

Responsible quantification

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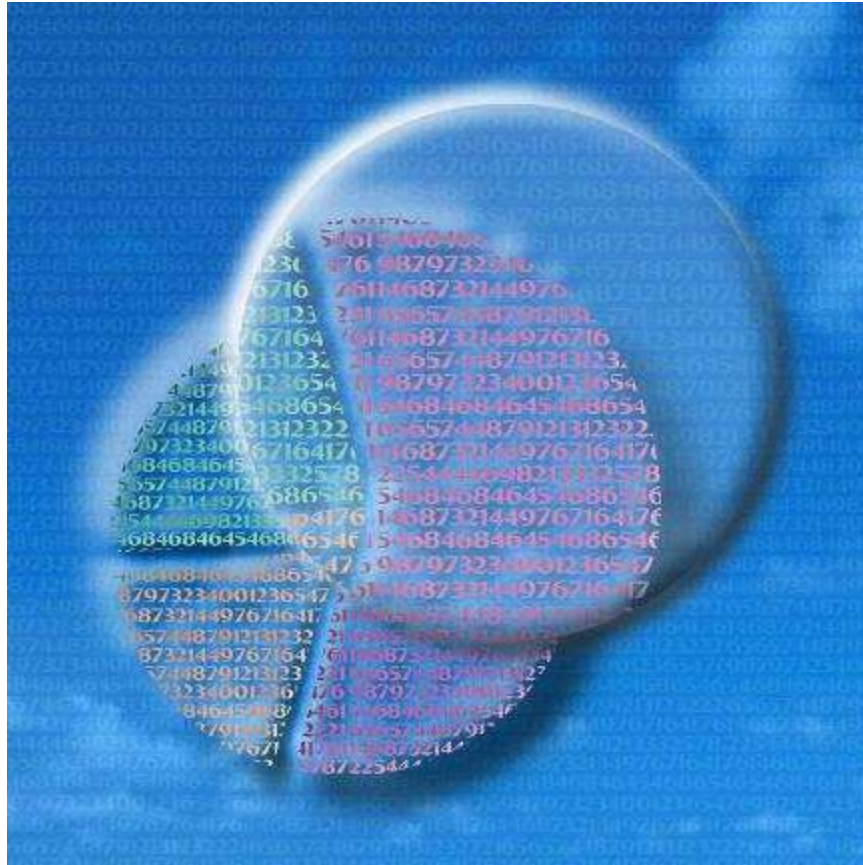
Institut de Ciència i Tecnologia Ambientals (ICTA) –
Universitat Autònoma de Barcelona (UAB)

Bergen, September 21, 2016

MNF990 PhD course

(Theory of Science & Ethics for MATNAT)

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Welcome to the home page of Andrea Saltelli

Caeteris are never paribus

Presentations

Where to find this presentation

andrea.saltelli@uib.no

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

Problems

Science: is there a crisis? In science? In its use for policy?

Evidence as the currency of the lobbies

Economics and its cyclic crises of relevance (the mathiness discussion)

Ripples from the crisis: toward a fact-less democracy?

Causes

De Solla Price, Ravetz, Lyotard, Mirowski

Why Quantify? Quantification and trust

Evidence based policy and its opposite

Evidence as hypocognition & Socially constructed ignorance

Remedies

Post-normal science; NUSAP

Sensitivity analysis; Sensitivity auditing

Quantitative story telling & Responsible quantification

The way

Sweeping away the 'idols'

The problem

Is there a crisis?





THE RIGHTFUL PLACE OF SCIENCE: **SCIENCE ON THE VERGE**

CONTRIBUTORS

Alice Benessia	Jerome R. Ravetz
Silvio Funtowicz	Andrea Saltelli
Mario Giampietro	Roger Strand
Ângela Guimarães Pereira	Jeroen P. van der Sluijs



http://www.andreasaltelli.eu/file/repository/Saltelli_Verge_Barcelona_June.pdf

The
Economist

OCTOBER 19TH - 26TH 2013

economist.com

Washington's lawyer surplus
How to do a nuclear deal with Iran
Investment tips from Nobel economists
Junk bonds are back
The meaning of Sachin Tendulkar

HOW SCIENCE GOES WRONG.

99

Einsteinium

Unreliable research

Trouble at the lab

Scientists like to think of science as self-correcting. To an alarming degree, it is not

Oct 19th 2013 | From the print edition



22K



Jason Ford

The crisis has ethical,
epistemological, methodological
and even metaphysical
dimensions;



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Identified points of friction:

- paradigm of evidence-based policy
- use of science to produce implausibly precise numbers and reassuring techno-scientific imaginaries
- use of science to ‘compel’ decision by the sheer strength of ‘facts’



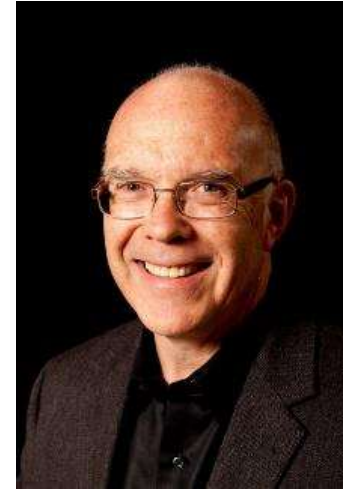
THE RIGHTFUL PLACE OF SCIENCE: **SCIENCE ON THE VERGE**

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- Generation of new data/ publications at an unprecedented rate.
- Compelling evidence that the majority of these discoveries will not stand the test of time.
- Causes: failure to adhere to good scientific practice & the desperation to publish or perish.
- ...



C. Glenn Begley



John P. A. Ioannides

New Scientist

WEEKLY April 16 - 22, 2018

FLY ME TO THE STARS
The tiny spaceship bound
for Alpha Centauri

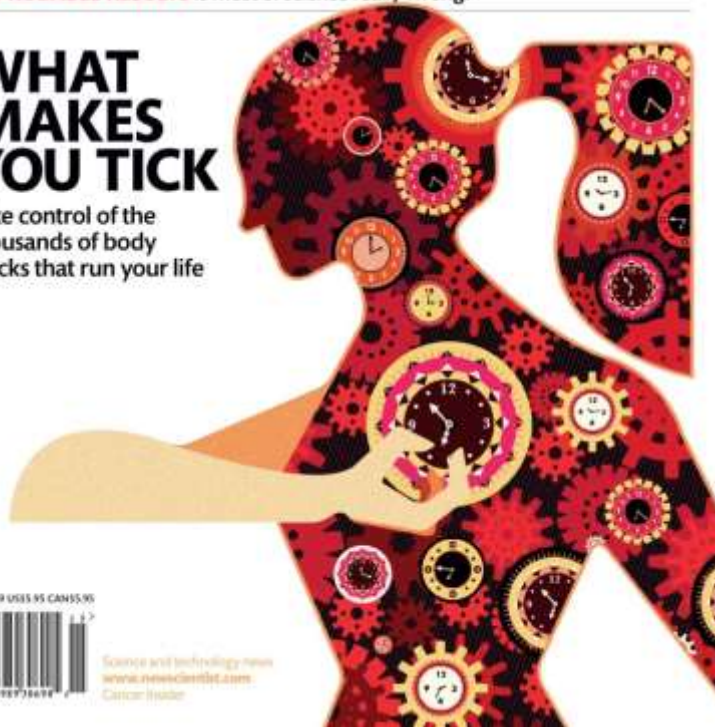
SINS OF THE FATHER
How you inherit your
dad's bad habits

LIFE IN THE CLOUDS
High-flying microbes are
controlling the weather

IMPROBABLE RESULTS Is most of science really wrong?

WHAT MAKES YOU TICK

Take control of the
thousands of body
clocks that run your life



No3009 US\$5.95 CAN\$5.95



Science and technology news
www.newscientist.com
Cancer Insider



The crisis is registered by New Scientist;
Editorial “Crisis? What Crisis?”

