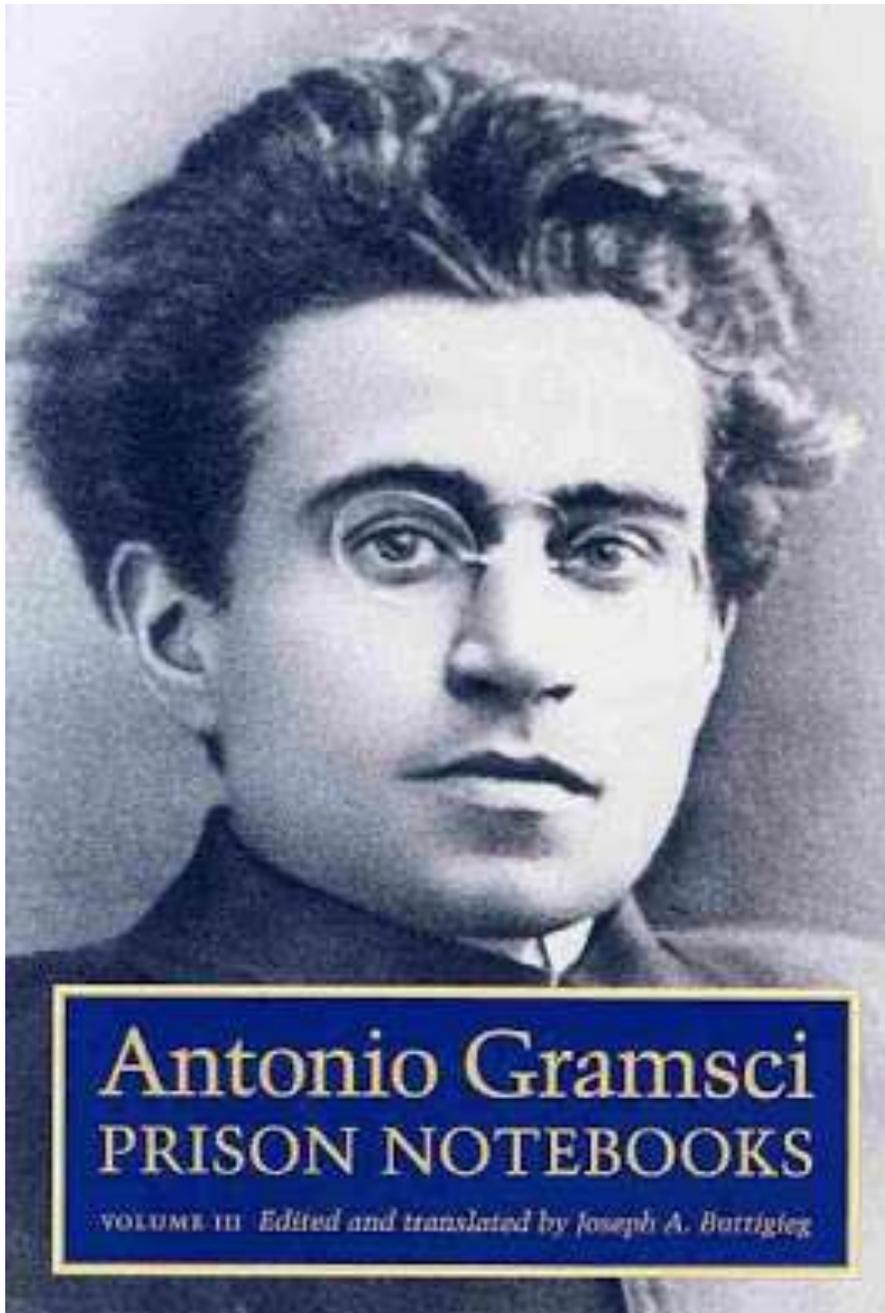
Lettere dal carcere

Edizione critica del Istituto Gramsci

A cura di Valentino Gerratana



“La crisi consiste appunto nel fatto che il vecchio muore e il nuovo non può nascere: in questo interregno si verificano i fenomeni morbosi più svariati”



“The crisis consists precisely in the fact that the old is dying and the new cannot be born; in this interregnum a great variety of morbid phenomena take place”

- The **old** is science
- The **new** is a Reformation of science itself
- How about the **morbid phenomena**?





# Snapshots of the crisis: a rich ecosystem

 OPEN ACCESS

ESSAY

## Why Most Clinical Research Is Not Useful

John P. A. Ioannidis 

Published: June 21, 2016 • <https://doi.org/10.1371/journal.pmed.1002049>

## THE POWER OF BIAS IN ECONOMICS RESEARCH\*

*John P. A. Ioannidis, T. D. Stanley and Hristos Doucouliagos*

Rather than isolated instances  
of corruptions now entire fields  
of research are found diseased



Edition: **United Kingdom** ▾

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Events



# THE CONVERSATION

Academic rigour, journalistic flair

Q S

## Science's credibility crisis: why it will get worse before it can get better

November 9, 2017 12:39pm GMT



Author



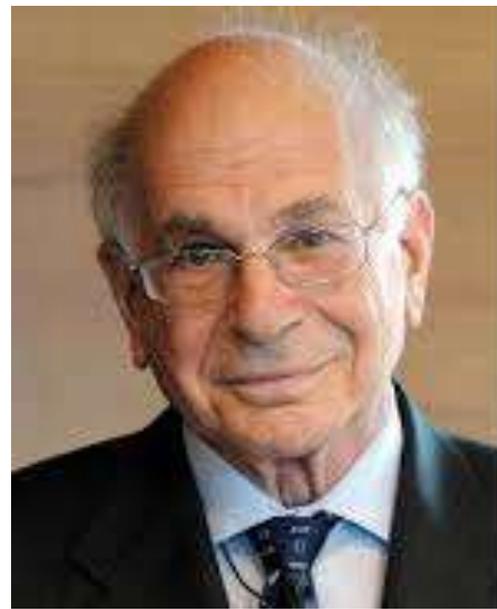
**Andrea Saltelli**

Adjunct Professor Centre for the Study of the Sciences and the Humanities, University of Bergen, University of Bergen

Pre-clinical and clinical medical research, psychology, organic chemistry, empirical economics ...



