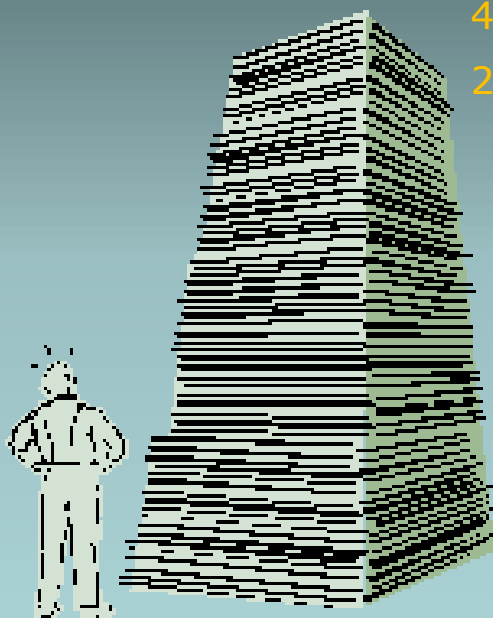
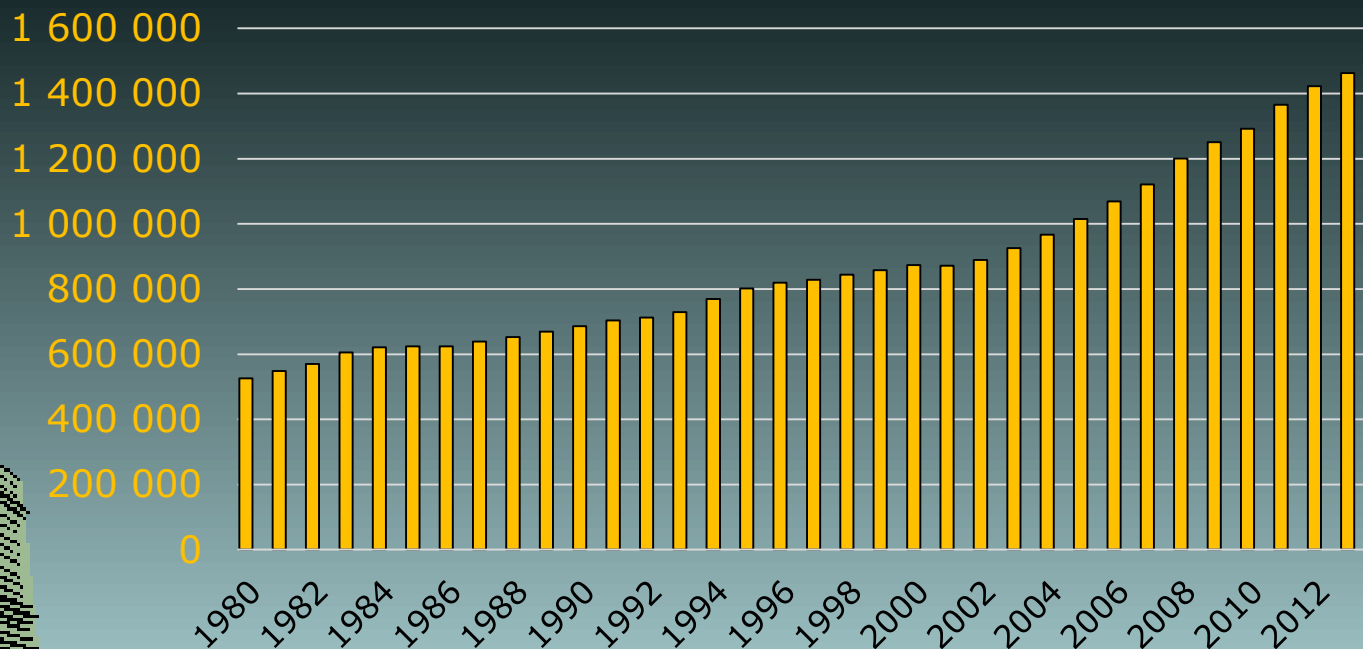


World production in Web of Science 1980-2013



Introduction to bibliometrics

Gunnar Sivertsen

Nordic Institute for Studies in Innovation,
Research and Education, Oslo

NIFU



evropský
sociální
fond v ČR



EVROPSKÁ UNIE



MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY



OP Vzdělávání
pro konkurenceschopnost

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Overview of the lecture (I)

1. What is bibliometrics?

- Definitions
- Historical examples
- Journals and conferences
- A practical definition for research policy

2. Bibliometric data sources

3. Basic metadata for bibliometric indicators for studies and evaluations of research

Overview of the lecture (II)

1. Four useful types of indicators
 - Research activity
 - Research profile
 - Research collaboration
 - Impact on further research
2. Discussion I: Bibliometrics in the social sciences and humanities
3. Discussion II: Bibliometrics for research assessment

Overview of the lecture (I)

1. What is bibliometrics?

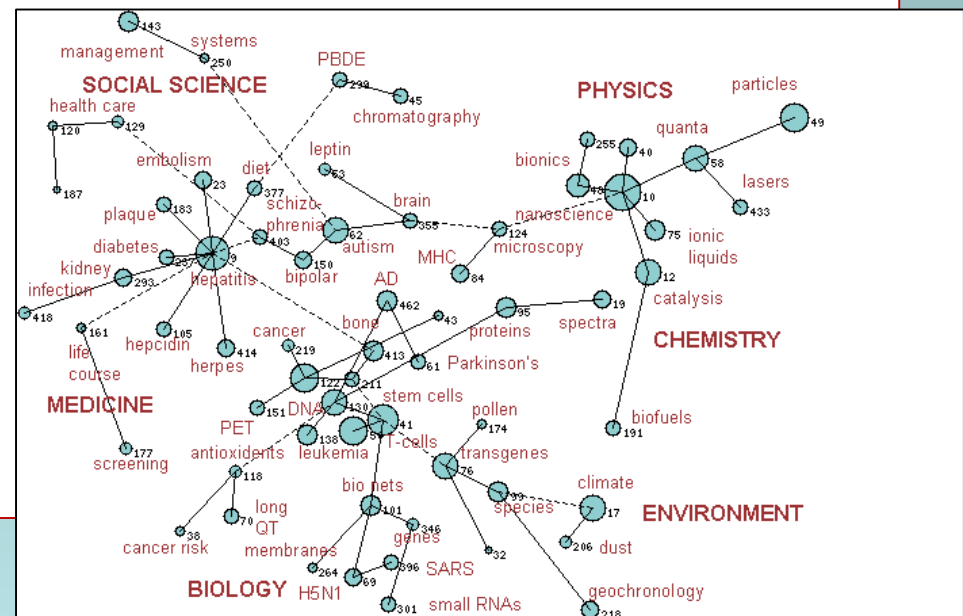
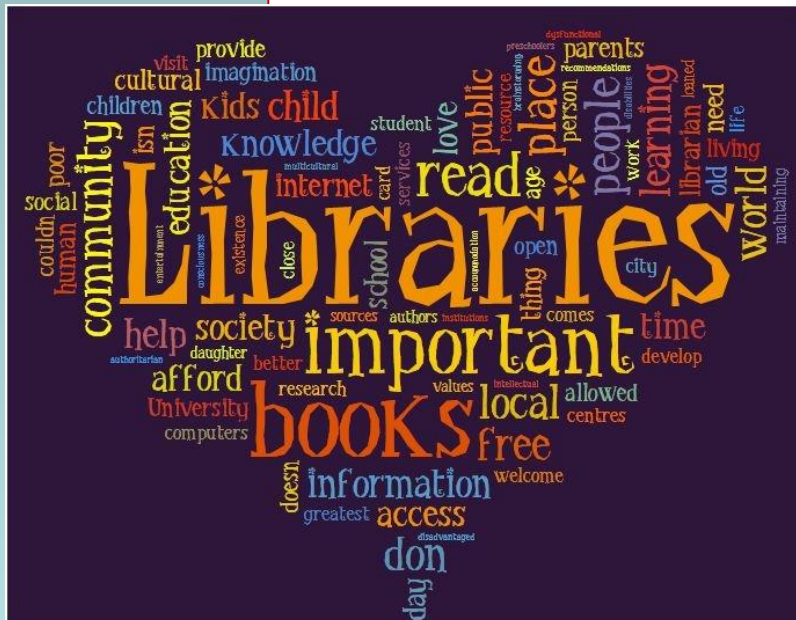
- Definitions
- Historical examples
- Journals and conferences
- A practical definition for research policy

2. Bibliometric data sources

3. Basic metadata for bibliometric indicators for studies and evaluations of research

Bibliometrics/ scientometrics

- Pritchard (1969) explained the term *bibliometrics* as “the application of mathematical and statistical methods to books and other media of communication”.
- Nalimov and Mulchenko (1969) defined *scientometrics* as “the application of those quantitative methods which are dealing with the analysis of science viewed as an information process”.



Impact



usage

downloads
views



peer-review

expert opinion

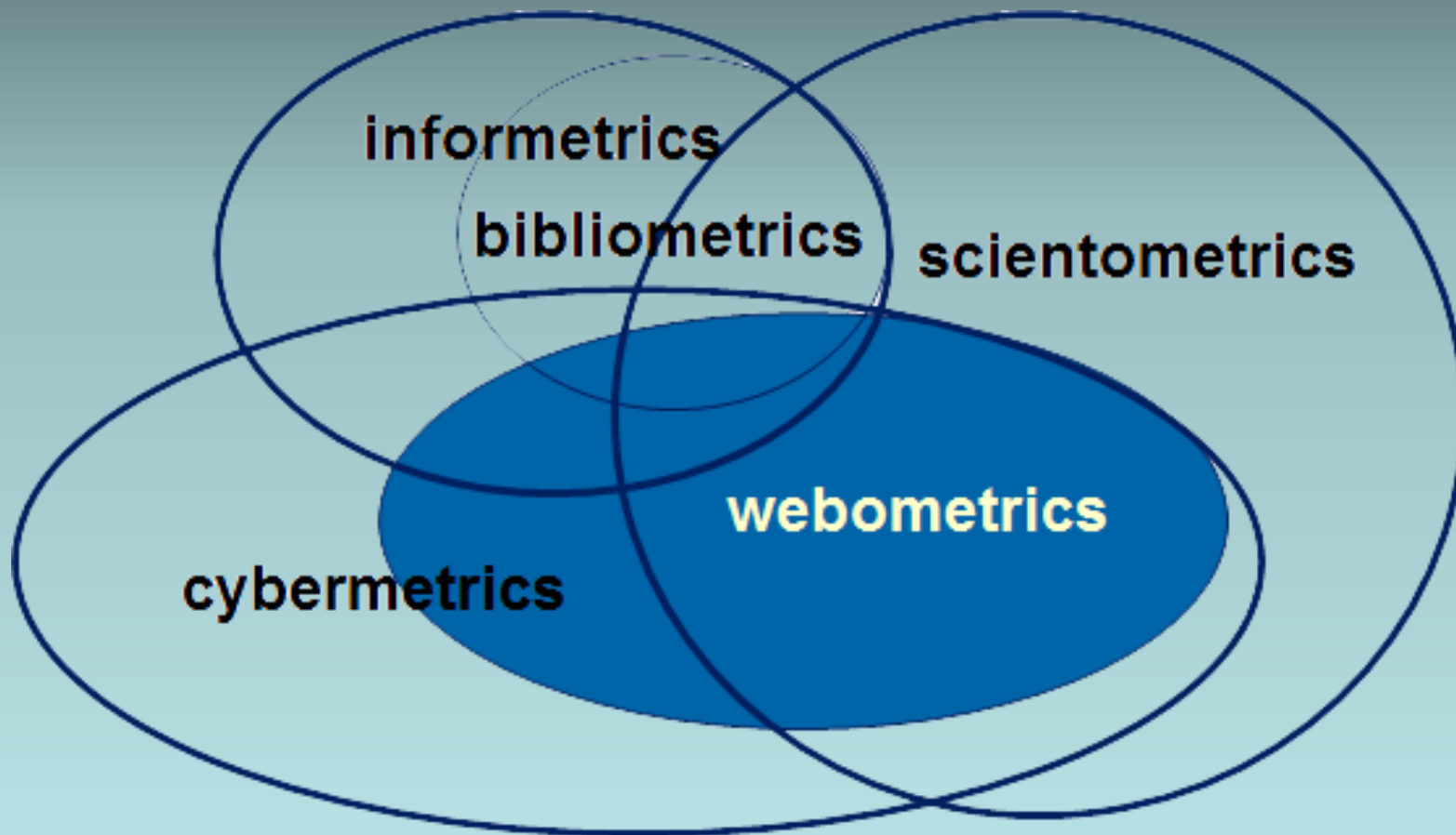


citations



alt-metrics

storage
links
bookmarks
conversations



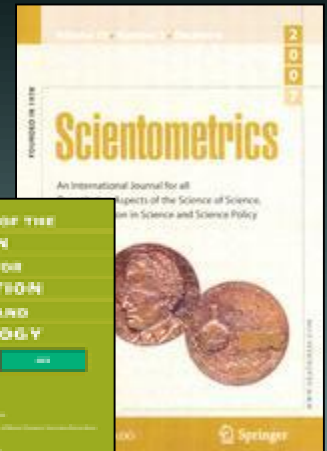
Journals and conferences

■ Journals (selected)

- Scientometrics
- Journal of Informetrics
- Journal of the American Association of Information Science and Technology

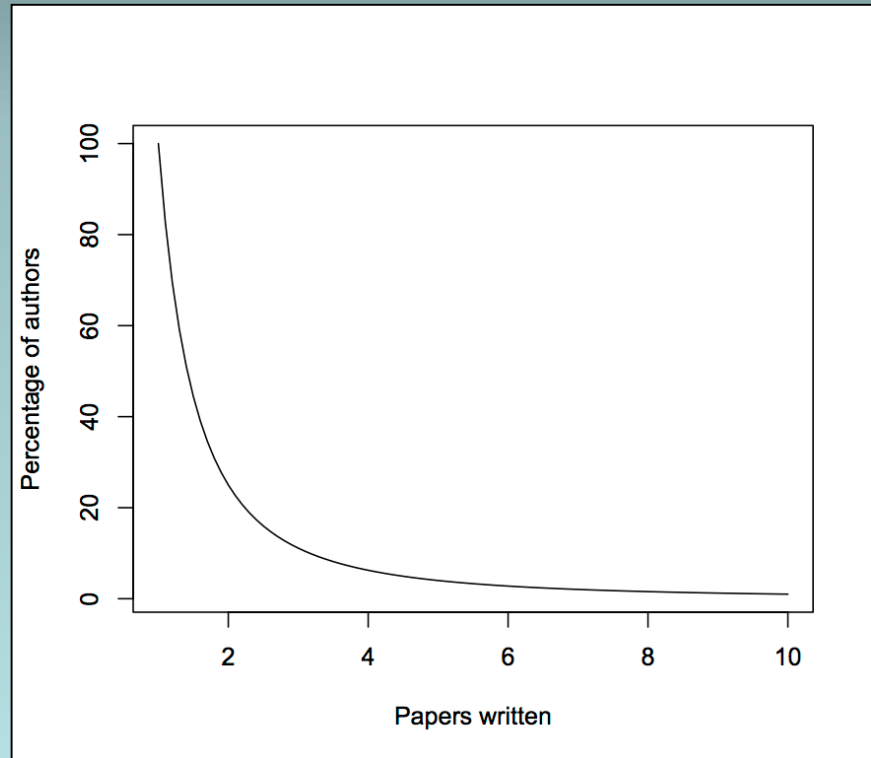
■ Conferences (selected)

- ISSI (International Society for Scientometrics and Infometrics)
- STI ENID (Science & Technology Indicators)



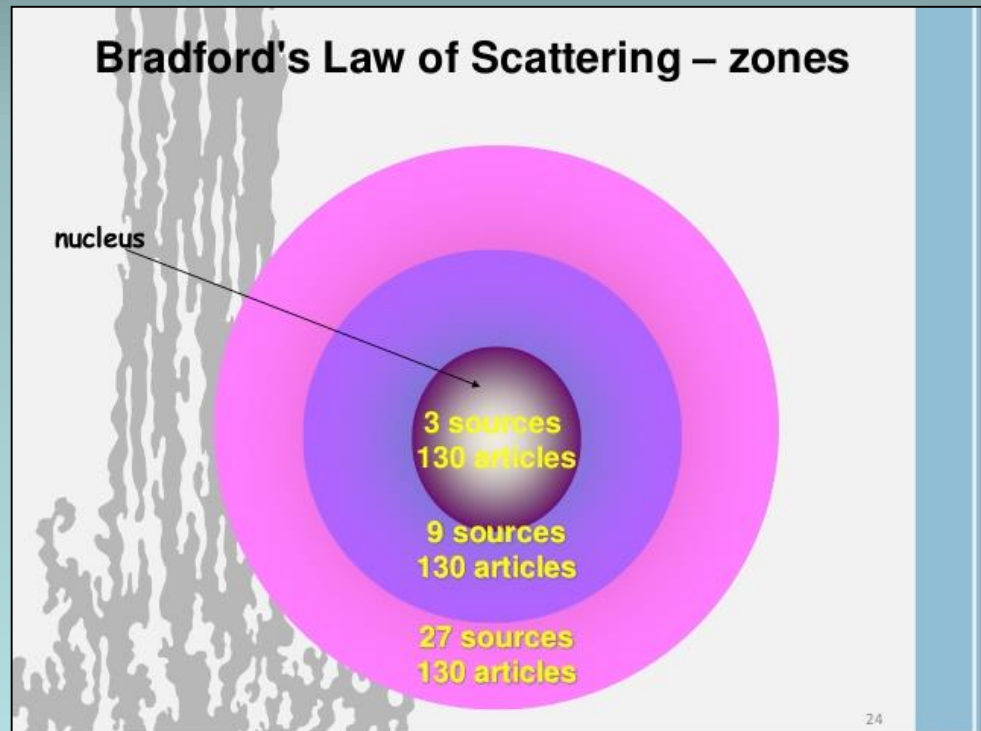
Historical examples of results within – or contributions from – bibliometrics

- Alfred J. Lotka (1880-1949) demonstrated in 1926 that the productivity differences of authors follow a fixed ratio.
Lotka's law: $1/n^a$



