Bibliometrics primer:

measures of impact

Arthur Eger, MSc., Customer Development Manager, Elsevier

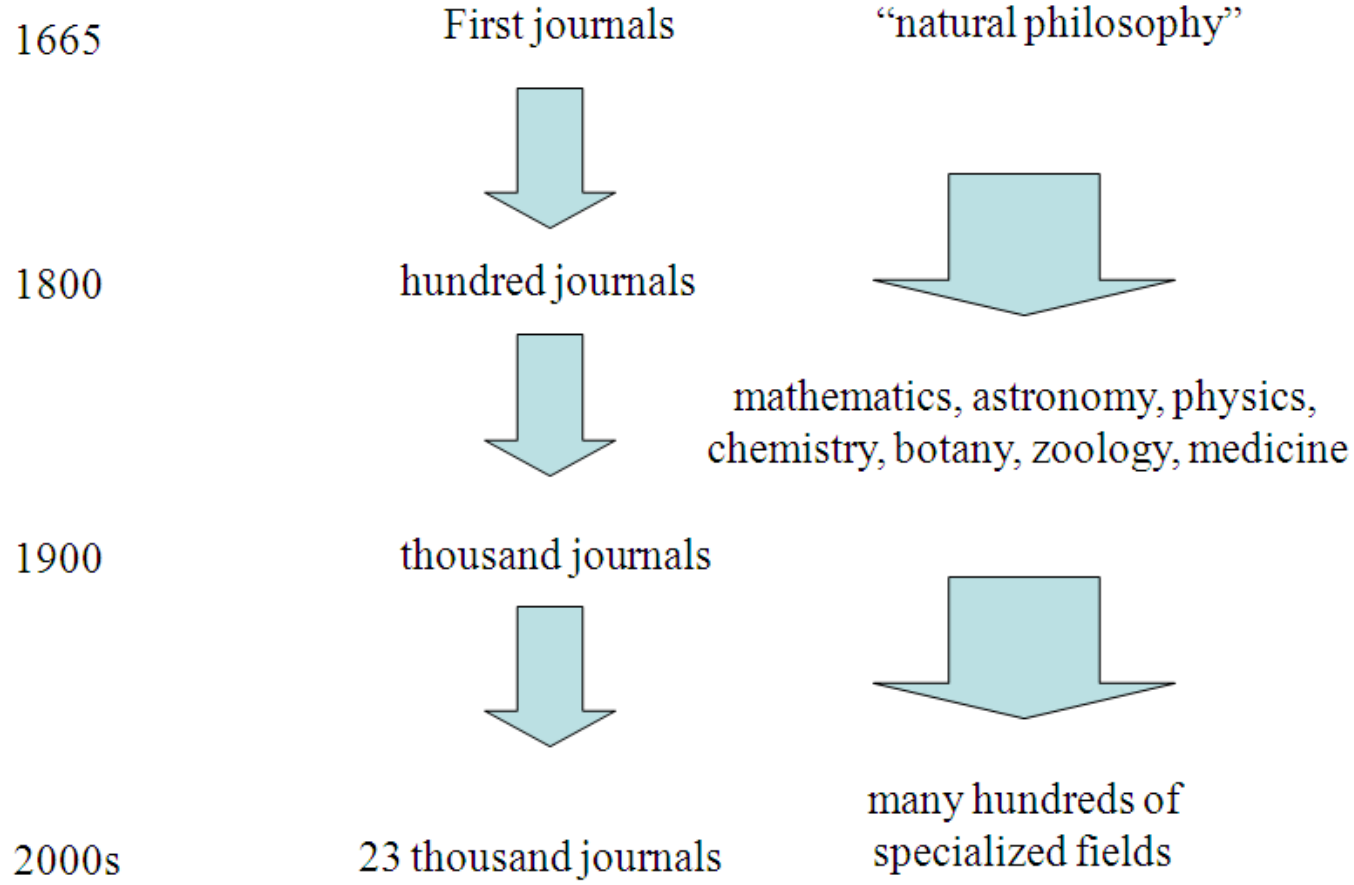
Nick Barber, Library Consultant, Elsevier