Reconstruction of a Train Wreck: How Priming Research Went off the Rails



THINKING,  
FAST AND SLOW



DANIEL  
KAHNEMAN

WINNER OF THE NOBEL PRIZE IN ECONOMICS

“[...]questions have been raised about the robustness of priming results ... your field is now the poster child for doubts about the integrity of psychological research...”

<https://replicationindex.wordpress.com/2017/02/02/reconstruction-of-a-train-wreck-how-priming-research-went-of-the-rails/comment-page-1/>

# Retraction Watch

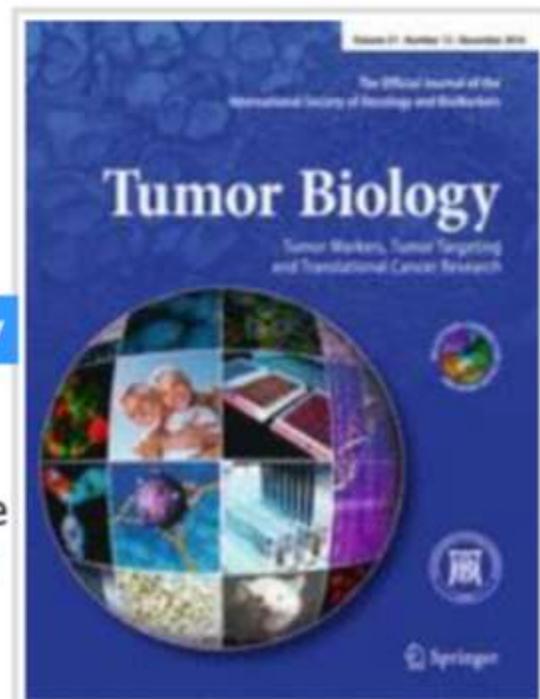
Tracking retractions as a

## A new record: Major publisher retracting more than 100 studies from cancer journal over fake peer reviews

with 11 comments

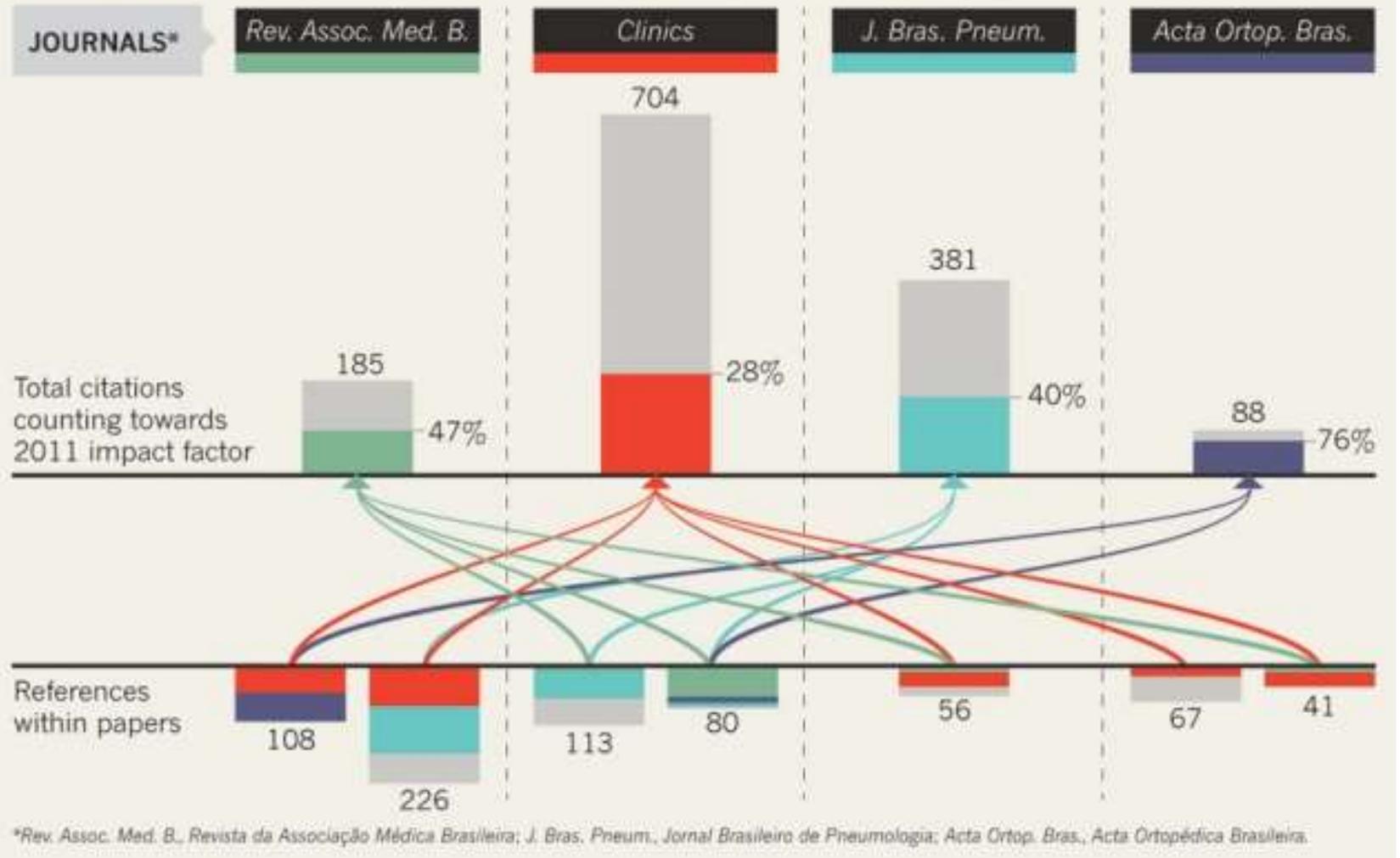
Springer is [retracting 107 papers](#) from one journal after discovering they had been accepted with fake peer reviews. Yes, 107.

