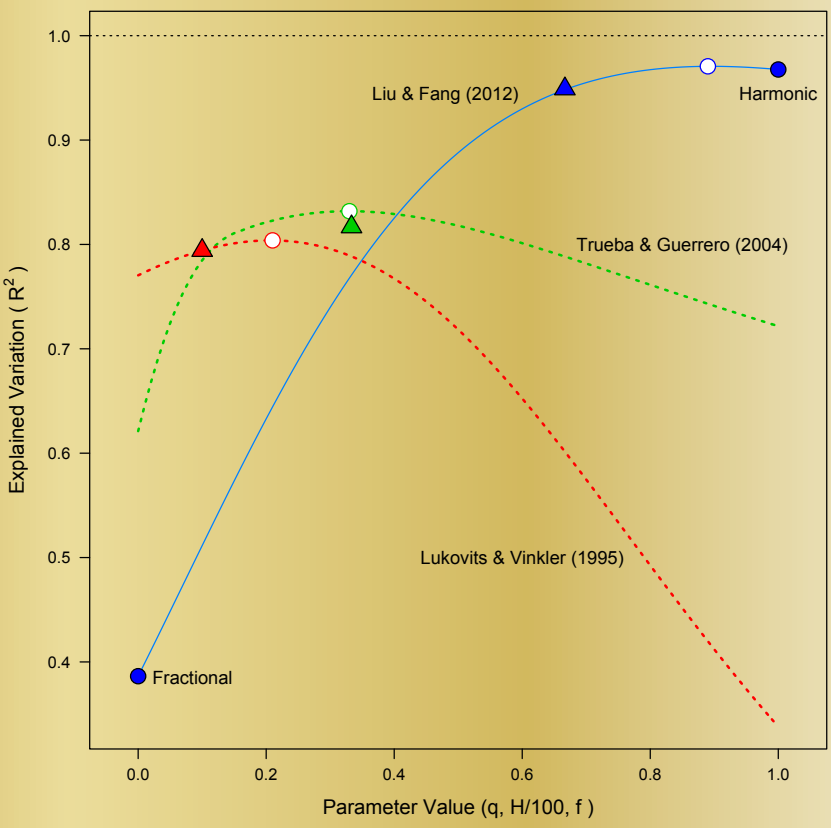
Publication metrics

Improved accuracy is necessary and attainable

MUNIN Conference on Scholarly Publishing
9th Annual Conference
26-27 November 2014
Tromsø, Norway

Nils T. Hagen
Faculty of Bioscience and Aquaculture

UNIVERSITY OF NORDLAND

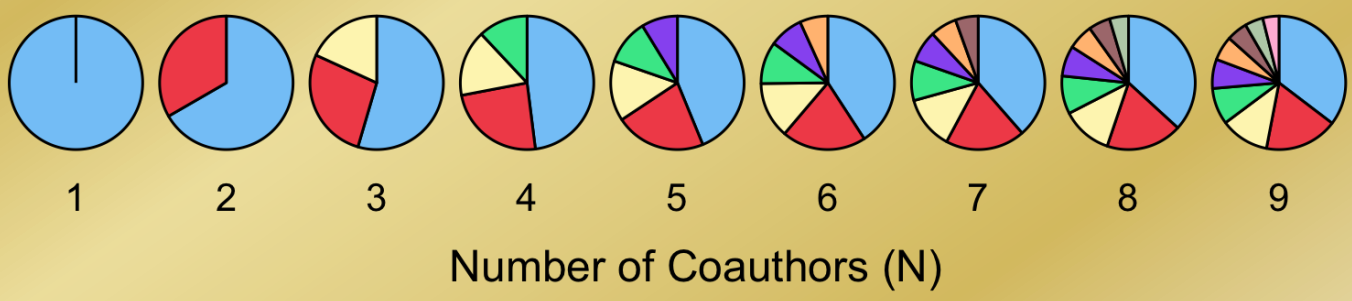


(Hagen 2013 *J. Informetrics* 7:784-789)

Harmonic credit

1. One publication credit is shared among all coauthors
2. The first author gets the most credit, and in general the i^{th} author receives more credit than the $(i + 1)^{th}$ author
3. The greater the number of authors, the less credit per author

(Hagen 2008 *PLoS ONE* 3:e4021, based on Hodge & Greenberg 1981 *Science 213:950*)



willing to suggest that those positions are disproportionately taken up by people with backgrounds in science and engineering?

The authors suggest that scientists and engineers are "trained" to follow wherever the evidence leads. I disagree that majoring in science or engineering is the only way to learn how to consider a problem from all angles. The authors have set up a false dichotomy—being trained to form an argument that best supports a given conclusion does not preclude the ability to examine a situation dispassionately and reach the correct conclusion. Certainly, there are lawyers who are unqualified to make policy decisions on scientific issues, both because they lack basic scientific understanding and because they have other interests besides promoting the best available policies, but the authors have made unwarranted (and insulting) generalizations about lawyers.

DONALD D. DEROSIER
Carmichael, CA 95608, USA. E-mail: derosied@earthlink.net

(*2*). They detailed the advantages of their scheme and proposed the formula: Points = $[(1/i)/(1 + (1/2) + \ldots + (1/N)] \times 100$ for the *i*th author out of *N*. The denominator in the formula is the well-known harmonic series; and the points are standardized to 100 per paper. Apart from the standardization, this is exactly what Sekercioglu proposes.

Sekercioglu's Letter opens by citing a never-cited 40-year-old contribution to *Science* that argued that more than three authors on one paper is not justifiable. It is interesting to note that both Price and Hodge and Greenberg proposed division of authorship credit "… to discourage putting many authors on a single paper" (*1*).

Authorship trends have not progressed as Price and Hodge and Greenberg had hoped. Sekercioglu's letter highlights the need for a critical reappraisal of the way modern bibliometry allocates publication credit (*3*).

NILS T. HAGEN
Department of Biosciences and Aquaculture, Bodø University College, N-8049 Bodø, Norway. E-mail: Nils.Hagen@hibo.no

References
1. S. E. Hodge, D. A. Greenberg, *Science* **213**, 950 (1981).
2. D. D. S. Price, *Science* **212**, 986 (1981).
3. N. T. Hagen, *PLoS ONE* **3**, e4021 (2008).

Response

I THANK HAGEN FOR POINTING OUT A CRITICAL reference (*1*) that I inadvertently omitted. A key difference in my formulation is that author rank can be independent from author order. This is essential in many cases where the last author is the senior author or where some authors may have contributed equally to the publication. Hodge and Greenberg's proposal does not allow for this. They state that "the first author always receives twice as many points as the second" and they have deliberately not allowed for the last author being the senior author, as they "do not wish to encourage this pernicious habit."

We need to encourage the conversation on quantifying coauthor credit so that proposals are rigorously debated, improved, and decided upon by the scientific community. Otherwise, we may still be having this discussion three decades from now.

CAGAN H. SEKERCIOGLU
Center for Conservation Biology, Department of Biology, Stanford University, Stanford, CA 94305, USA. E-mail: cagan@stanford.edu

Reference
1. S. E. Hodge, D. A. Greenberg, *Science* **213**, 950 (1981).