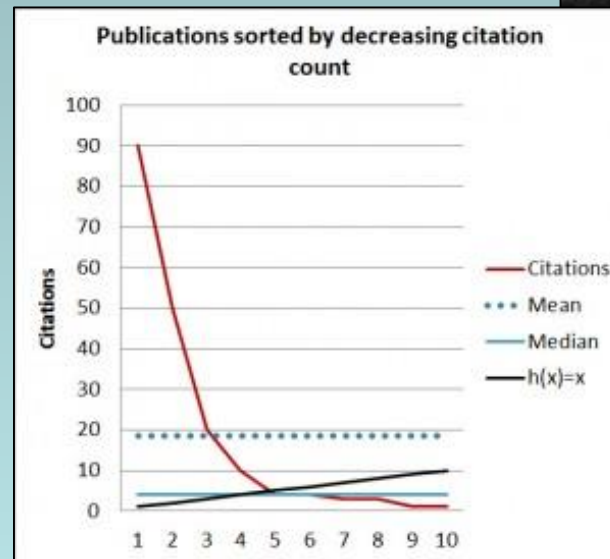
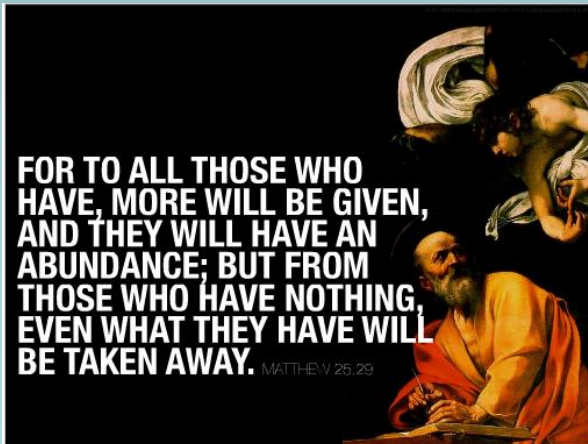
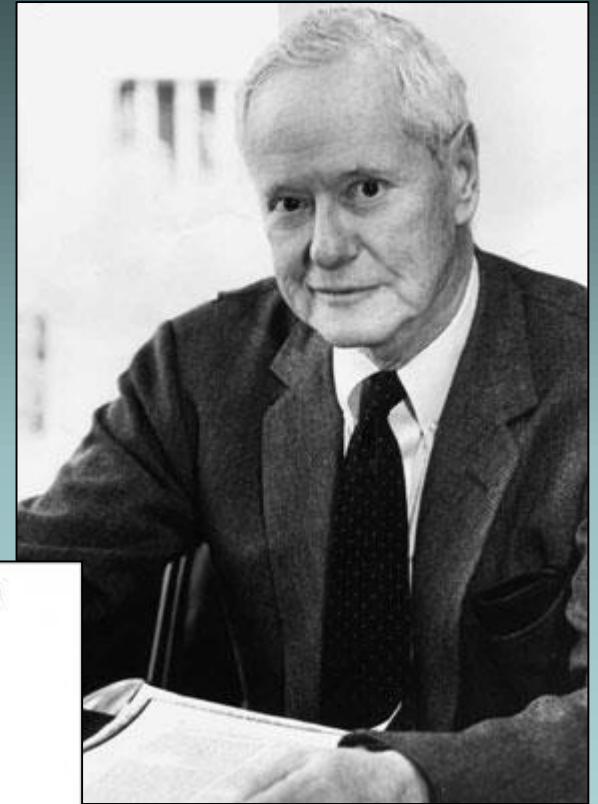
Historical examples of results within – or contributions from – bibliometrics

- Samuel C. Bradford (1878-1948) demonstrated in 1934 the exponentially diminishing returns of extending a search for references in science journals.
- Bradford's *law of scattering* is the basis for the notion of *core journals*



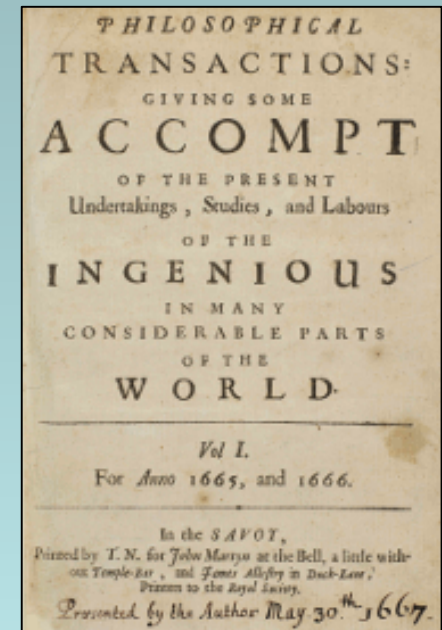
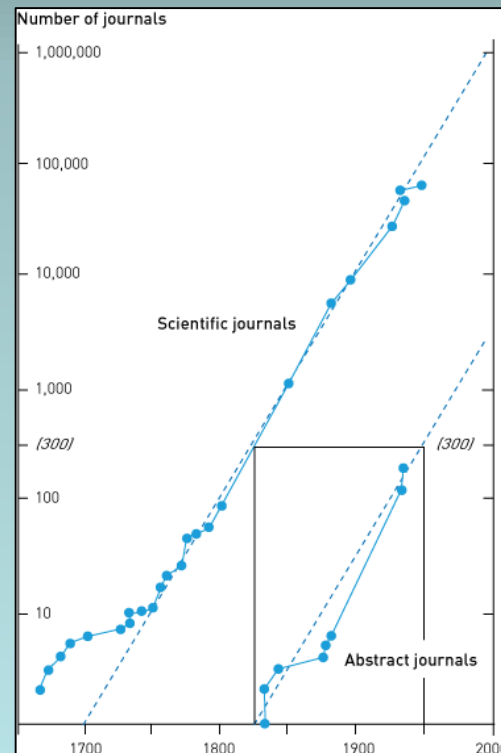
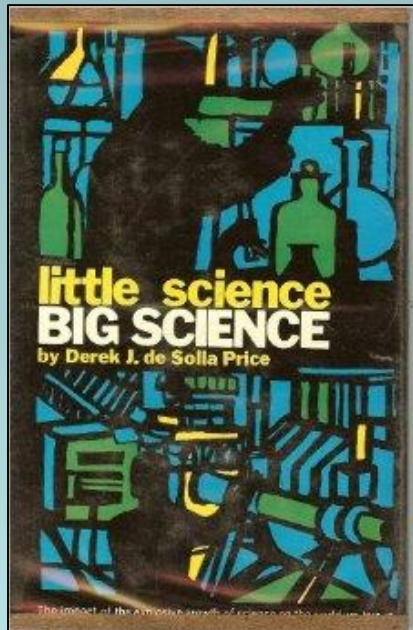
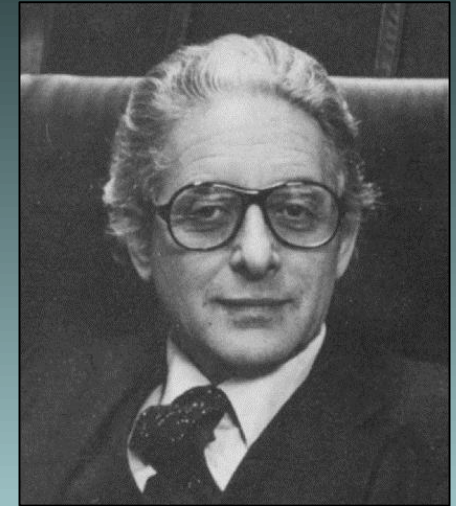
Historical examples of results within – or contributions from – bibliometrics

- Robert K. Merton (1910-2003) demonstrated the “Matthew effect” (accumulated advantage) in (the sociology of) science by using bibliometrics



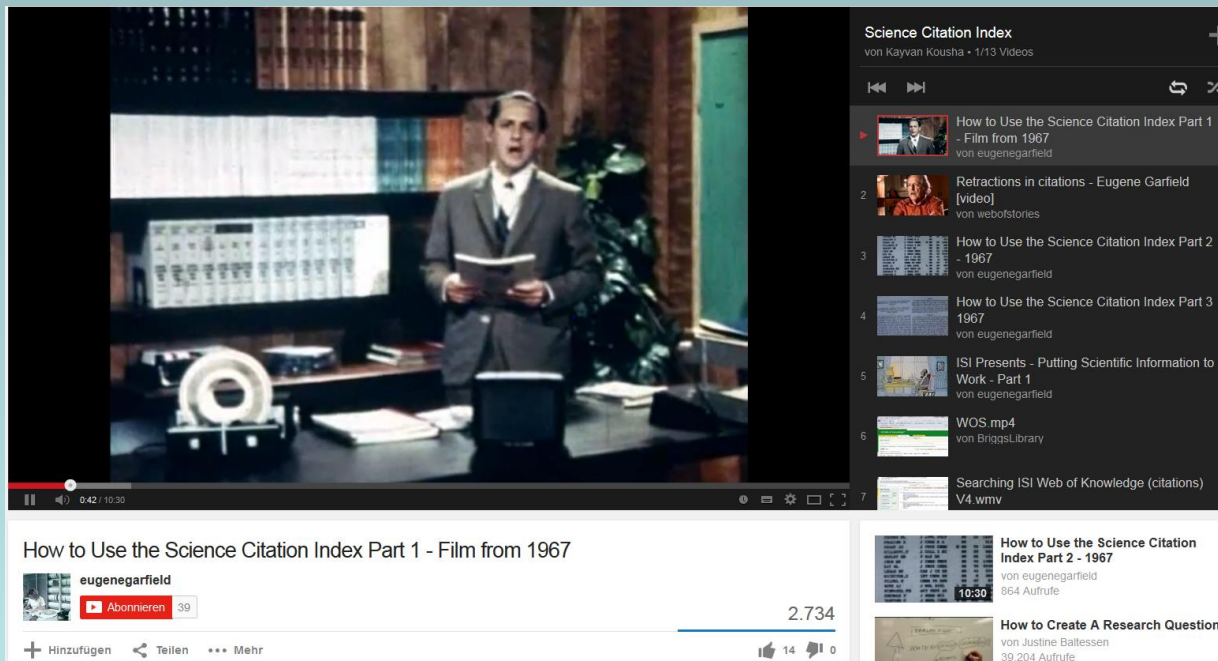
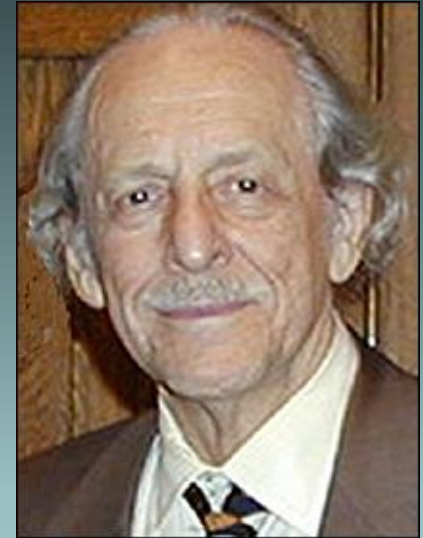
Historical examples of results within – or contributions from – bibliometrics

- Derek J. de Solla Price (1922-1983) demonstrated the exponential growth and the structure of modern science by partly using bibliometrics



Historical examples of results within – or contributions from – bibliometrics

- Eugene Garfield (b. 1925) launched the *Science Citation Index* in 1964 as a tool for information retrieval, not as a tool for research evaluation
- “Citations are the formal, explicit linkages between papers that have particular points in common. A citation index is built around these linkages.” *Citation Indexing*, 1979.



Science Citation Index
von Kayvan Kousha • 1/13 Videos

How to Use the Science Citation Index Part 1 - Film from 1967
von eugenegarfield

Retractions in citations - Eugene Garfield
[video]
von webstories

How to Use the Science Citation Index Part 2 - 1967
von eugenegarfield

How to Use the Science Citation Index Part 3 1967
von eugenegarfield

ISI Presents - Putting Scientific Information to Work - Part 1
von eugenegarfield

WOS.mp4
von BriggsLibrary

Searching ISI Web of Knowledge (citations)
V4 wmv

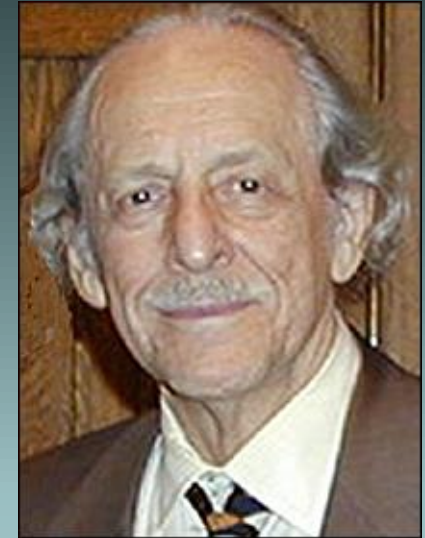
How to Use the Science Citation Index Part 1 - Film from 1967
eugenegarfield
Abonnieren 39
2.734

Hinzufügen Teilen Mehr

14 0

Historical examples of results within – or contributions from – bibliometrics

- Eugene Garfield (b. 1925) developed the *Journal Impact Factor* as a management tool for libraries (journal selection), not as a tool for research evaluation



Impact_Factor_BrainShark_New

THOMSON REUTERS

Guillaume Riviere
Customer Education Specialist

Contents

- 1. Journal Citation R... 0:16
- 2. This presentation ... 0:24
- 3. Introduction 0:26
- 4. Access JCR from t... 0:21
- 5. Subject Categories 0:25
- 6. View Journal data 0:42
- 7. Sort Journals in th... 0:52
- 8. Full Record Page 0:14
- 9. Impact Factor 1:27
- 10. Untitled 0:31
- 11. Journal Rank in co... 0:28
- 12. The Box plot 1:33
- 13. To provide one th... 1:22
- 14. Category Impact ... 0:23

Total duration: 13:29 / 13:29

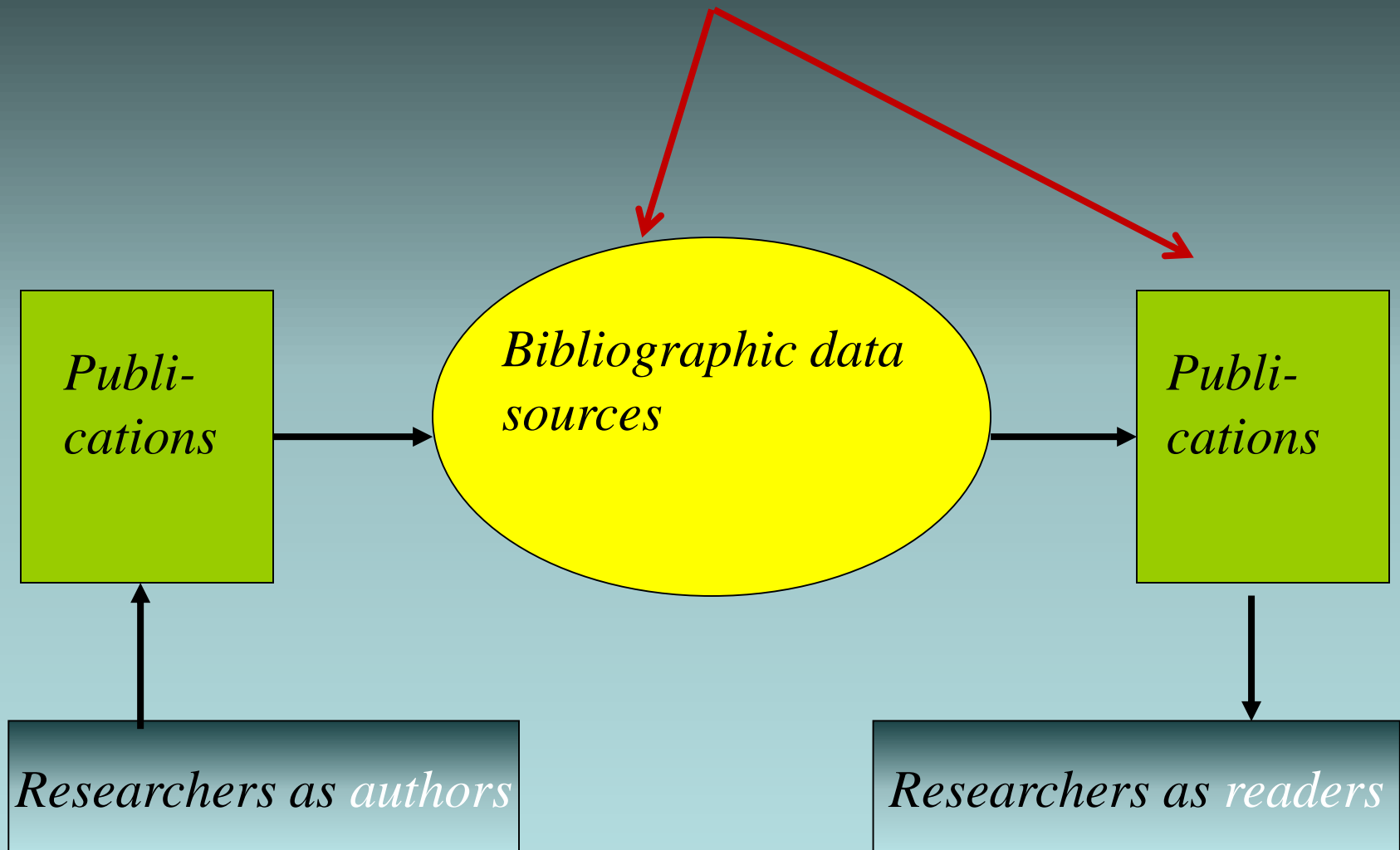
Journal Citation Reports –
The Impact Factor