To submit a fake review, someone (often the author of a paper) either makes up an outside expert to review the paper, or suggests a real researcher — and in both cases, provides a fake email address that comes back to someone who will invariably give the paper a glowing review. In this case, Springer, the publisher of *Tumor Biology* through 2016, told us that an investigation produced “clear evidence” the reviews were submitted under the names of real researchers with faked emails. Some of the authors may have used a third-party editing service, which may have supplied the reviews. The [journal is now published by SAGE](#).



## CITATION STACKING

In 2011, four Brazilian journals published seven review papers with hundreds of references to previous research (2009–10) in each others' journals. This raised their 2011 impact factors.



Use and abuse of metrics: from self-citation to citation cartels to citation stacking

Richard Van Noorden, 2017, Brazilian citation scheme outed. Thomson Reuters suspends journals from its rankings for 'citation stacking'. Nature, 27 August 2013



Contents lists available at [ScienceDirect](#)

Futures

journal homepage: [www.elsevier.com/locate/futures](http://www.elsevier.com/locate/futures)



Original research article

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

Andrea Saltelli<sup>a,b,c,\*</sup>, Mario Giampietro<sup>a,c,d</sup>



CrossMark

*Journal of Clinical Epidemiology* 73 (2016) 82–86

**Journal of  
Clinical  
Epidemiology**

## Evidence-based medicine has been hijacked: a report to David Sackett

John P.A. Ioannidis<sup>a,b,c,d,\*</sup>

<sup>a</sup>*Department of Medicine, Stanford Prevention Research Center, Stanford, CA 94305, USA*

<sup>b</sup>*Department of Health Research and Policy, Stanford University School of Medicine, Stanford, CA 94305, USA*

<sup>c</sup>*Department of Statistics, Stanford University School of Humanities and Sciences, Stanford, CA 94305, USA*

<sup>d</sup>*Meta-Research Innovation Center at Stanford (METRICS), Stanford University, Stanford, CA 94305, USA*

Accepted 18 February 2016; Published online 2 March 2016

Power asymmetries in the framing of issues: those who have the deepest pockets marshal the best evidence; Instrumental use of quantification to obfuscate; (Saltelli and Giampietro, 2017)

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Evidence based medicine hijacked to serve corporate agendas. Meta-analyses and guidelines serving vested interests. “Under market pressure, clinical medicine has been transformed to finance-based medicine” (Ioannidis, 2016)

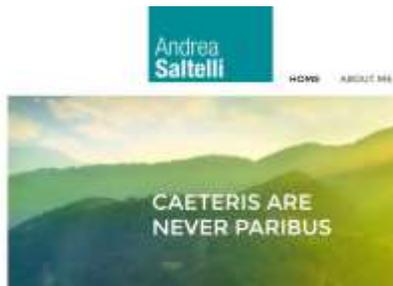
# Old and new heroes, while history repeats itself (Love canal, Flint...)



Lois Gibbs



Marc Edwards



[http://www.andreasaltelli.eu/file/repository/LOVE\\_CANAL.pdf](http://www.andreasaltelli.eu/file/repository/LOVE_CANAL.pdf)  
[https://en.wikipedia.org/wiki/Flint\\_water\\_crisis](https://en.wikipedia.org/wiki/Flint_water_crisis); <http://flintwaterstudy.org/>;  
<http://www.nytimes.com/2016/08/21/magazine/flints-water-crisis-and-the-troublemaker-scientist.html>

# ... and billionaires?



John and Laura  
Arnold



Brian Nosek, the  
Reproducibility  
Project.