Credit for Coauthors

IN THE LETTER "QUANTIFYING COAUTHOR contributions" (17 October 2008, p. 371), C. H. Sekercioglu's proposal that the *k*th ranked coauthor be considered to contribute $1/k$ as much as the first author is not novel. It was originally made in 1981 in a letter to *Science* by Susan E. Hodge and David A. Greenberg titled "Publication credit" (*1*).

Hodge and Greenberg were responding to a plea from Derek De Solla Price for dividing authorship credit equally among all coauthors

Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 3 months or issues of general interest. They can be submitted through the Web (www.submit2science.org) or by regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

CORRECTIONS AND CLARIFICATIONS

Reports: "A null mutation in human *APOC3* confers a favorable plasma lipid profile and apparent cardioprotection" by T. I. Pollin *et al.* (12 December 2008, p. 1702). On page 1703, the exon was mischaracterized. The second sentence in the second full paragraph of the first column should read as follows: Sequencing of the coding region of *APOC3* revealed a C → T substitution at the terminal nucleotide of exon 2, the 55th nucleotide from the ATG start codon; this substitution resulted in a premature stop codon for an arginine residue at amino acid position 19 (R19X).

TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Arsenic (III) Fuels Anoxygenic Photosynthesis in Hot Spring Biofilms from Mono Lake, California"

B. Schoepp-Cothenet, S. Duval, J. M. Santini, W. Nitschke

Kulp *et al.* (Reports, 15 August 2008, p. 967) described a bacterium able to photosynthetically oxidize arsenite [As(III)] via arsenate [As(V)] reductase functioning in reverse. Based on their phylogenetic analysis of As(V) reductase, they proposed that this enzyme was responsible for the anaerobic oxidation of As(III) in the Archean. We challenge this proposition based on paleogeochemical, bioenergetic, and phylogenetic arguments.

Full text at www.sciencemag.org/cgi/content/full/323/5914/583c

RESPONSE TO COMMENT ON "Arsenic (III) Fuels Anoxygenic Photosynthesis in Hot Spring Biofilms from Mono Lake, California"

R. S. Oremland, J. F. Stolz, M. Madigan, J. T. Hollibaugh, T. R. Kulp, S. E. Hoeft, J. Fisher, L. G. Miller, C. W. Culbertson, M. Asao

Schoepp-Cothenet *et al.* bring a welcome conceptual debate to the question of which came first in the course of planetary biological evolution, arsenite [As(III)] oxidation or dissimilatory arsenate [As(V)] reduction. However, we disagree with their reasoning and stand by our original conclusion.

Full text at www.sciencemag.org/cgi/content/full/323/5914/583d

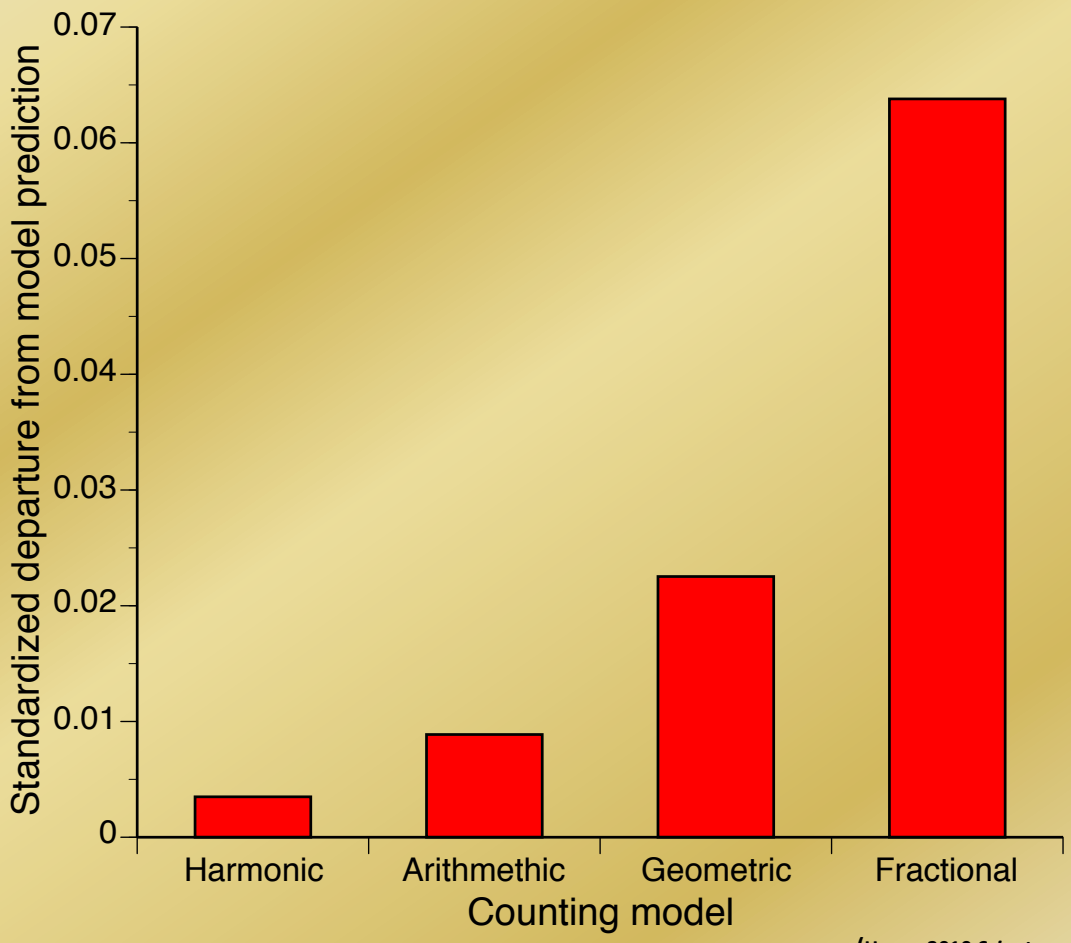
Harmonic formula

(Hagen 2008 *PLoS ONE* 3:e4021, based on Hodge & Greenberg 1981 *Science 213:950*)

$$i^{th}\,author = \frac{\frac{1}{i}}{\left(1 + \frac{1}{2} + \ldots + \frac{1}{N}\right)}$$

1 2 3 4 5 6 7 8 9

Number of Coauthors (N)



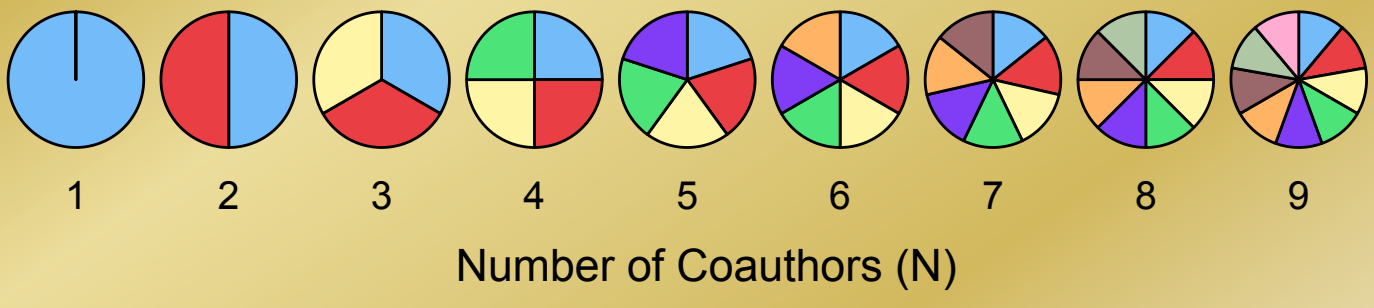
(Hagen 2010 *Scientometrics* 84:785-793)

