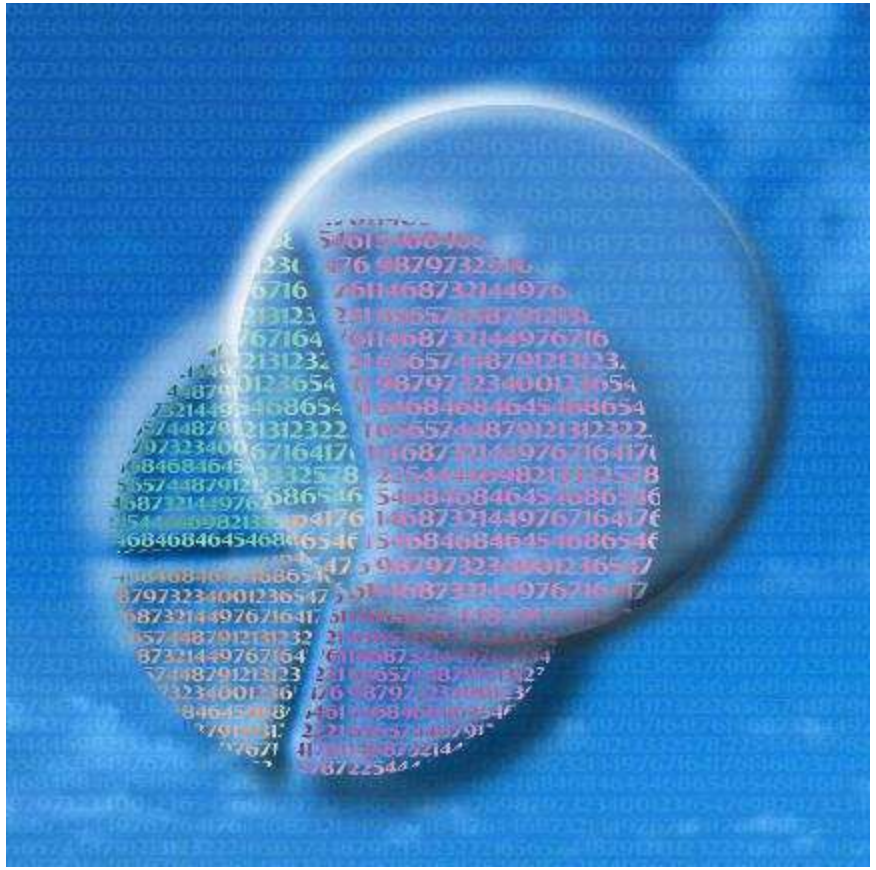


PNS and the crisis in Science

Andrea Saltelli and
Silvio Funtowicz
Centre for the Study of the Sciences and the Humanities (SVT), University of Bergen (UIB)

Tübingen, PNS workshop, September 25-26 2017, Panel II: Vagaries of trust in science governance

Where to find this talk: www.andreasaltelli.eu

sensitivity analysis, sensitivity auditing, science for policy, impact assessment

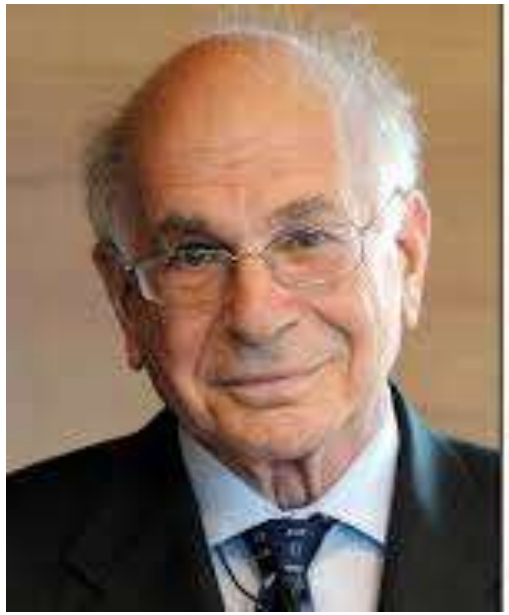
- There is a crisis in the quality control of science which won't be fixed soon
- Science's establishment between denial & technical fixes
- PNS predicted and diagnosed the crisis and its ethical dimension
- What to do?

