

Sensitivity analysis, sensitivity auditing and quantitative story telling. Hints for use in the Adverse Outcome Pathways model

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London, UK
The Wellcome Collection

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Barcelona, Bellaterra Campus, February 6–8 2017

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Lovely (also in the sense of 'of love') piece by an Italian scholar [@robertocalasso](https://twitter.com/robertocalasso):

[nybooks.com/articles/2016/...](https://nybooks.com/articles/2016/)

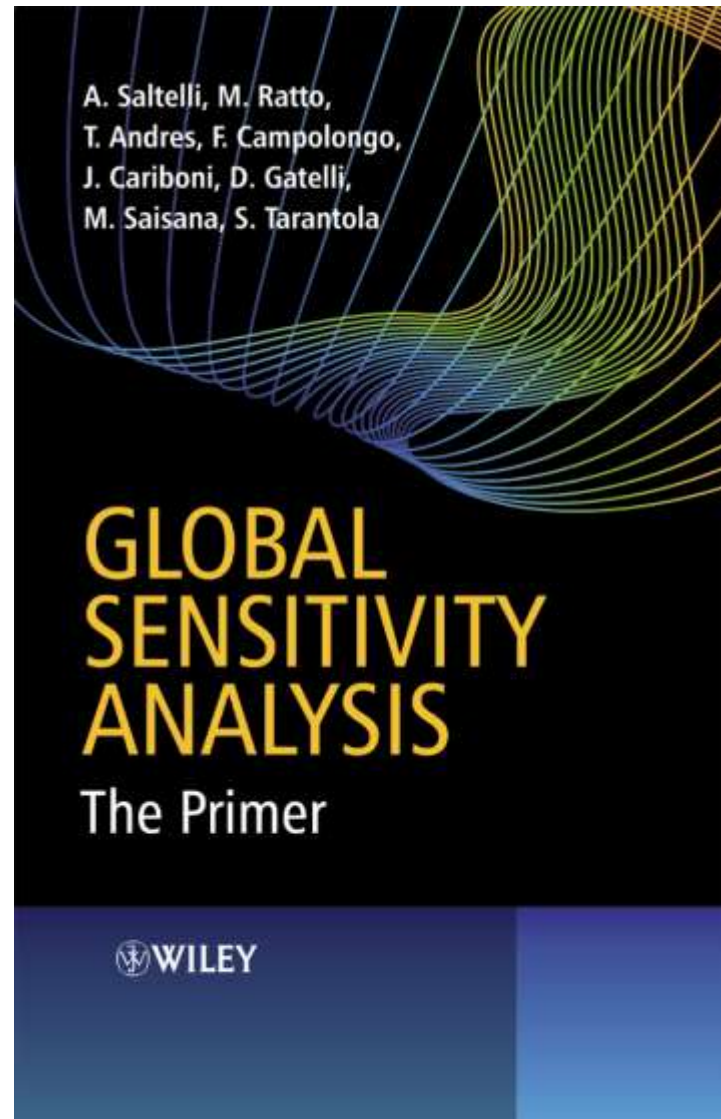


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sensitivity analysis, sensitivity auditing, science for policy, impact assessment

Sensitivity analysis book available on LibGen



Sensitivity analysis

[Saltelli, A., Annoni, P., 2010, How to avoid a perfunctory sensitivity analysis, Environmental Modeling and Software, 25, 1508–1517.](#)