THOMSON REUTERS

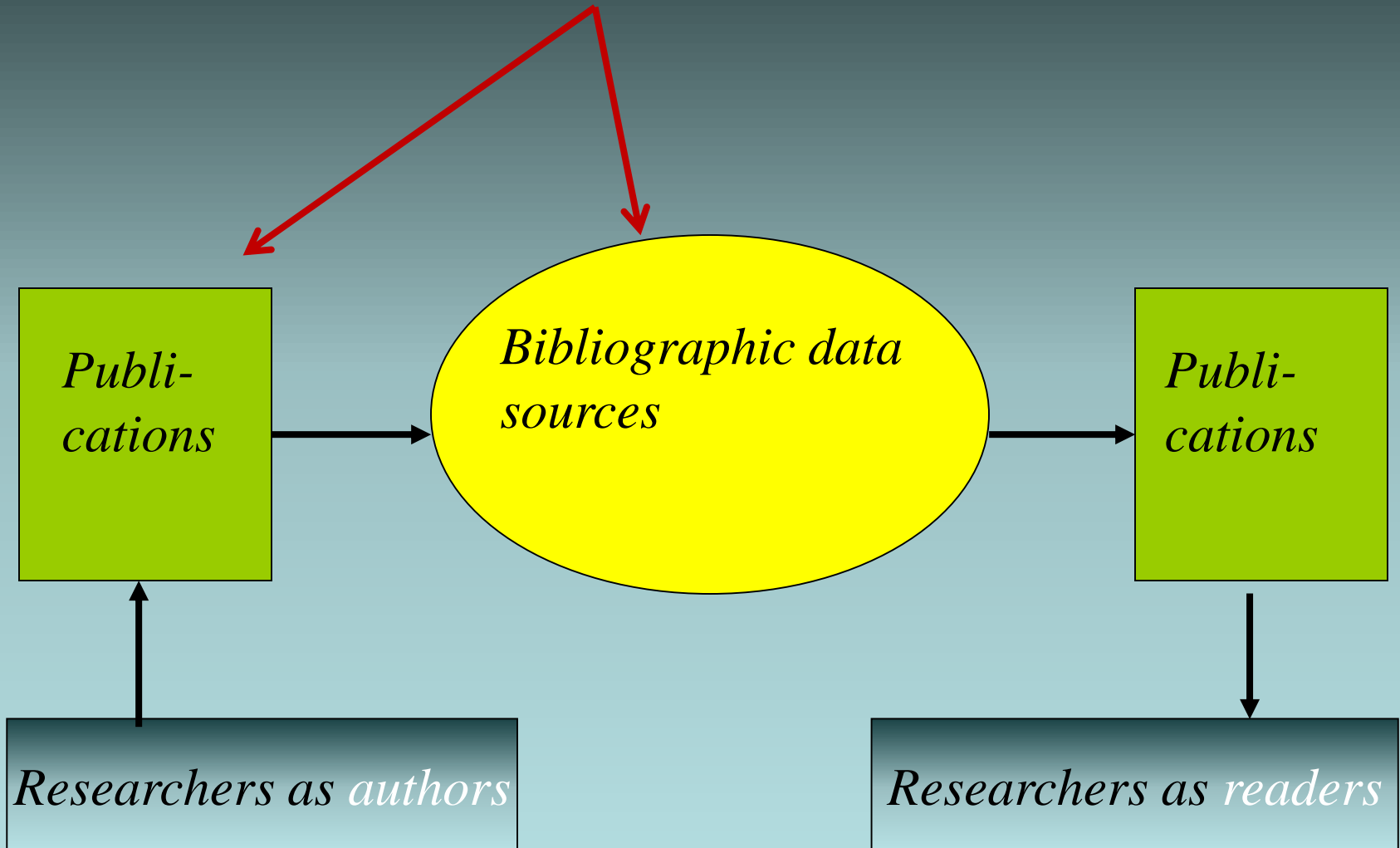
BIOMEDICAL JOURNALS SORTED BY IMPACT FACTOR Source: *Journal Citation Reports 1996*

Rank	Journal Abbreviation	1996 Total Cites	Impact Factor	Immed. Index	1996 Articles	Cited Half-Life
1	*CELL	149477	40.397	6.616	451	4.7
2	*NAT GENET	19950	31.473	10.836	122	2.5
3	*NATURE	270077	28.417	6.290	885	6.3
4	*NEW ENGL J MED	118106	24.834	5.909	406	6.5
5	*SCIENCE	221696	23.605	4.837	1095	5.6
6	*NAT MED	4065	22.127	5.985	164	1.3
7	*IMMUNITY	4893	19.937	3.583	120	1.8
8	*GENE DEV	27255	18.810	3.363	259	3.7
9	*LANCET	100526	17.948	4.742	532	6.5
10	*NEURON	26192	16.953	3.039	254	3.9
11	*J EXP MED	60034	15.572	2.092	541	5.1
12	*FASEB J	12188	13.771	2.181	182	5.1
13	*EMBO J	62920	13.255	2.124	725	4.7
14	*J CELL BIOL	67402	12.680	1.807	483	5.9
15	*ARCH GEN PSYCHIAT	22625	11.509	1.657	102	9.2
16	*ANN INTERN MED	36850	11.210	2.397	224	7.1
17	*MOL CELL BIOL	58647	10.727	1.659	748	4.5
18	*J NATL CANCER I	21910	10.328	1.811	159	6.7
19	*NATL ACAD SCI USA	276559	10.244	1.295	2790	5.9
20	*MOL BIOL CELL	5036	9.915	1.311	148	2.9
21	*BLOOD	67238	9.745	1.043	1149	4.4
22	*PLANT CELL	9161	9.579	2.006	176	3.6
23	*J CLIN INVEST	72294	9.486	1.130	760	6.3
24	*NAT STRUCT BIOL	2890	9.430	2.527	131	1.8
25	*AM J HUM GENET	17036	9.366	1.760	271	4.3
26	*GASTROENTEROLOGY	39531	9.329	2.500	392	6.1
27	*JAMA-J AM MED ASSOC	53060	9.277	2.356	547	6.5
28	*DEVELOPMENT	22382	9.182	2.910	425	3.7
29	*CIRCULATION	64644	9.094	1.006	773	5.6
30	*CANCER RES	82343	8.958	0.982	946	5.4
31	*ANN NEUROL	20719	8.715	1.592	213	6.2
32	*J NEUROSCI	40357	7.955	1.374	756	4.8
33	*J CLIN ONCOL	21588	7.881	1.192	370	4.8
34	*ONCOGENE	19259	7.727	0.764	627	3.2
35	*CIRC RES	26855	7.617	0.992	257	6.9

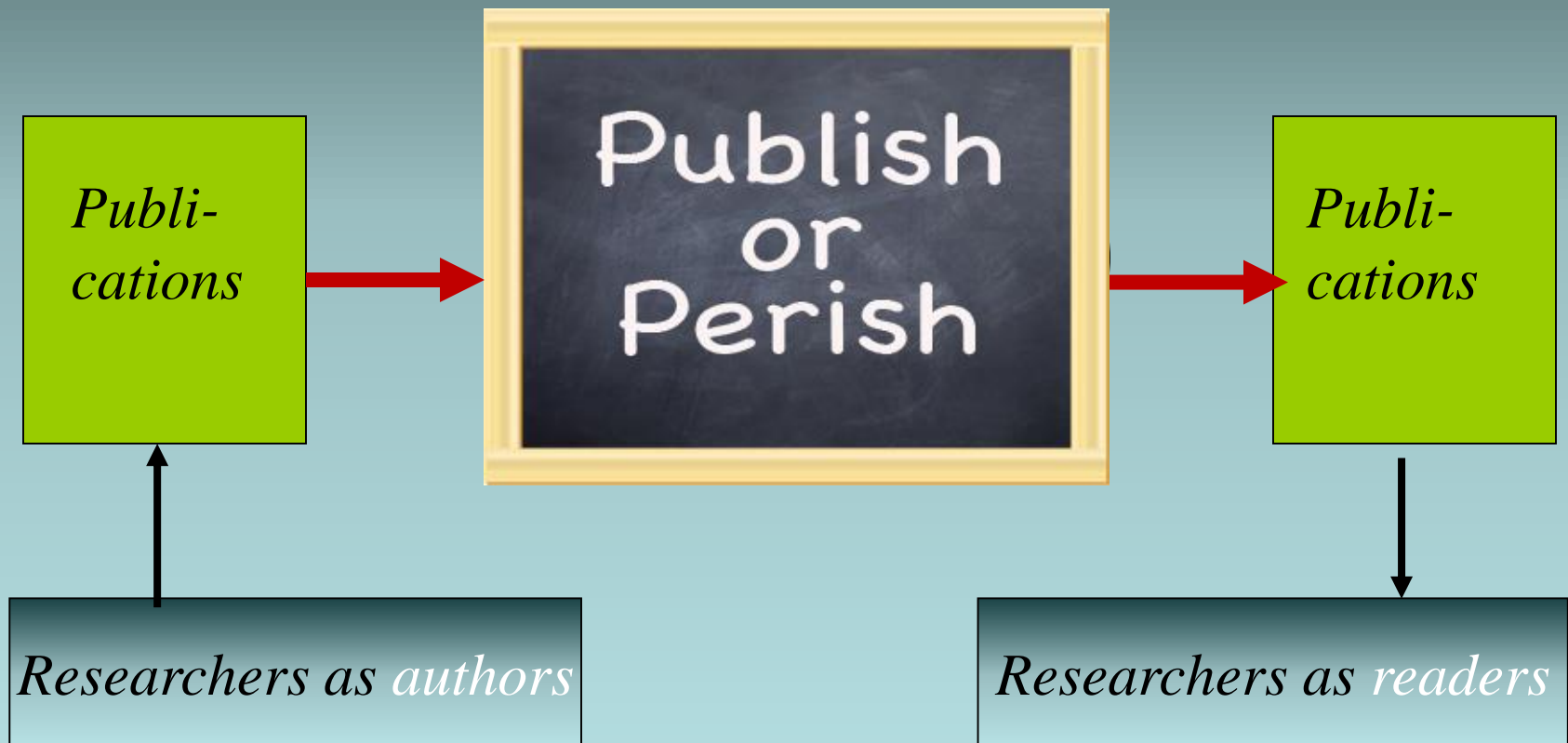
Bibliographic data sources are normally used to search and retrieve the scientific literature



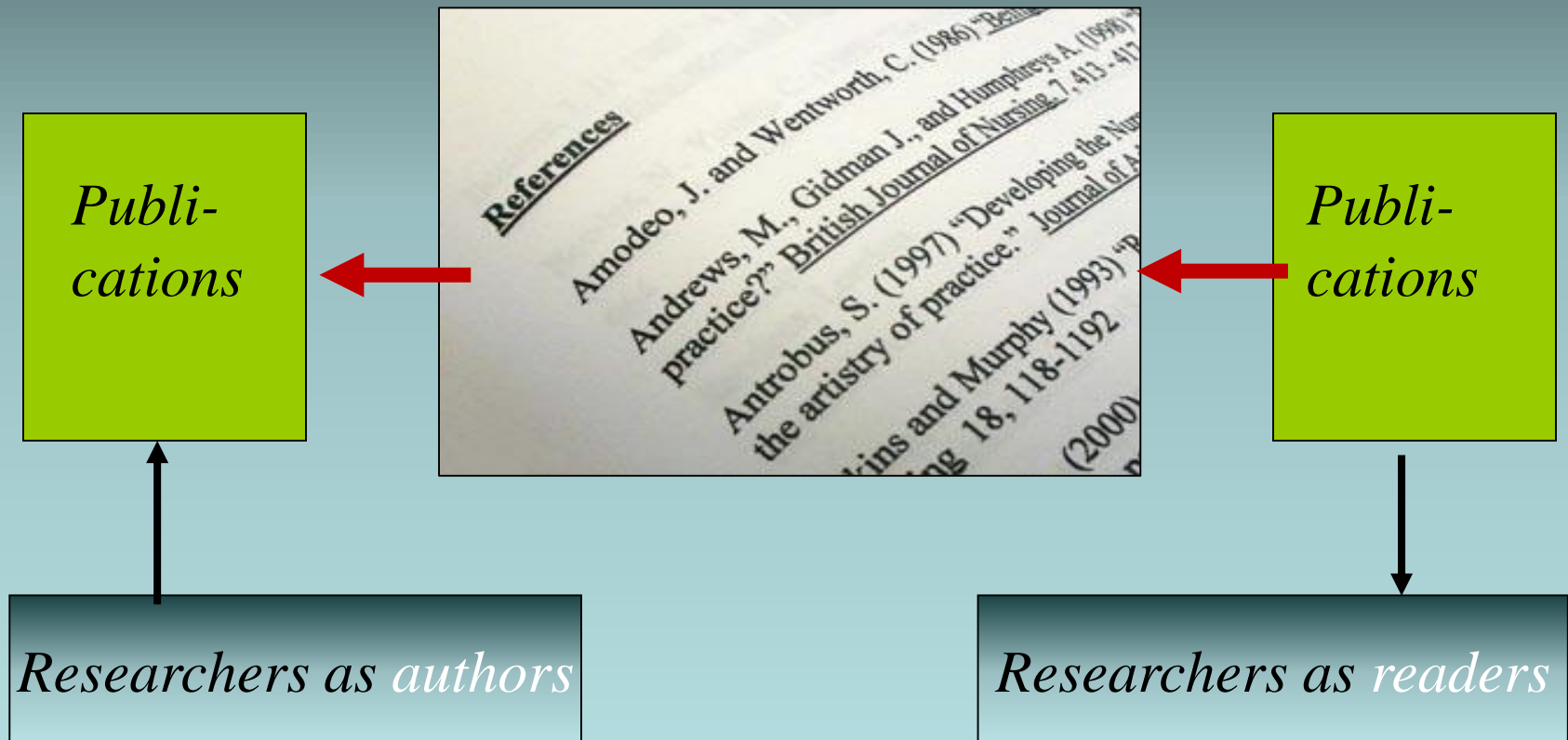
Bibliometrics is the use of bibliographic data to study the research behind the scientific literature



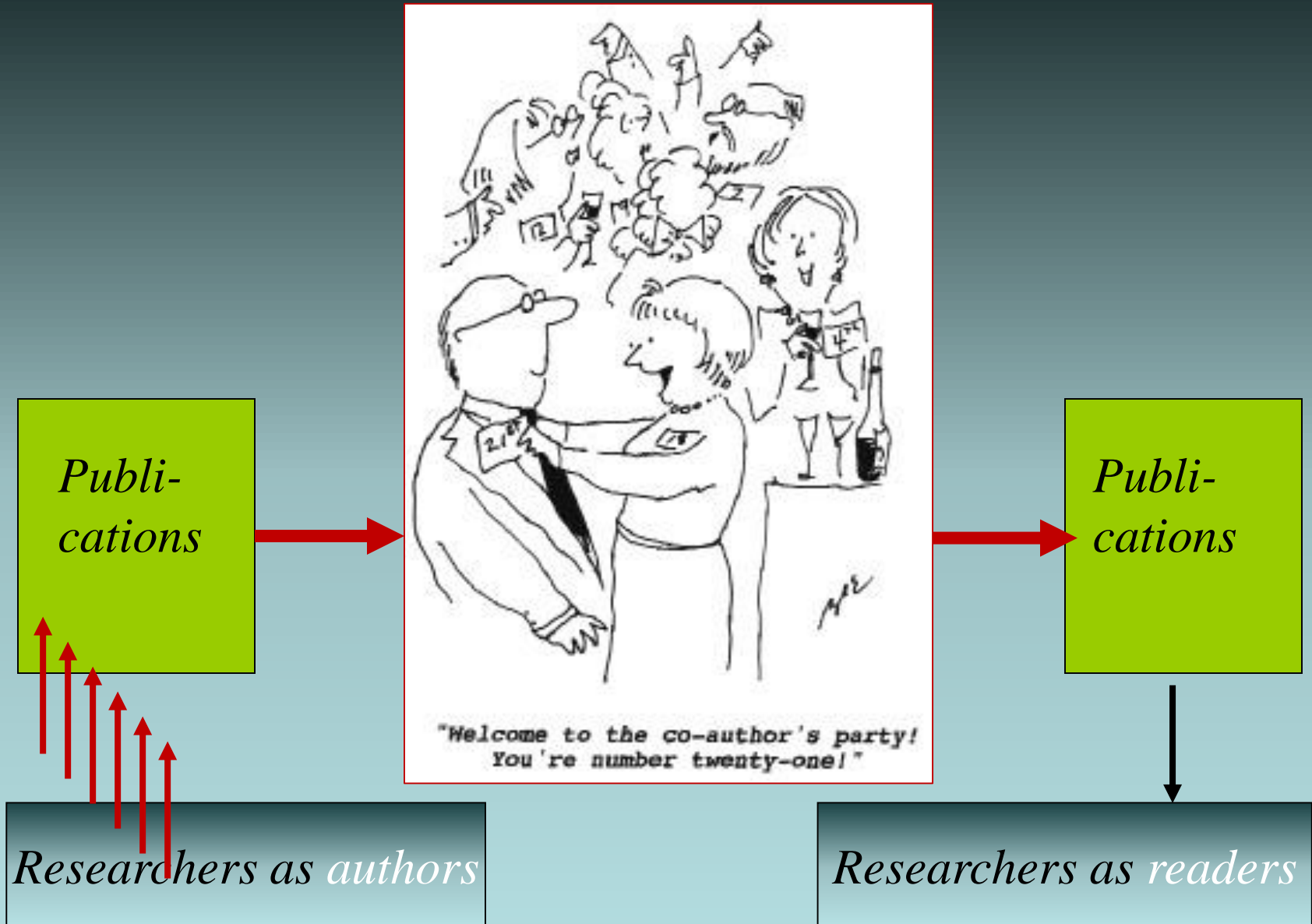
Bibliometrics is possible because research must be published



.. and because relevant references must be given



... and because co-authors must be credited



Overview of the lecture (I)

1. What is bibliometrics?

- Definitions
- Historical examples
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2. Bibliometric data sources

3. Basic metadata for bibliometric indicators for studies and evaluations of research

Web of Science

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Web of ScienceSM

Results Author=(sivertsen g)

Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI.

Lemmatization=On

Results: 5

Page 1 of 1

Refine Results

Search within results for

Web of Science Categories

☐ INFORMATION SCIENCE LIBRARY SCIENCE (3)☐ COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS (2)☐ CLINICAL NEUROLOGY (1)☐ COMPUTER SCIENCE INFORMATION SYSTEMS (1)☐ NEUROSCIENCES (1)[more options / values...](#)

Document Types

☐ ARTICLE (5)☐ PROCEEDINGS PAPER (1)[more options / values...](#)

Subject Areas

Authors

Group Authors

Editors

Source Titles

Book Series Titles

Publication Years

Institutions

Funding Agencies

Languages

Countries/Territories

View Distinct Author Sets for [sivertsen g](#)The Distinct Author Set feature is a discovery tool showing sets of papers likely written by the same person. ([Tell me more.](#))
 (0) | Save to: [more options](#)
☐ 1. Title: [UNDERSTANDING PATTERNS OF INTERNATIONAL SCIENTIFIC COLLABORATION](#)Author(s): LUUKKONEN T; PERSSON O; [SIVERTSEN G](#)

Source: SCIENCE TECHNOLOGY & HUMAN VALUES Volume: 17 Issue: 1 Pages: 101-126 DOI: 10.1177/016224399201700106 Published: WIN 1992

Times Cited: 138 (from Web of Science)

☐ 2. Title: [THE MEASUREMENT OF INTERNATIONAL SCIENTIFIC COLLABORATION](#)

Author(s): LUUKKONEN T; TIJSSSEN RJW; PERSSON O; et al.