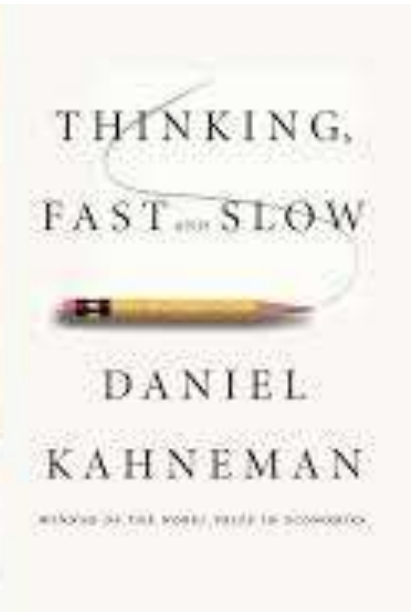
Snapshots of the crisis: a rich ecosystem

1. Much published [redacted] research not reliable / uncertain reliability / no benefit to patients / not useful to decision makers.
2. Most [redacted] professionals not aware of problem.
3. Even if aware lack skills to evaluate the reliability and usefulness of [redacted] evidence.
4. Patients and families lack relevant, accurate [redacted] evidence and skilled guidance at the time of [redacted] decision-making.

How To Survive the Medical Misinformation Mess, by John P. A. Ioannidis, Michael E. Stuart, Shannon Brownlee, Sheri A. StriteEuropean Journal of Clinical Investigation, Accepted Articles, Accepted manuscript online: 7 SEP 2017