Does the crisis impact
science for policy &
science's advice?

“Belinda Phipps, who took over at the Science Council last year, accused the sector of complacency and said the public trusted scientists only because they did not understand their work.”

THE  TIMES

Science

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Welcome to your preview of The Times

Scientists ‘should take ethics oath like doctors’



Tom Whipple Science Editor

Published at 12:01AM, February 22 2016

Scientists need their own version of the Hippocratic oath and a regulation system similar to doctors to avoid a big scandal, the head of their standards body has said.

Studies suggest that a significant proportion of scientific papers are not repeatable

Monty Rakusen/Corbis

 Post a comment

Her words: “What struck me, coming into this sector is just how unregulated it is compared to the medical profession.

Think what damage a scientist could do if he or she behaved badly or fraudulently. The potential damage is enormous, yet there is almost no regulation.”

Whipple, T., The Times, February 22, 2016

THE  TIMES

Science

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Monty Rakusen/Corbis

 Post a comment

Ignoring the connection between science's crisis and science advice?

The OECD report on Science Advice 2015; not a single mention of science's crisis.

<http://www.oecd-ilibrary.org/docserver/download/5js33l1jcpwb.pdf?expires=1442656356&id=id&accname=guest&checksum=AF1467AD25F8BE6516083077CCEE31A>

OECD publishing

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

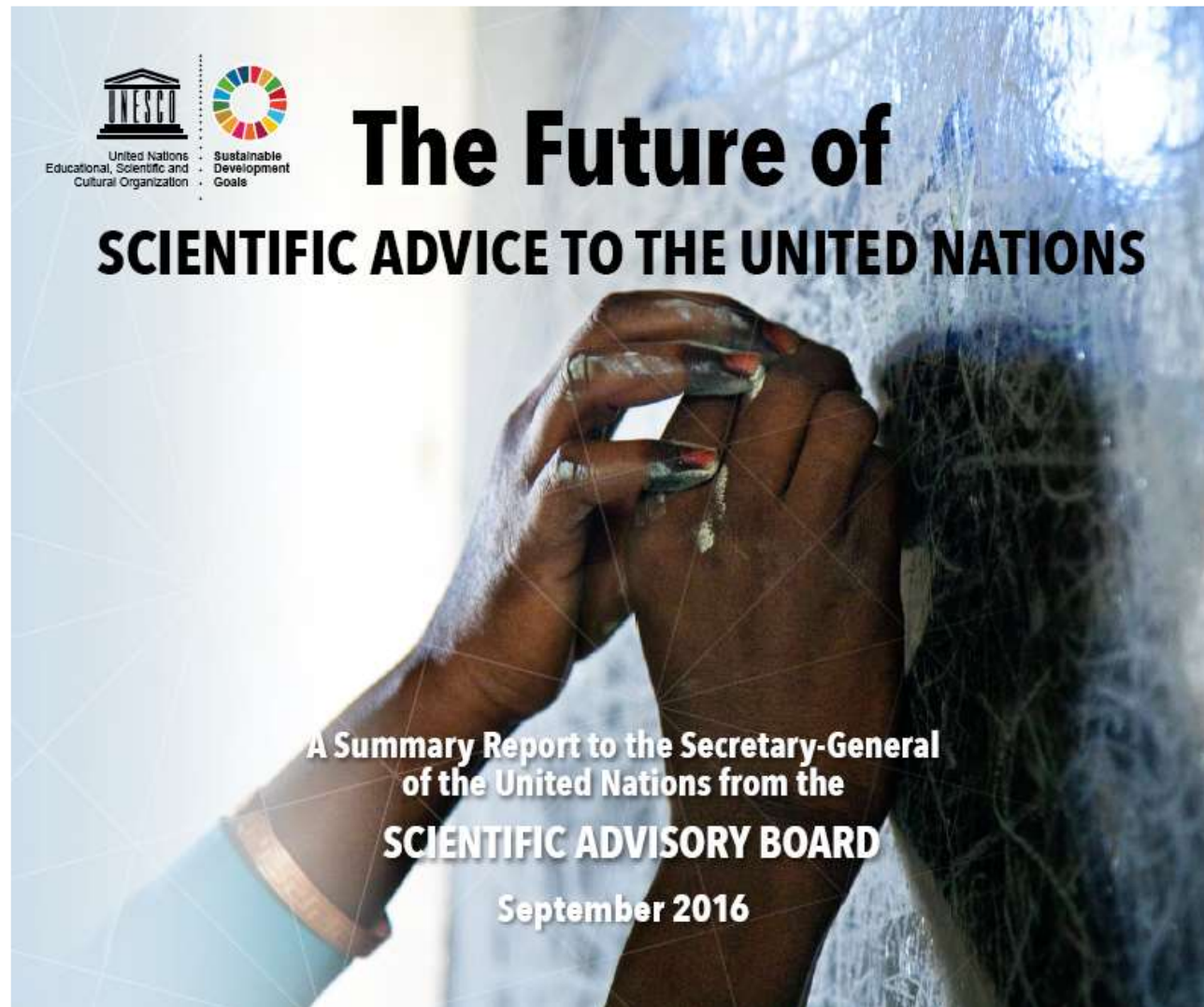
THE ROLE AND RESPONSIBILITY OF EXPERT
BODIES AND INDIVIDUAL SCIENTISTS

OECD

Ditto here:

"Scientific
credibility is built
upon rigor and
reproducibility"

No crisis for
the UN.



Those aspect of science most used in policy (mathematical and statistical modelling) are also those more problematic. See e.g. the p-value saga...



**AMERICAN STATISTICAL ASSOCIATION RELEASES STATEMENT ON
STATISTICAL SIGNIFICANCE AND P-VALUES**

*Provides Principles to Improve the Conduct and Interpretation of Quantitative
Science*

March 7, 2016

Saltelli, A., Funtowicz, S., 2014, When all models are wrong: More stringent quality criteria are needed for models used at the science-policy interface, *Issues in Science and Technology*, Winter 2014, 79–85.

<http://issues.org/30-2/andrea/>

Wasserstein, R.L. and Lazar, N.A., 2016. 'The ASA's statement on p-values: context, process, and purpose', *The American Statistician*, DOI:10.1080/00031305.2016.1154108.



Nassim N. Taleb's sharp synthesis:

The Intellectual Yet Idiot, September 16, 2016

With psychology papers replicating less than 40%, dietary advice reversing after 30 years of fatphobia, macroeconomic analysis working worse than astrology, [...] and pharmaceutical trials replicating at best only 1/3 of the time, people are perfectly entitled to rely on their own ancestral instinct and listen to their grandmothers [...] with a better track record than these policymaking goons.