Source: SCIENTOMETRICS Volume: 28 Issue: 1 Pages: 15-36 DOI: 10.1007/BF02016282 Published: SEP 1993

Times Cited: 86 (from Web of Science)

☐ 3. Title: [The effect of highly cited papers on national citation indicators](#)Author(s): Aksnes DW; [Sivertsen G](#)

Source: SCIENTOMETRICS Volume: 59 Issue: 2 Pages: 213-224 DOI: 10.1023/B:SCIE.0000018529.58334.eb Published: 2004

Times Cited: 23 (from Web of Science)

☐ 4. Title: [Publishing affects funding in neurology](#)Author(s): Gilhus N. E.; [Sivertsen G](#)

Source: EUROPEAN JOURNAL OF NEUROLOGY Volume: 17 Issue: 1 Pages: 147-151 DOI: 10.1111/j.1468-1331.2009.02768.x Published: JAN 2010

Times Cited: 0 (from Web of Science)

☐ 5. Title: [Are Female Researchers Less Cited? A Large-Scale Study of Norwegian Scientists](#)

Author(s): Aksnes Dag W.; Rorstad Kristoffer; Piro Fredrik; et al.

Source: JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY Volume: 62 Issue: 4 Pages: 628-636 DOI: 10.1002/j

Times Cited: 0 (from Web of Science)

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Search within results

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Year

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- ☐ 2010 (3) >
- ☐ 2004 (1) >
- ☐ 2002 (1) >
- ☐ 1994 (1) >

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Author Name

⌵

- ☐ Sivertsen, G. (9) >
- ☐ Aksnes, D.W. (2) >
- ☐ Blaabjerg, F. (2) >
- ☐ Fink, H. (2) >
- ☐ Sondergaard, J. (2) >

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Subject Area

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- ☐ Computer Science (3) >
- ☐ Social Sciences (2) >
- ☐ Agricultural and Biological Sciences (1) >
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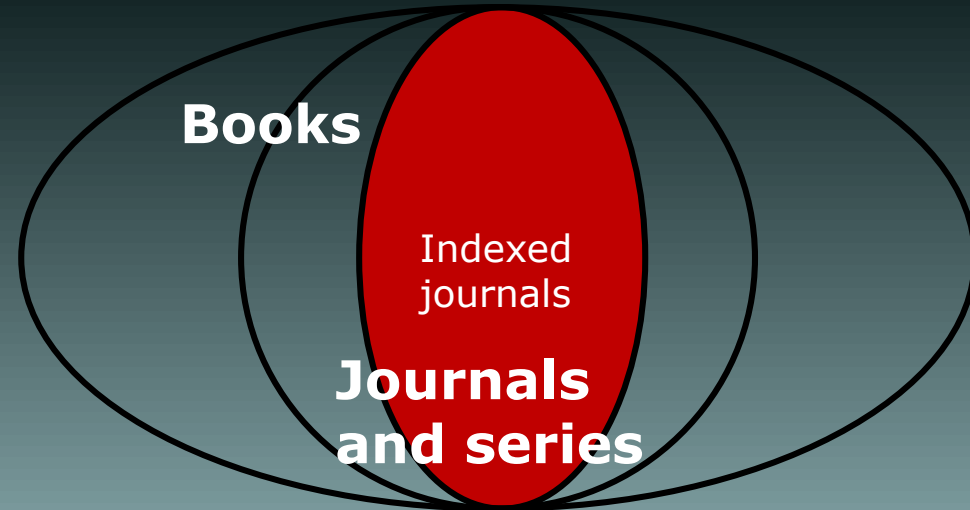
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	Document title	Author(s)
<input type="checkbox"/> 1	The measurement of international scientific collaboration	Luukkonen, T., Tussen, R.J.W., Persson, G.
	View at publisher Show abstract Related documents	
<input type="checkbox"/> 2	The effect of highly cited papers on national citation indicators	Aksnes, D.W., Sivertsen, G.
	View at publisher Show abstract Related documents	
<input type="checkbox"/> 3	The impact factor as an instrument of allocation. Not accepted by the journals in Scandinavia [Inverkanstal som fördelningsinstrument. Ej accepterat av tidskrifter i Norden.]	Drettner, B., Seglen, P.O., Sivertsen, G.
<input type="checkbox"/> 4	Are female researchers less cited? A large-scale study of Norwegian scientists	Aksnes, D.W., Rorstad, K., Piro, F., Sivertsen, G.
	View at publisher Show abstract Related documents	
<input type="checkbox"/> 5	We wish more professional debate about the bibliometric research indicators [Vi ønsker mere faglig debat om den bibliometriske forskningsindikator.]	Søndergaard, J., Mouritzen, P.E., Olesen, S., Fink, H., Blaabjerg, F., Sivertsen, G.
<input type="checkbox"/> 6	Vi ønsker mere faglig debat om den bibliometriske forskningsindikator	Søndergaard, J., Mouritzen, P.E., Olesen, S., Fink, H., Blaabjerg, F., Sivertsen, G.
	Related documents	
<input type="checkbox"/> 7	Publishing affects funding in neurology	Gilhus, N.E., Sivertsen, G.
	View at publisher Show abstract Related documents	
<input type="checkbox"/> 8	Tidsskr Nor Laegeforen and 21 other spelling variations [Tidsskr Nor Laegeforen--og 21 andre stavemåter.]	Sivertsen, G.
	View at publisher	

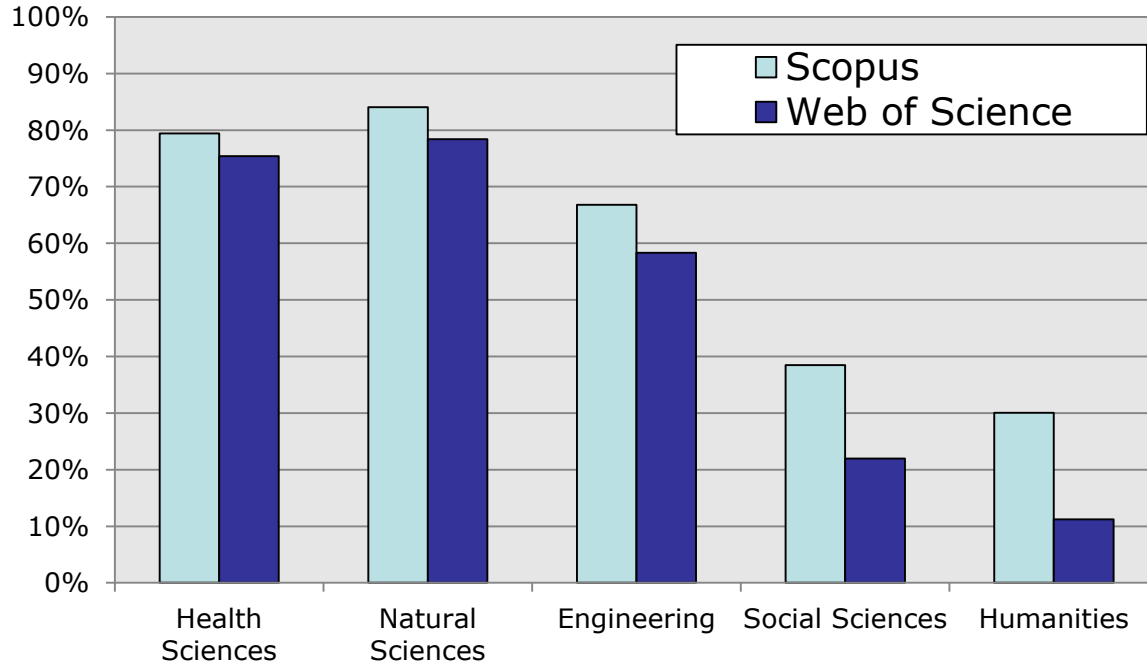
Incomplete coverage of international journals.

Very limited coverage of books.

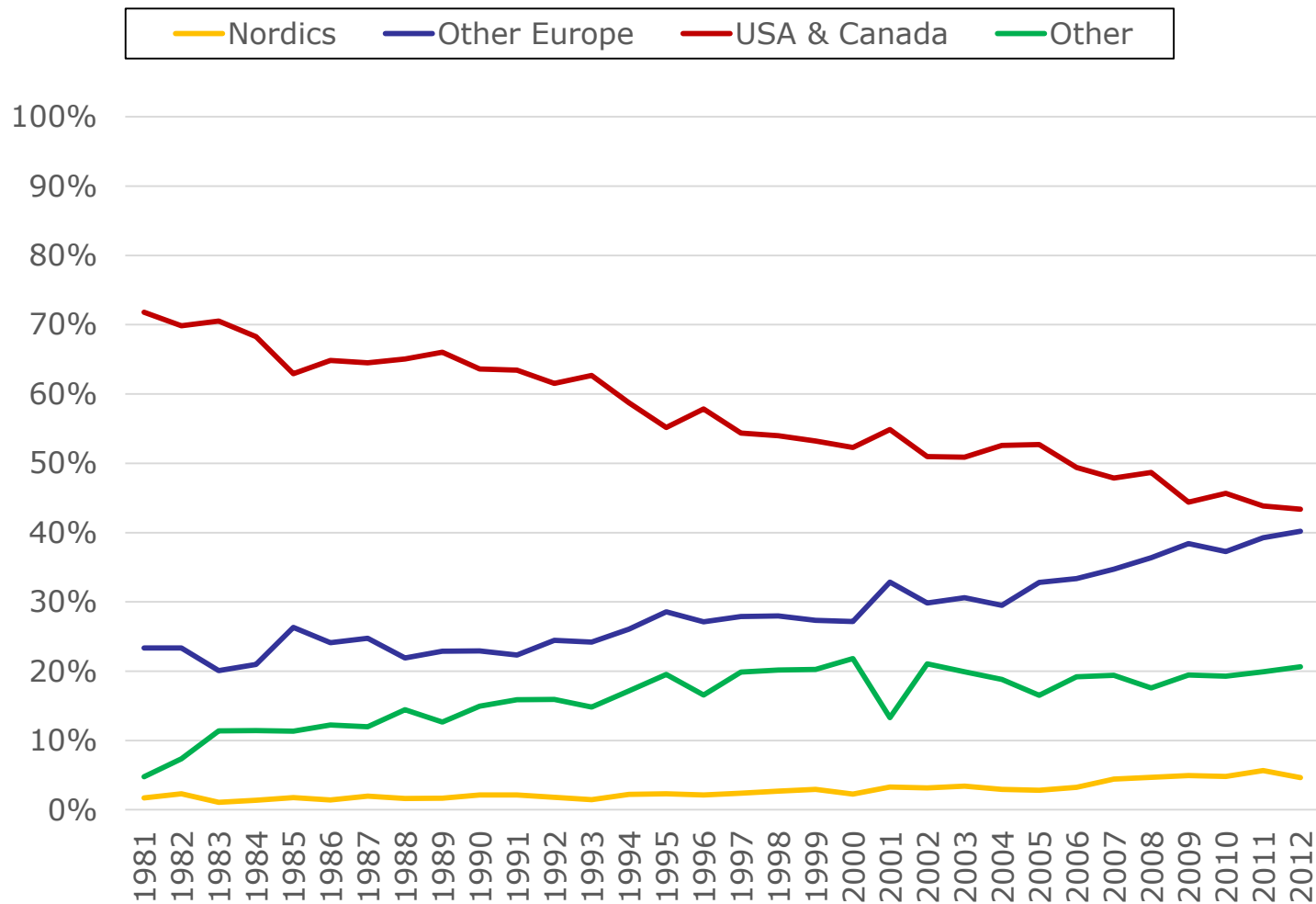
Random or no coverage of the national level (books and journals)



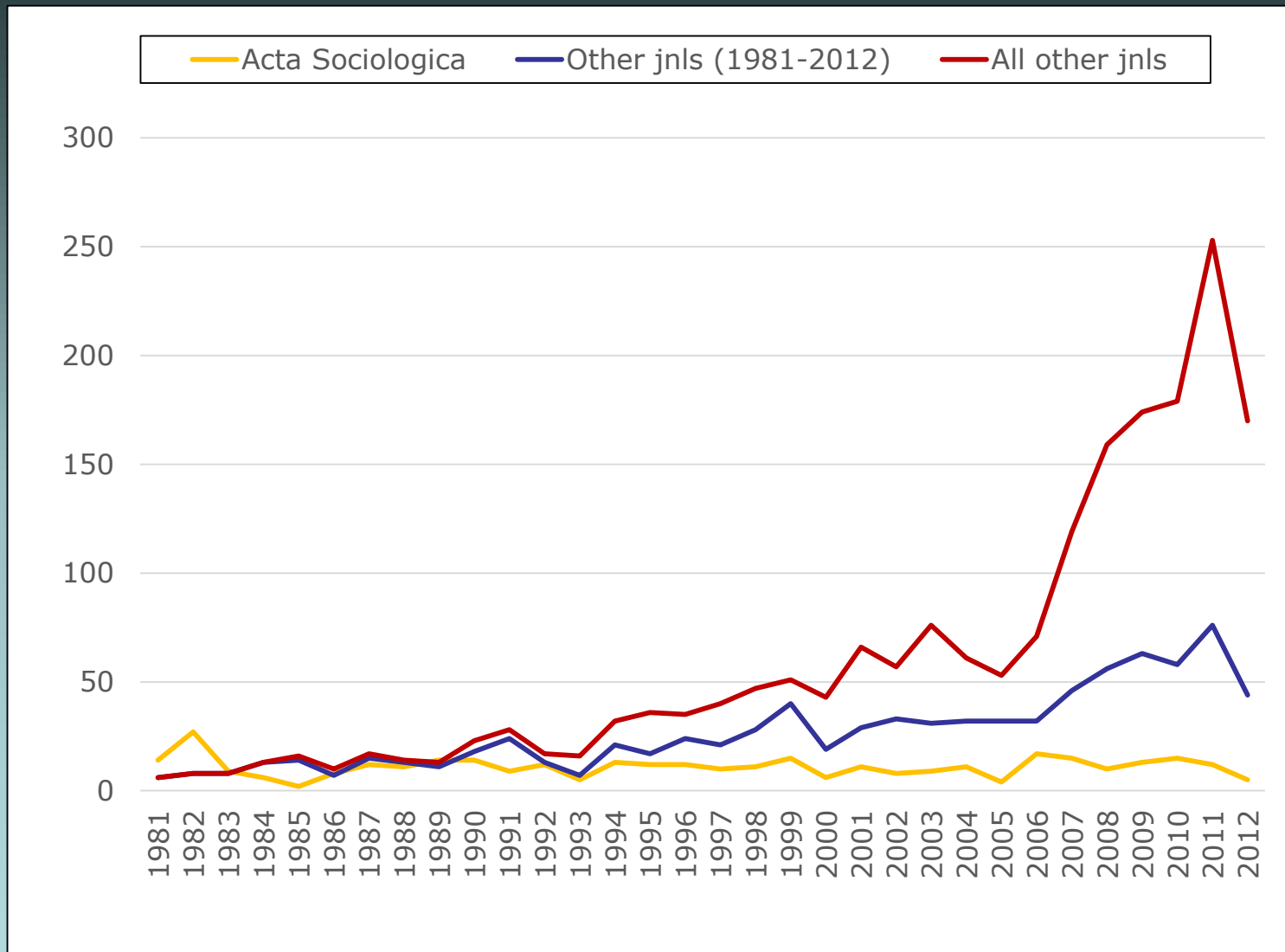
Coverage of 70,500 scholarly publications from the higher education sector in Norway 2005-2012.



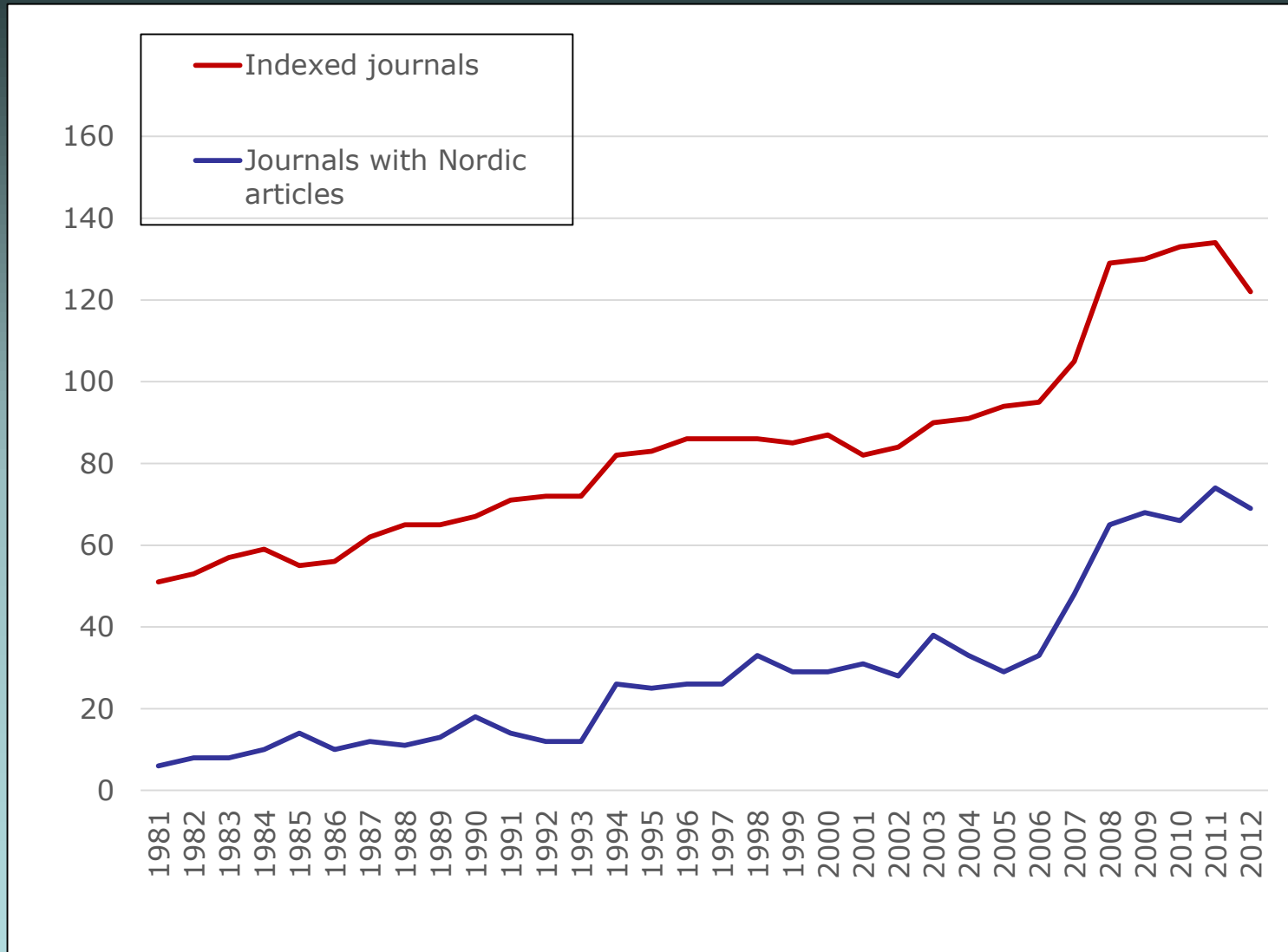
Country representation in sociology in Web of Science 1981-2012



Number of articles from the Nordic countries in sociological journals indexed by WoS 1981-2012



Number of sociological journals indexed by WoS 1981-2012 and number of them with Nordic articles



Österreichische Zeitschrift für Politikwissenschaft is covered ...