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





"[…]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/

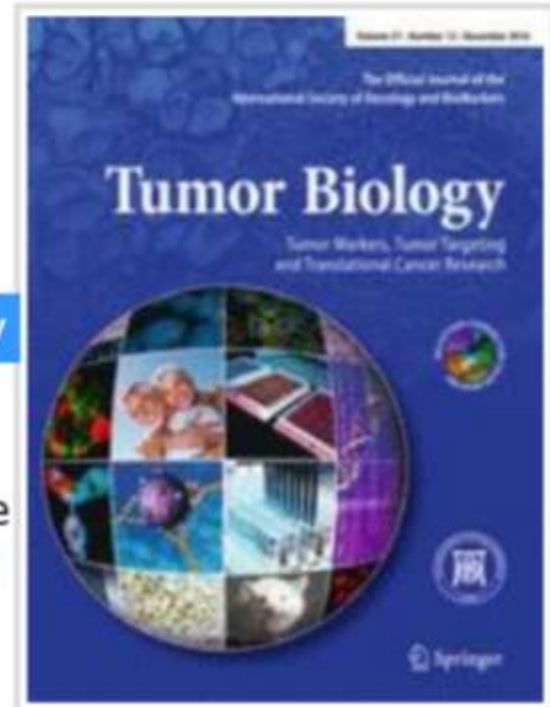
Retraction Watch

Tracking retractions as a

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

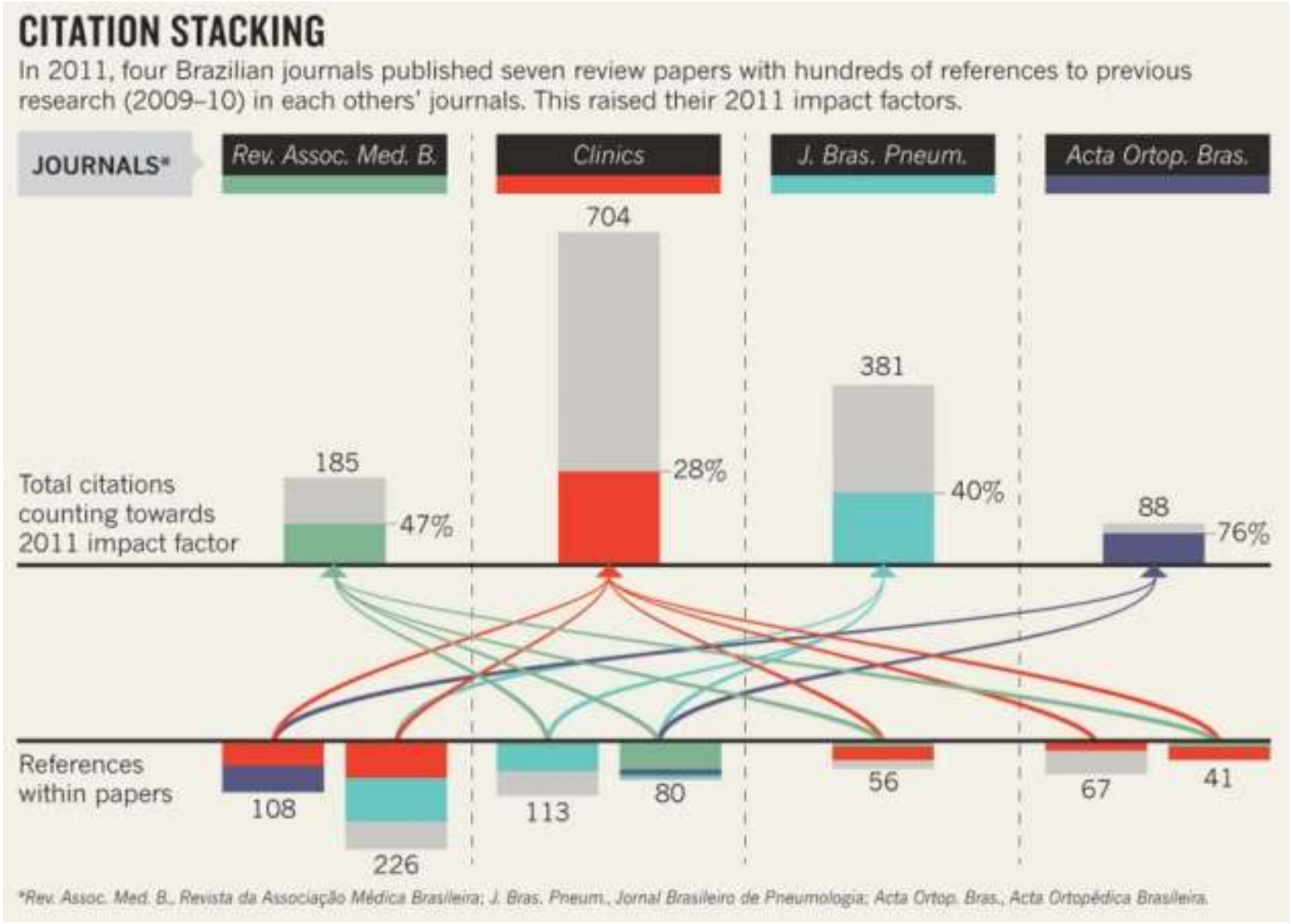
with 11 comments

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.

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

Original research article

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

Andrea Saltelli[a,b,c,*], Mario Giampietro[a,c,d]

Journal of Clinical Epidemiology 73 (2016) 82–86

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

John P.A. Ioannidis[a,b,c,d,*]

[a]*Department of Medicine, Stanford Prevention Research Center, Stanford, CA 94305, USA*
[b]*Department of Health Research and Policy, Stanford University School of Medicine, Stanford, CA 94305, USA*
[c]*Department of Statistics, Stanford University School of Humanities and Sciences, Stanford, CA 94305, USA*
[d]*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)

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
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