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Special Communication | September 12, 2016

Sugar Industry and Coronary Heart Disease Research

A Historical Analysis of Internal Industry Documents

ONLINE FIRST

Cristin E. Kearns, DDS, MBA^{1,2}, Laura A. Schmidt, PhD, MSW, MPH^{1,3,4}, Stanton A. Glantz, PhD^{1,5,6,7,8}

[\[+\] Author Affiliations](#)

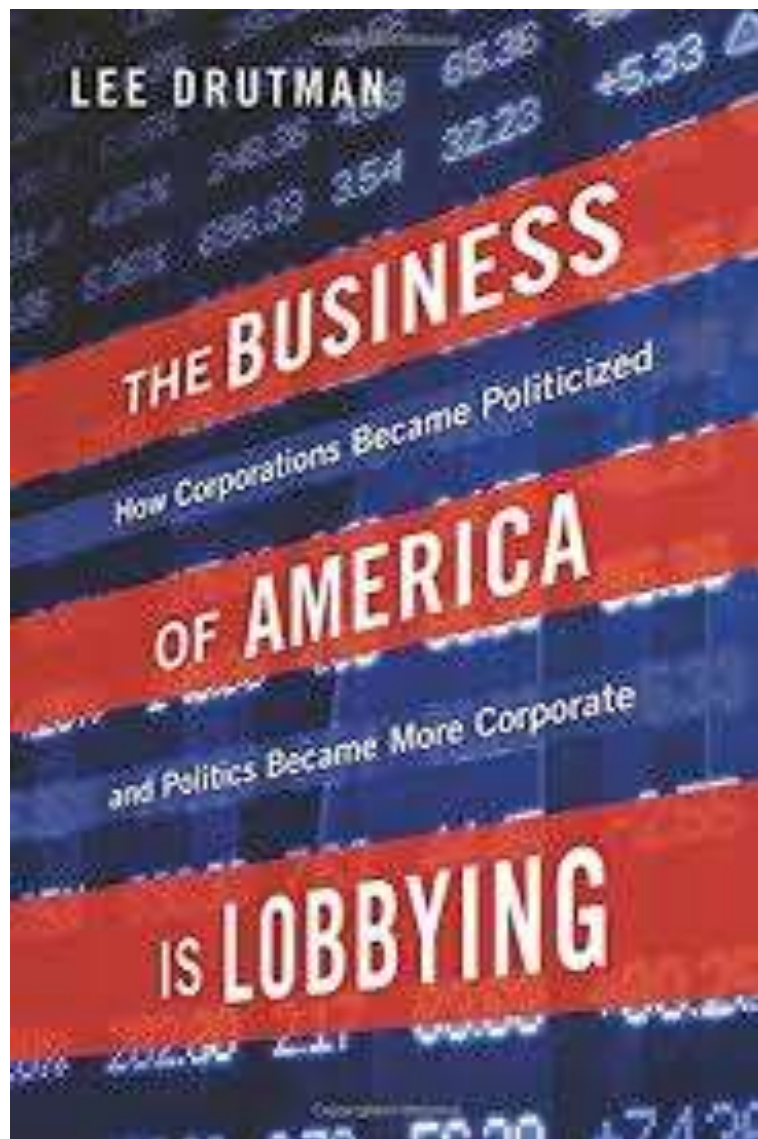
JAMA Intern Med. Published online September 12, 2016. doi:10.1001/jamainternmed.2016.5394

Text Size: [A](#) [A](#) [A](#)

“...our findings suggest the industry sponsored a research program in the 1960s and 1970s that successfully cast doubt about the hazards of sucrose while promoting fat as the dietary culprit in coronary heart disease.”

<http://archinte.jamanetwork.com/article.aspx?articleid=2548255>

Evidence as the
currency of
lobbies



Lee Drutman



l'ordre des choses

AGONE



Sylvain Laurens

Some quick read:

<http://www.nybooks.com/articles/2016/04/07/how-lobbyists-win-in-washington/>

<http://www.contretemps.eu/lectures/lire-extrait-courtiers-capitalisme-sylvain-laurens>

général. Or, il existe une différence fondamentale entre avancer l'idée qu'un système démocratique serait simplement perverti par des lobbys et émettre l'hypothèse que l'existence de ces lobbys est consubstantielle d'un mode de gouvernement technocratique dans lequel la légitimité conférée à des élus par le suffrage universel ne pèse presque rien au regard d'autres critères. Ce

Sylvain Laurens, 2015, Les Courtiers du capitalisme, Milieux d'affaires et bureaucrates à Bruxelles, Marseille, Éditions Agone.



A truly black pearl: a candid admission in a book written for the lobbyists: The regulation game.



“Regulatory policy is increasingly made with the participation of experts, especially academics. A regulated firm or industry should be prepared whenever possible to co-opt these experts. This is most effectively done by identifying the leading expert in each relevant field and hiring them as consultants or advisors or giving them research grant or the like. This activity requires a modicum of finesse; it must not be too blatant, for the experts themselves must not recognize that they have lost their objectivity and freedom of action. ”

Think Tank Scholar or Corporate Consultant? It Depends on the Day

Acting as independent arbiters to shape government policy, many researchers also have corporate roles that are sometimes undisclosed.

By ERIC LIPTON, NICHOLAS CONFESSORE and BROOKE WILLIAMS

AUG. 8, 2016

The New York Times

http://www.nytimes.com/2016/08/09/us/politics/think-tank-scholars-corporate-consultants.html?_r=0

“In economics, medicine, energy and a host of other subjects, there are fears that financial conflicts of interest give the impression that academic findings are up for sale.”

Matthews, D., 2015, Is industry funding undermining trust in science?, Times Higher Education, <https://www.timeshighereducation.com/features/is-industry-funding-undermining-trust-in-science>



Film ‘Inside Job’. Interview with Frederic Mishkin, a banking professor at Columbia University, praising Iceland’s “strong” banking regulation system two year before it went bust. Mishkin had been paid \$124,000 by the Icelandic Chamber of Commerce to write the paper. The story of the work’s title exposed by the film.

Cambridge Journal of Economics 2012, 36, 43–63
doi:10.1093/cje/ber036

Dangerous interconnectedness: economists’ conflicts of interest, ideology and financial crisis

Jessica Carrick-Hagenbarth and Gerald A. Epstein★

Matthews, D., 2015, Is industry funding undermining trust in science?, Times Higher Education,
<https://www.timeshighereducation.com/features/is-industry-funding-undermining-trust-in-science>

Campaign for Accountability's ("CfA") new report, **Academic Deception**, reveals how a payday lending industry trade association paid for and edited a controversial academic paper claiming that payday loans do not leave consumers trapped in cycles of debt.



<https://www.scribd.com/doc/288230891/Academic-Deception>

Economics and its cyclic crises of relevance

Today: the ‘Mathiness’ discussion: blogs of Paul Romer, Judith Curry and Erik Reinert’s ‘scholasticism’ paper.

See <https://paulromer.net/mathiness/>

<https://judithcurry.com/2015/08/12/the-adversarial-method-versus-feynman-integrity-2/>

http://www.andreasaltelli.eu/file/repository/Full_Circle_scholasticism_2.pdf



Paul Romer



Judith Curry



Erik Reinert

Ripples from the crisis:
toward a fact-less
democracy?

“Michael Gove, a Conservative Outsider once close to Prime Minister David Cameron, said: “People in this country have had enough of experts.”

P. Stephens, Financial Times, June 23 2016, <https://www.ft.com/content/bfb5f3d4-379d-11e6-a780-b48ed7b6126f>

See also <https://www.ft.com/content/82a1a548-3b93-11e6-8716-a4a71e8140b0#axzz4Hzb9D6Ql>





LUCY P. MARCUS

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PROJECT SYNDICATE

THE WORLD'S OPINION PAGE

Truthiness on the March

People do replace facts with truthiness='gut feelings'.
But

“As soon as a few experts are found to have been offering half-truths – or worse – the credibility of the entire field can be called into question.”



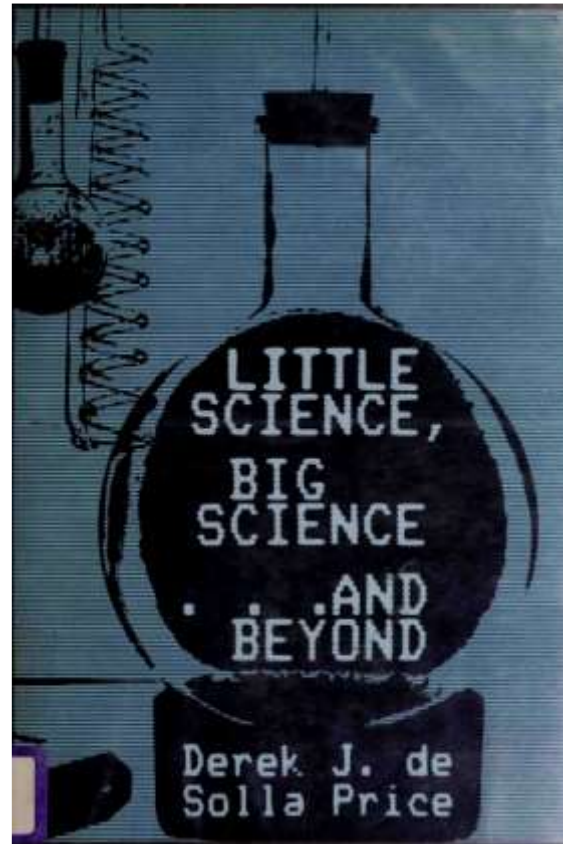
Discussion points



- How does this crisis affect me? Do I recognize elements of this crisis in my life as a student?