Fractional credit

One publication credit is shared *equally* among all coauthors

Equalizing bias (EqB) when coauthors have made unequal contributions

EqB = Fractional credit – Harmonic estimate of actual credit

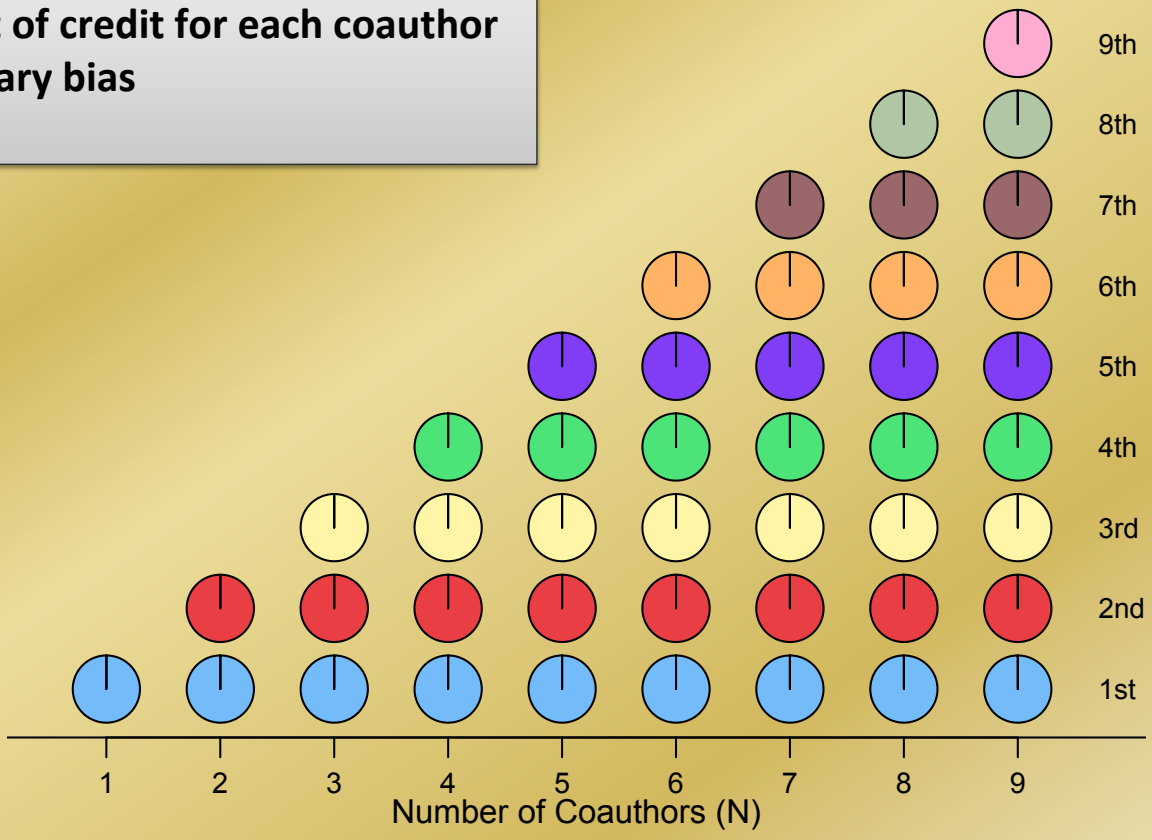


(Hagen 2008 *PLoS One* 3:e4021)