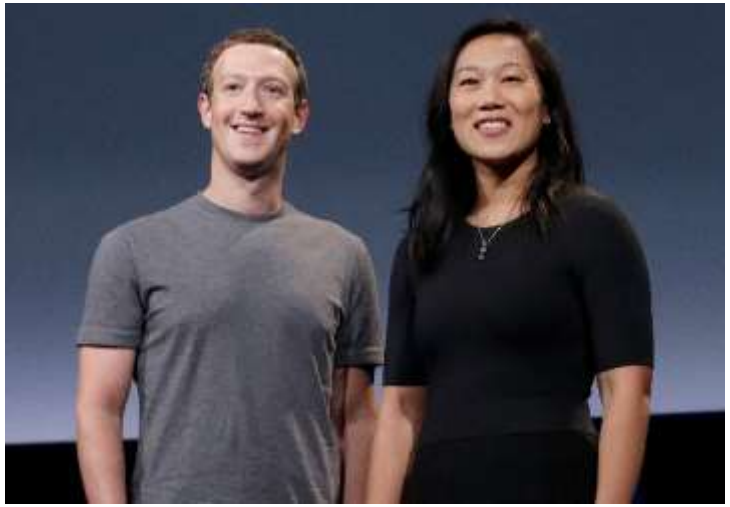
Gary Taubes, The case against sugar

https://www.wired.com/2017/01/john-arnold-waging-war-on-bad-science/

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

Research

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

Received: 1 June 2016
Accepted: 17 August 2016

The natural selection of bad science

Paul E. Smaldino[1] and Richard McElreath[2]

[1]Cognitive and Information Sciences, University of California, Merced, CA 95343, USA
[2]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

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. Improving the quality of research requires change at the institutional level.

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

Increasing the reliability of available, published evidence may not be an imminently reachable goal. Therefore, efforts should focus on making healthcare professionals, more sensitive to the limitations of the evidence, training them to do critical appraisal, and enhancing their communication skills so that they can effectively summarize and discuss medical evidence with patients to improve decision-making. Similar efforts may need to target also patients, journalists, policy makers, the lay public and other healthcare stakeholders.

How To Survive the Medical Misinformation Mess, by John P. A. Ioannidis, Michael E. Stuart, Shannon Brownlee, Sheri A. StriteEuropean Journal of Clinical Investigation, Accepted Articles, Accepted manuscript online: 7 SEP 2017