The causes

In 1963 Derek J. de Solla Price prophesized that Science would reach saturation (and in the worst case senility) under its own weight, victim of its own success and exponential growth (pp 1-32).



Derek J. de Solla Price

Science/knowledge degenerates when it becomes a commodity for Ravetz (1971), Lyotard (1979) and Mirowski (2011).

Ravetz, J., 1971, *Scientific Knowledge and its Social Problems*, Oxford University Press, p. 22.

Lyotard, J.-F. 1979. *La Condition postmoderne. Rapport sur le savoir*, Paris : Minit, Chapter 10.

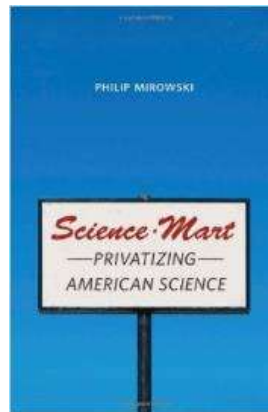
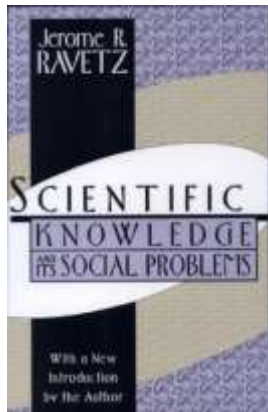
Mirowski, P. 2011. *Science-Mart: Privatizing American Science*, Harvard University Press.



Jerome R.
Ravetz



Jean-François
Lyotard



Philip Mirowski

p.22: “with the industrialization of science, certain changes have occurred which weaken the operation of the traditional mechanism of quality control and direction at the highest level. [...] The problem of quality control in science is thus at the centre of the social problems of the industrialized science of the present period. If it fails to resolve this problem [...] then the immediate consequences for morale and recruitment will be serious; and those for the survival of science itself, grave”

Ravetz, J., 1971, *Scientific Knowledge and its Social Problems*, Oxford University Press, p.22.



Jerome R.
Ravetz

Why quantify?

The myth of scientific quantification via risk or cost benefit analyses, including of the impact of new technologies, has been at the hearth of the critique of the ecological moment (e.g. Schumacher, 1973; Winner, 1986; Funtowicz and Ravetz, 1994)

E. F. Schumacher, 1973, *Small Is Beautiful. Economics as if People Mattered*, Penguin Perennial,

Winner, L., 1986. *The Whale and the Reactor: a Search for Limits in an Age of High Technology*. The University of Chicago Press, 1989 edition.

Funtowicz, S.O. and Ravetz, J.R. (1994). The worth of a songbird: Ecological economics as a post-normal science. *Ecological Economics* 10(3), 197–207.

[...] quality is much more difficult to 'handle' than quantity, just as the exercise of judgment is a higher function than the ability to count and calculate. Quantitative differences can be more easily grasped and certainly more easily defined than qualitative differences: their concreteness is beguiling and gives them the appearance of scientific precision, even when this precision has been purchased by the suppression of vital differences of quality.



Ernst Friedrich
"Fritz"
Schumacher

E. F. Schumacher, 1973, *Small Is Beautiful. Economics as if People Mattered*, Penguin Perennial,

Techniques (such as cost benefit analysis, CBA) are never neutral; according to Winner (1986) ecologists should not fall into the trap of CBA and risk analyses

(Chapter ON NOT HITTING THE TAR-BABY)



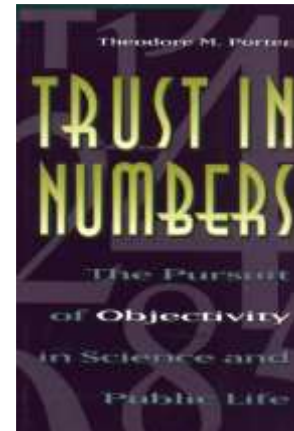
Langdon Winner

Winner, L., 1986. *The Whale and the Reactor: a Search for Limits in an Age of High Technology*. The University of Chicago Press, 1989 edition.

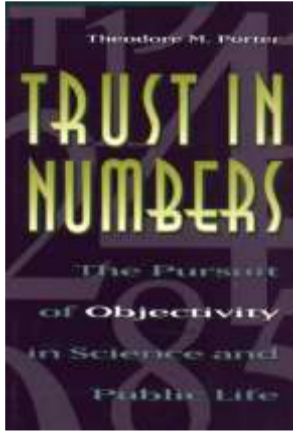
p. 8: “The appeal of numbers is especially compelling to bureaucratic officials who lack the mandate of a popular election, or divine right. Arbitrariness and bias are the most usual grounds upon which such officials are criticized. A decision made by the numbers (or by explicit rules of some other sort) has at least the appearance of being fair and impersonal.”



Theodor M. Porter

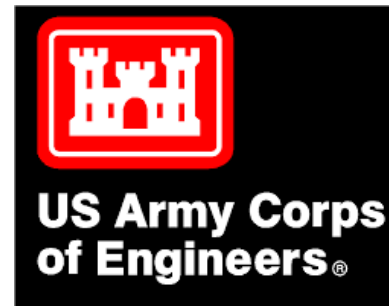


Theodore M. Porter, Trust in Numbers, The Pursuit of Objectivity in Science and Public Life, Princeton 1995



p. 8: “Scientific objectivity thus provides an answer to a moral demand for impartiality and fairness. Quantification is a way of making decisions without seeming to decide. Objectivity lends authority to officials who have very little of their own.”

Trust, authority and styles of quantification: two different stories

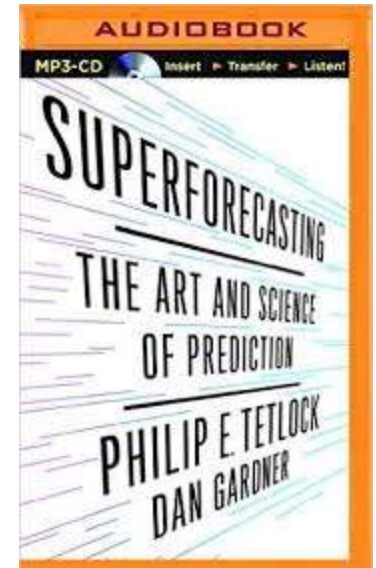


Porter's story: Quantification needs judgment which in turn needs trust ...without trust quantification becomes mechanical, a system, and 'systems can be played'.



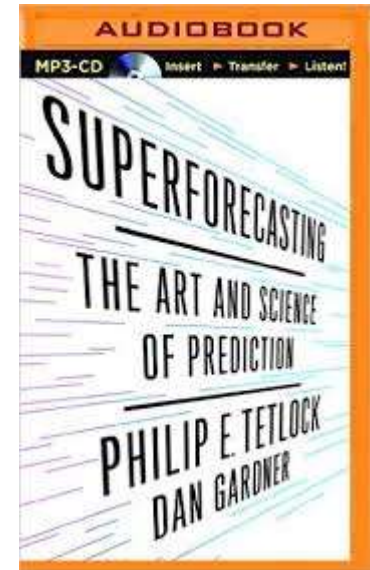
Evidence based
policy or its
opposite?