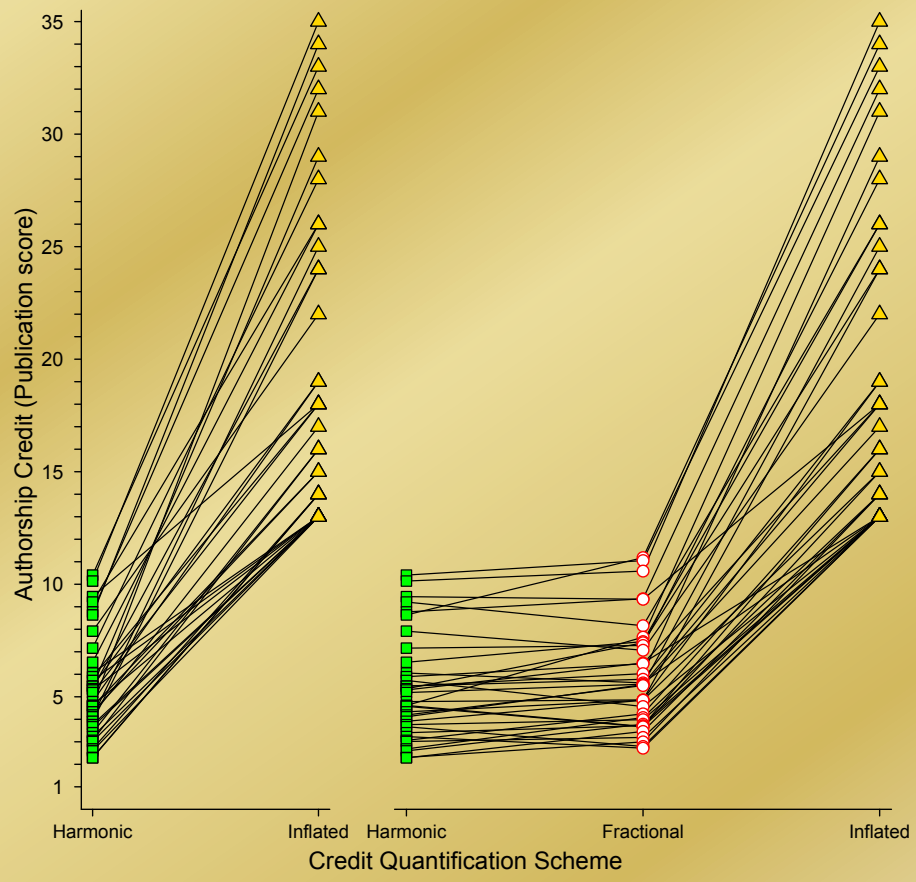
Inflated credit

One full unit of credit for each coauthor

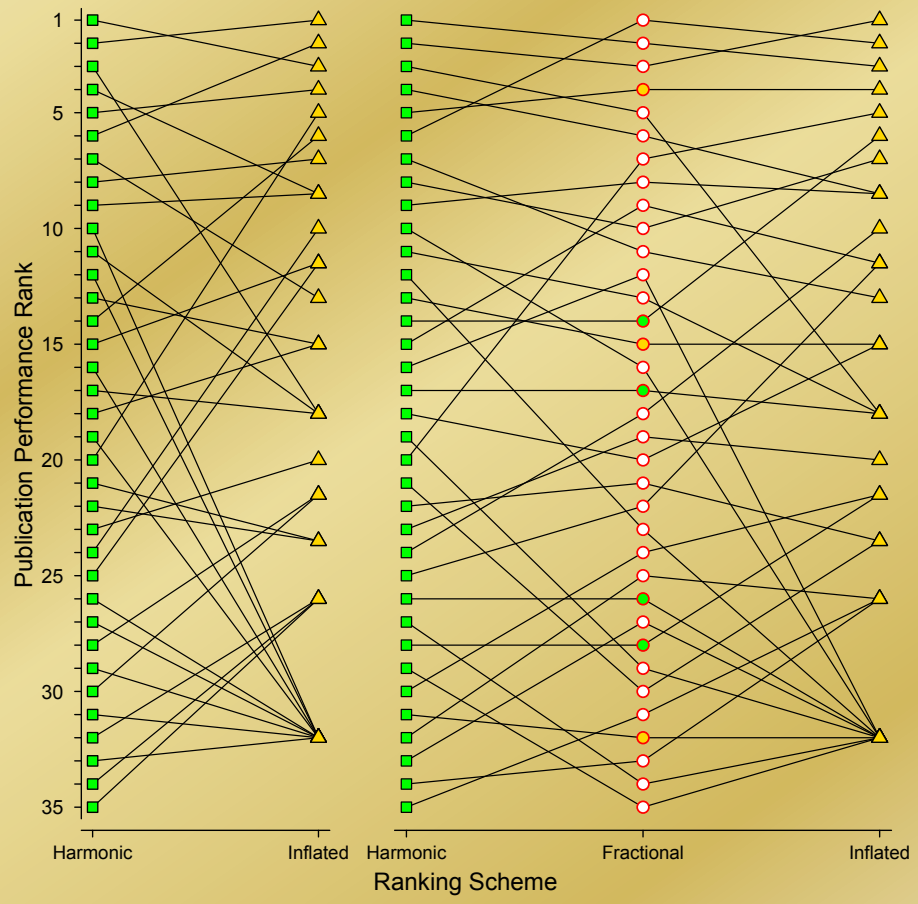
- **Inflationary bias**
- **EqB**



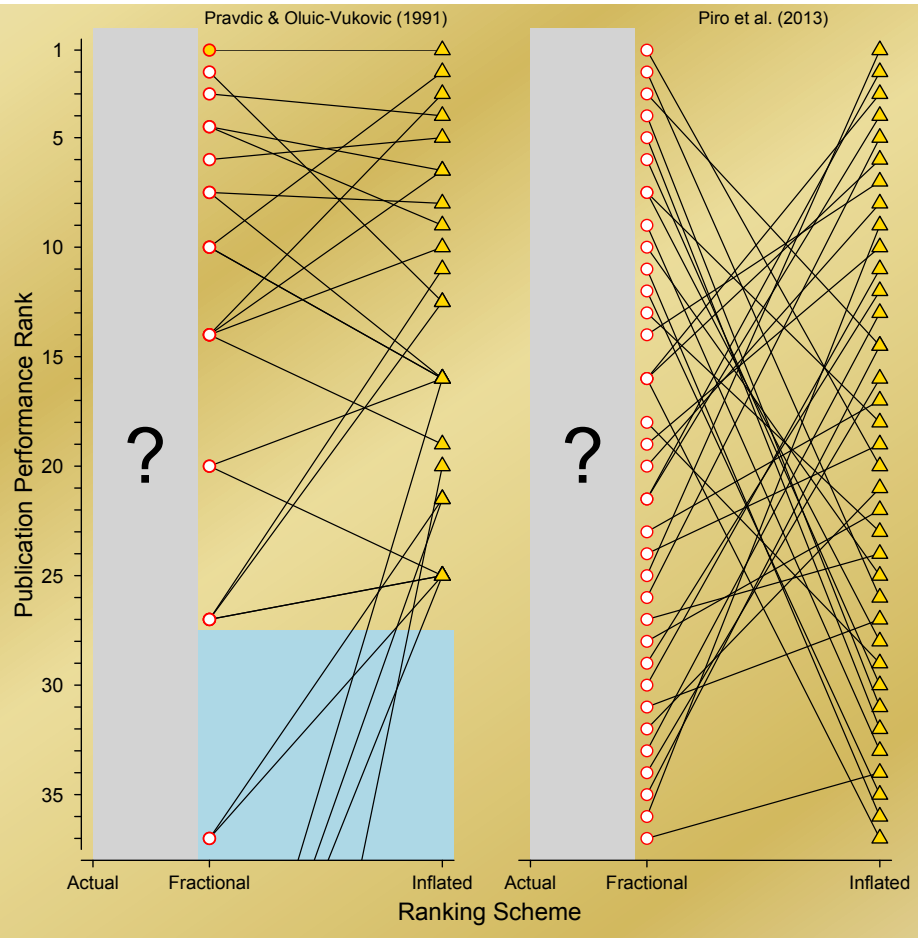
(Hagen 2008 *PLoS One* 3:e4021)



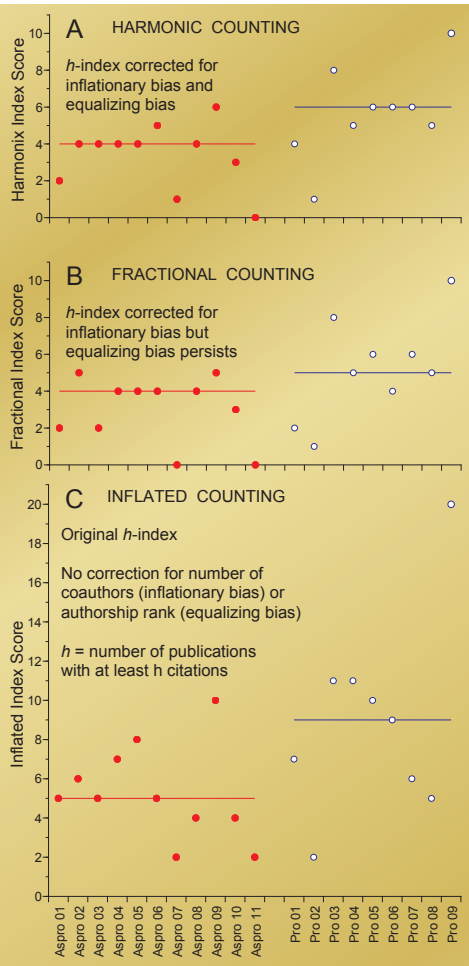
(Hagen 2014 *J. Informetrics* 8:310-317)



(Hagen 2014 *J. Informetrics* 8:310-317)



(Hagen 2014 *J. Informetrics* 8:310-317)