Sensitivity auditing

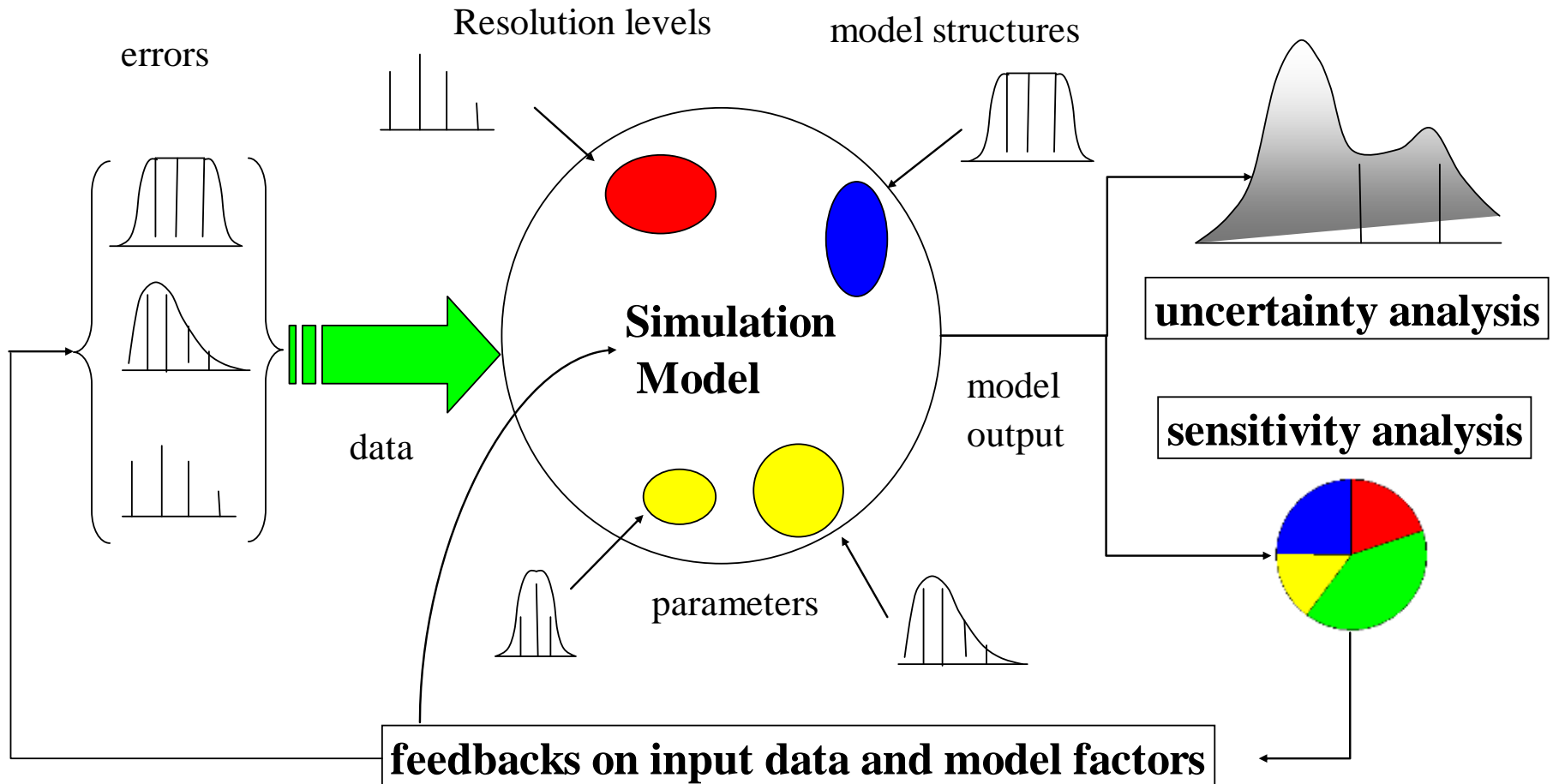
[Saltelli, A., Funtowicz, S., 2014, When all models are wrong: More stringent quality criteria are needed for models used at the science–policy interface, Issues in Science and Technology, Winter 2014, 79–85.](#)

Quantitative storytelling

[Andrea Saltelli, Mario Giampietro, 2017, What is wrong with evidence based policy, and how can it be improved? Futures, DOI: <http://dx.doi.org/doi:10.1016/j.futures.2016.11.012>.](#)