Evidence-based policy is a movement modeled on evidence-based medicine, with the goal of subjecting government policies to rigorous analysis so that legislators will actually know—not merely think they know— whether policies do what they are supposed to do...



Tetlock P. and Gardner, D., 2015, Super-forecasting. The art and Science of prediction, Penguin, p.257.

[...] Of course politics will always be politics and politicians will always factor in partisan advantage and ideological conviction, but there is plenty of evidence that rigorous analysis has made a real difference in government policy.



Tetlock P. and Gardner, D., 2015, Super-forecasting. The art and Science of prediction, Penguin, p.257.

PETRUCHIO: I say it is the moon.

KATHERINE: I know it is the moon.

PETRUCHIO: Nay, then you lie. It is the blessèd sun.

KATHERINE: Then God be blessed, it is the blessèd sun.

But sun it is not, when you say it is not,

And the moon changes even as your mind.

What you will have it named, even that it is,

And so it shall be so for Katherine.

(Shakespeare, the Taming of the Shrew, Act IV)



The expression ‘Policy based evidence’ has entered the public discourse.

Warring parties accuse one another of the sin.

“Greenpeace [...] wants is policy based evidence making not evidence based policy making” (Sanderson, 2015) ...

Wilkes, G., 2015, Free Lunch: Policy-based evidence-making, Financial Times, July 3.

Sanderson, A.B., 3 Feb 2015, Breitbart, see <http://www.breitbart.com/london/2015/02/03/academic-attacks-greenpeace-for-ignoring-the-evidence-on-gm-crops/>; the politician is UKIP Energy Spokesman Roger Helmer MEP.

“This need [for evidence] has been reified in the UK and elsewhere, as routines of 'evidence-based policy'-making have been hardwired into the business of Government.

[...]such approaches are fundamentally flawed [because] Government [...] seeks to capture and control the knowledge producing processes to the point where this type of 'research' might best be described as 'policy-based evidence'.”

Evidence as hypocognition
& Socially constructed
ignorance

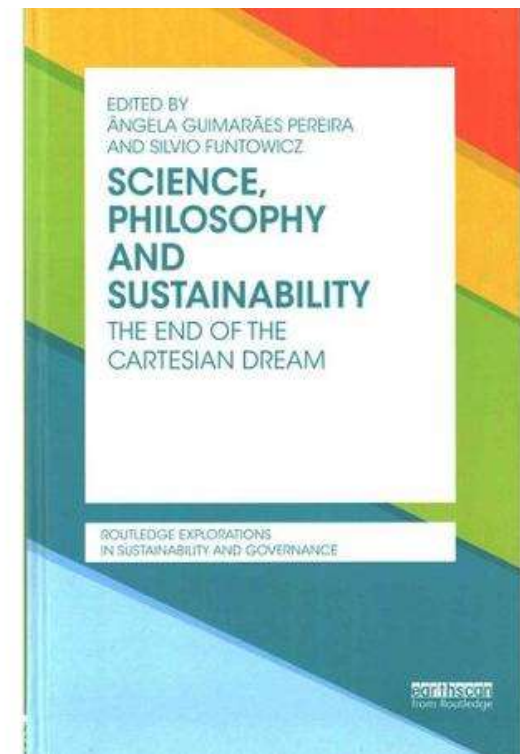
For Rayner (2012) “Sense-making is possible only through processes of exclusion. Storytelling is possible only because of the mass of detail that we leave out. Knowledge is possible only through the systematic ‘social construction of ignorance’ (Ravetz, 1986)”

Rayner, S., 2012, Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourses, *Economy and Society*, 41:1, 107–125.

Rayner's (2012) strategies societies may use to deal with “uncomfortable knowledge”.

- Denial: “There isn’t a problem”
- Dismissal: “It’s a minor problem”
- Diversion: “Yes I am working on it” (In fact I am working on something that is only apparently related to the problem)
- Displacement: “Yes and the model we have developed tells us that real progress is being achieved” (The focus is now the model not the problem).

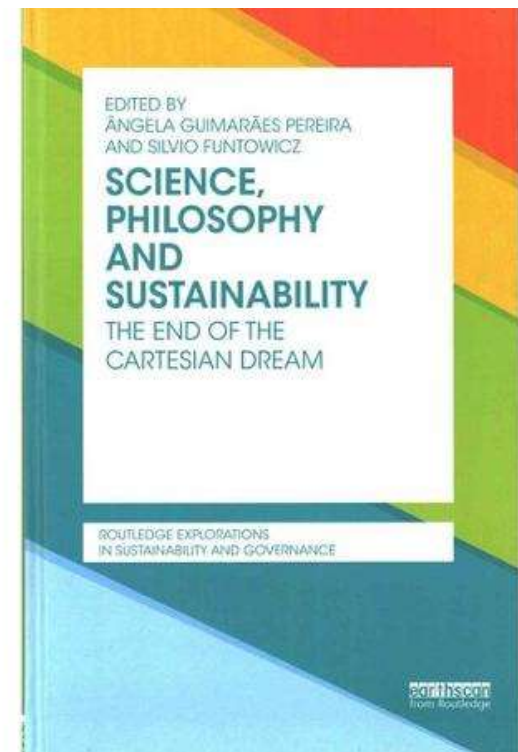
- A plea for a rediscovery of ignorance
 - especially ignorance generated by science itself;



Ravetz, J., R., 2015, Descartes and the rediscovery of ignorance, in Guimarães Pereira, Â., and Funtowicz, S., Eds., 2015, The end of the Cartesian dream, Routledge's series: Explorations in Sustainability and Governance.

Ravetz, J., R., 1987, Usable Knowledge, Usable Ignorance, Incomplete Science with Policy Implications, Knowledge: Creation, Diffusion, Utilization, 9(1), 87–116.

- Dichotomy between knowledge and ignorance as problematic as that between facts and value;
- Ignorance useful: work can be done on its boundaries (finding where these can be penetrated, spotting signals of troubles ahead).
- @ the root of our western humanistic learning; Socrates' **knowing of not knowing**, Cusanus' **docta ignorantia** ...



Ravetz, J., R., 2015, Descartes and the rediscovery of ignorance, in Guimarães Pereira, Â., and Funtowicz, S., Eds., 2015, The end of the Cartesian dream, Routledge's series: Explorations in Sustainability and Governance.

Ravetz, J., R., 1987, Usable Knowledge, Usable Ignorance, Incomplete Science with Policy Implications, Knowledge: Creation, Diffusion, Utilization, 9(1), 87-116.

“Uncomfortable knowledge” can be used as a gauge of an institution’s health.

The larger the “uncomfortable knowledge” an institution needs to maintain, the closer it is to its ancien régime stage (Funtowicz and Ravetz, 1994).



Discussion points



- Am I being fed more evidence based policy or more policy based evidence?
- In my research am I doing more evidence based policy or more policy based evidence?

Remedies

Post-normal science and NUSAP

What is Pseudo-science?

STS scholars Silvio
Funtowicz & Jerome R.
Ravetz's

(STS=studies of science
and technology)

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



- NUSAP, is a notational system for the management and communication of uncertainty in science for policy
- NUSAP's five categories: Numeral, Unit, Spread, Assessment and Pedigree.

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



Post Normal Science's model of Extended Participation across disciplines – acknowledging that different disciplines see through different lenses, and across communities of both experts and stakeholders;



Jerry Ravetz and Silvio Funtowicz

From ‘speaking truth to power’ towards ‘working deliberatively within imperfections’ (Jeroen van der Sluijs, 2012);

Science is but one among a plurality of relevant knowledges;

Facts become ‘extended facts’.