John Ioannidis,  
Meta-research  
innovation  
centre at  
Stanford



Ben  
Goldacre,  
alltrials.net



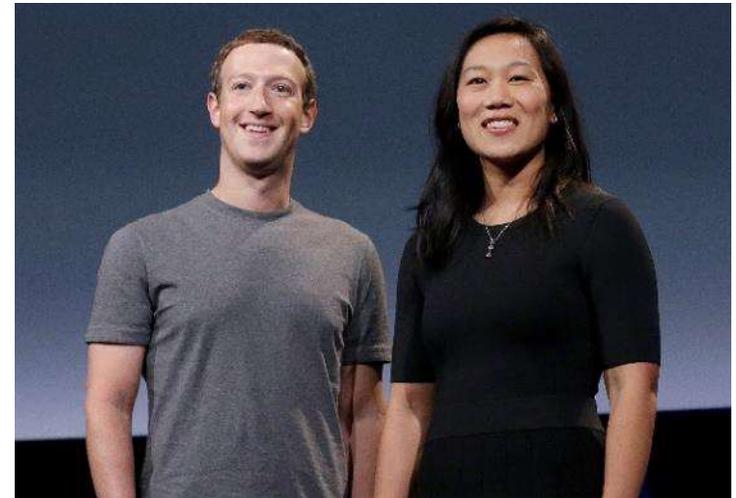
Gary Taubes, The  
case against sugar

# Other billionaires – the battle for open science

<http://www.economist.com/news/science-and-technology/21719438-about-change-findings-medical-research-are-disseminated-too>



Bill & Melinda Gates



Mark Zuckerberg &  
Priscilla Chan

## Different cultures, different reactions



Yoshiki Sasai

<http://www.nature.com/news/stem-cell-pioneer-blamed-media-bashing-in-suicide-note-1.15715>



Won't be fixed  
anytime soon

ROYAL SOCIETY  
OPEN SCIENCE

[rsos.royalsocietypublishing.org](http://rsos.royalsocietypublishing.org)

Research



CrossMark  
click for updates

**Cite this article:** Smaldino PE, McElreath R.

2016 The natural selection of bad science.

*R. Soc. open sci.* **3**:160384.

<http://dx.doi.org/10.1098/rsos.160384>

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# The natural selection of bad science

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Paul E. Smaldino<sup>1</sup> and Richard McElreath<sup>2</sup>

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<sup>1</sup>Cognitive and Information Sciences, University of California, Merced, CA 95343, USA

<sup>2</sup>Department of Human Behavior, Ecology, and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

 PES, 0000-0002-7133-5620; RME, 0000-0002-0387-5377

Poor research design and data analysis encourage false-positive findings. Such poor methods persist despite perennial calls for improvement, suggesting that they result from something more than just misunderstanding. The persistence of poor methods results partly from incentives that favour them, leading to the natural selection of bad science. This dynamic requires no conscious strategizing—no deliberate cheating nor loafing—by scientists, only that publication is a principal factor for

The persistence of poor methods results partly from incentives that favour them, leading to the natural selection of bad science. This dynamic requires no conscious strategizing—no deliberate cheating nor loafing—by scientists, only that publication is a principal factor for career advancement.

Smaldino PE, McElreath R., 2016 The natural selection of bad science. *R. Soc. open sci.* 3: 160384. <http://dx.doi.org/10.1098/rsos.160384>

[redacted] As in the real world, successful labs produce more 'progeny,' such that their methods are more often copied and their students are more likely to start labs of their own. Selection for high output leads to poorer methods and increasingly high false discovery rates. [redacted]

[redacted] Improving the quality of research requires change at the institutional level.



# Science's establishment in denial

Please cite this paper as:

OECD (2015), "Scientific Advice for Policy Making: The Role and Responsibility of Expert Bodies and Individual Scientists", *OECD Science, Technology and Industry Policy Papers*, No. 21, OECD Publishing, Paris.  
<http://dx.doi.org/10.1787/5js3311jcpwb-en>



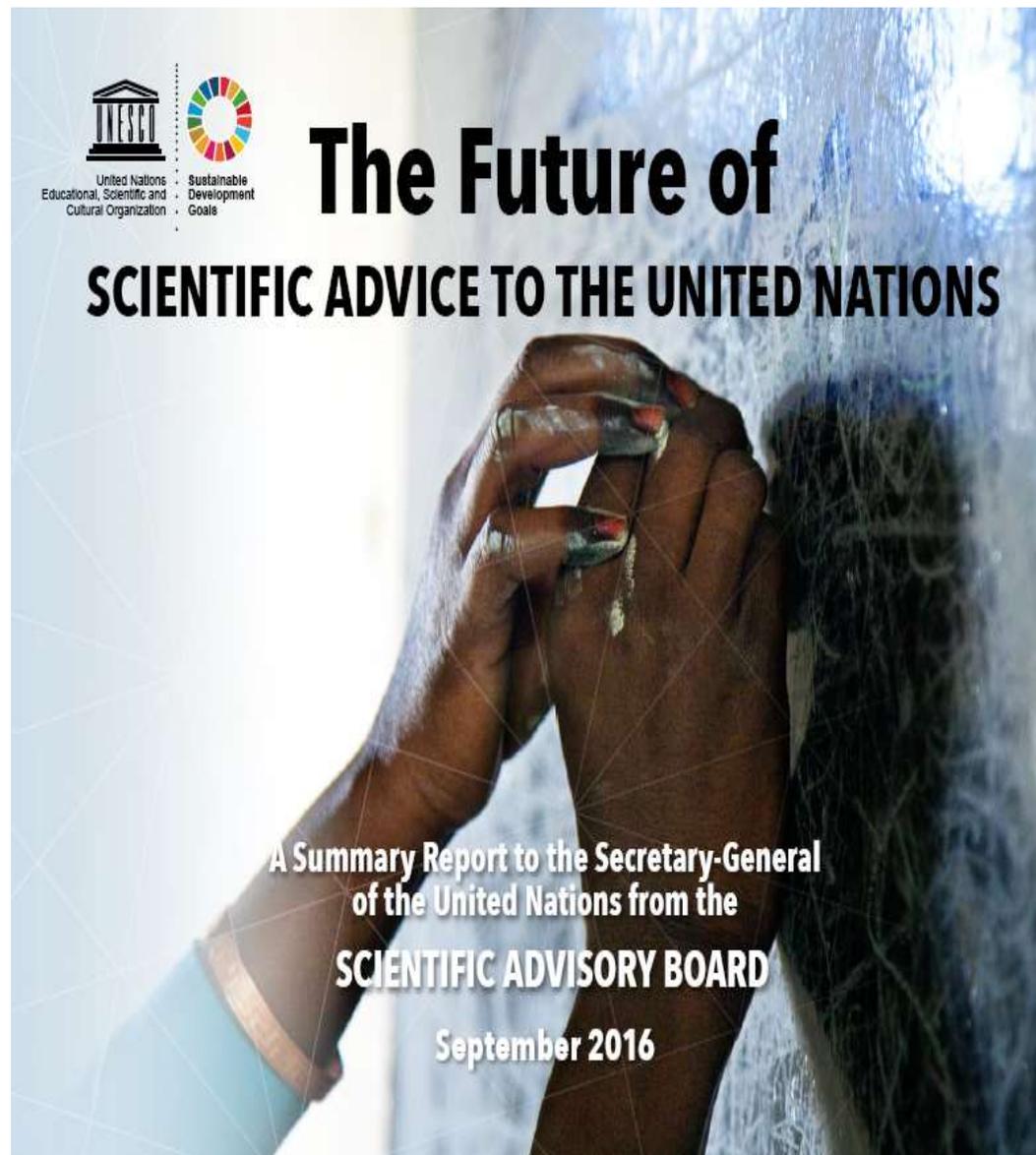
OECD Science, Technology and Industry  
Policy Papers No. 21