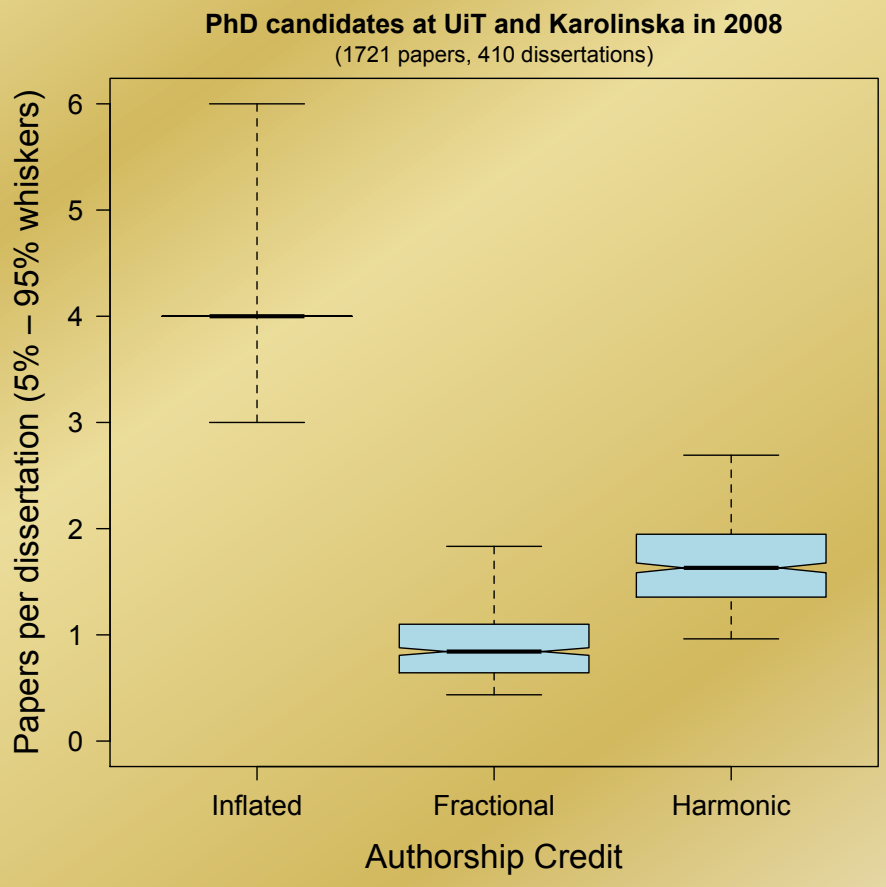
(Hagen 2008 *PLoS One* 3:e4021)

Scandinavian PhD's

Median = 4 papers

Harmonic median
= 1.63 paper equivalents
or
40.8% of credit

Fractional median
= 0.84 paper equivalents
or
21.1% of credit



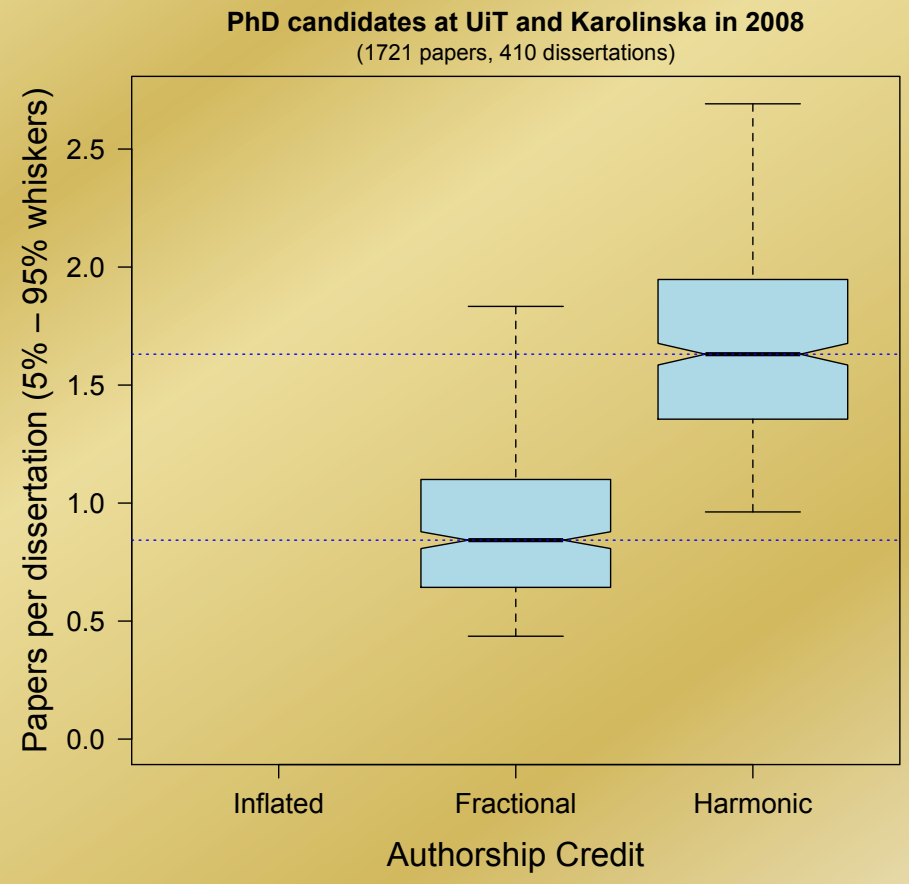
(Data from Hagen 2010 *Scientometrics* 85:576-579)

Scandinavian PhD's

Median = 4 papers

Harmonic median
= 1.63 paper equivalents
or
40.8% of credit

Fractional median
= 0.84 paper equivalents
or
21.1% of credit



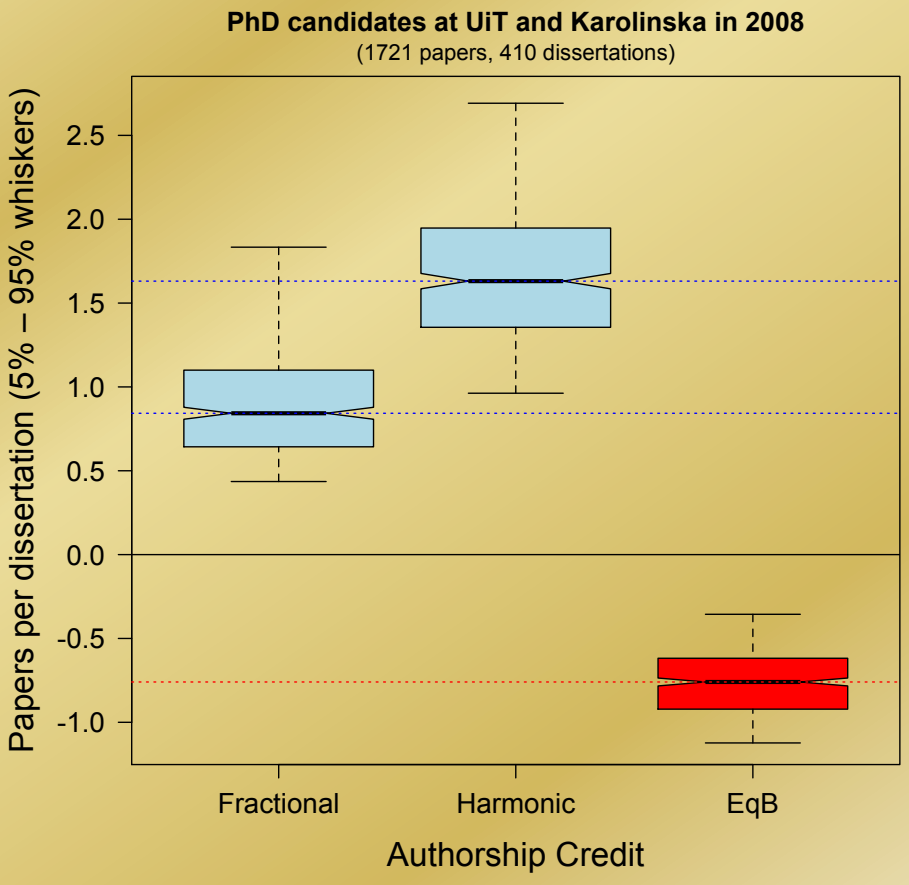
(Data from Hagen 2010 *Scientometrics* 85:576-579)