Funtowicz, S. O. & Ravetz, J. R. 1993. Science for the post-normal age. *Futures*, 25(7), 739–755.

Funtowicz, S and Ravetz J 1990, *Uncertainty and Quality in Science for Policy*, Kluwer Academic Publishers, Dordrecht.

van der Sluijs, J. P., 2012. “Uncertainty and Dissent in Climate Risk Assessment: A Post-Normal Perspective”, *Nature and Culture*, 7 (2): 174–195.

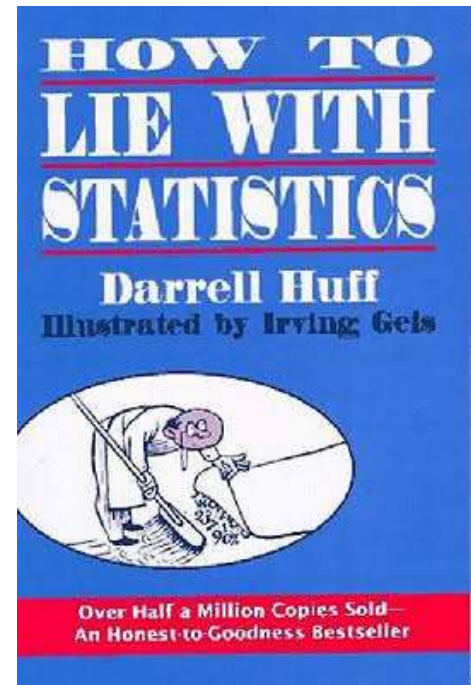
Sensitivity Analysis

Sensitivity analysis secrets

- What is the question?
- Confirmation versus falsification
- Sensitivity analysis is not “run” on a model but on a model once applied to a case.
- Sensitivity analysis should not be used to hide assumptions.
- If SA shows that a question cannot be answered by the model find another question/model which can be treated meaningfully.

Will any sensitivity analysis do the job?

Can I lie with sensitivity analysis as I can lie with statistics?



Saltelli, A., Annoni P., 2010, How to avoid a perfunctory sensitivity analysis, *Environmental Modeling and Software*, **25**, 1508–1517.

Most of sensitivity analyses
(apparently 96 over 100 in 2014)
leave unexplored a very large fraction
– if not the almost totality – of the
input factors space.

Saltelli, A., Annoni P., 2010, How to avoid a perfunctory sensitivity analysis, *Environmental Modeling and Software*, **25**, 1508–1517.

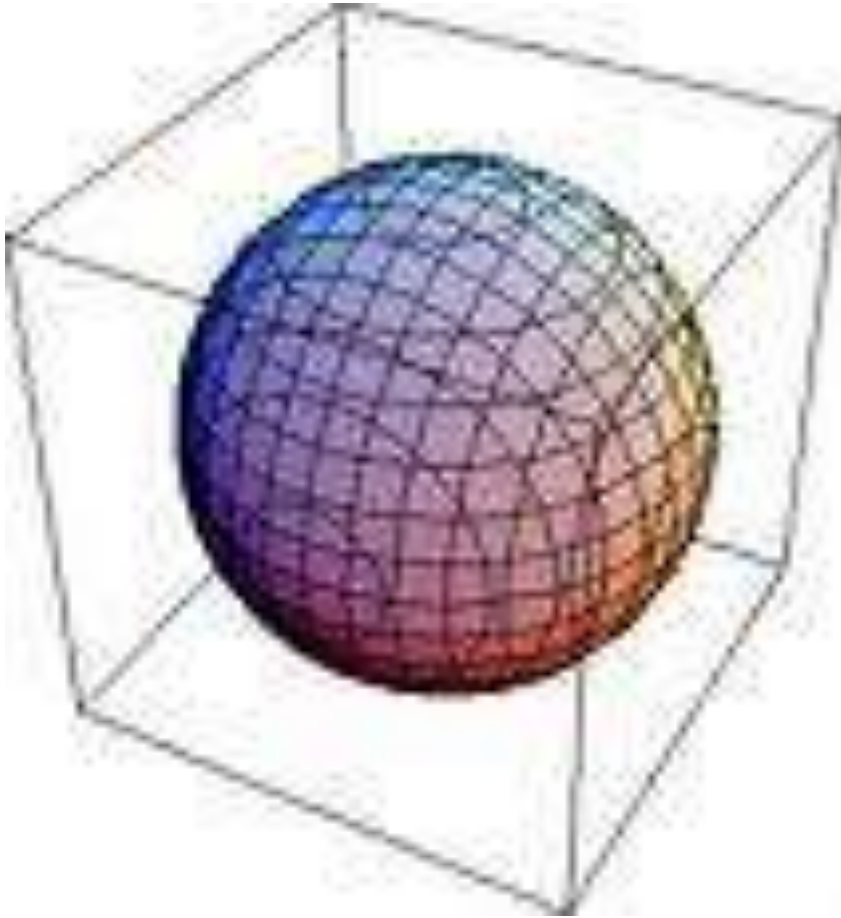
Ferretti, F., Saltelli A., Tarantola, S., 2016, Trends in Sensitivity Analysis practice in the last decade, *Science of the Total Environment*, special issue on Human and biota exposure, <http://dx.doi.org/10.1016/j.scitotenv.2016.02.133>

For a 10 factors model a SA done by moving one factor at a time leaves unexplored 99.75% of the input space.

Saltelli, A., Annoni P., 2010, How to avoid a perfunctory sensitivity analysis, *Environmental Modeling and Software*, **25**, 1508–1517.

Ferretti, F., Saltelli A., Tarantola, S., 2016, Trends in Sensitivity Analysis practice in the last decade, *Science of the Total Environment*, special issue on Human and biota exposure, <http://dx.doi.org/10.1016/j.scitotenv.2016.02.133>

Moving one factor at a time in 3 dimensions
all points remain in the sphere.



Volume sphere /
volume cube =?