## Scientific Advice for Policy Making

THE ROLE AND RESPONSIBILITY OF EXPERT  
BODIES AND INDIVIDUAL SCIENTISTS

OECD

2015

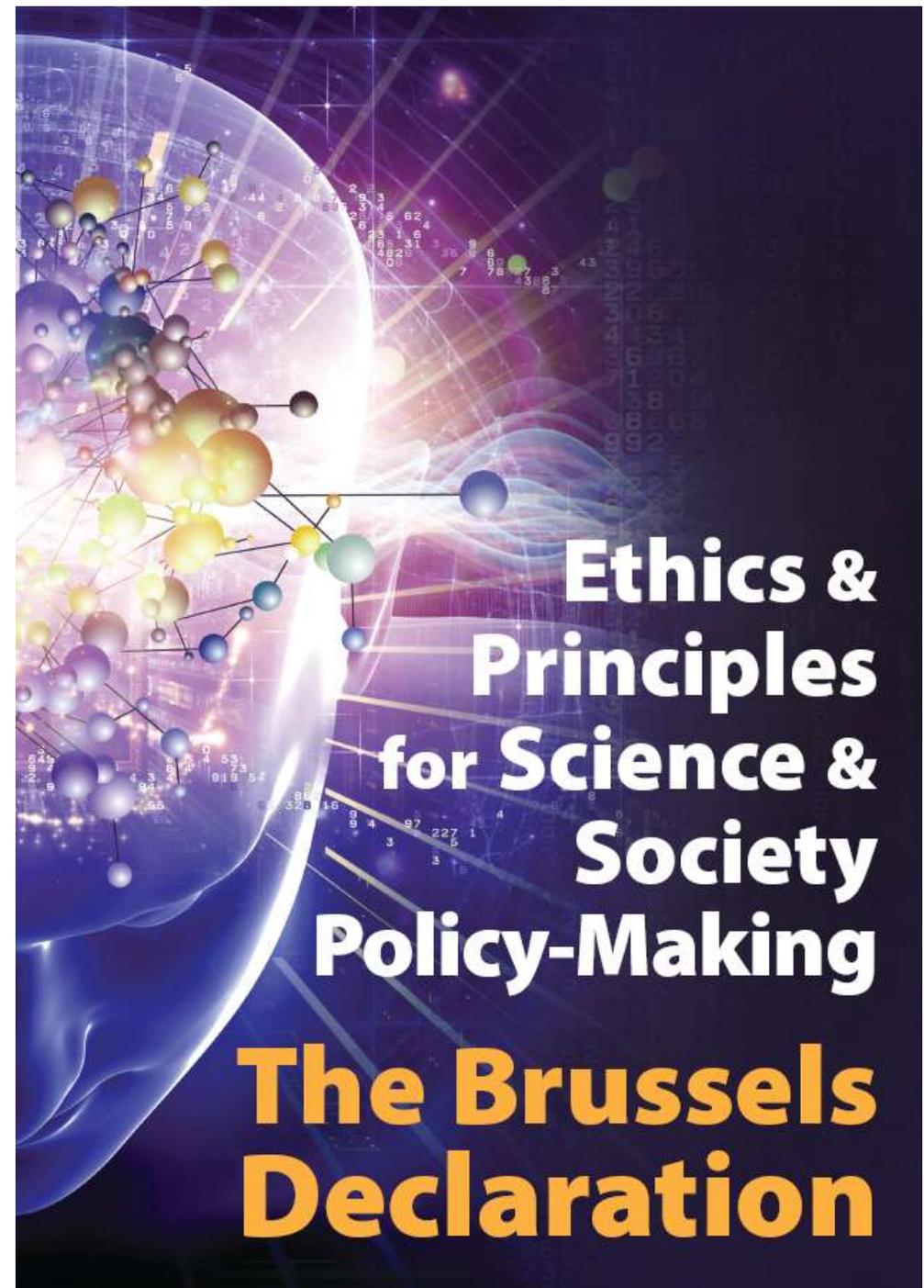