Scandinavian PhD's

Equalizing bias provides a measure of inaccuracy

Median equalizing bias
= -0.76 paper equivalents

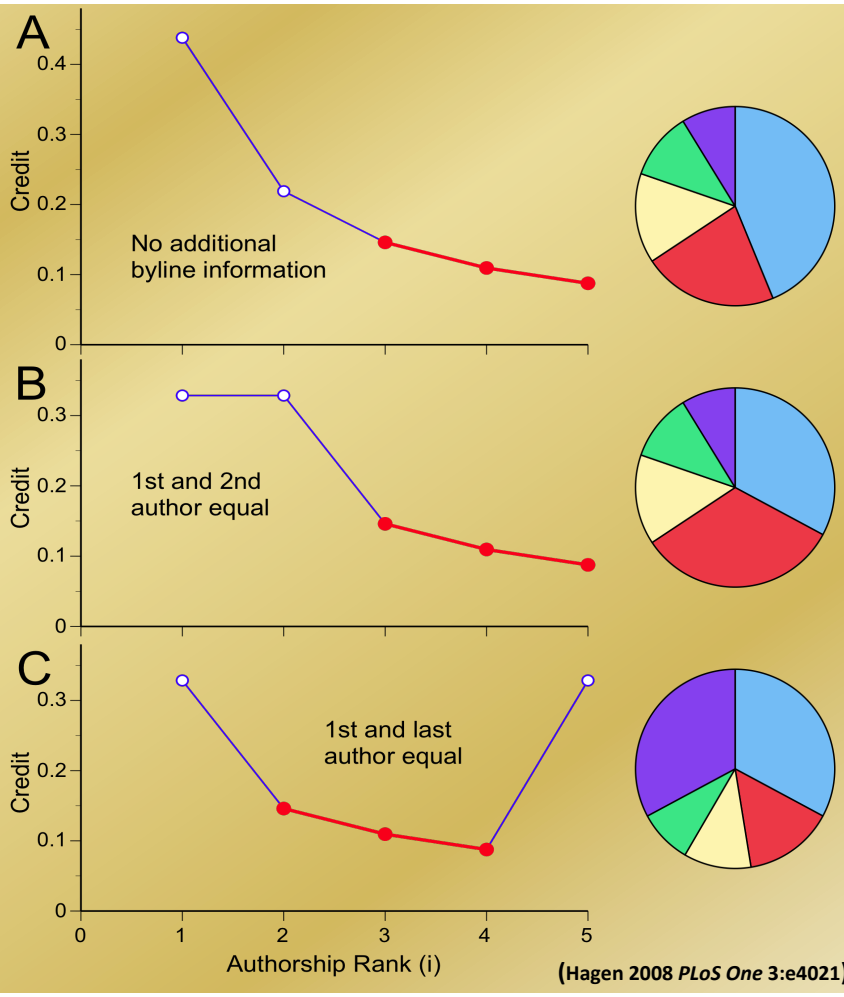
Fractional credit
Median underestimation of a PhD candidate's actual contribution
= 53.4%



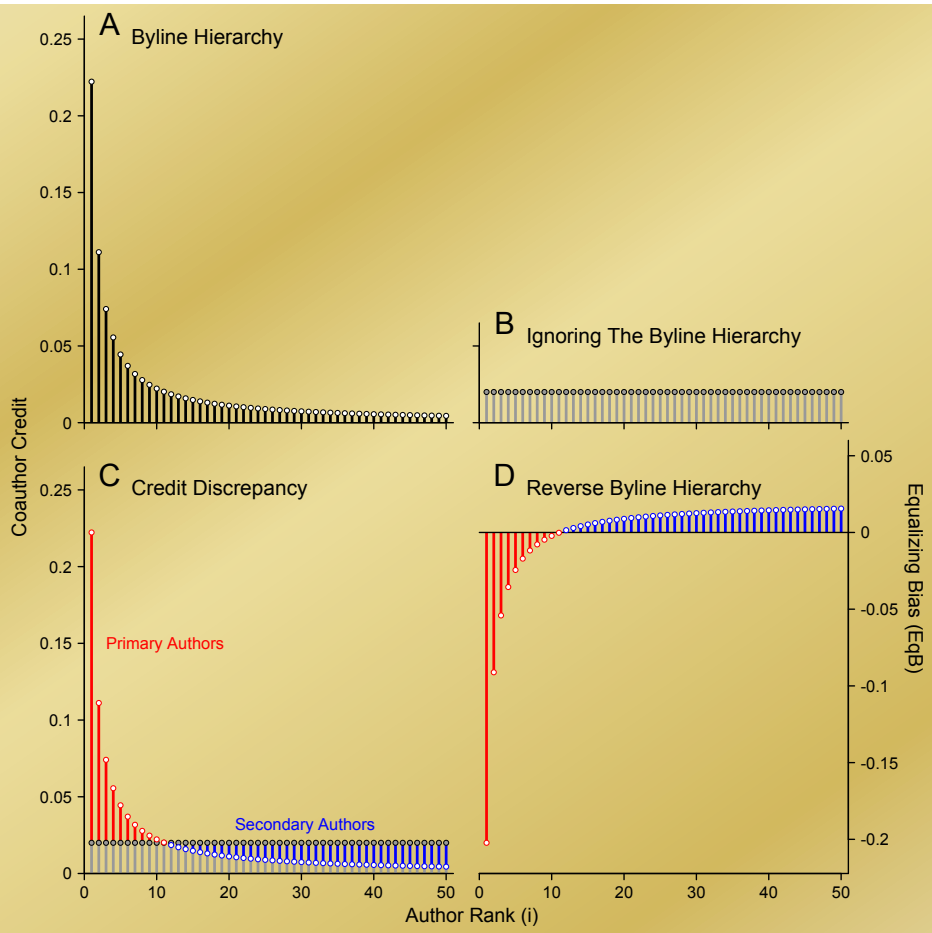
(Data from Hagen 2010 *Scientometrics* 85:576-579)