Science's establishment between denial & technical fixes

OECDpublishing

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/10.1787/5js33l1jcpwb-en

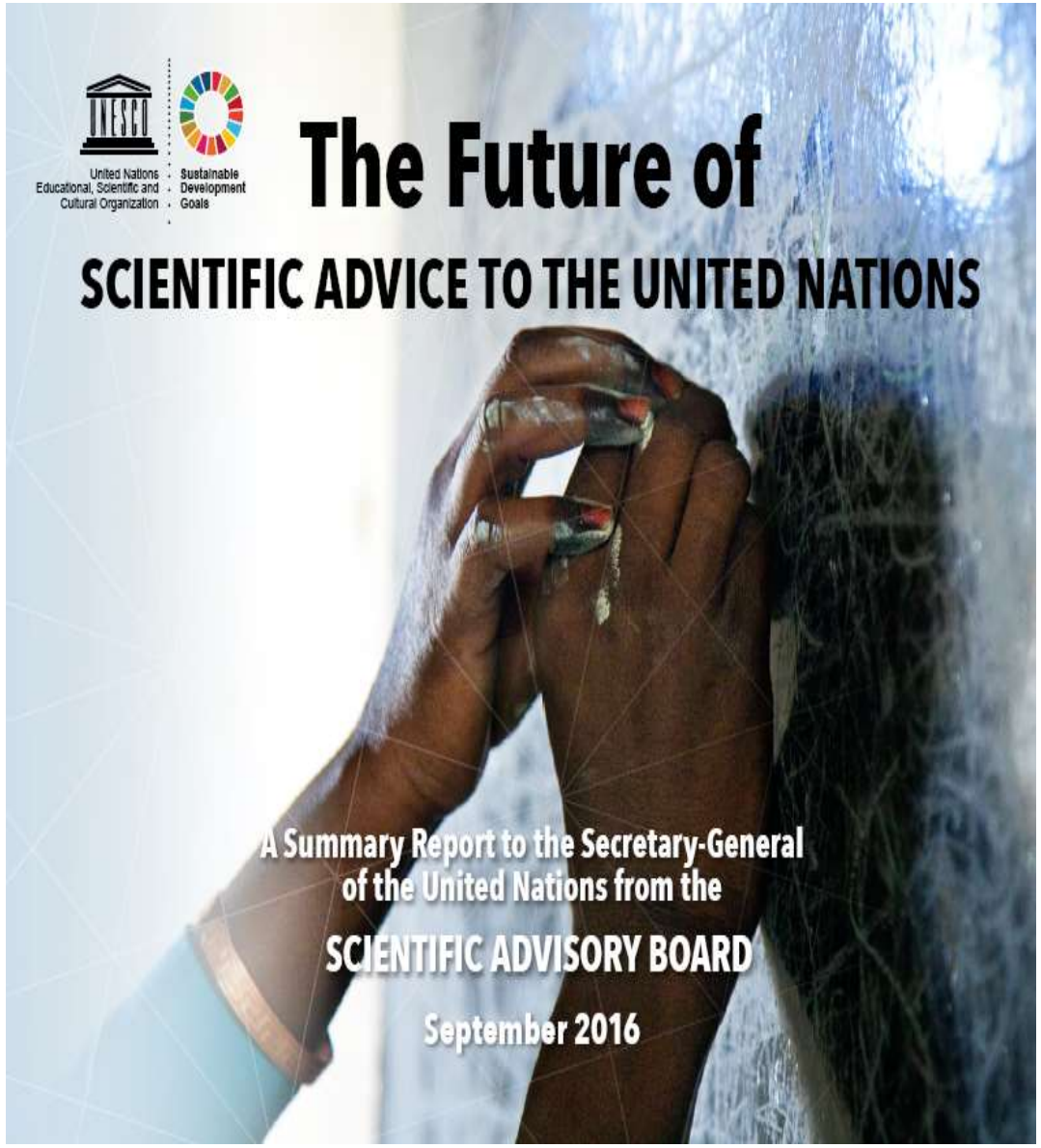
OECD Science, Technology and Industry Policy Papers No. 21