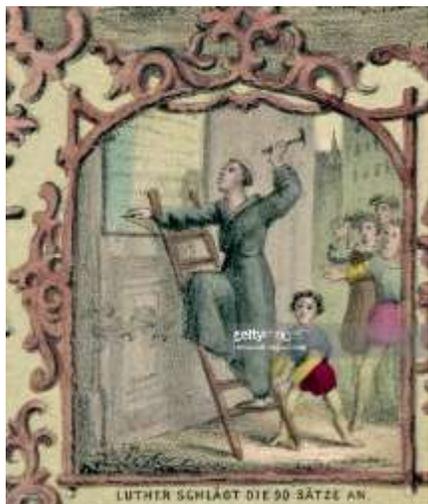
2016

Adopted February 2017 at  
symposium AAAS after 5 y  
gestation.

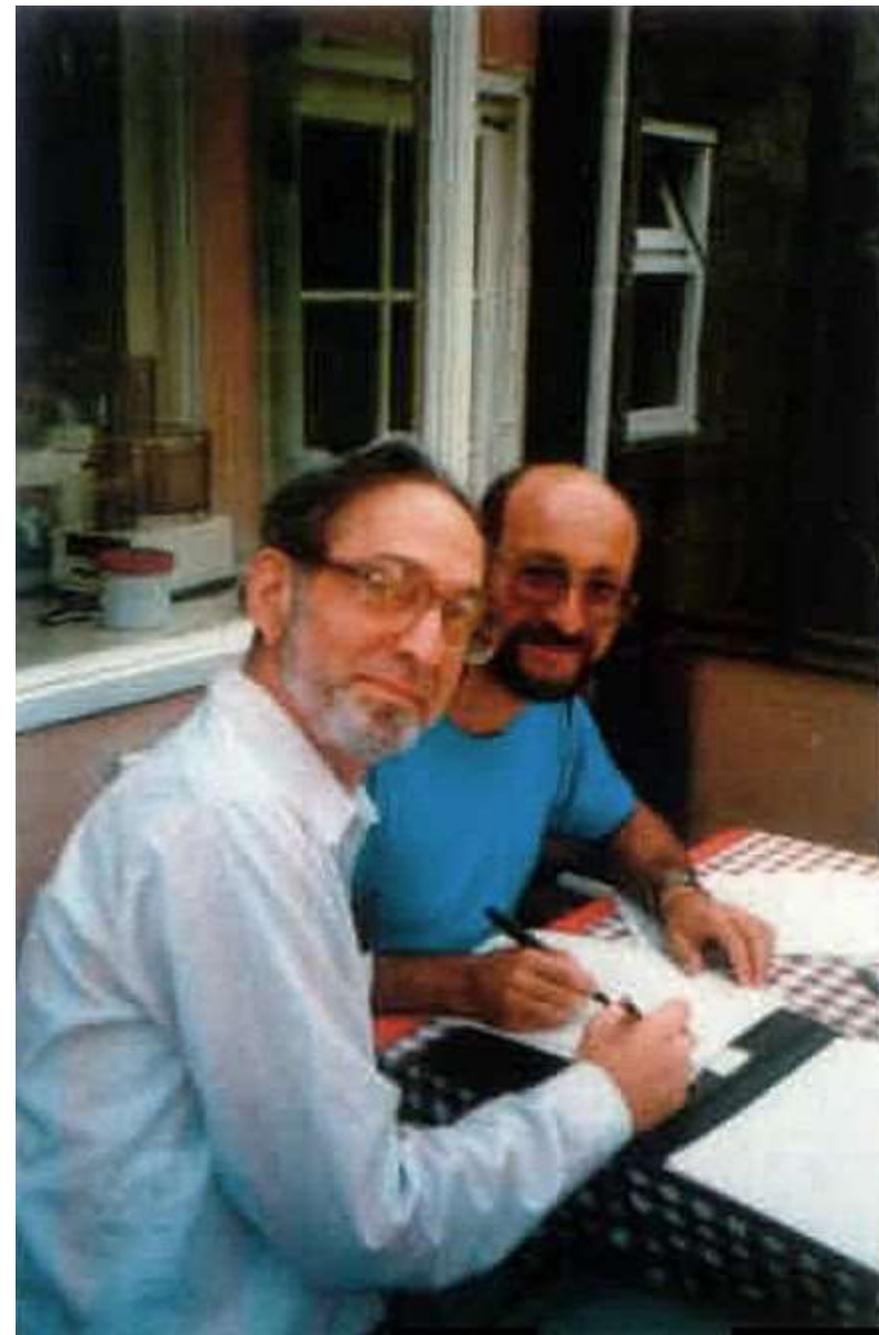
Hundreds of experts  
involved:

- No crisis
- No effect of crisis on  
evidence based policy





Post normal  
science scholars  
saw it coming

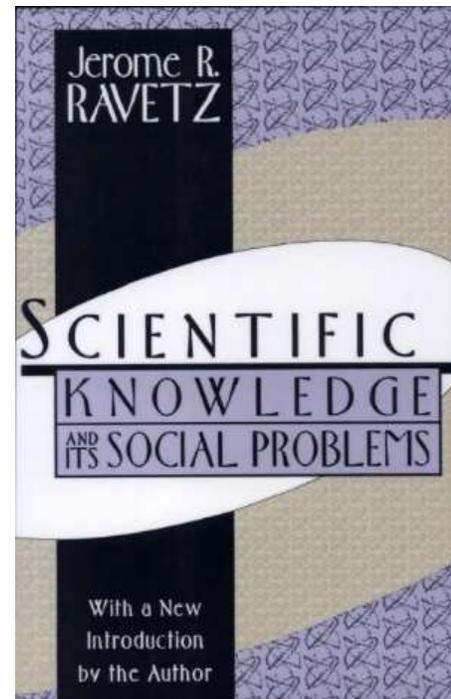


p. 179

For it is possible for a field to be diseased [...] reforming a diseased field is a task of great delicacy [...] not even an apparatus of institutional structures, can do anything to maintain or restore the health of a field in the absence of an essential ethical element operating through the interpersonal channel of communication.



Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press.



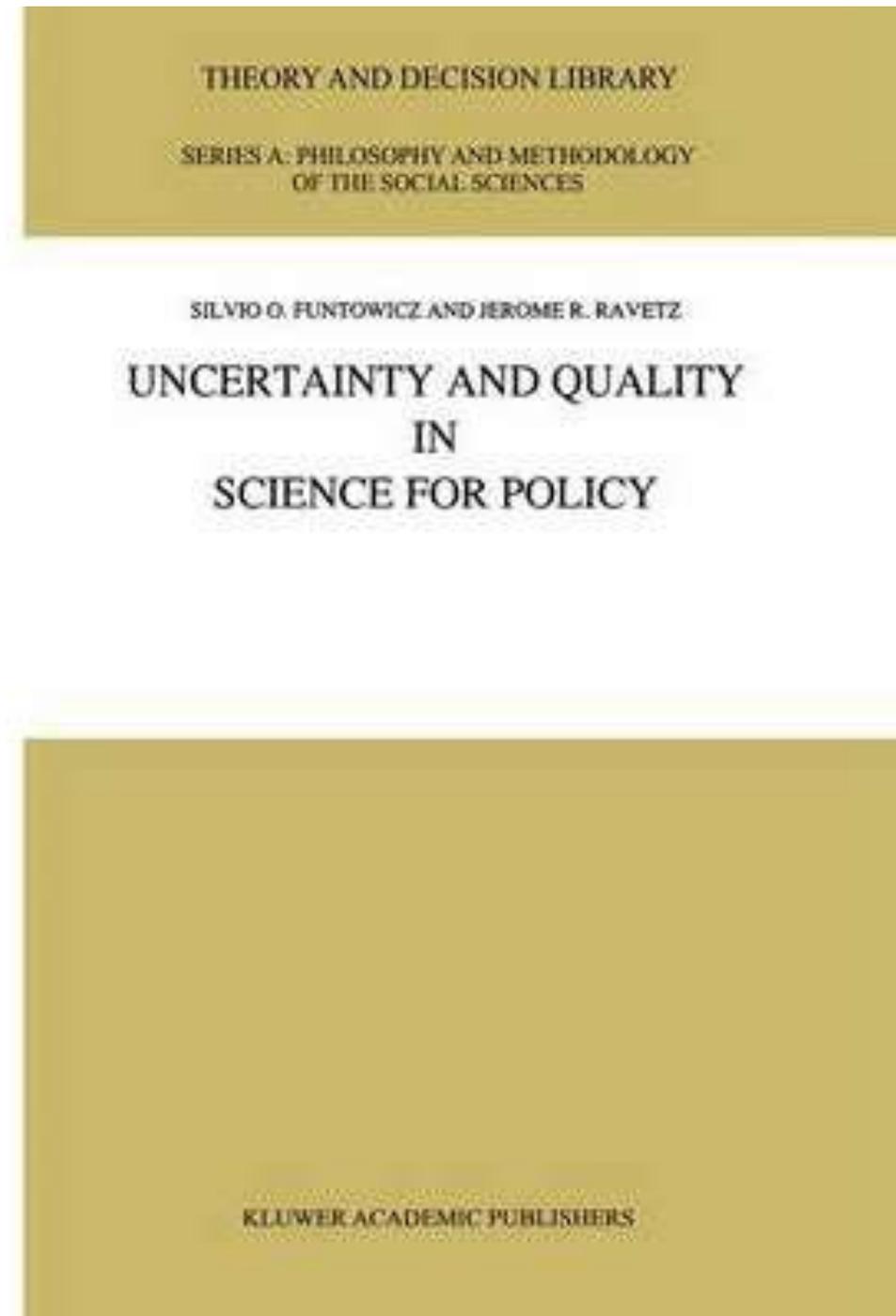
Jerome R.  
Ravetz

Something is not OK with the use of science for policy;

Quality is lost if uncertainty is misunderstood or used instrumentally;

The need for craft skills with numbers (NUSAP); ...