An engineer's vision of UA, SA



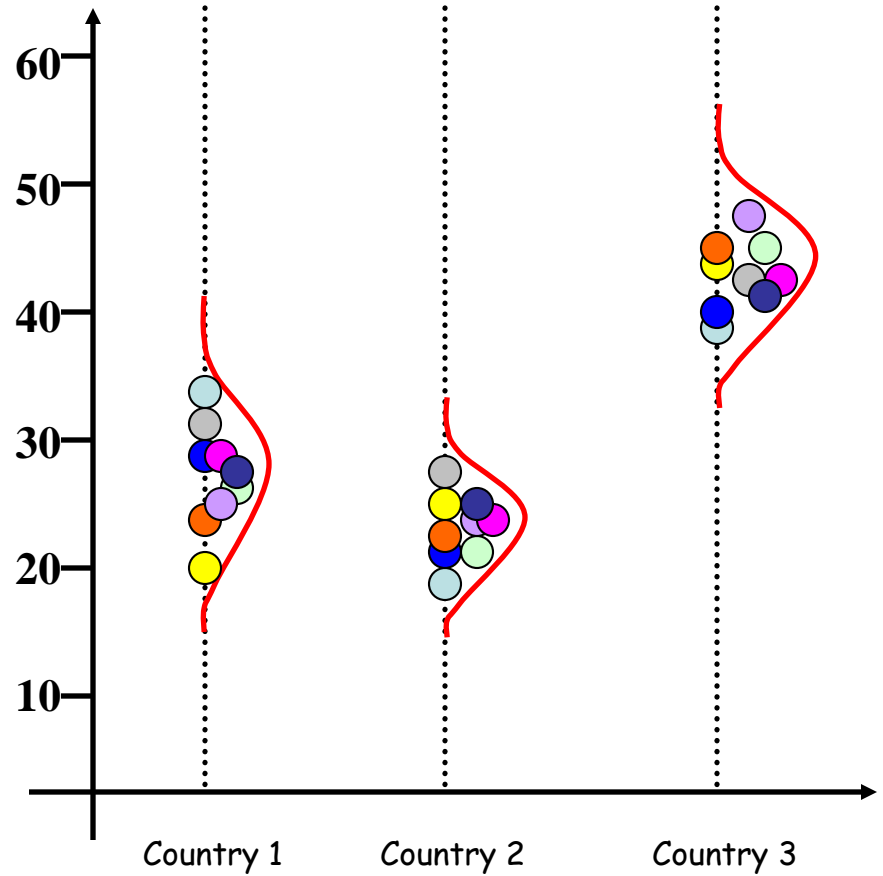
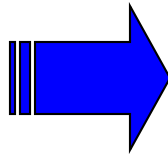
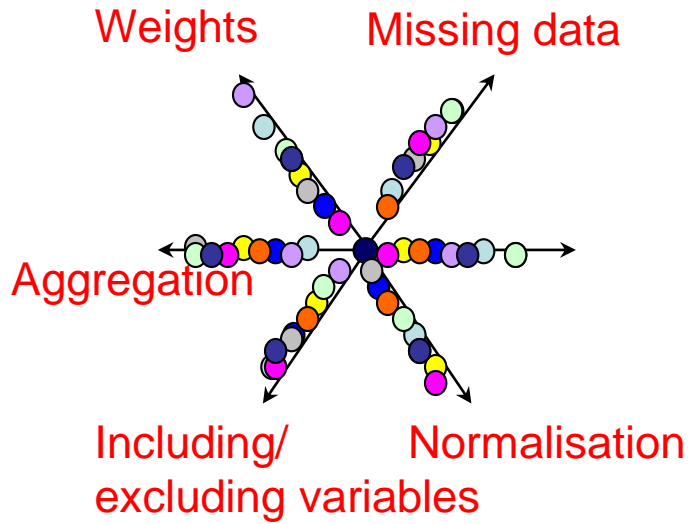
One can sample more than just factors

One can sample modelling assumptions

Example: The output is a composite indicator

Assumption	Alternatives
Number of indicators	<ul style="list-style-type: none">▪ all six indicators included or one-at-time excluded (6 options)
Weighting method	<ul style="list-style-type: none">▪ original set of weights,▪ factor analysis,▪ equal weighting,▪ data envelopment analysis
Aggregation rule	<ul style="list-style-type: none">▪ additive,▪ multiplicative,▪ Borda multi-criterion

Space of alternatives



<http://ec.europa.eu/smart-regulation/>



The screenshot shows the 'Better Regulation Guidelines' page on the European Commission website. The page features a blue header with the European Commission logo and the text 'Better Regulation'. Below the header, there is a navigation menu on the left with options like 'Home', 'REFIT', 'Stakeholder consultations', 'Roadmaps / Inception Impact Assessments', 'Impact Assessment', 'Evaluation', 'Regulatory Scrutiny Board', and 'Guidelines'. The main content area is titled 'Better Regulation Guidelines' and contains text explaining the guidelines, their purpose, and a list of related documents. A sidebar on the right includes a search bar, social media links, and a feedback form.

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Impact Assessment

Evaluation

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Guidelines

- Better Regulation Guidelines
- Better Regulation "Toolbox"
- Key documents

Better Regulation Guidelines

These guidelines explain what Better Regulation is and how it should be applied in the day to day practices when preparing new initiatives and proposals or managing existing policies and legislation.

They cover the whole policy cycle, from policy preparation and adoption to implementation and application, to evaluation and revision of EU law. For each of these phases there are a number of Better Regulation principles, objectives, tools and procedures to make sure that the EU has the best regulation possible. These relate to planning, impact assessment, stakeholder consultation, implementation and evaluation.

The [Better Regulation Guidelines](#) are structured into chapters which cover each of the instruments of the law-making process. The corresponding [toolbox](#) gives more detailed and technical information.

Better Regulation Guidelines are based on the outcomes of public consultation exercises carried out in 2013 and 2014.

- [Public consultation on the revision of the Commission's Impact Assessment Guidelines](#)
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Source: IA Toolbox, p. 391



Secrets of sensitivity analysis

First secret: The most important question is the question.

Corollary 1: Sensitivity analysis is not “run” on a model but on a model once applied to a question.

First secret: The most important question is the question.

Corollary 2: The best setting for a sensitivity analysis is one when one wants to prove that a question cannot be answered given the model

It is better to be in a setting of falsification than in one of confirmation (Oreskes et al., 1994).

