

Sound Science: Selective citation in science based decision-making

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Background

What do food regulations, medical interventions, and measures against climate change have in common?

- They depend on science based decision-making.
- This decision-making may be biased in different ways (see blue box).
- Citation bias leads to biased knowledge production, because part of the evidence gets systematically ignored.
- Citation can be driven by different determinants that effect knowledge development and decision-making in varying degrees

In order to get insight in citation, this project has several goals:

- a) to write a review on citation bias,
- b) to develop methodology to investigate
 - prevalence of selective citation
 - its determining factors
- c) to apply this method on different research topics.

Selective reporting

Reporting bias:

Positive results have a higher chance of being reported in a paper than negative results.

Publication bias:

Positive papers have a higher chance of being published in a journal than negative papers.

Citation bias:

Positive papers have a higher chance of being cited than negative papers.

Project information

Duration: Part A of the project has started in January 2015 and will last until July 2017.

Part B may start after that and last for another 1.5 years or more.

Funding: Part A of this project is funded by CEFIC / LRI (LRI-Q3).

Systematic review

The first aim of the project is to get an overview of the available literature on citation bias in all scientific disciplines.

A systematic search strategy has been developed and is applied on the Web of Science Core Collection. All papers containing data on the association between study outcome and citation count were included.

Research area	Found support for citation bias			Total in review
	Yes	No	Mixed / unclear	
Social	2	0	4	6
Biomedical	12	3	4	19
Natural	0	1	2	3
Multiple	1	0	0	1
Total	15	4	10	29

Figure 1: Number of papers on citation bias

Association between significance and citation count

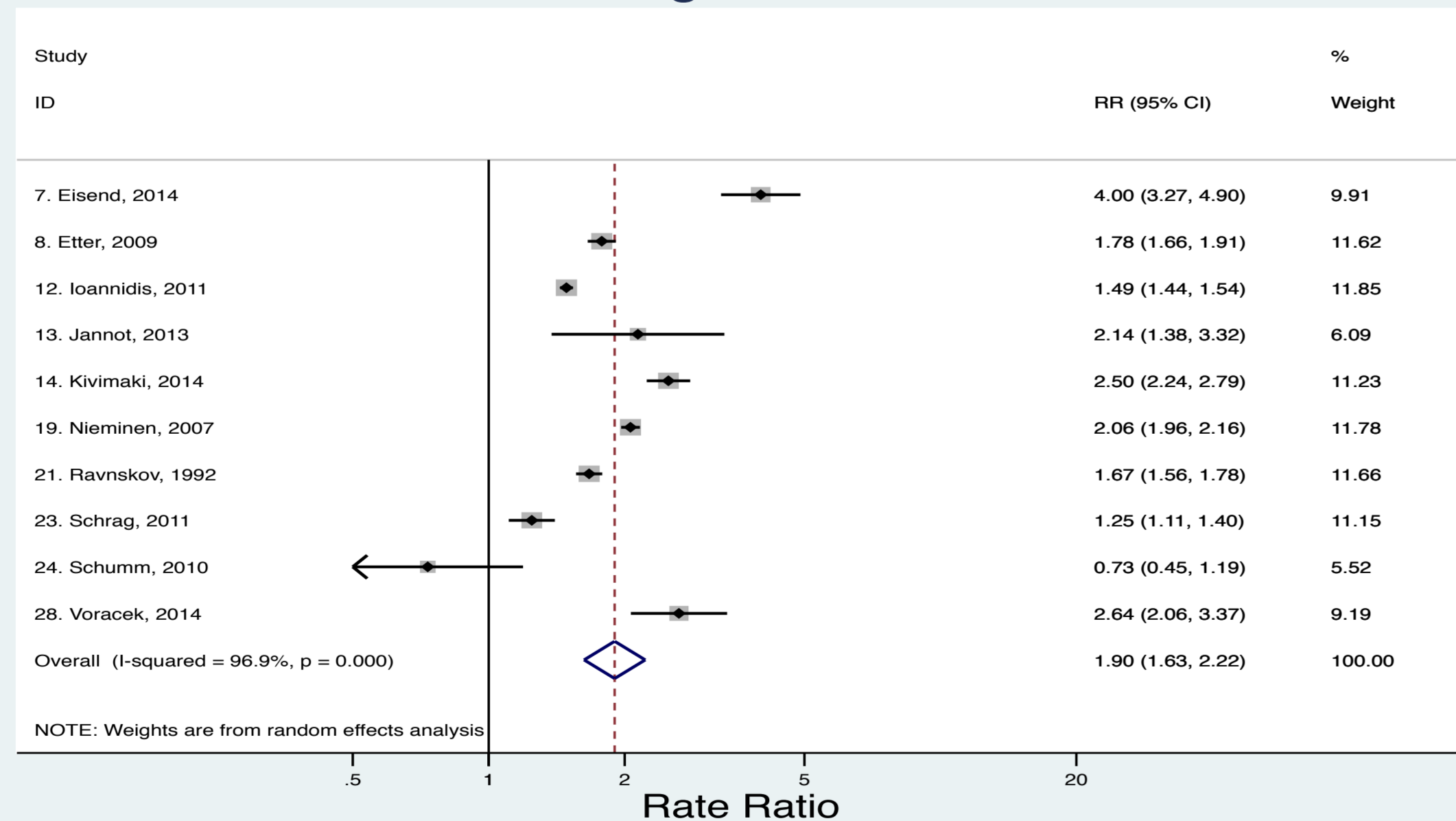
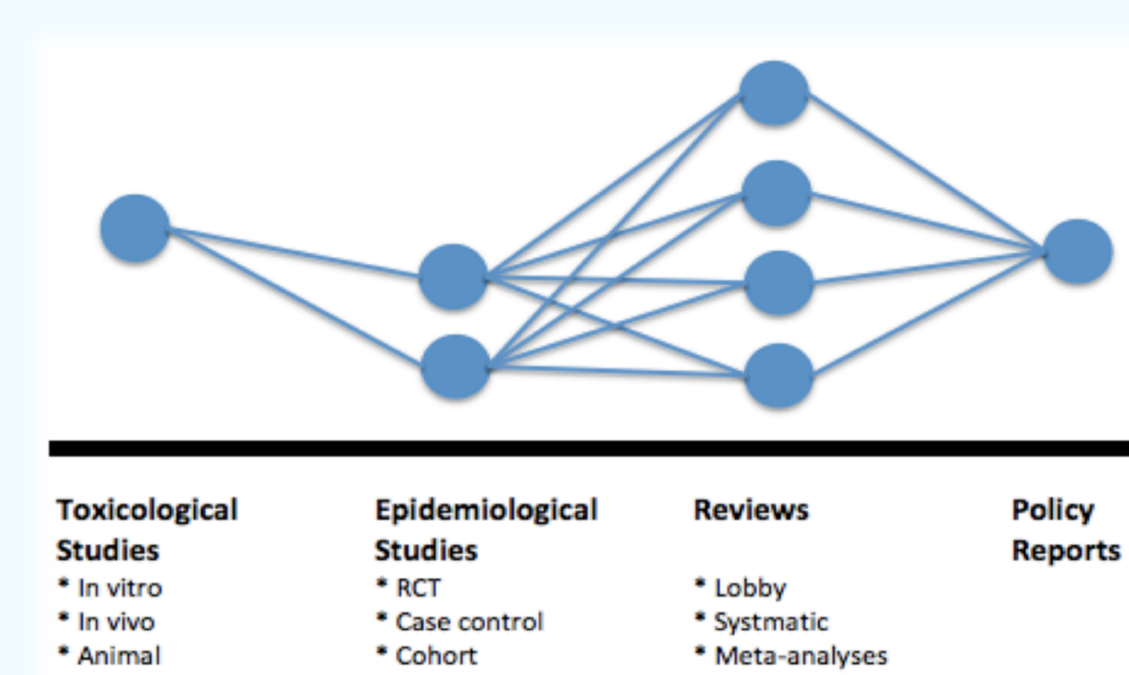