Harmonic credit

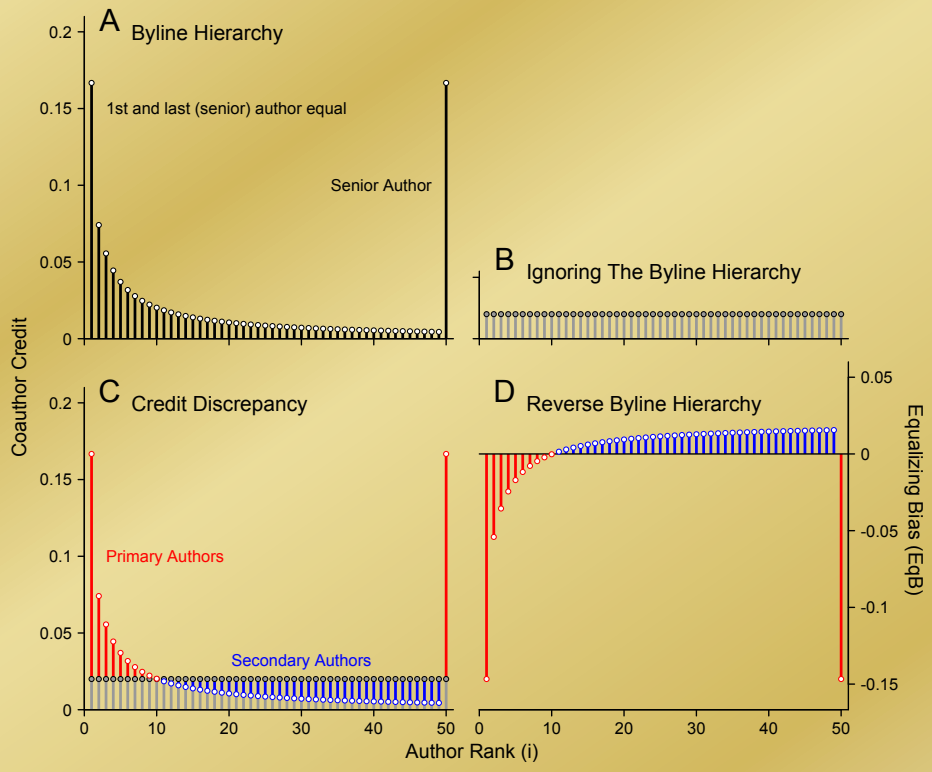
Accommodates additional byline information



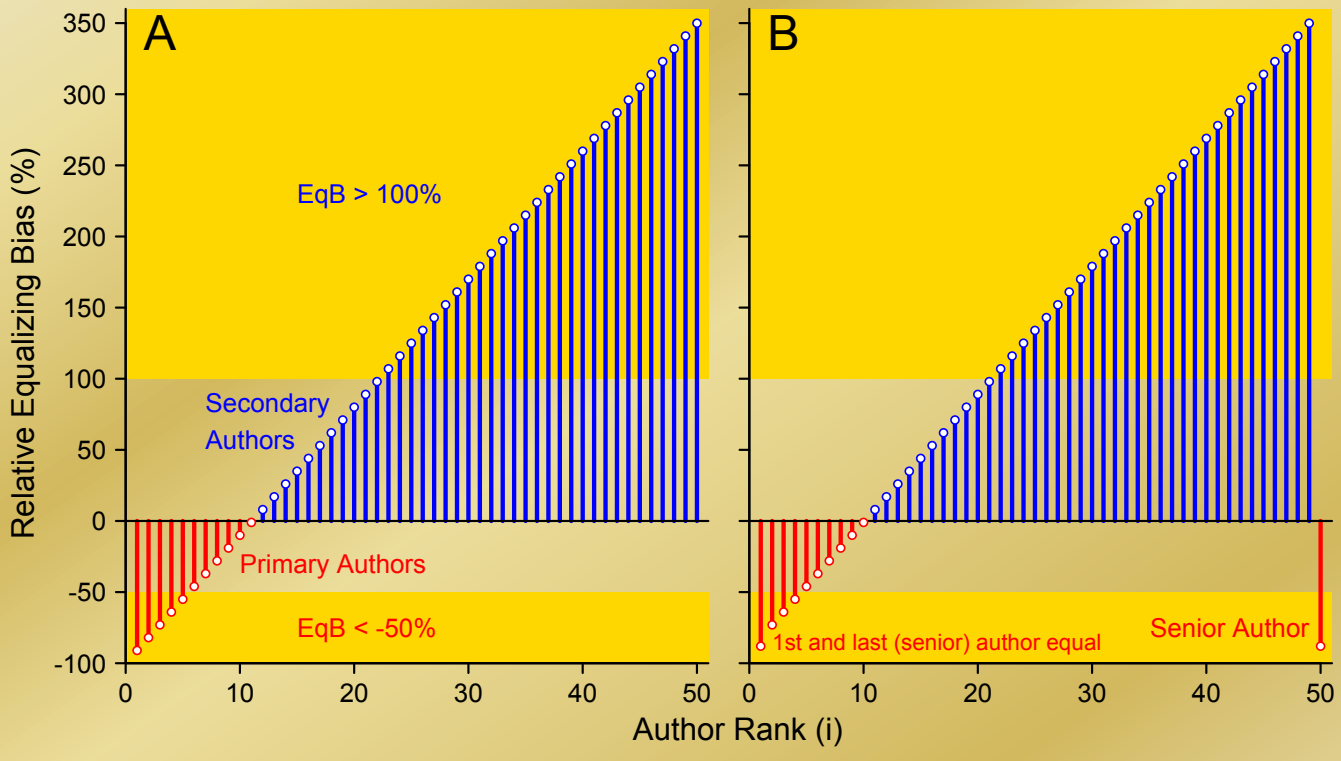
(Hagen 2008 *PLoS One* 3:e4021)



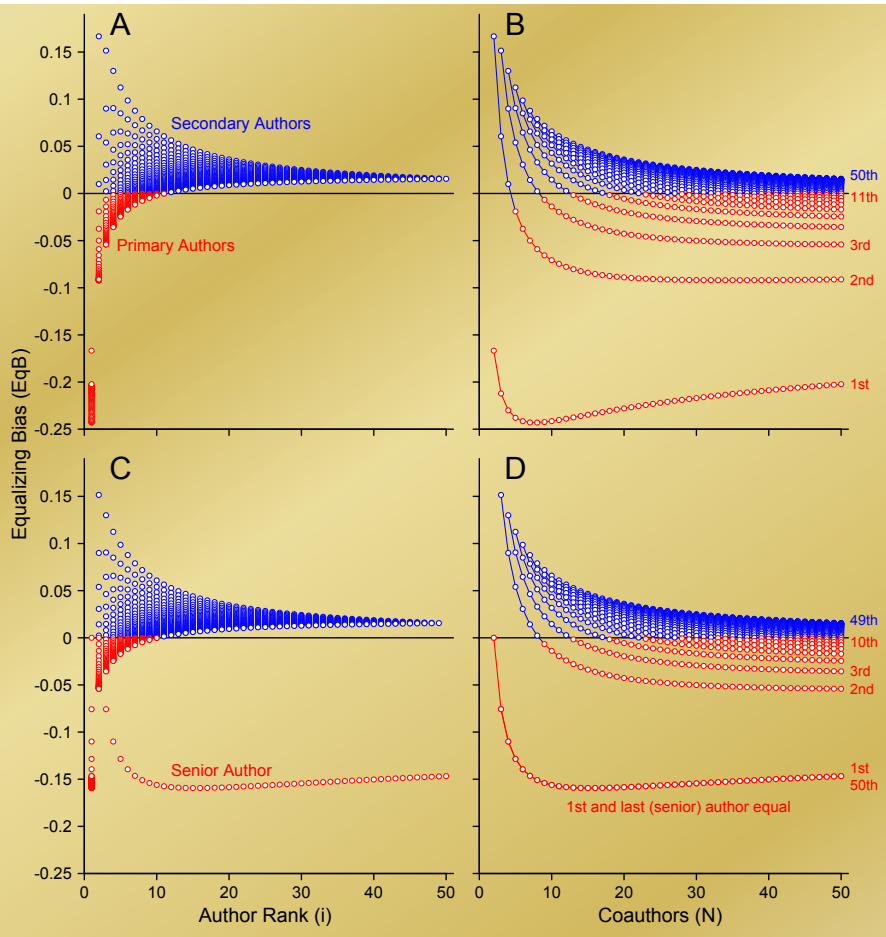
(Hagen 2014 *J. Informetrics* 8:618-627)