First Editor and Commercial Publisher: Henry Oldenburg (1618-1677)

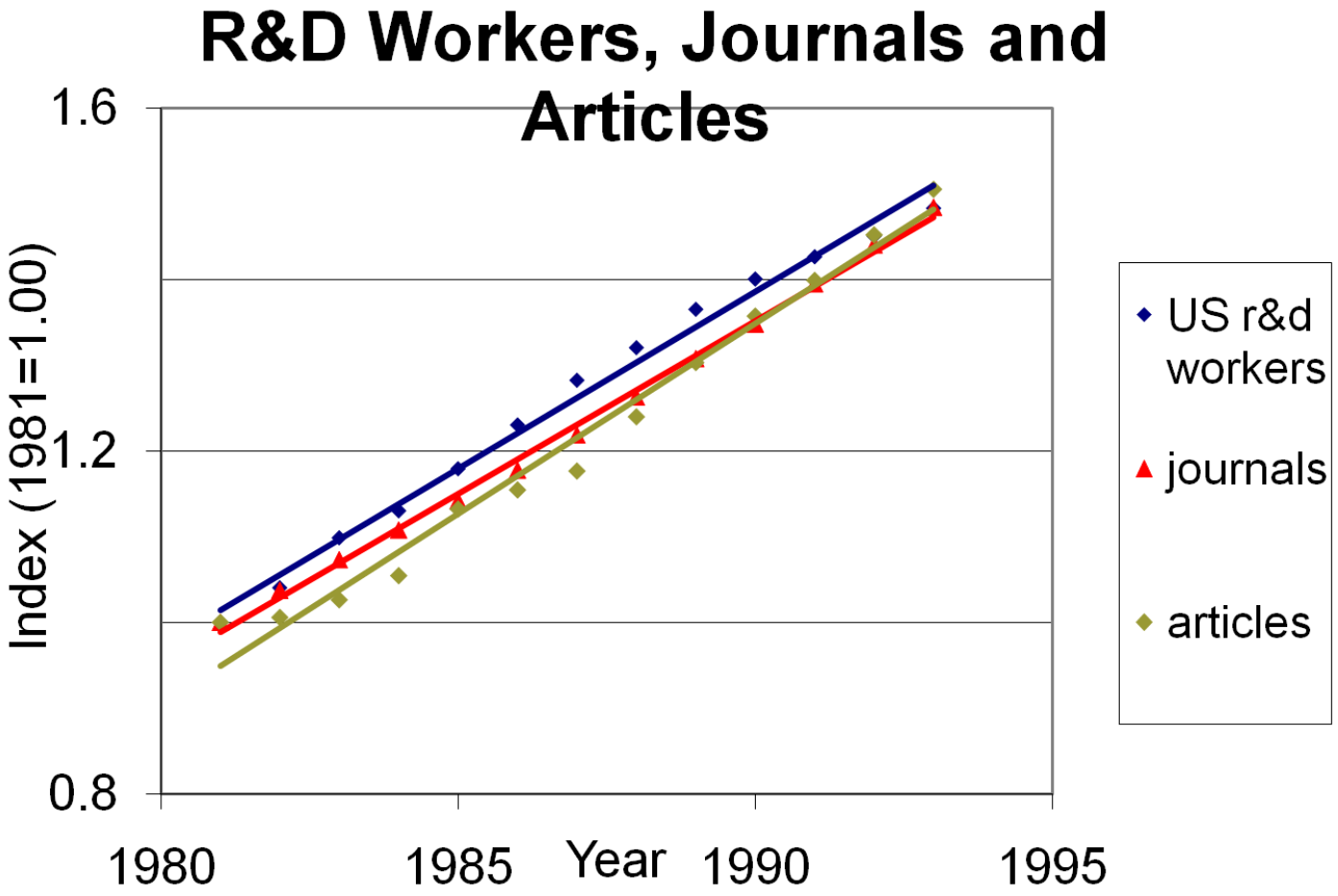
- Born in Germany
- Resident in London from 1652
- Indefatigable correspondent with major scientists of his day
- Appointed (joint) Secretary to the Royal Society in 1663
- Created (as editor and commercial publisher) the first scientific journal in 1665: Philosophical Transactions of the Royal Society