Scientific Advice for Policy Making

THE ROLE AND RESPONSIBILITY OF EXPERT BODIES AND INDIVIDUAL SCIENTISTS

OECD

2015



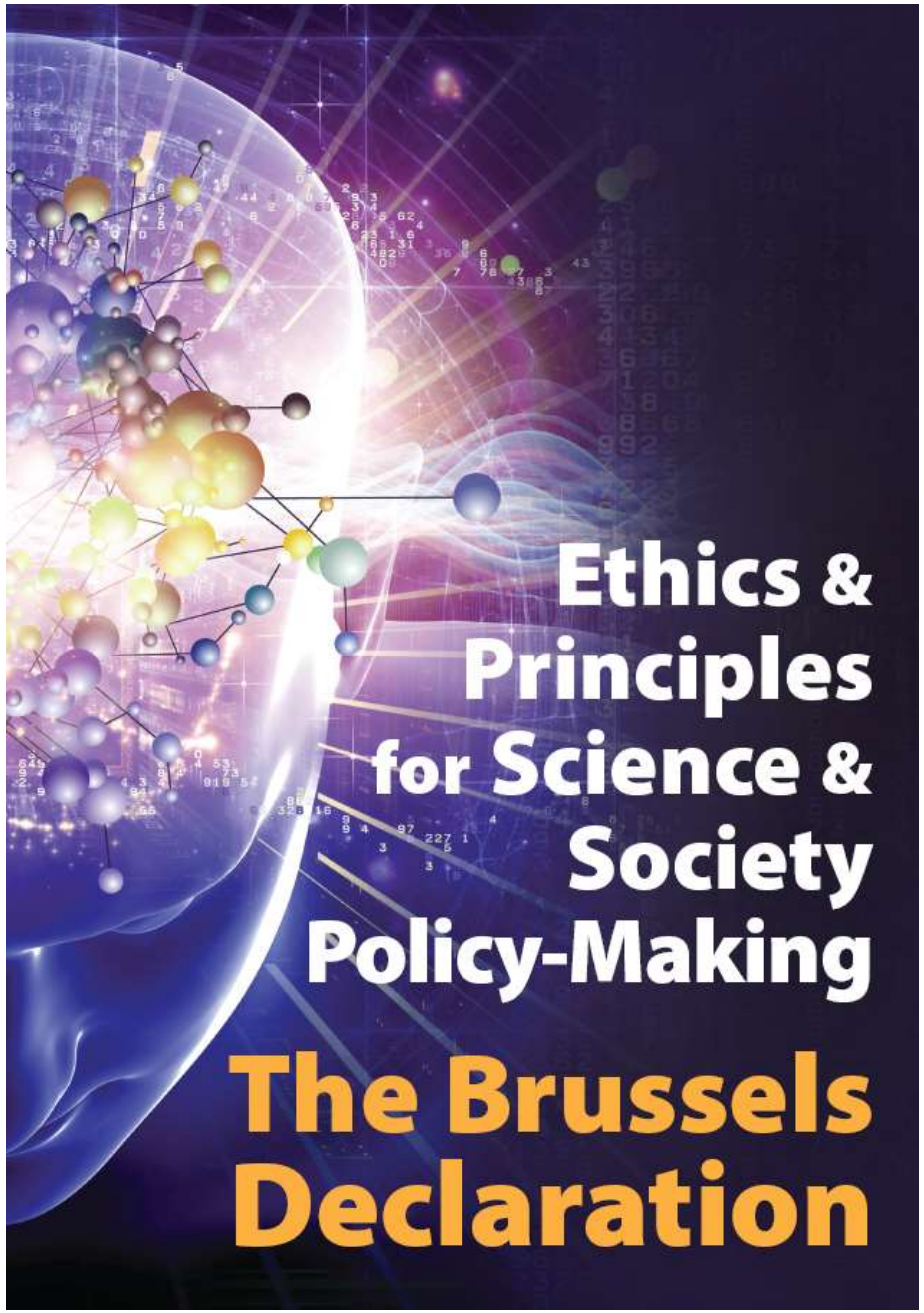
2016

Adopted February 2017 at symposium AAAS after 5 y gestation.

Hundreds of experts involved:

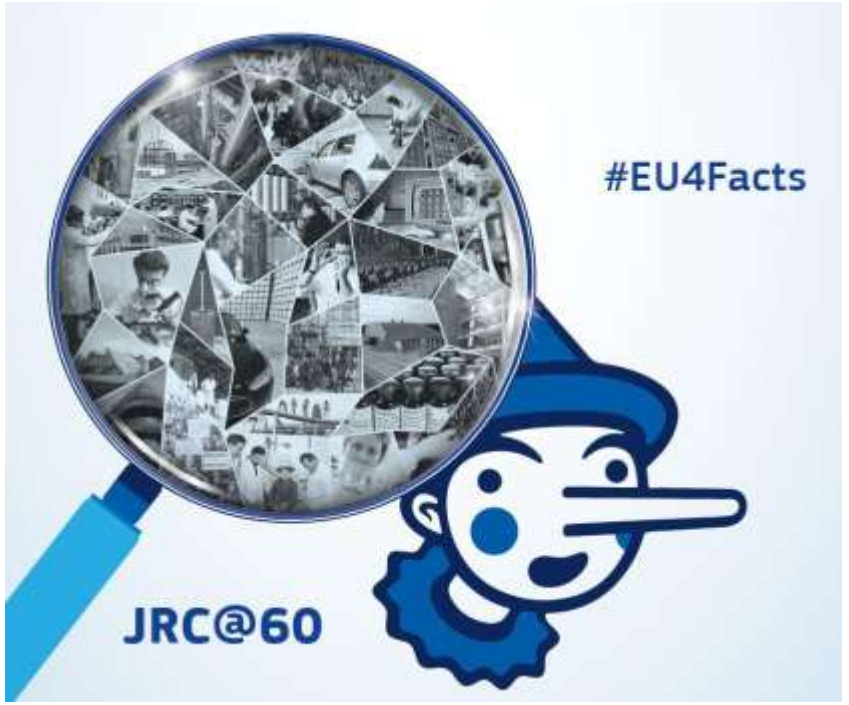
- No crisis
- No effect of crisis on evidence based policy

2017



Programme

- **Why should we trust science?** - The role of science in times of fake news and 'filter bubbles'.
- **Re-designing policymaking using behavioural and decision science** - How can evidence and data be effectively balanced with values and emotions when policy decisions are taken?