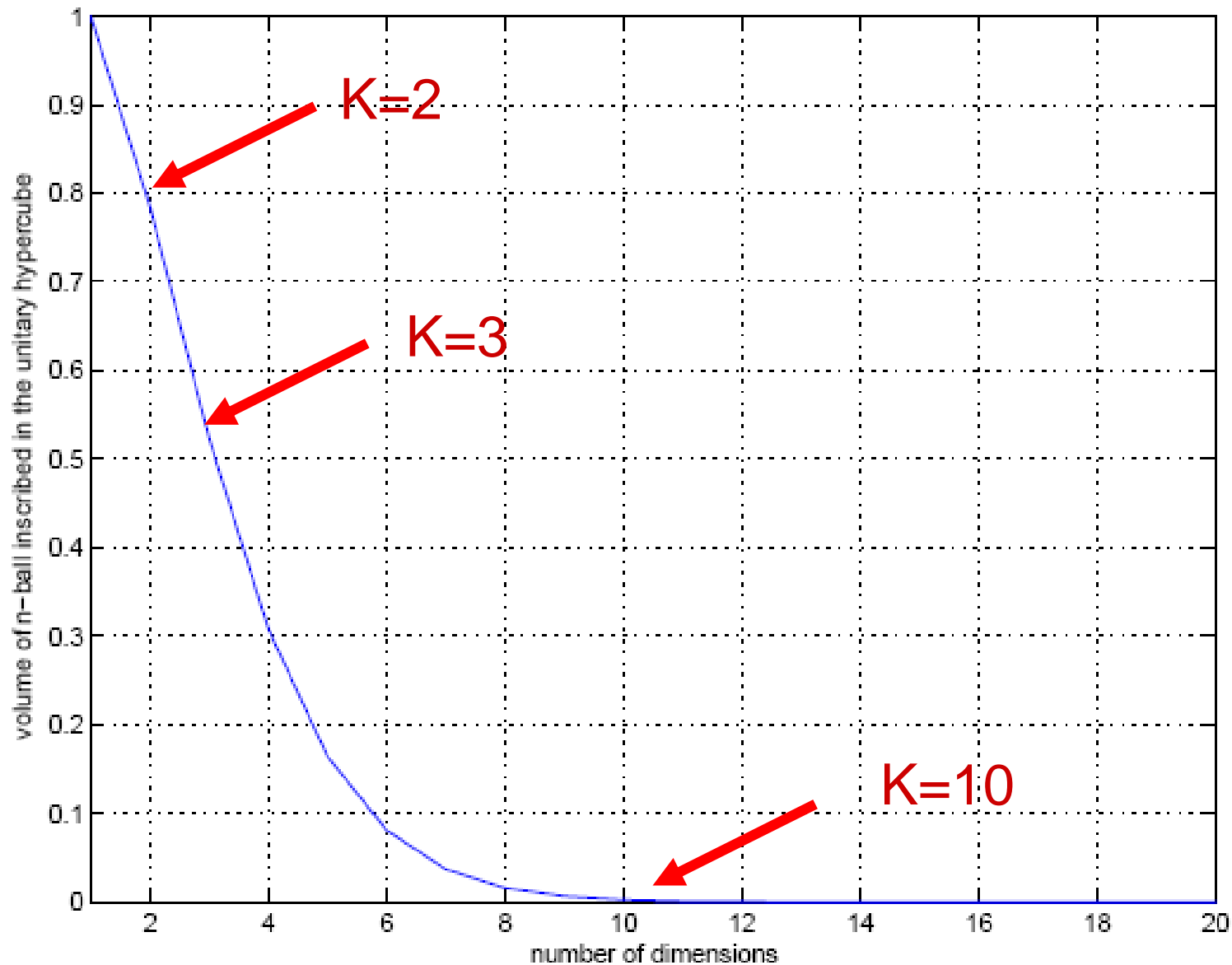
~ 1/2

OAT in 10 dimensions

Volume hypersphere / volume
ten dimensional hypercube ~ 0.0025



OAT in k dimensions



Sensitivity Auditing

Sensitivity auditing

- Originates from uncertainty & sensitivity analysis
- Addresses model-based evidence used for policy

Saltelli, A., Guimarães Pereira, Â., Van der Sluijs, J.P. and Funtowicz, S., 2013, What do I make of your latinorum? Sensitivity auditing of mathematical modelling, Int. J. Foresight and Innovation Policy, 9, 2/3/4, 213–234.

Saltelli, A., Funtowicz, S., When all models are wrong: More stringent quality criteria are needed for models used at the science-policy interface, Issues in Science and Technology, Winter 2014, 79-85.
<http://issues.org/30-2/andrea/>

RULE ONE: Check against rhetorical use of mathematical modelling



The instrumental use of mathematical modelling to advance one's agenda can be termed rhetorical, or strategic, like the use of Latin by the elites and the clergy in the classic age.

RULE TWO: Adopt an ‘assumption hunting’ attitude;

What was ‘assumed out’? What are the tacit, pre-analytic, possibly normative assumptions underlying the analysis?

E.g. in ‘Bogus Quantification: Uses and Abuses of Models’ John Kay uncovers that the UK transport WebTAG model (the standard for transport policy simulation) needs as input ‘Annual Percentage Change in Car Occupancy up to 2036.’



John Kay

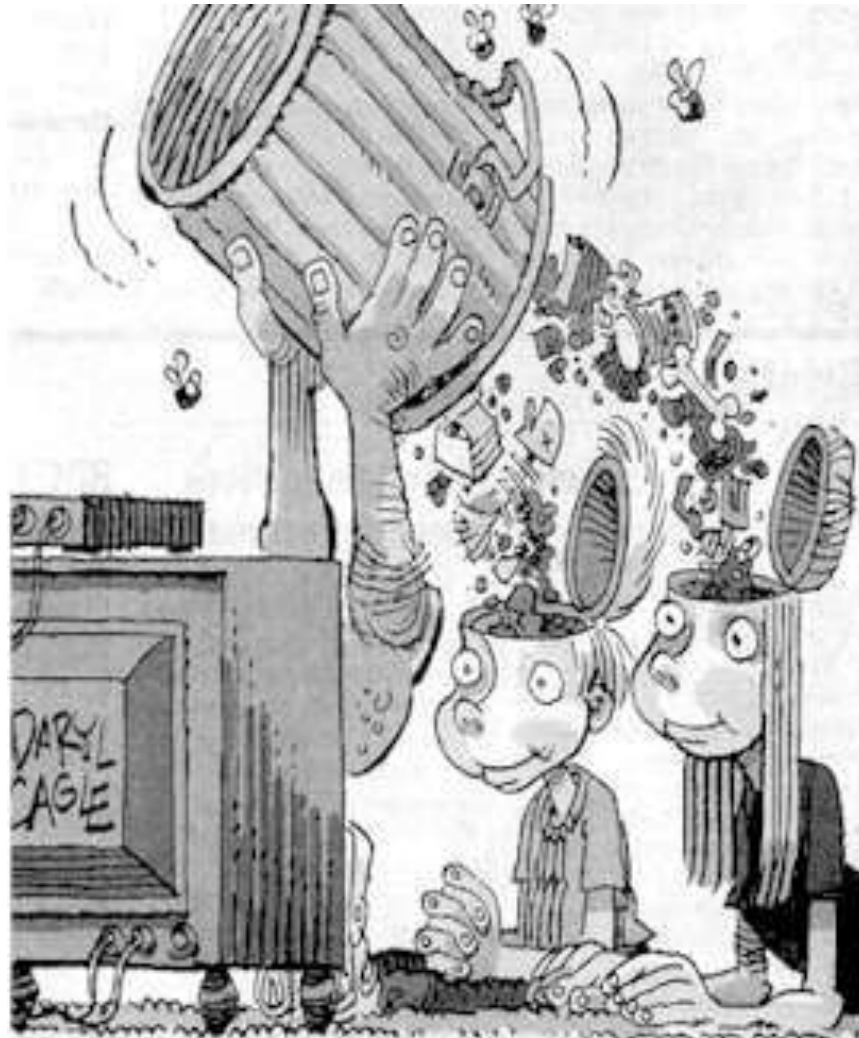


Discussion points



- Can I recall an example of ‘excessive’ or exaggerated quantification (hyper-precision)?
- In my research am I haunted by a hidden assumptions, or by an elephants in the room nobody else sees?

RULE THREE: detect GIGO (Garbage In, Garbage Out)
Science or pseudo-science, artificial inflation/deflation of
uncertainties



Quantitative
story-telling
and responsible
quantification

“There is only a perspective seeing, only a perspective “knowing”; and the more affects we allow to speak about one thing, the more eyes, different eyes, we can use to observe one thing, the more complete will our “concept” of this thing, our “objectivity”, be.”

Friedrich Nietzsche, *Genealogy of Morals*, Third Essay

Quantitative story telling paying attention
to frames – in order to open them ...

.. To explore a broader set of plausible and
relevant stories.

Chapter 2 in THE BOOK



THE RIGHTFUL
PLACE OF SCIENCE:
**SCIENCE ON THE
VERGE**

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- Most analyses offered as input to policy are framed as cost benefit analysis (monetization, the occupational psychosis of economists) or risk analyses.



Langdon Winner

Winner, L., 1986. *The Whale and the Reactor: a Search for Limits in an Age of High Technology*. The University of Chicago Press, 1989 edition.

The issue of frames. How do we perceive the world.