Developments in Journal Publishing:

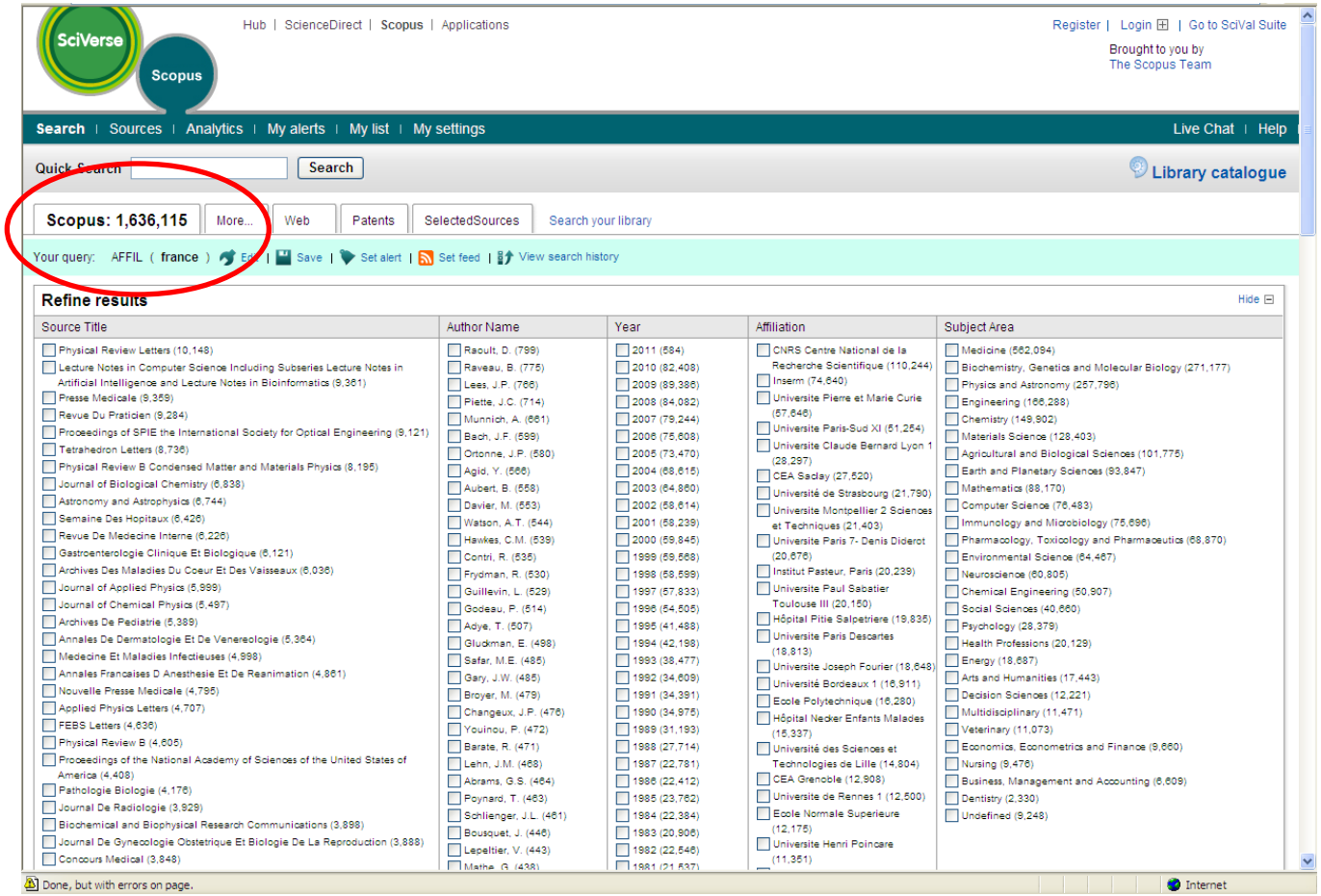
Differentiation/Fragmentation