[Normally the opposite is the case]

Second secret: Sensitivity analysis should not be used to hide assumptions [it often is]



Third secret: If sensitivity analysis shows that a question cannot be answered by the model one should find another question/model which can be treated meaningfully.

[Often the love for the model prevails]

Badly kept secret:

There is always one more bug!

(Lubarsky's Law of Cybernetic
Entomology)

And of course please don't ...

... run a sensitivity analysis where each factor has a 5% uncertainty



Sensitivity auditing

EC impact assessment guidelines: what do they say about sensitivity auditing ?

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http://ec.europa.eu/smart-regulation/guidelines/docs/br_toolbox_en.pdf

p. 392

... where there is a major disagreement among stakeholders about the nature of the problem, ... then sensitivity auditing is more suitable but sensitivity analysis is still advisable as one of the steps of sensitivity auditing.

Sensitivity auditing, [...] is a wider consideration of the effect of all types of uncertainty, including structural assumptions embedded in the model, and subjective decisions taken in the framing of the problem.

[...]

The ultimate aim is to communicate openly and honestly the extent to which particular models can be used to support policy decisions and what their limitations are.

p. 393

“In general sensitivity auditing stresses the idea of honestly communicating the extent to which model results can be trusted, taking into account as much as possible all forms of potential uncertainty, and to anticipate criticism by third parties.”

Quantitative story-telling

“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.

Frames

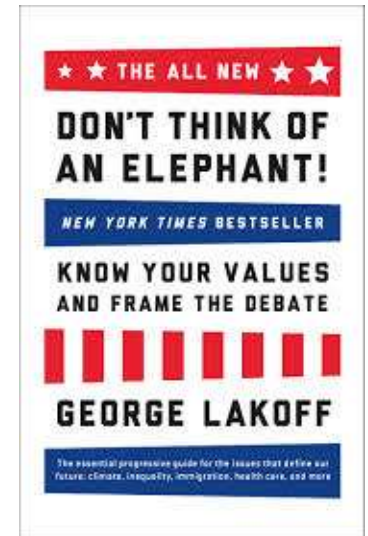
The expression ‘tax relief’ is apparently innocuous but it suggests that tax is a burden, as opposed to what pays for road, hospitals, education and other infrastructures of modern life (Lakoff, 2004).



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.



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 — \$13,595

“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

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.



George Akerlof

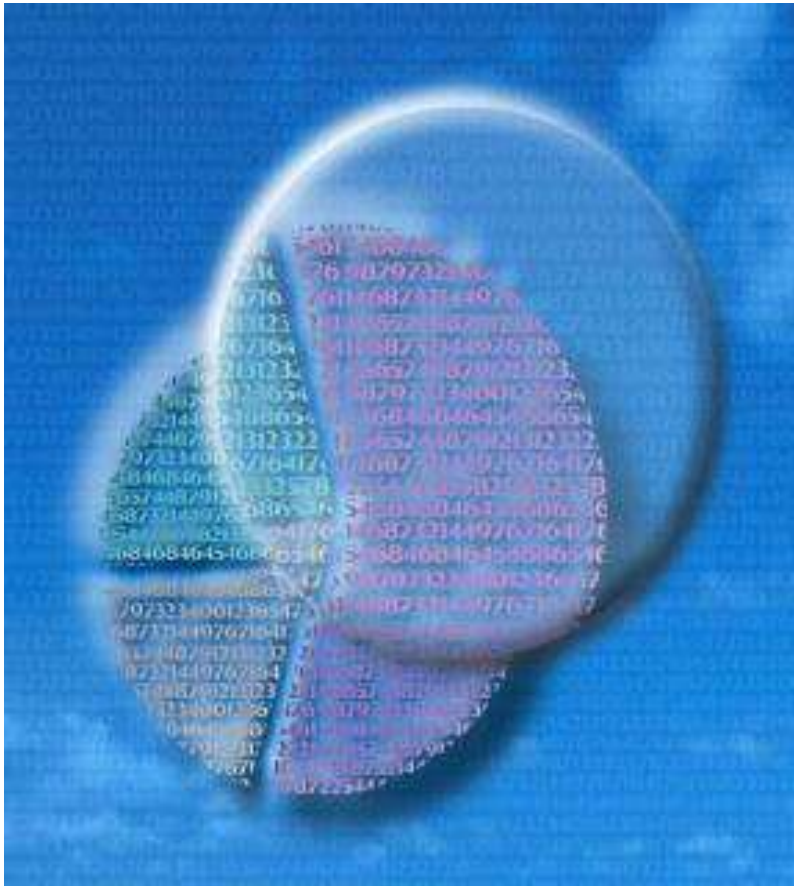


Robert R. Shiller

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).



END

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