The screenshot displays the 'Web of Knowledge' interface. At the top, the logo 'WEB OF KNOWLEDGESM' is followed by the tagline 'DISCOVERY STARTS HERE'. Below this, a navigation bar includes 'Web of Science' and 'Additional Resources'. The 'Web of Science' section contains links for 'Search', 'Author Finder', 'Cited Reference Search', 'Advanced Search', and 'Search History'. The main content area shows the search results for the query 'Publication Name=(österreichische*)', refined by 'Source Titles=(ÖSTERREICHISCHE ZEITSCHRIFT FÜR POLITIKWISSENSCHAFT)', 'Timespan=All Years', 'Databases=SCI-EXPANDED, SSCI, A&HCI', and 'Lemmatization=On'. The results count is 2210. A 'Refine Results' sidebar on the left allows filtering by 'Web of Science Categories' (e.g., POLITICAL SCIENCE) and 'Document Types' (e.g., BOOK REVIEW, ARTICLE). The main results list shows three entries, with the first two having titles like 'Challenges and Threats to Democracy by New C...' and 'European Governance: On the Relationship of D...'. A red arrow points from the text 'is covered ...' to the source 'ÖSTERREICHISCHE ZEITSCHRIFT FÜR POLITIKWISSENSCHAFT' in the first result.

WEB OF KNOWLEDGESM | DISCOVERY STARTS HERE

Web of Science | Additional Resources

Search | Author Finder | Cited Reference Search | Advanced Search | Search History

Web of ScienceSM

<< Back to previous page

Results Publication Name=(österreichische*)
Refined by: Source Titles=(ÖSTERREICHISCHE ZEITSCHRIFT FÜR POLITIKWISSENSCHAFT)
Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI.
Lemmatization=On

Results: 2210

Refine Results

Search within results for

Web of Science Categories

POLITICAL SCIENCE (2,194)

Document Types

BOOK REVIEW (1,230)

ARTICLE (794)

EDITORIAL MATERIAL (157)

REVIEW (15)

NOTE (6)

Save to: EndNote[®] Web | EndNote[®]

1. Title: Challenges and Threats to Democracy by New C...
Author(s): Brand Ulrich; Kreisky Eva; Segert Dieter
Source: ÖSTERREICHISCHE ZEITSCHRIFT FÜR POLITIKWISSENSCHAFT
Times Cited: 0 (from Web of Science)
BIBSYS x

2. Title: European Governance: On the Relationship of D...
Author(s): Bieling Hans-Juergen
Source: ÖSTERREICHISCHE ZEITSCHRIFT FÜR POLITIKWISSENSCHAFT
Times Cited: 0 (from Web of Science)
BIBSYS x [View abstract]

3. Title: "Only Paradoxes to offer?" Feminist Theories of...

But **Österreichische Zeitschrift für Soziologie** is not covered



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DISCOVERY STARTS HERE

ence

Additional Resources

Author Finder

Cited Reference Search

Advanced Search

Search History

of ScienceSM

previous page

Publication Name=(österreichische*)

Refined by: Source Titles=(ÖSTERREICHISCHE ZEITSCHRIFT FÜR POLITIKWISSENSCHAFT)

Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI.

Lemmatization=On

2210

results

results for

Search

Refine

Web of Science Categories

☐ POLITICAL SCIENCE (2,194)

Document Types

☐ BOOK REVIEW (1,230)

☐ ARTICLE (794)

☐ EDITORIAL MATERIAL (157)

☐ REVIEW (15)

☐ NOTE (6)

Refine



(0)



Save to:

EndNote[®] Web

EndNote[®]

1. Title: **Challenges and Threats to Democracy by New C**
Author(s): Brand Ulrich; Kreisky Eva; Segert Dieter
Source: **ÖSTERREICHISCHE ZEITSCHRIFT FÜR POLITIKWIS**
Times Cited: 0 (from Web of Science)
BIBSYS x
2. Title: **European Governance: On the Relationship of D**
Author(s): Bieling Hans-Juergen
Source: **ÖSTERREICHISCHE ZEITSCHRIFT FÜR POLITIKWIS**
Times Cited: 0 (from Web of Science)
BIBSYS x [[View abstract](#)]
3. Title: **"Only Paradoxes to offer?" Feminist Theories of**

Swedish Journal of Sociology is covered ...

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Web of Science | **Additional Resources**

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Web of ScienceSM

Results Publication Name=(sociologist forskning)
Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI.
Lemmatization=On

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Comparative Analysis	74
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Teacher Attitudes	62
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[Identifying and Comparing Scandinavian Ethnography: Comparisons and Influences](#)

Beach, Dennis – Ethnography and Education, 2010

In recent years, there has been a significant growth in the volume of research production in education ethnography in Scandinavia due partly to a regionally financed network. The present article makes some comparisons between Scandinavian and other education research contexts in relation to aspects of general ethnographic design to try to analyse...

Descriptors: Ethnography, Foreign Countries, Comparative Analysis, Financial Support

[The Ethical Dimensions of Curriculum Leadership in Scandinavian Countries](#)

Norberg, Katarina; Johansson, Olof – Journal of Educational Administration, 2010

Purpose: Schooling is a significant tool for fostering future generations, which, in turn, implies that the curriculum is an ethical document. It mirrors the society's notion of what is valuable, useful and necessary from a societal and individual perspective. The purpose of this paper is to address the Scandinavian curricula's ethical framework,...

Descriptors: Ethics, Instructional Leadership, Curriculum, Politics of Education

[Sex Differences in Left-Handedness Are Also Evident in Scandinavia and in Twins: Comment on Papadatou-Pastou, Martin, Munafò, and Jones \(2008\)](#)

Vuoksima, Eero; Kaprio, Jaakko – Psychological Bulletin, 2010

The lack of sex difference in left-handedness in Scandinavian countries reported by Papadatou-Pastou, Martin, Munafò, and Jones (2008) is questioned. We investigated the sex difference in left-handedness in two Finnish, one Norwegian, and one Swedish population-based sample not included in the Papadatou-Pastou et al. (2008) meta-analysis. The...

Descriptors: Handedness, Twins, Foreign Countries, Gender Differences

[Outside the Box: The Danish Folkehojskole as Educational Innovator](#)

Collins, John – Australian Journal of Adult Learning, 2013

Travelling between various Scandinavian adult educational institutions in 1978, the author, John Collins, picked up a couple of hitchhikers—Danish students returning to their school after a short vacation period. As they neared the Funen Island harbour village, which was their destination, the students invited Collins to visit their school. What...

Descriptors: Educational Innovation, Folk Schools, Foreign Countries, Educational Philosophy

[Shifting Authenticities in Scandinavian Music Education](#)

Dyndahl, Petter; Nielsen, Siw Graabraek – Music Education Research, 2014

There has been an ongoing tendency, taking place in the Scandinavian countries from the late 1970s onwards, to expand the repertoires and resources of music as an educational matter, an academic field, as well as an area for support and funding from cultural authorities, organisations and institutions. Here, popular music, jazz, folk music and...

Descriptors: Music Education, Popular Culture, Music, Educational Finance

["Folkbildning" through Hip-Hop: How the Ideals of Three Rappers Parallel a Scandinavian Educational Tradition](#)

Soderman, Johan – Music Education Research, 2011

The purpose of this article is to show how the rappers' talk about hip-hop and its connection to pedagogy and social activism parallel the Scandinavian tradition of folkbildning. Scandinavian folkbildning can be seen as a movement to provide voluntary education for the general population. It can also be the name of the process of learning in which...

Descriptors: Foreign Countries, Popular Culture, Music, Cultural Context

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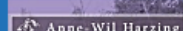
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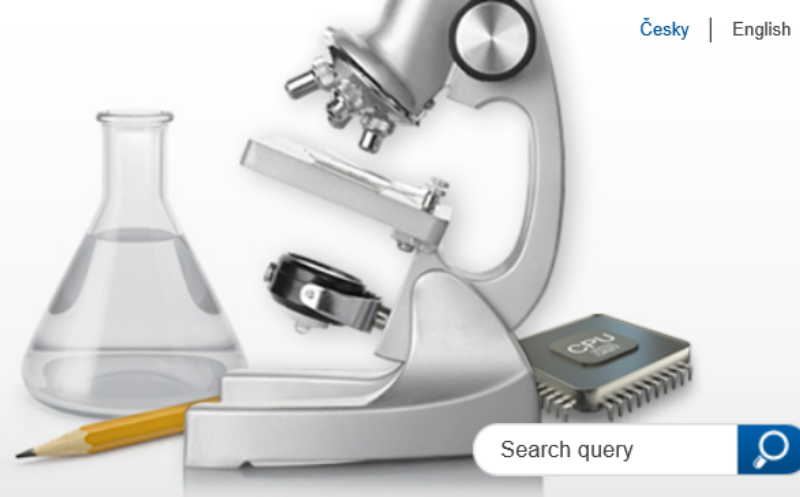
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Cites	Per year	Rank	Authors	Title	Year	Publication
283	13.48	1	..., O Persson, G Sivertsen	Understanding patterns of international scientific collaboration	1992	Science, Technology
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5	0.24	8	G Sivertsen	Internationalization via journals: scientific and scholarly journals edited in the Nordic c...	1992	
5	0.50	21	G Sivertsen	Bibliografiske datakilder til dokumentasjon av vitenskapelige publikasjoner: En utredni...	2003	Oslo: NIFU
3	1.50	14	..., K Rorstad, F Piro, G Sivertsen	Are female researchers less cited? A large-scale study of Norwegian scientists	2011	Journal of the Ameri...
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- Historical examples
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- A practical definition for research policy

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UNDERSTANDING PATTERNS OF INTERNATIONAL SCIENTIFIC COLLABORATION

Author(s): LUUKKONEN, T (LUUKKONEN, T); PERSSON, O (PERSSON, O); SIVERTZ, A (SIVERTZ, A)

Source: SCIENCE TECHNOLOGY & HUMAN VALUES Volume: 17 Issue: 1 Pages: 1-10

Times Cited: 150 (from Web of Science)

Cited References: 14 [[view related records](#)] [Citation Map](#)

Abstract: International scientific collaboration has increased both in volume and importance. They address such questions as how one might explain country-to-country difference in patterns of international collaboration in scientific fields. Attention is drawn to cognitive methodology that gives one a measure, independent of size, of countries' propensities to collaborate.

Accession Number: WOS:A1992GW95200006

Document Type: Article

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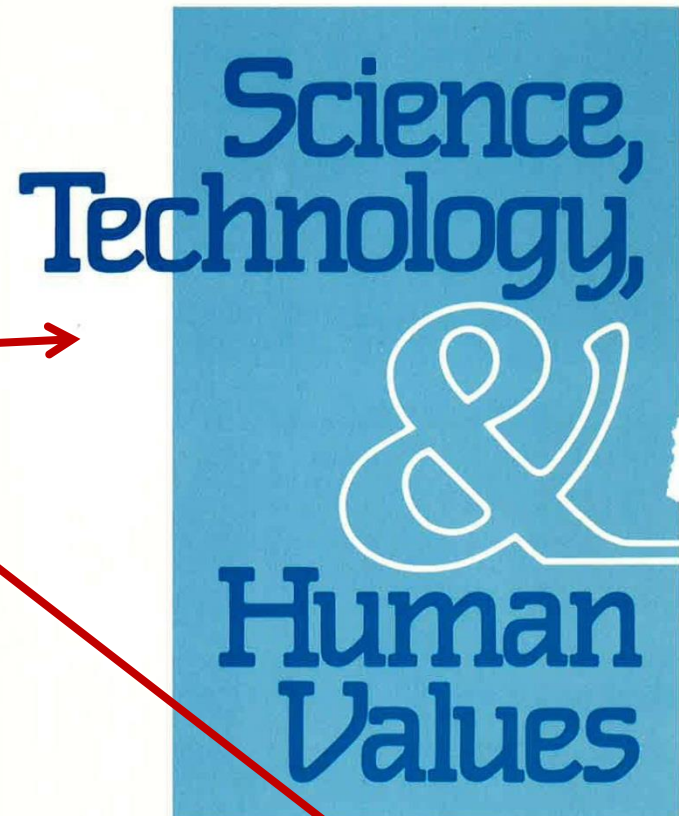
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Author(s): LUUKKONEN, T (LUUKKONEN, T); TIJSSEN, RJW (TIJSSEN, RJW); PERSSON, O (PERSSON, O); SIVERTSEN, G (SIVERTSEN, G)

Source: SCIENTOMETRICS Volume: 28 Issue: 1 Pages: 15-36 DOI: 10.1007/BF02016282 Published: SEP 1993

Times Cited: 81 (from Web of Science)

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Abstract: A growing science policy interest in international scientific collaboration has brought about a multitude of studies which attempt to measure the countries and to explore intercountry collaborative networks. This paper attempts to clarify the methodology that is being used or can be used for this purpose. The paper concludes that, in an analysis of collaborative links, it is essential to use both absolute and relative measures. The latter normalize difference information. Absolute measures yield an answer to questions such as which countries are central in the international network of science, whether collaborative and which countries are the most important collaborative partners of another country. Relative measures provide answers to questions of the intensity of

Document Type: Article

Language: English

KeyWords Plus: COOPERATION

Reprint Address: LUUKKONEN, T (reprint author), ACAD FINLAND,POB 57,SF-00551 HELSINKI,FINLAND

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Coherence among Head Direction Cells before Eye Opening in Rat Pups

By: Bjerknes, TL (Bjerknes, Tale L.)^[1]; Langston, RF (Langston, Rosamund F.)^[2]; Kruge, IU (Krug, Ingvald U.)^[1]; Moser, EI (Moser, Edvard I.)^[1]; Moser, MB (Moser, May-Britt)^[1]

CURRENT BIOLOGY
Volume: 25 Issue: 1 Pages: 103-108
DOI: 10.1016/j.cub.2014.11.009
Published: JAN 5 2015
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Abstract

Mammalian navigation is thought to depend on an internal map of space consisting of functionally specialized cells in the hippocampus and the surrounding parahippocampal cortices [1-7]. Basic properties of this map are present when rat pups explore the world outside of their nest for the first time, around postnatal day 16-18 (P16-P18) [810]. One of the first functions to be expressed in navigating animals is the directional tuning of the head direction cells [8, 9]. To determine whether head direction tuning is expressed at even earlier ages, before the start of exploration, and to establish whether vision is necessary for the development of directional tuning, we recorded neural activity in pre- and parasubiculum, or medial entorhinal cortex, from P11 onward, 3-4 days before the eyelids unseal. Head direction cells were present from the first day of recording. Firing rates were lower than in adults, and preferred firing directions were less stable, drifting within trials and changing completely between trials. Yet the cells drifted coherently, i.e., relative firing directions were maintained from one trial to the next. Directional tuning stabilized shortly after eye opening. The data point to a hardwired attractor network for representation of head direction in which directional tuning develops before vision and visual input serves primarily to anchor firing direction to the external world.