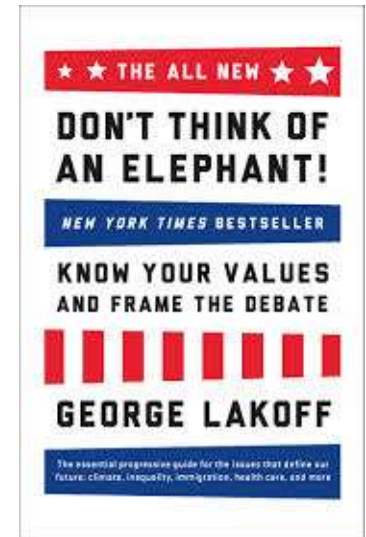


George Lakoff

Lakoff, G., 2010, Why it Matters How We Frame the Environment, Environmental Communication: A Journal of Nature and Culture, 4:1, 70-81.

Lakoff, G., 2004-2014, Don't think of an elephant: know your values and frame the debate, Chelsea Green Publishing.

For a summary see http://www.andreasaltelli.eu/file/repository/Hypocognition_Etc.pdf



Frames

- The expression ‘tax relief’ is apparently innocuous but it suggests that tax is a burden, as opposed to what pays for road, hospitals, education and other infrastructures of modern life (Lakoff, 2004).

Frames

- Published road accident statistics record the conditions of the driver as to alcohol or drug use but not the make and year of the car or its safety features (Gusfield, 1981).

Gusfield, J. (1981). *The Culture of Public Problems. Drinking–Driving and the Symbolic Order.* The University of Chicago Press.

Frames; GMO presented as a food scare.

“Montpelier is **America's only McDonald's-free state capital**. A fitting place, then, for a law designed to satisfy the unfounded fears of foodies [...] genetically modified crops, declared safe by the scientific establishment, but reviled as **Frankenfoods** by the **Subarus-and-sandals set**”, (The Economist, 2014).



The Economist, Vermont v science, The little state that could kneecap the biotech industry, May 10th 2014

Why Free Markets Make Fools of Us

Cass R. Sunstein

OCTOBER 22, 2015 ISSUE

Phishing for Phools: The Economics of Manipulation and Deception

by George A. Akerlof and Robert J. Shiller

Princeton University Press, 272 pp., \$24.95



The Rolls-Royce Silver Cloud — \$13,995

“At 60 miles an hour the loudest noise in this new Rolls-Royce comes from the electric clock”

An advertisement for Rolls-Royce from the late 1950s

Frames and narratives

For Akerlof and Shiller – against what the ‘invisible hand’ would contend – economic actors have no choice but to exploit frames to ‘phish’ people into practices which benefit the actors not the subject phished. Implication for democracy.



George Akerlof



Robert R. Shiller

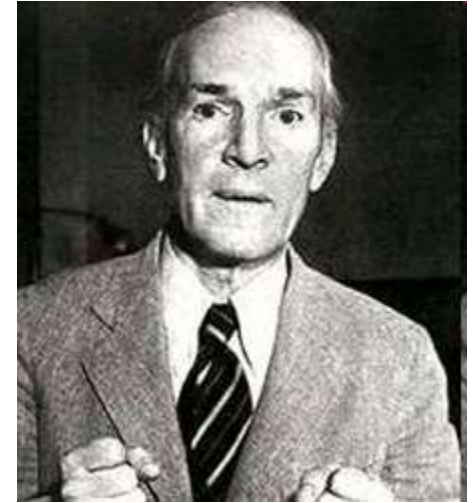
Instead of Evidence-based policy: robust policy.

Test for:

- feasibility (compatibility with processes outside human control);
- viability (compatibility with processes under human control, in relation to both the economic and technical dimensions); and
- desirability (compatibility with a multitude of normative considerations relevant to a plurality of actors).

On the persistence of narratives

“It is difficult to get a man to understand something when his salary depends upon his not understanding it.”



Upton Sinclair



Discussion points



- Can I recall an instance where uncertainties have been either amplified or deflated instrumentally?
- Can I recall an example of a framing which did not sound right to me?

The way



Bacon believed that
in order to achieve
progress “idols”
should be swept
away

"Tempore Patet Occulta Veritas"

=

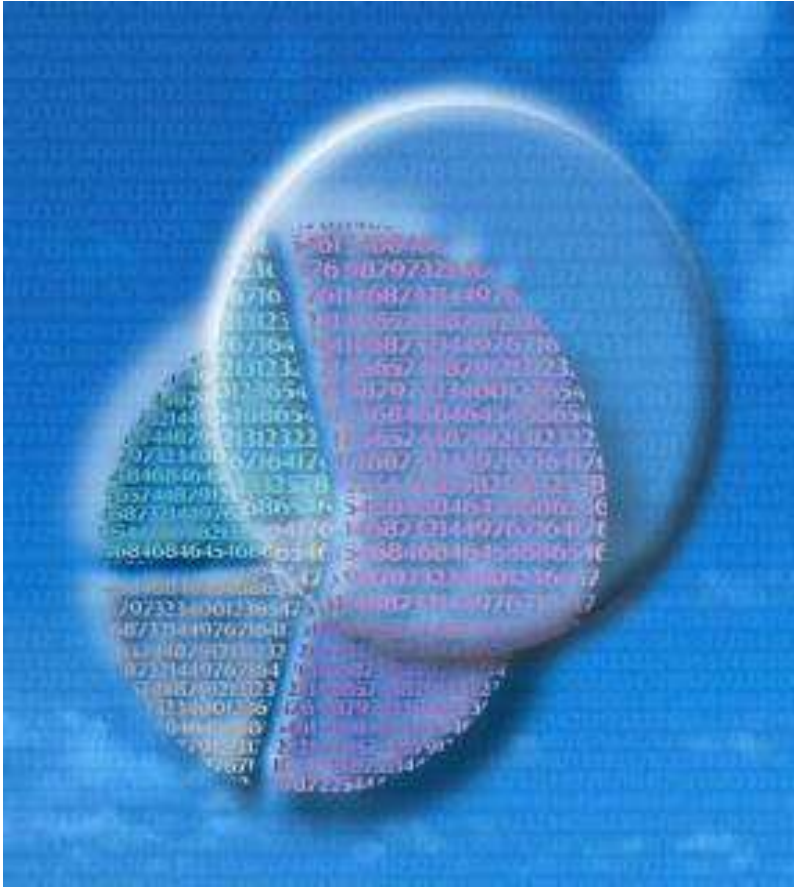
'Time brings forth hidden truth',
from the front

From the front page of the New Atlantis

Many idols in the public discourse on science:

- The Cult of Science, inclusive of:
 - science as metaphysics,
 - scientists as nobler human beings;
- Positivistic, techno-optimistic paradigms;
- Deficit model;
- The idea ‘science’ speak with one voice;
- Science’s neutrality.





END

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From the section 'The Demythologization of Science'

This cognitive disorder rests on the illusion that the knowledge of the individual citizen is of less value than the "knowledge" of science. The former is the opinion of individuals. It is merely subjective and is excluded from policies. The latter is "objective"-defined by science and promulgated by expert spokesmen. This objective knowledge is viewed as a commodity which can be refined, constantly improved, accumulated and fed into a process, now called "decision-making." This new mythology of governance by the manipulation of knowledge-stock inevitably erodes reliance on government by people.

[...]

Even in the courtroom and in parliament, scientific hearsay – well hidden under the veil of expert testimony – biases juridical and political decisions. Judges, governments, and voters abdicate their own evidence about the necessity of resolving conflicts in a situation of defined and permanent scarcity and opt for further growth on the basis of data which they admittedly cannot fully understand.

[...]

But closed peer groups cannot be entrusted with self-restraint in furthering their expert knowledge.

[...]

Scientific measurements may suggest that a certain endeavor threatens a major balance of life. Only the informed judgment of a majority of prudent men who act on the much more complex basis of everyday evidence can determine how to limit individual and social goals. Science can clarify the dimensions of man's realm in the universe. Only a political community can dialectically choose the dimensions of the roof under which its members will live.