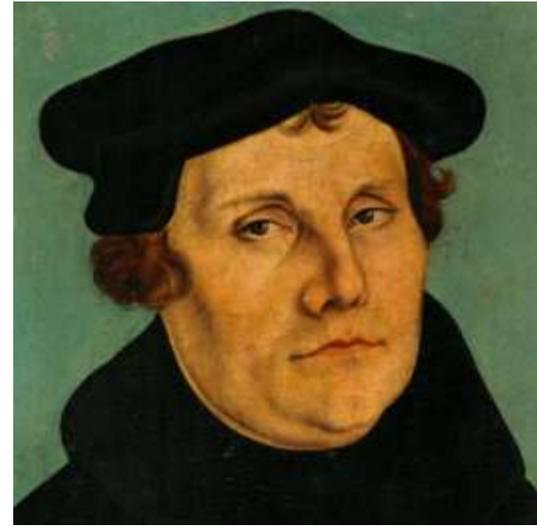
Funtowicz, S. O. and Ravetz, J. R., 1990. Uncertainty and quality in science for policy, Dordrecht: Kluwer.





What to do?

Science exhibits  
pathologies /  
corruptions comparable  
to the traffic in  
indulgencies which  
enraged Luther ~1517

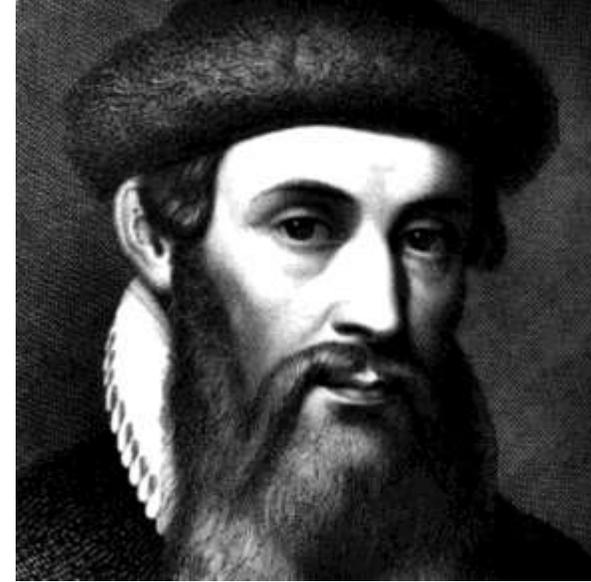


Martin Luther



Johann Tetzel

The internet the new  
press?



Johannes  
Gutenberg

The combination of corruption, indignation  
and a revolutionary technology made the  
Reformation possible; is the same possible  
for science?

Seek inspiration in the radical 1970s-era movements that sought to change the world by changing first science itself

Fight asymmetries; offer expertise to the weaker stakeholders; help those to shape the questions asked of science

Fight methodological corruption, e.g. deconstructing shoddy quantifications

Recast our public conversation about science

<https://theconversation.com/scientists-march-on-washington-is-a-bad-idea-heres-why-73305>

<https://gizmodo.com/how-radical-70s-scientists-tried-to-change-the-world-1681987399>



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## What is science's crisis really about?

Andrea Saltelli<sup>a,b,\*</sup>, Silvio Funtowicz<sup>a</sup>

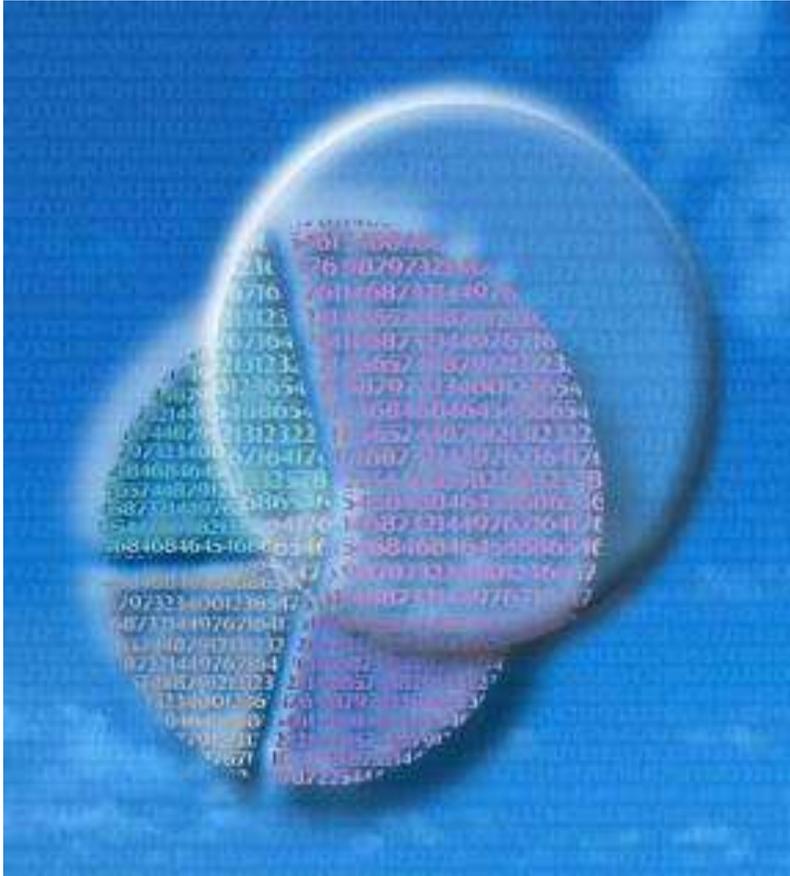
<sup>a</sup> Centre for the Study of the Sciences and the Humanities (SVT), University of Bergen, Norway

<sup>b</sup> Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona, Spain



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**THE CONVERSATION**



# END

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