Keywords

KeyWords Plus: FREELY MOVING RATS; GEOMETRIC BORDERS; ENTORHINAL CORTEX; VESTIBULAR INPUT; SPATIAL MAP; REPRESENTATION; POSTSUBICULUM; SYSTEM

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1. Four useful types of indicators
 - Research activity
 - Research profile
 - Research collaboration
 - Impact on further research
2. Discussion I: Bibliometrics in the social sciences and humanities
3. Discussion II: Bibliometrics for research assessment

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Four useful types of indicators

Research activity	Publications per unit
Research profile	Publications per field of research
Research collaboration	Authors and addresses in publication
Impact on further research	Subsequent citations from other publications

Four useful types of indicators

Research activity	Publications per unit
Research profile	Publications per field of research
Research collaboration	Authors and addresses in publication
Impact on further research	Subsequent citations from other publications

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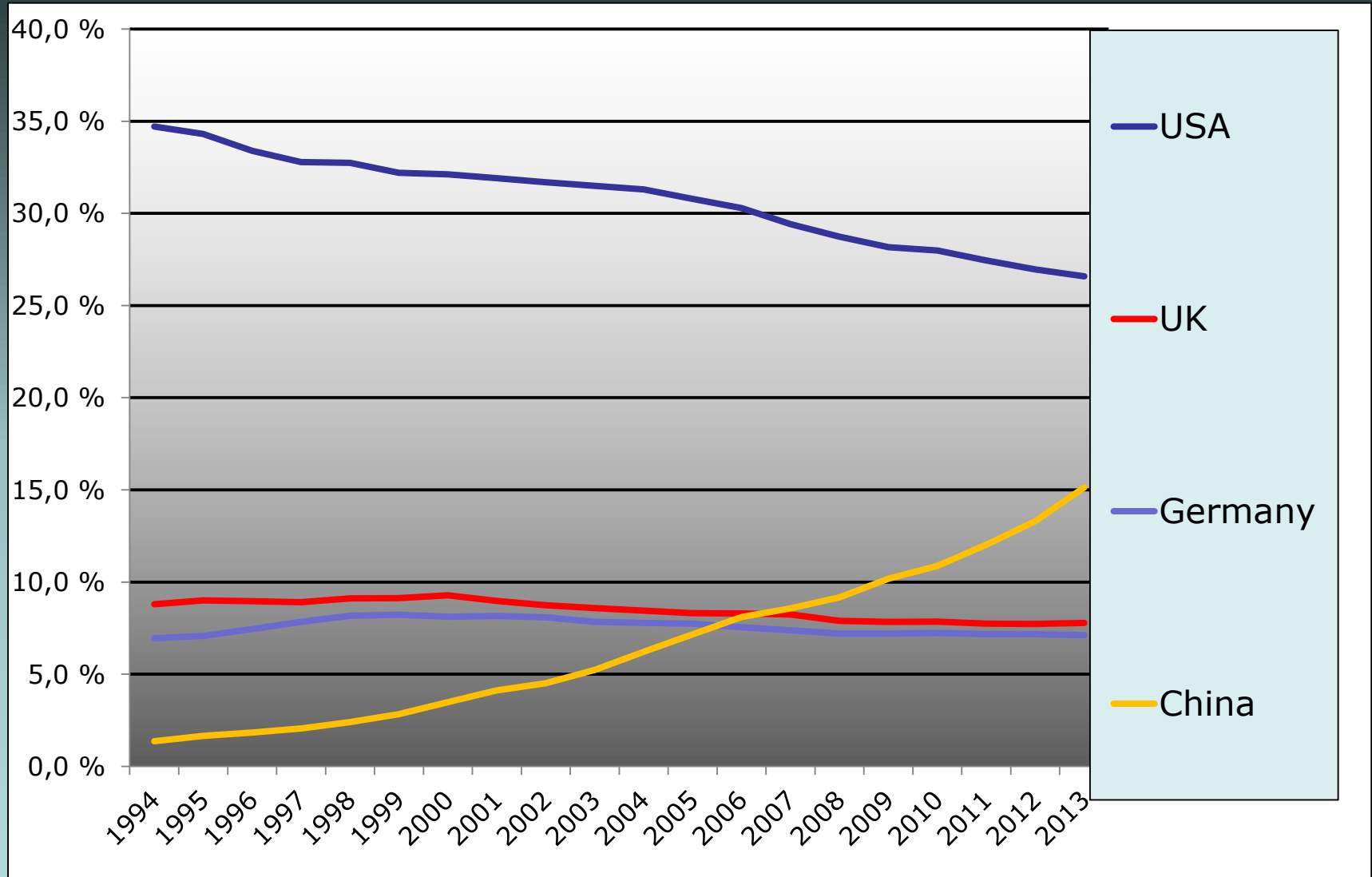
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Subject Category: Computer Science; Information Science & Library Science

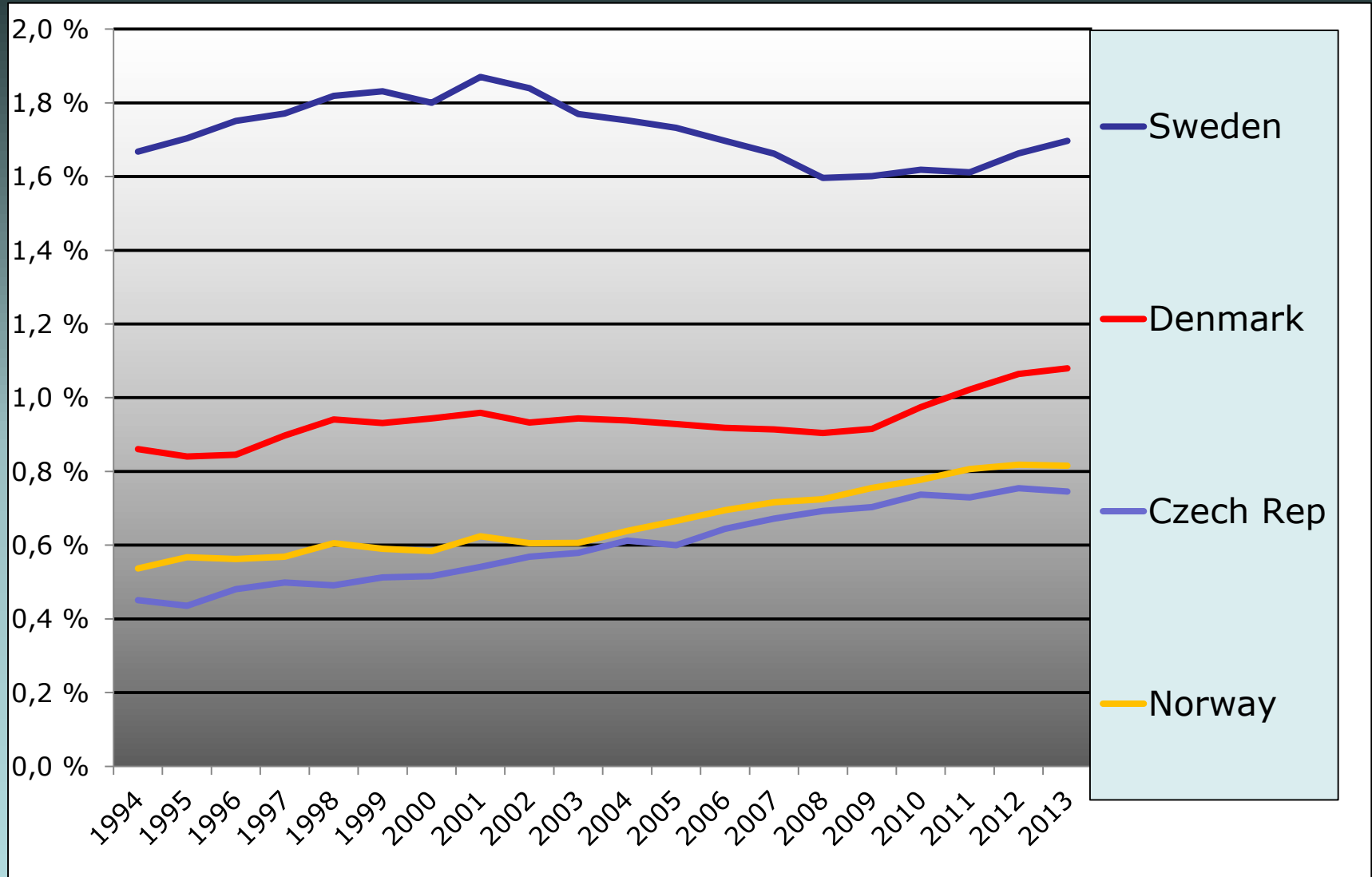
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World shares in articles in Web of Science 1994-2013

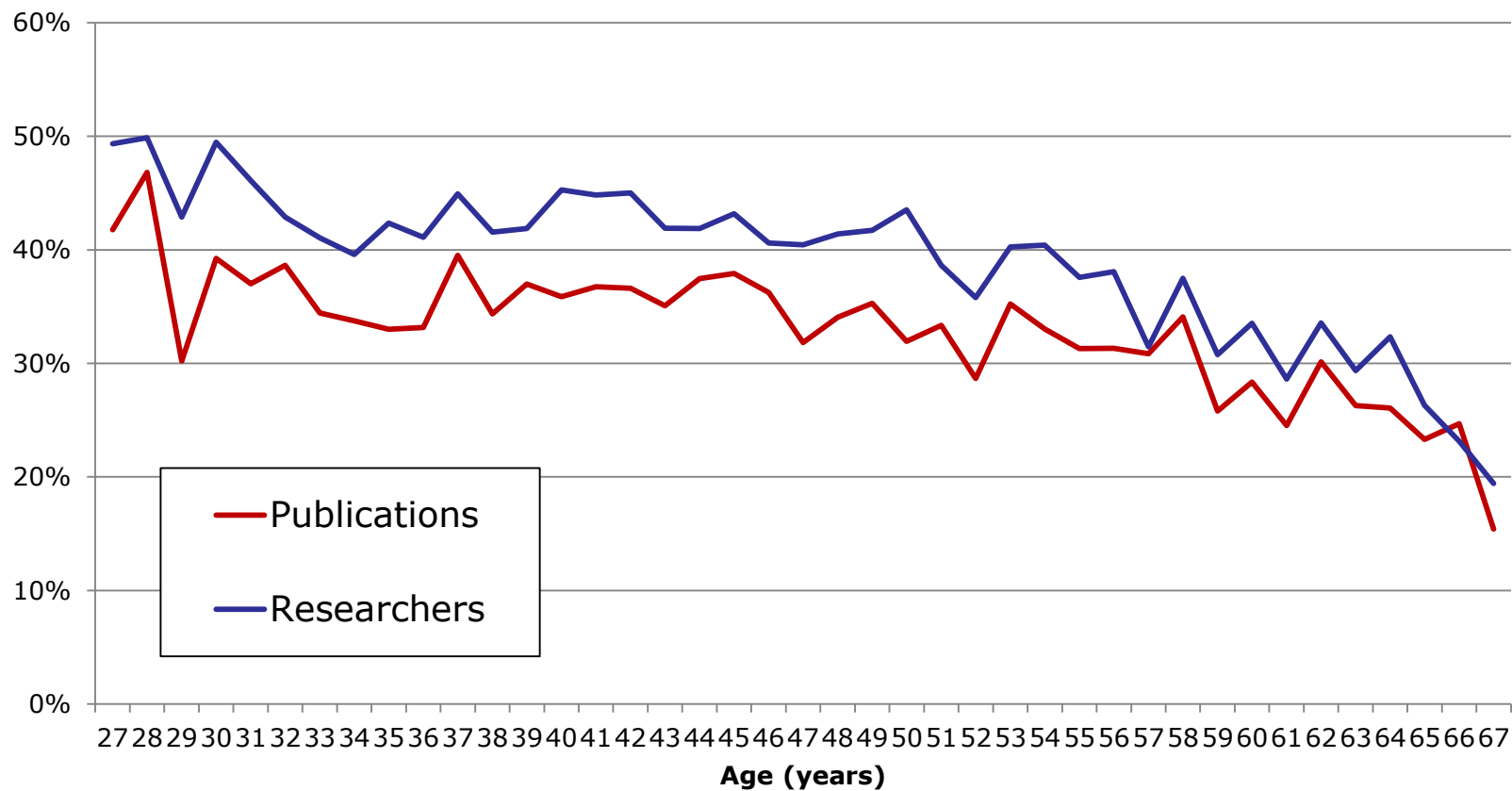


World shares in articles in Web of Science 1994-2013



Based on Norwegian RIV data from 2011

Figure 1. Age and women's share of Norway's researchers and their total scientific publication output in 2011



Four useful types of indicators

Research activity	Publications per unit
Research profile	Publications per field of research
Research collaboration	Authors and addresses in publication
Impact on further research	Subsequent citations from other publications




Usually: Subject classification of journals

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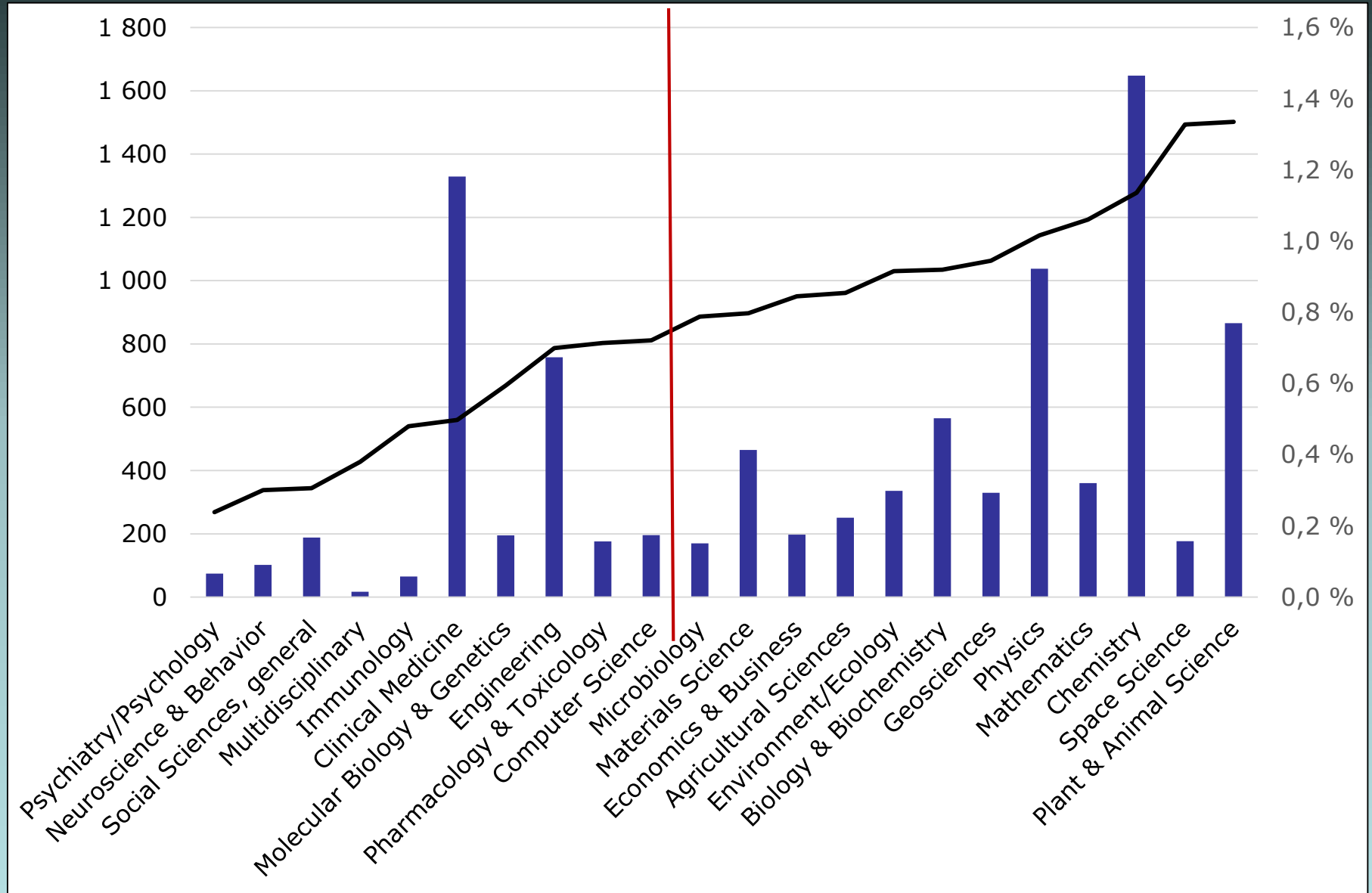
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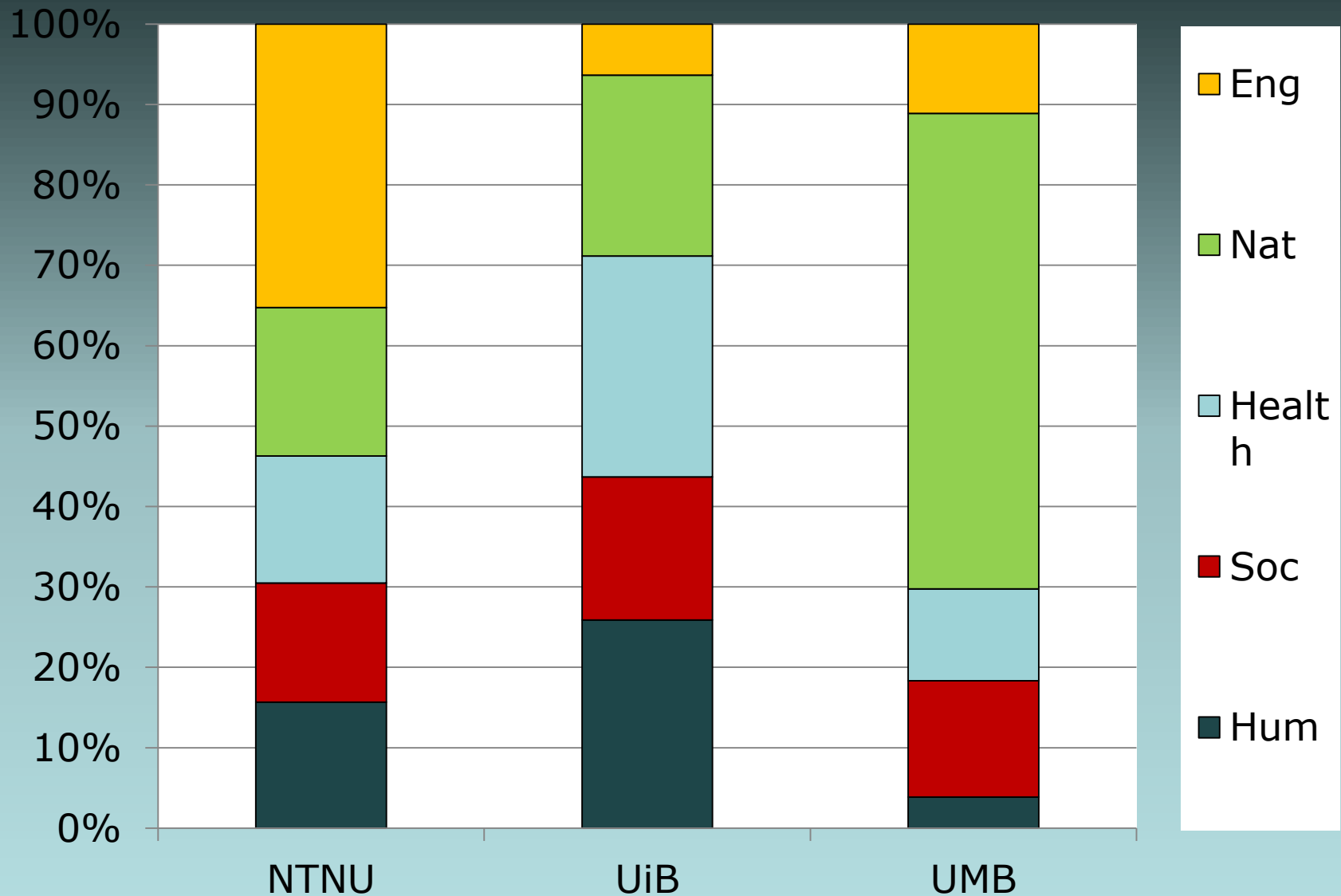
Czech articles and shares in the world's output