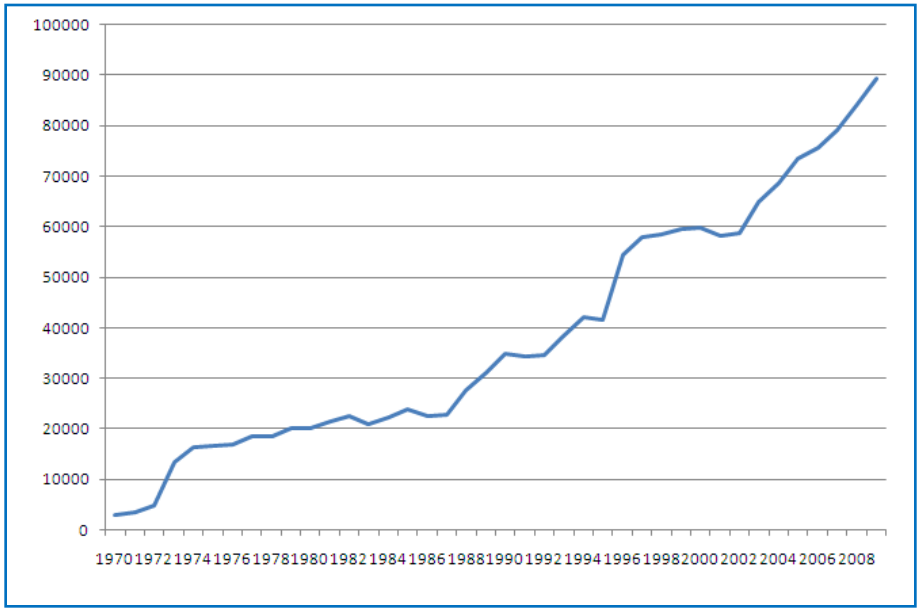
Relationship of Journals and Researcher Growth