Figure 2: Forest plot on relation between statistical significance and citation count

Papers with significant outcomes are cited twice as often as those with non-significant outcomes.

Citation network analysis

Apart from study outcome, other determinants can drive the selection of citations by authors. Therefore, the second aim of this project is to identify these different determinants and to assess their effect on the knowledge development in different research fields. To reach this aim, citation network analyses on different research fields will be performed.



As a first step in the citation network analysis, all the relevant publications and corresponding citations are identified and visualized in a network (see picture left for an example).

Simultaneously, a list with potential determinants of selective citation has been identified from the scientific literature (see table).

Trans fatty acids and cholesterol

The first research field to perform a citation network analysis on is: the effect of industrially produced trans fatty acids on LDL- and HDL-cholesterol. Scientific consensus has been established in this field. This makes it a suitable topic for our first analysis, because there is not much new data being added to the network. With this analysis we will examine how primary data on this topic developed into a generally accepted scientific consensus.

Potential determinants of citation

Study Outcome *
Hedging *
Funding Source *
Country
Number of affiliations
Number of references
Language
Gender
Authority of the author
Self-citation
Journal impact factor
Study design
Sample size
Study quality **

* unjustified determinant

** justified determinant

Future directions

The third aim of the project is to apply the developed methodology on further research topics, namely:

- Swimming in chlorinated water and childhood's asthma (part A)
- Two research topics, topic to be decided (part A)
- Two research topics, topic to be decided (part B)

Eventually, the project will also cover the following activities:

- Aggregate pattern recognition (overall analysis, part B)
- Dissemination and guideline development (part B)

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