Web of Science in 2011



Research profiles of three Norwegian universities

Based on Norwegian RIV data



Four useful types of indicators

Research activity	Publications per unit
Research profile	Publications per field of research
Research collaboration	Authors and addresses in publication
Impact on further research	Subsequent citations from other publications

Usually: Authors and addresses

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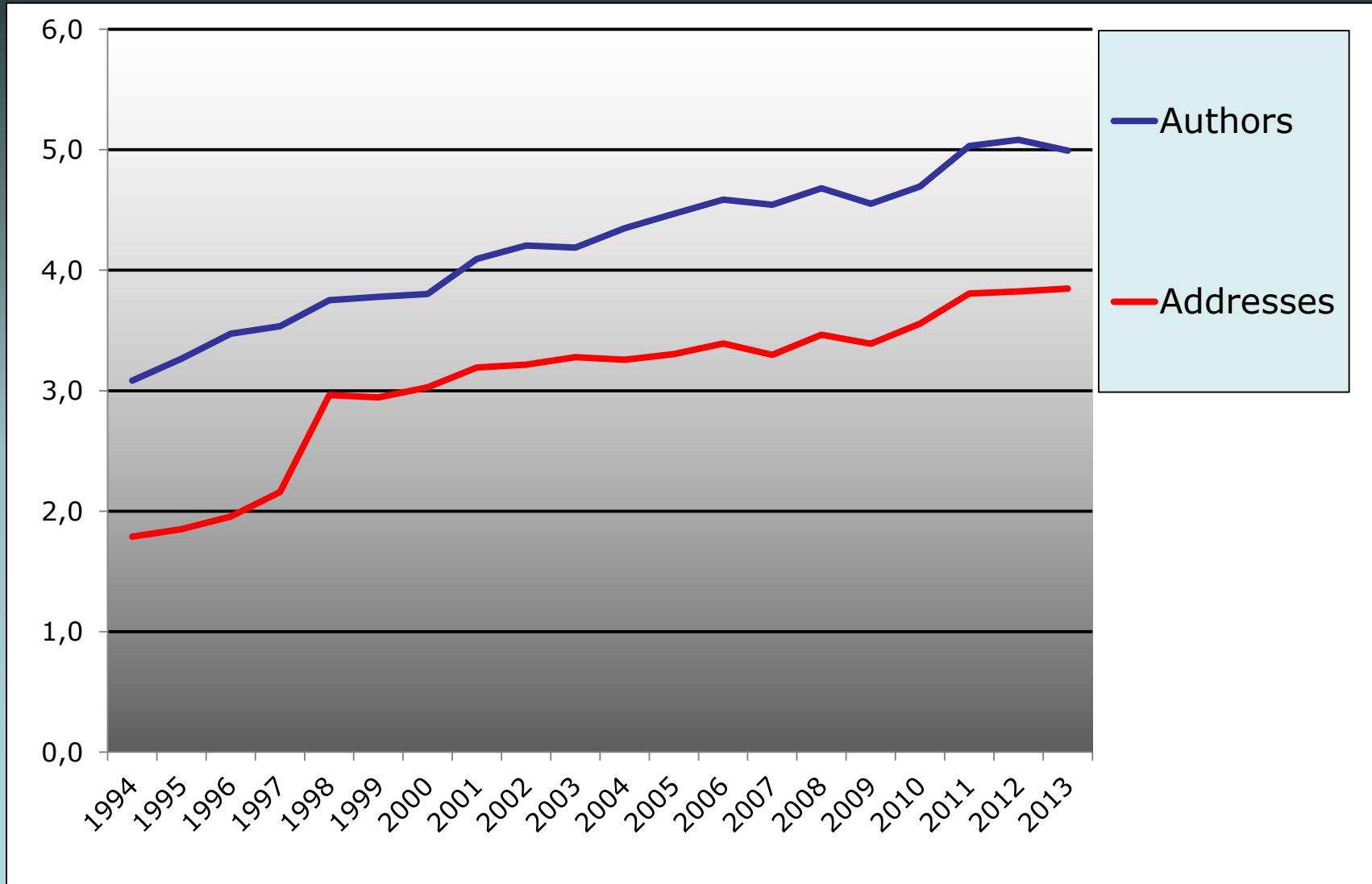
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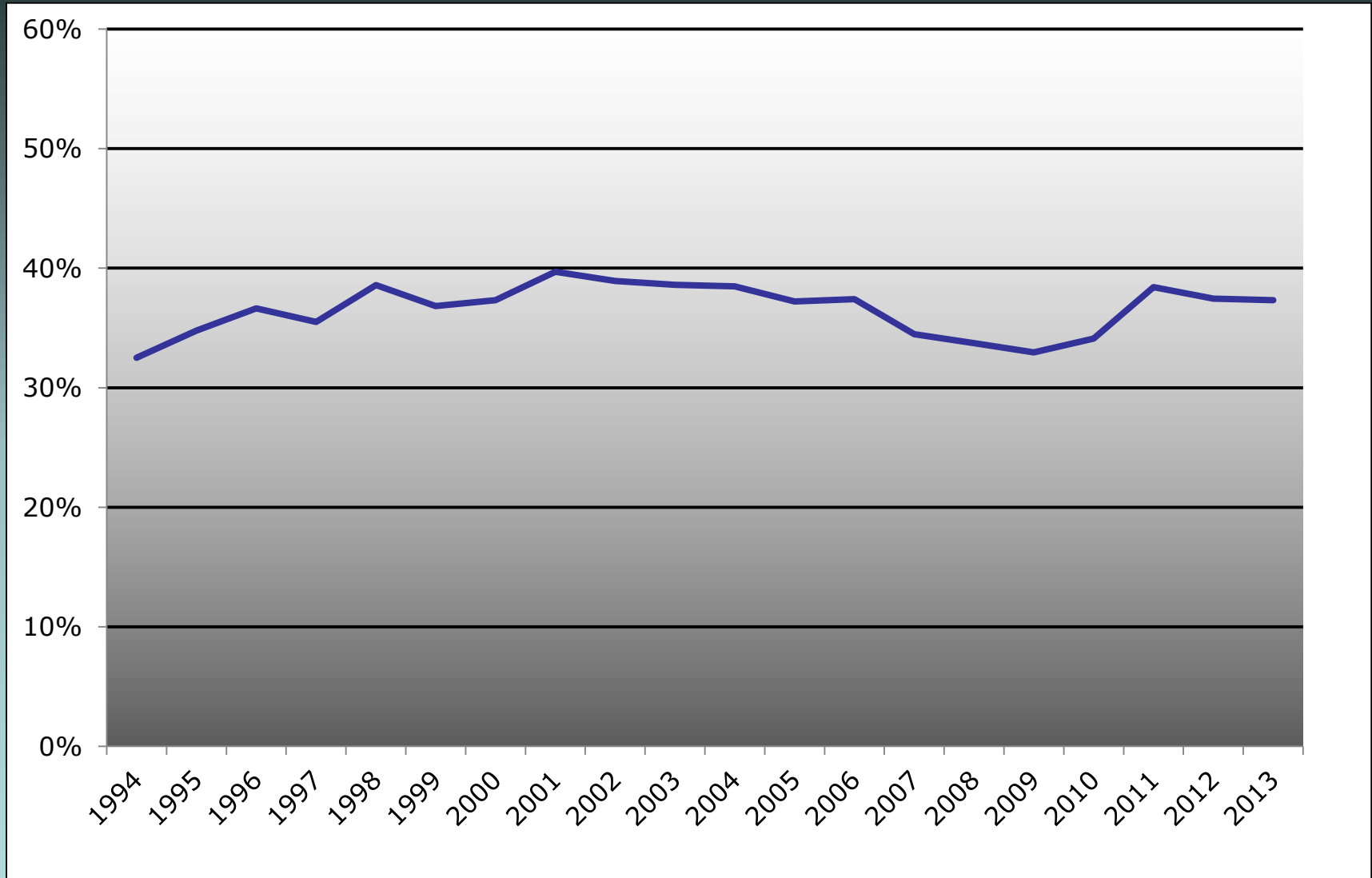
Average number of authors and addresses in Czech articles, Web of Science 1994-2013

Articles with more than 50 authors are not included



Percentage of Czech articles in Web of Science 1994-2013 with co-authors in other countries

Articles with more than 50 authors are not included



Four useful types of indicators

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Subsequent citations

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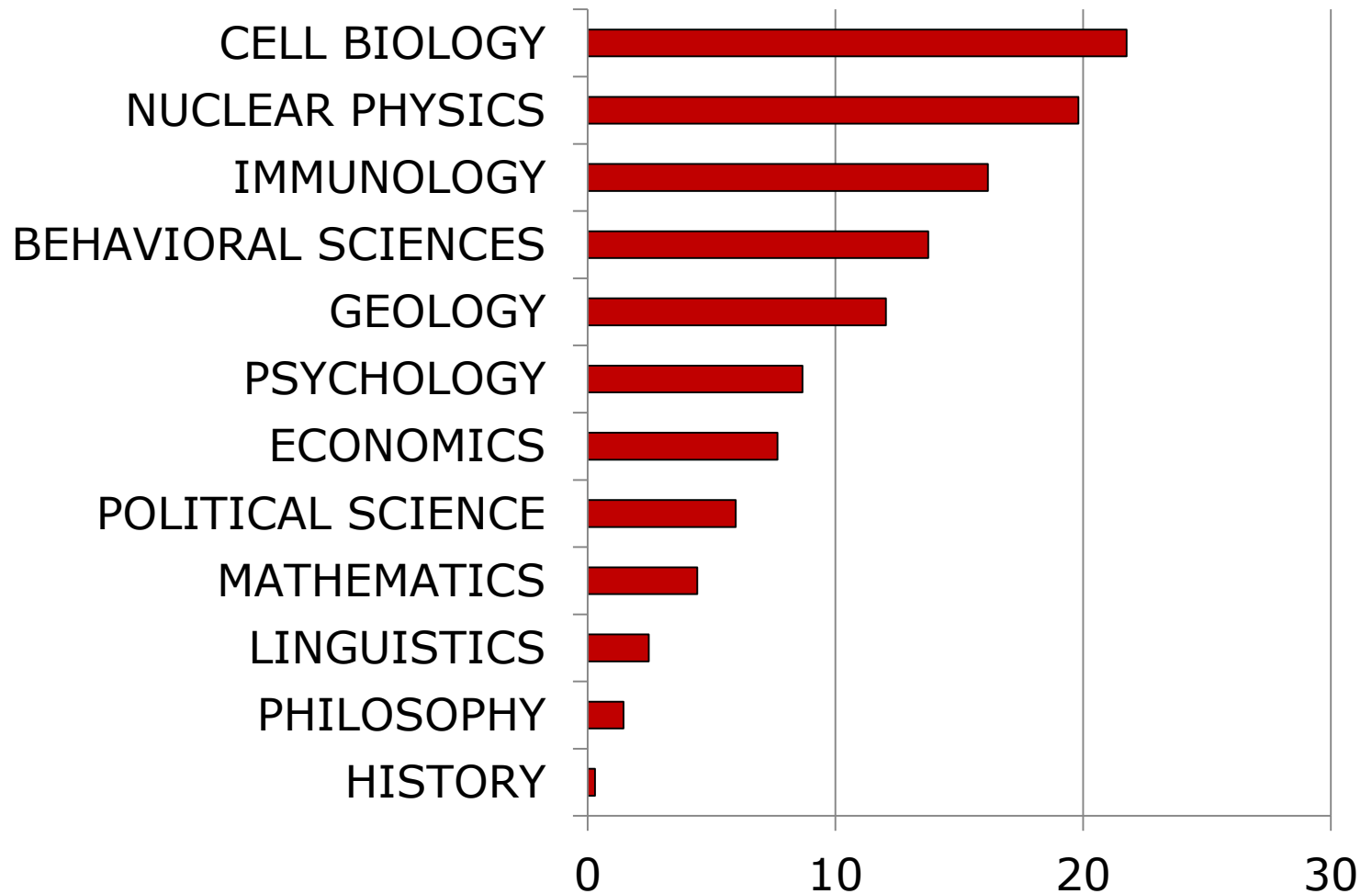
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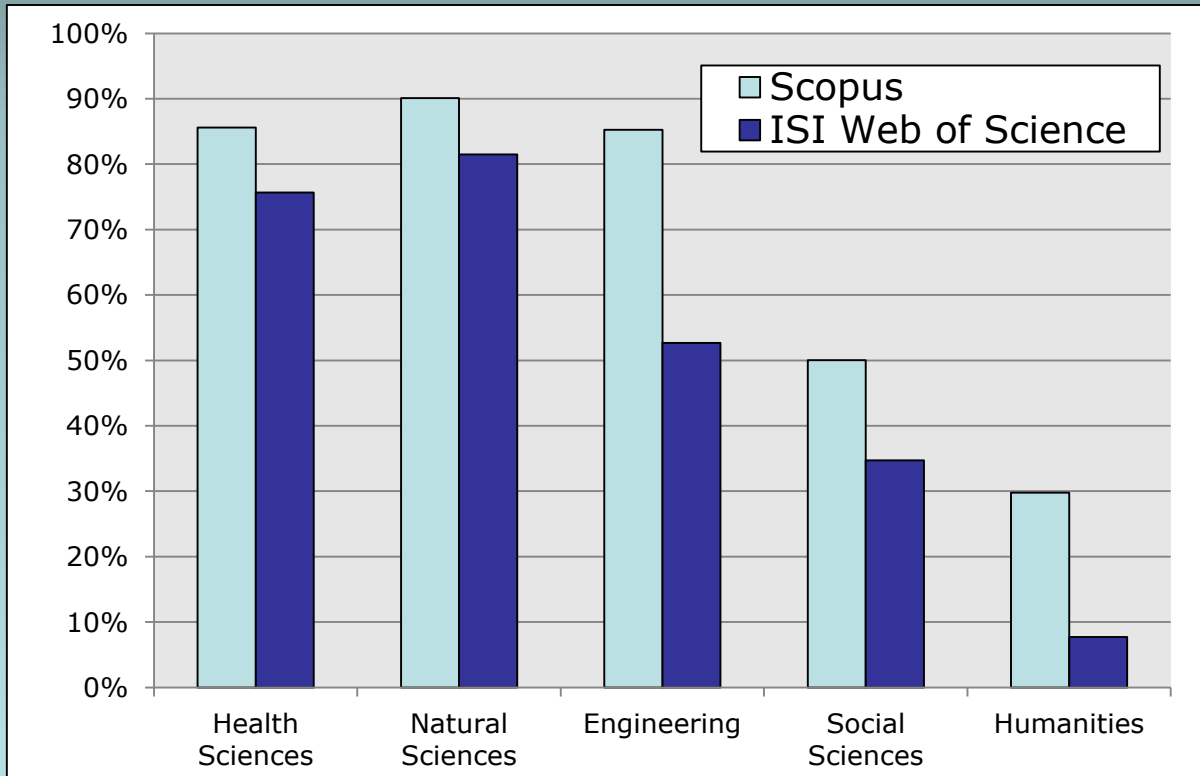
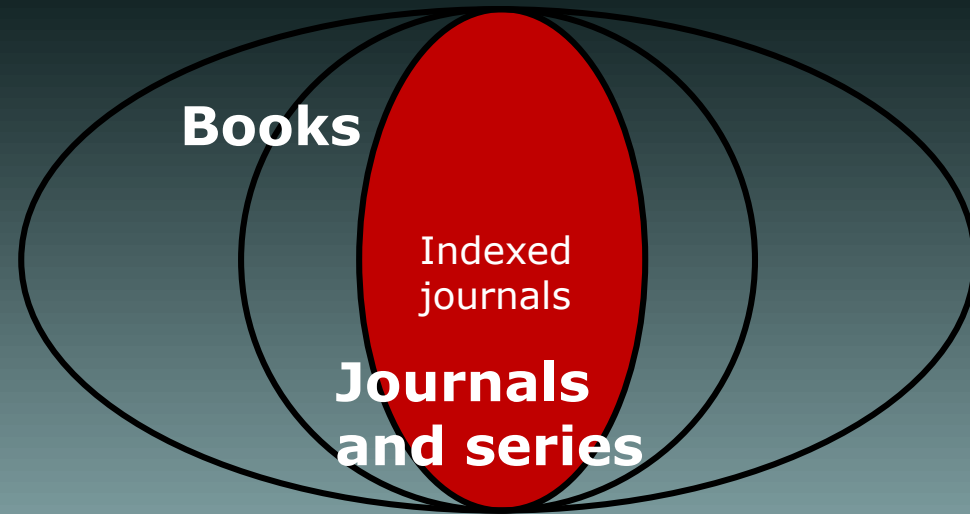
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Average number of citations per field: The need for field normalization