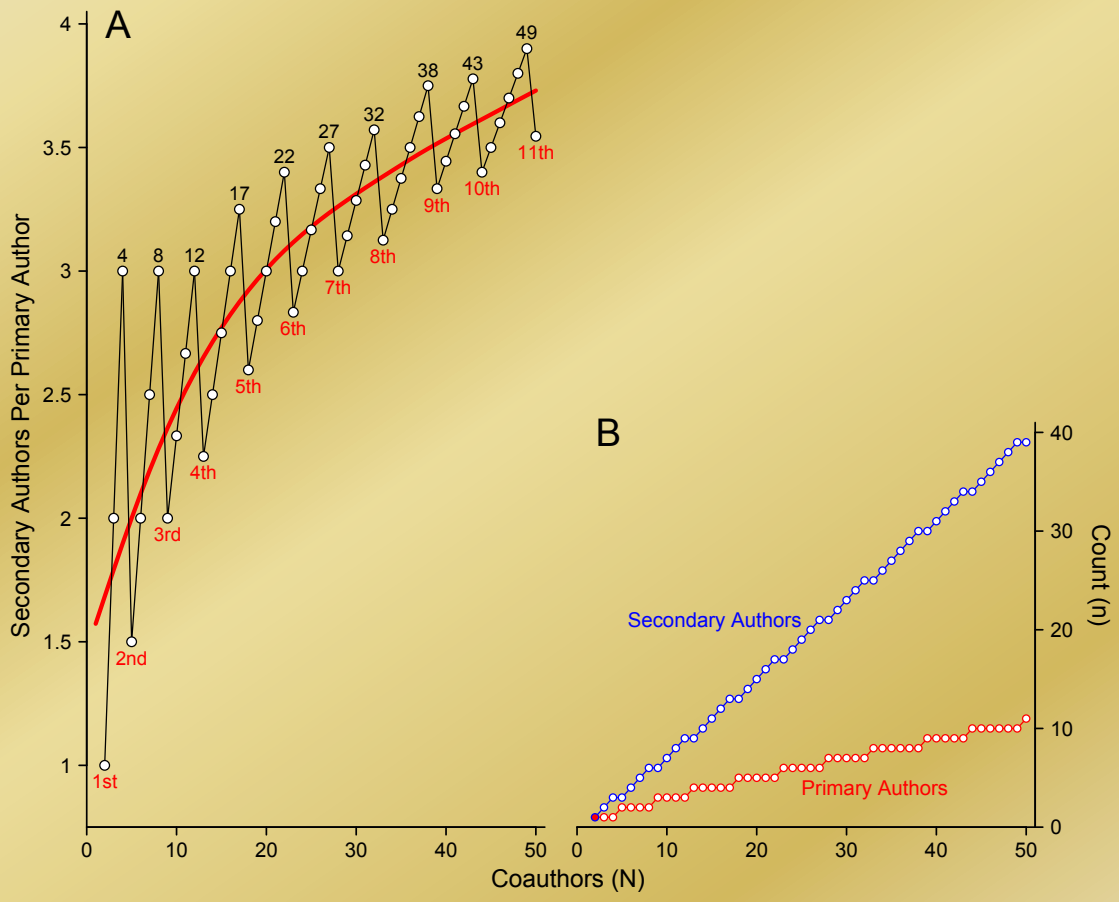
(Hagen 2014 *J. Informetrics* 8:618-627)



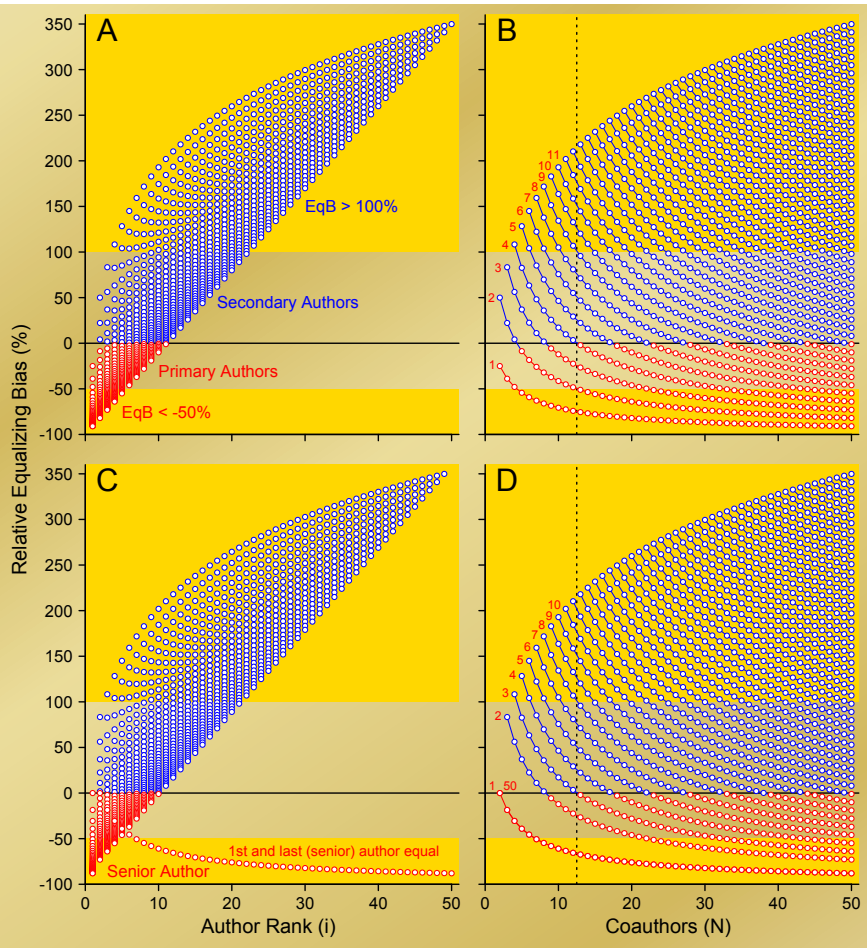
(Hagen 2014 *J. Informetrics* 8:618-627)



(Hagen 2014 *J. Informetrics* 8:618-627)



(Hagen 2014 *J. Informetrics* 8:618-627)



(Hagen 2014 *J. Informetrics* 8:618-627)