'Science is "show me", not "trust me"' (P. Stark)

Values via behavioural science?

http://www.bitss.org/2015/12/31/science-is-show-me-not-trust-me/

Contents lists available at ScienceDirect

Futures

journal homepage: www.elsevier.com/locate/futures

Post-normal institutional identities: Quality assurance, reflexivity and ethos of care

Ângela Guimarães Pereira[a,1,*], Andrea Saltelli[b]

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[b] Centre for the Study of the Sciences and the Humanities (SVT), University of Bergen (UIB), Norway and Institut de Ciència i Tecnologia Ambientals (ICTA), Universitat Autonoma de Barcelona (UAB), Spain

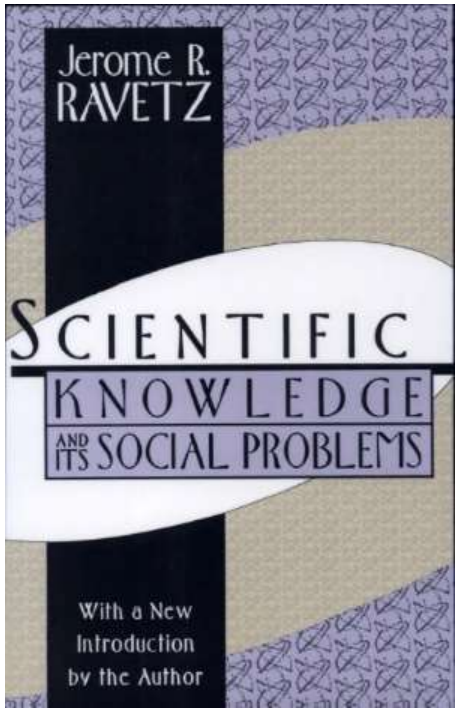
Suggestions for JRC

PNS 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, p.22.



Jerome R. Ravetz

Why quality and uncertainty in PNS' second foundational book?

Quality lost with assassination of uncertainty

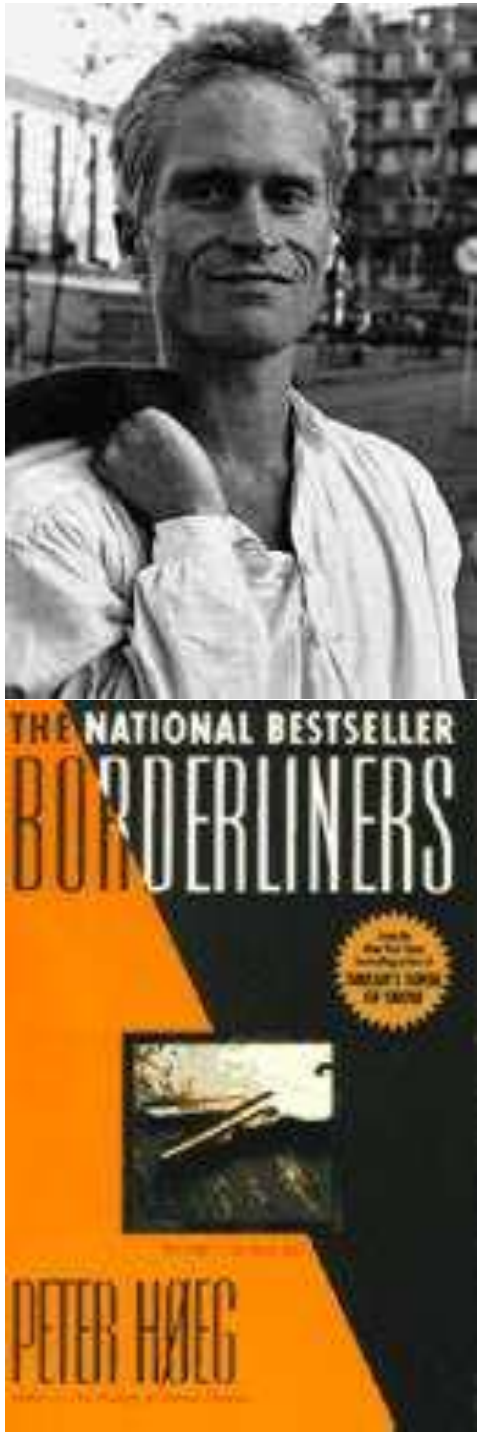
The reversal of Mertonian norms (organized dogmatism instead of organized scepticism)