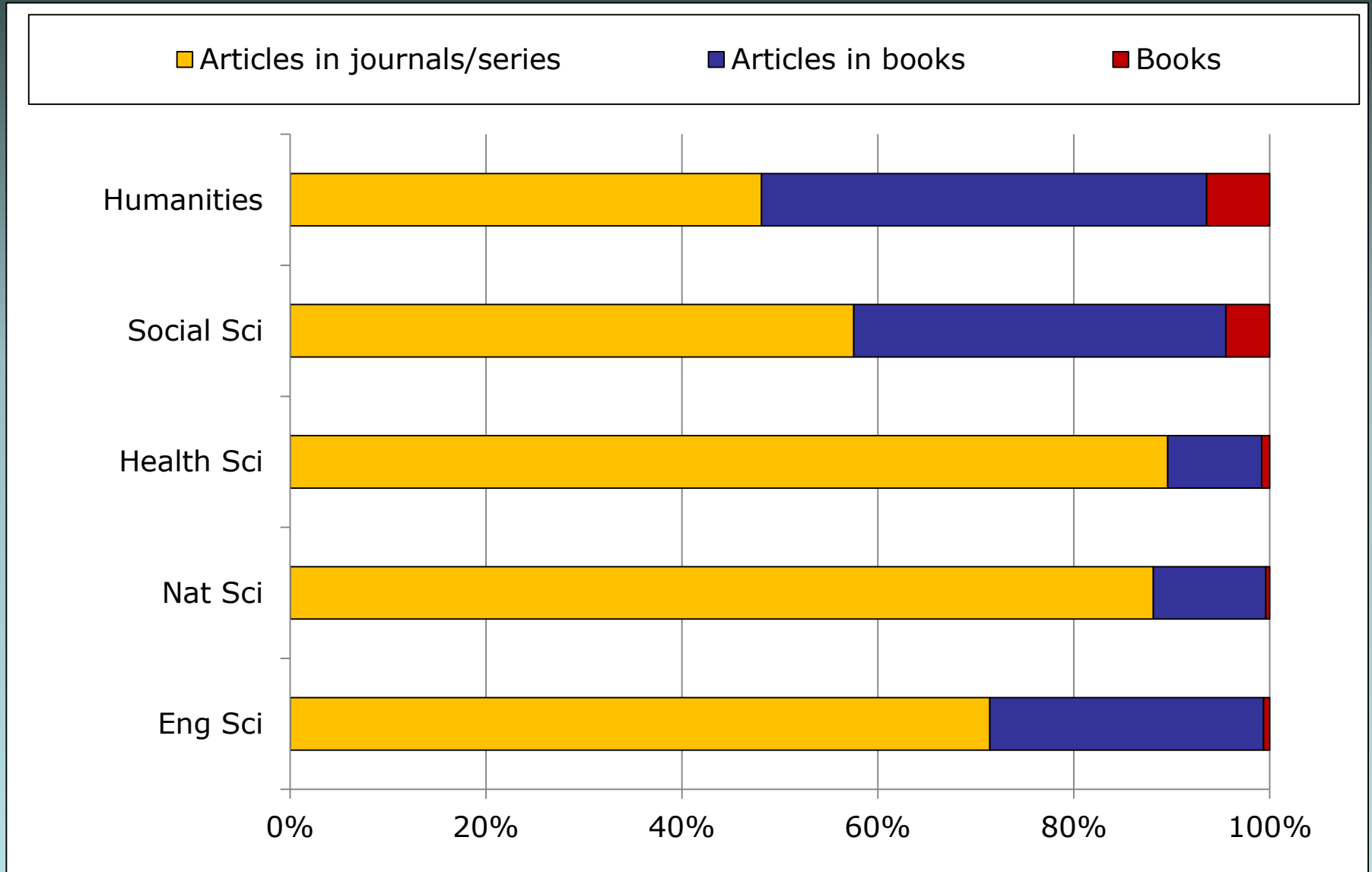
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 - Research collaboration
 - Impact on further research
2. Discussion I: Bibliometrics in the social sciences and humanities
3. Discussion II: Bibliometrics for research assessment



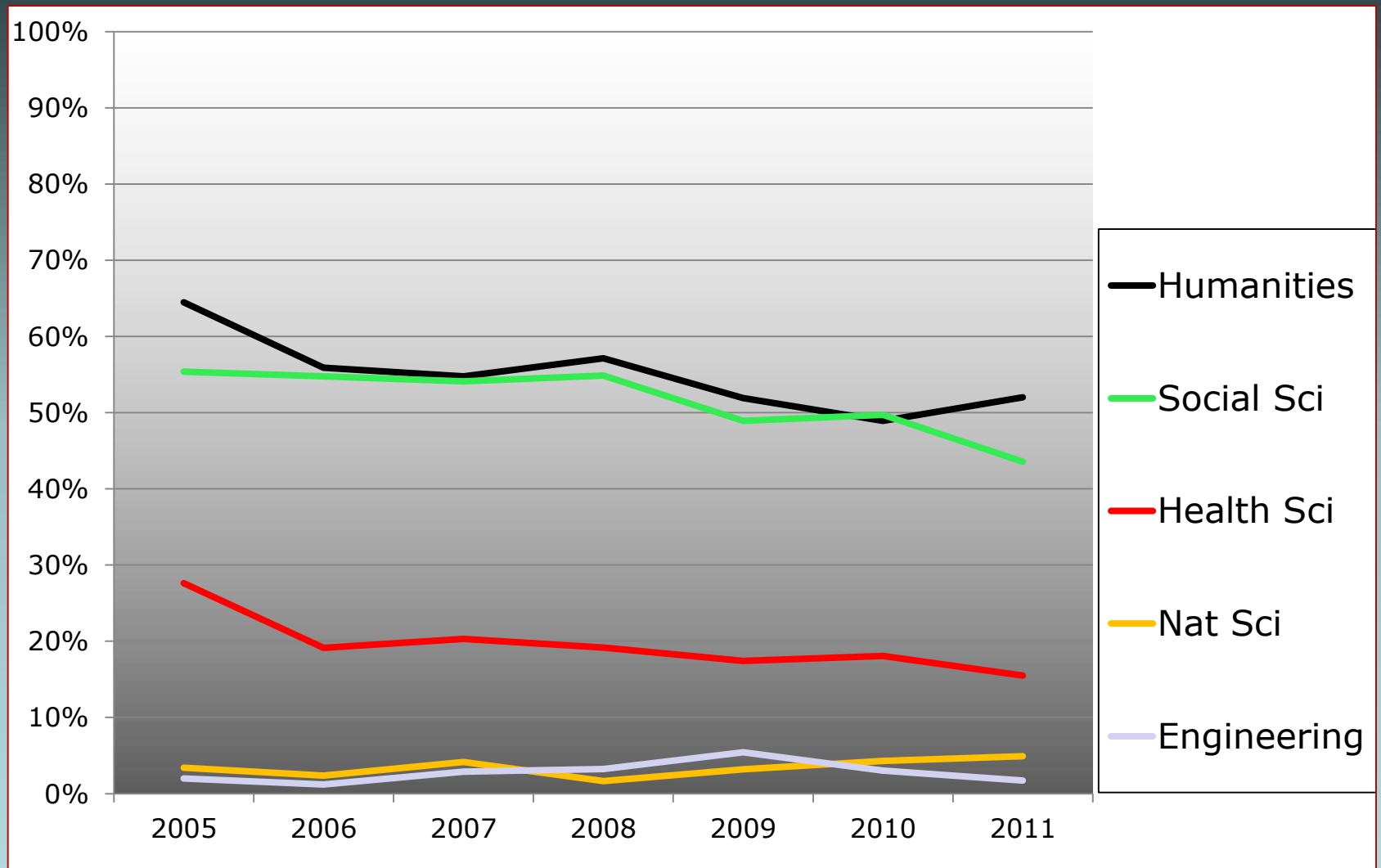
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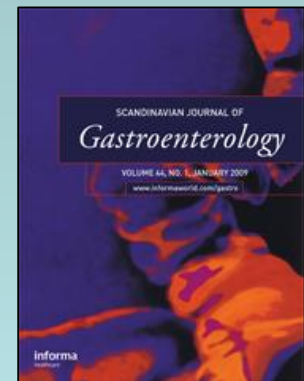
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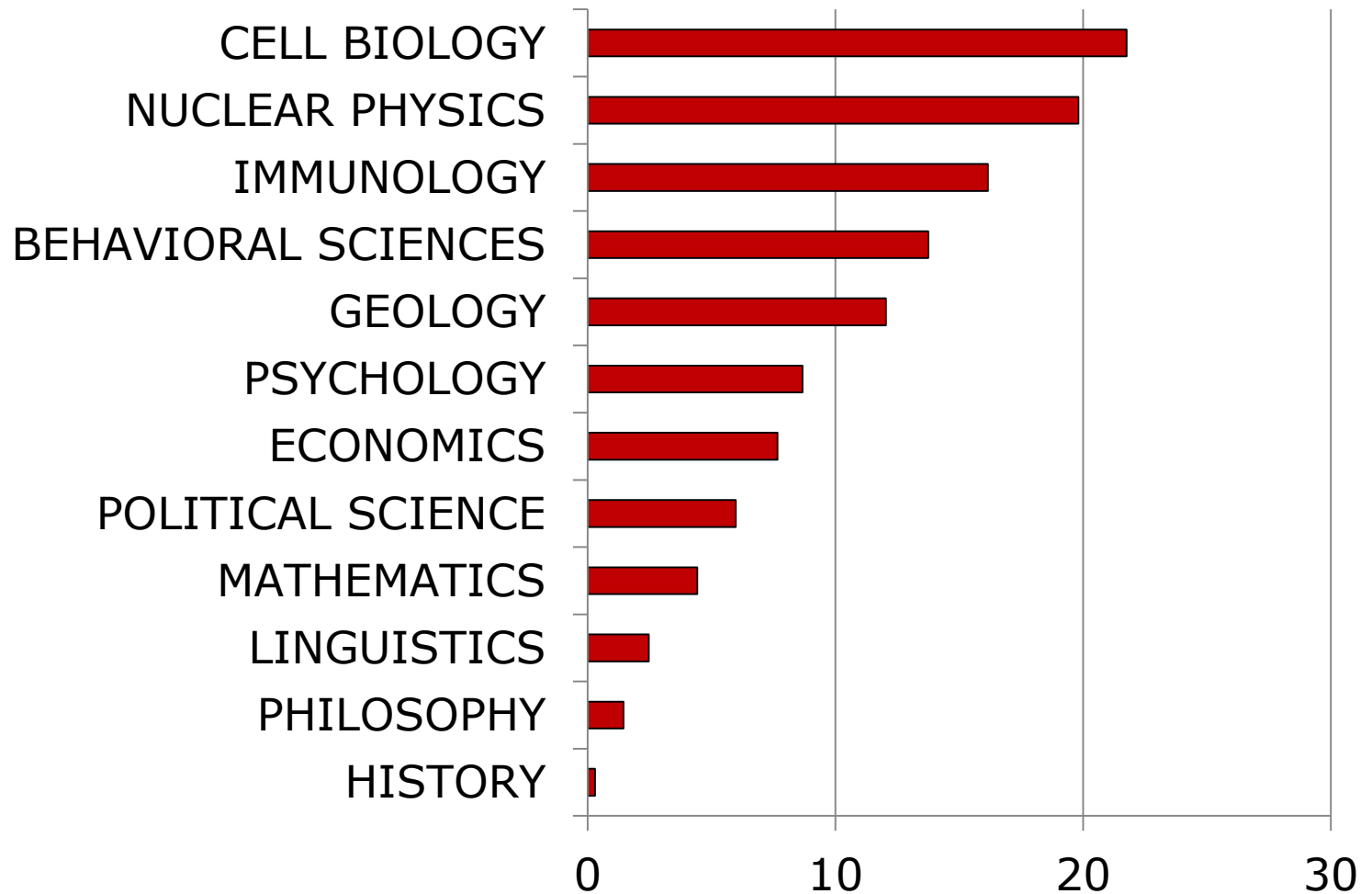


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	History	Linguistics	Sociology	Economics	Gastro- enterology
References	41	55	64	31	57
Average age of cited work	23 years	14 years	13 years	12 years	10 years
References to journals	17 %	27 %	56 %	74 %	96 %
References to WoS journals	2 %	20 %	50 %	68 %	93 %
Average citation rate in field (5 yrs)	0,27	1,69	1,90	2,36	6,78



Average number of citations per field



Summing up: Bibliometrics in the SSH

- The publication patterns of the SSH
 - Heterogeneous in publication formats, audiences, and languages
- Coverage of the SSH in bibliographic databases
 - Incomplete coverage of international journals in the SSH; very limited coverage of books; random or no coverage of the national level (books and journals)
- Referencing and citation patterns in the SSH
 - Generally low citation rates (limited validity of citation indicators) due to limited coverage of the cited literature in citation databases
- Trends, policies and prospects with regard to improved coverage of the SSH
 - CRIS-systems (with comprehensive coverage of the SSH) are on the rise and are being integrated with commercial bibliometric tools and citation databases.

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1. Four useful types of indicators
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Research Evaluation



- Bibliometrics may **inform**, but **not replace** peer review

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REF2014
Research Excellence Framework

2014

- Evaluation panels may be provided with bibliometrics upon request.
- Use of journal impact factors and other bibliometric indicators not supplied through the REF administration is forbidden.

General Recommendation

1. Do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions.

San Francisco Declaration on Research Assessment

Putting science into the assessment of research

There is a pressing need to improve the ways in which the output of scientific research is evaluated by funding agencies, academic institutions, and other parties.

To address this issue, a group of editors and publishers of scholarly journals met during the Annual Meeting of The American Society for Cell Biology (ASCB) in San Francisco, CA, on December 16, 2012. The group developed a set of recommendations, referred to as the *San Francisco Declaration on Research Assessment*. We invite interested parties to support by adding their names to this Declaration.

The outputs from scientific research are many and varied, including: research articles reporting new knowledge, data, reagents, and software; intellectual property; and highly trained young scientists. Funding agencies, institutions that employ scientists, and scientists themselves, all have a desire, and need, to assess the quality and impact of research output as measured accurately and evaluated wisely.

The Journal Impact Factor is frequently used as the primary parameter with which to compare the scientific output of individuals and institutions. The Journal Impact Factor, as calculated by Thomson Reuters, was originally created as a tool to help librarians identify journals to purchase, not as a measure of the scientific quality of research. We understand that the Journal Impact Factor has a number of well-documented deficiencies as a tool for research assessment. These limitations include: A) citation distributions within journals are highly skewed [1-3]; B) the properties of the Journal Impact Factor are field-specific: it is a composite of multiple, highly diverse article types, and C) Journal Impact Factors can be manipulated (or "gamed") by editorial policy [5]; and D) data used to calculate the Journal Impact Factors are neither transparent nor openly available to the public [4, 6, 7].

Below we make a number of recommendations for improving the way in which the quality of research output is evaluated. Outputs other than research articles will grow in importance in assessing research effectiveness in the future, but the peer-reviewed research paper will remain a central research output that informs research assessment practices relating to research articles published in peer-reviewed journals but can and should be extended by recognizing additional products, such as datasets, as important research outputs. These recommendations are aimed at funding agencies, academic institutions, journals, organizations that supply metrics, and individual researchers.

A number of themes run through these recommendations:

- the need to eliminate the use of journal-based metrics, such as Journal Impact Factors, in funding, appointment, and promotion considerations;
- the need to assess research on its own merits rather than on the basis of the journal in which the research is published; and
- the need to capitalize on the opportunities provided by online publication (such as relaxing unnecessary limits on the number of words, figures, and references in articles, and exploring new indicators of significance and impact).

We recognize that many funding agencies, institutions, publishers, and researchers are already encouraging improved practices in research assessment. Such steps are beginning to increase the momentum toward more sophisticated and meaningful approaches to research evaluation that can now be built upon and adopted by all of the key stakeholders.

The signatories of the *San Francisco Declaration on Research Assessment* support the adoption of the following practices in research assessment.

General Recommendation

1. Do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions.

For funding agencies

2. Be explicit about the criteria used in evaluating the scientific productivity of grant applicants and clearly highlight, especially for early-stage investigators, that the scientific content of a paper is much more important than publication metrics or the identity of the journal in which it was published.
3. For the purposes of research assessment, consider the value and impact of all research outputs (including datasets and software) in addition to research publications, and consider a broad range of impact measures including qualitative indicators of research impact, such as influence on policy and practice.

For institutions

4. Be explicit about the criteria used to reach hiring, tenure, and promotion decisions, clearly highlighting, especially for early-stage investigators, that the scientific content of a paper is much more important than publication metrics or the identity of the journal in which it was published.
5. For the purposes of research assessment, consider the value and impact of all research outputs (including datasets and software) in addition to research publications, and consider a broad range of impact measures including qualitative indicators of research impact, such as influence on policy and practice.

For publishers

6. Greatly reduce emphasis on the journal impact factor as a promotional tool, ideally by ceasing to promote the impact factor or by presenting the metric in the context of a variety of journal-based metrics (e.g., 5-year impact factor, EigenFactor [8], SCImago [9], h-index, editorial and publication times, etc.) that provide a richer picture of research impact.
7. Make available a range of article-level metrics to encourage a shift toward assessment based on the scientific content of an article rather than publication metrics of the journal in which it was published.
8. Encourage responsible authorship practices and the provision of information about the specific contributions of each author.
9. Whether a journal is open-access or subscription-based, remove all reuse limitations on reference lists in research articles and make them available under the Creative Commons Public Domain Dedication [10].
10. Remove or reduce the constraints on the number of references in research articles, and, where appropriate, mandate the citation of primary literature in favor of reviews in order to give credit to the group(s) who first reported a finding.

For organizations that supply metrics

11. Be open and transparent by providing data and methods used to calculate all metrics.
12. Provide the data under a licence that allows unrestricted reuse, and provide computational access to data, where possible.
13. Be clear that inappropriate manipulation of metrics will not be tolerated; be explicit about what constitutes inappropriate manipulation and what measures will be taken to combat this.
14. Account for the variation in article types (e.g., reviews versus research articles), and in different subject areas when metrics are used, aggregated, or compared.

For researchers

15. When involved in committees making decisions about funding, hiring, tenure, or promotion, make assessments based on scientific content rather than publication metrics.
16. Wherever appropriate, cite primary literature in which observations are first reported rather than reviews in order to give credit where credit is due.
17. Use a range of article metrics and indicators on personal/supporting statements, as evidence of the impact of individual published articles and other research outputs [11].
18. Challenge research assessment practices that rely inappropriately on Journal Impact Factors and promote and teach best practice that focuses on the value and influence of specific research outputs.

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The “Leiden Manifesto” (Draft September 2014)

1. Metrics properly used to support assessments; **they do not substitute for judgment.** Everyone retains responsibility for their assessments.
2. It is easy to underestimate the difficulty of constructing accurate data. Spend the **time** and money required to produce data of high quality. Those mandating use of metrics should be able to provide assurance that the data is accurate.
3. Metrics should be **transparent**, the construction of the data should follow a clearly stated set of rules. Everyone should have access to the data.
4. Data should be **verified by those evaluated**, who should be offered the opportunity to contribute explanatory notes if they wish.
5. **Sensitivity to field differences** is important. Metrics will differ by field. Humanists will not be able to use citation counts; computer scientists will need to ensure conference papers are included; and chemists will look the best in raw metrics constructed from Web of Science data. The state-of-the-art is to select a suite of possible indicators and allow fields to choose among them.
6. **Normalize** data to account for variation in citation and publication rates by field and over time.
7. Metrics should align with **strategic goals**.