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

It's a kind of scientific integrity, a principle of scientific thought that corresponds to a kind of utter honesty--a kind of leaning over backwards. [...] Details that could throw doubt on your interpretation must be given, if you know them. [...] give all of the information to help others to judge the value of your contribution."

Why uncertainty?

"That is what we meant by science. That both question and answer are tied up with uncertainty, and that they are painful. But that there is no way around them. And that you hide nothing; instead, everything is brought out into the open." (Høeg, 1995):



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

Futures 91 (2017) 5–11

Contents lists available at ScienceDirect

Futures

journal homepage: www.elsevier.com/locate/futures

What is science's crisis really about?

Andrea Saltelli[a,b,*], Silvio Funtowicz[a]

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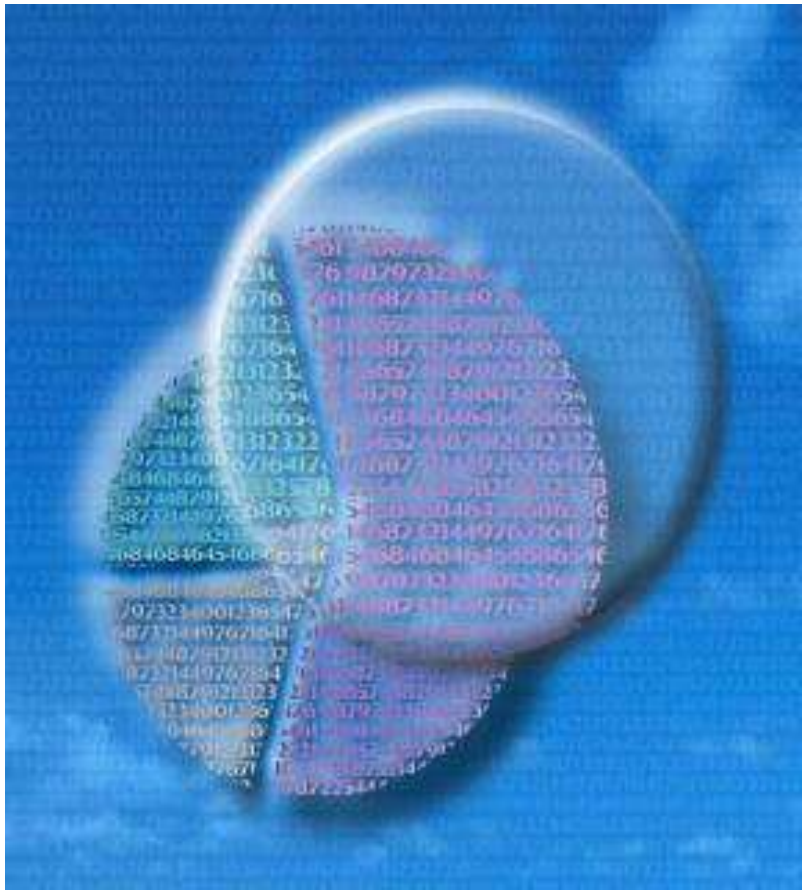
[b] Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona, Spain



END

Twitter:
@andreasaltelli