Newest Tools: Citation Tracking and Bibliometrics

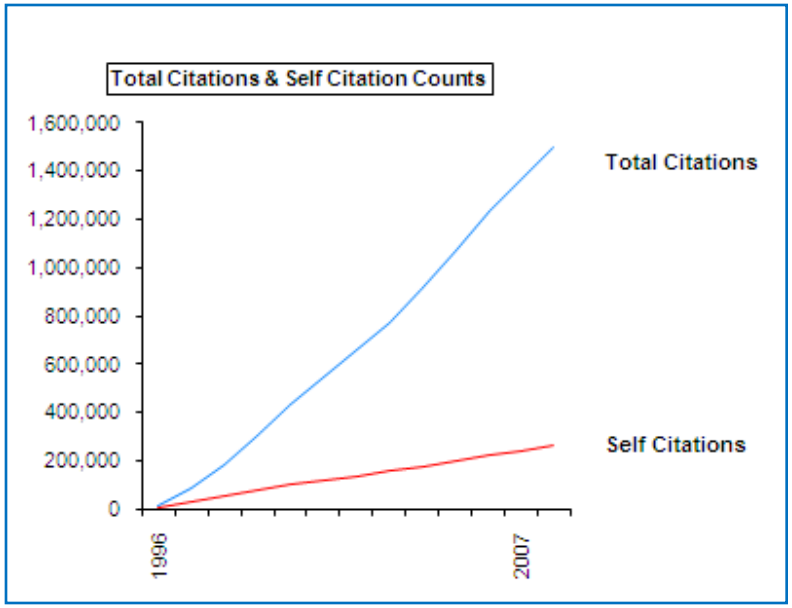


Articles Published by French Authors



Source: Scopus

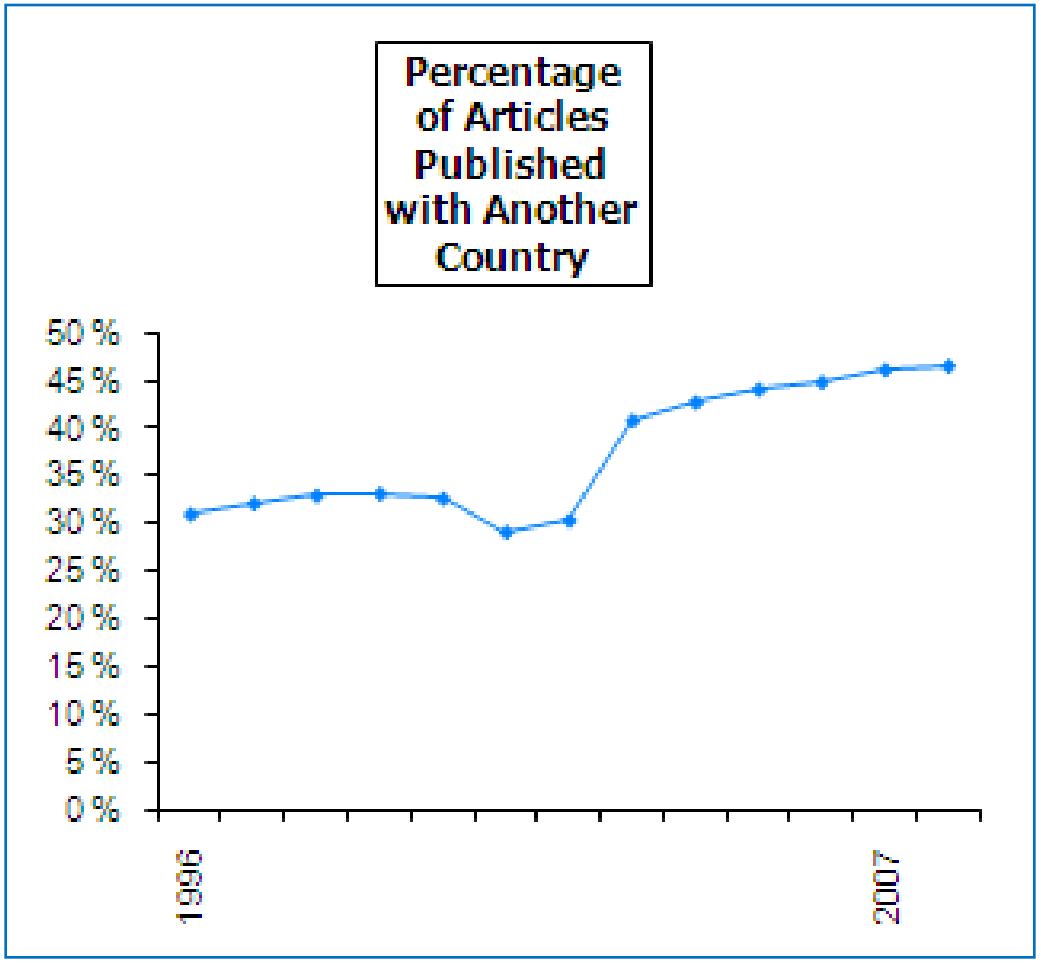
Average annual growth in article production: 5% per year over the last 10 years



Source: MAS SCOPUS

Average annual growth in total citations: 20% per year over the last 10 years

Internationally Co-authored Articles



Source: MAS SCOPUS

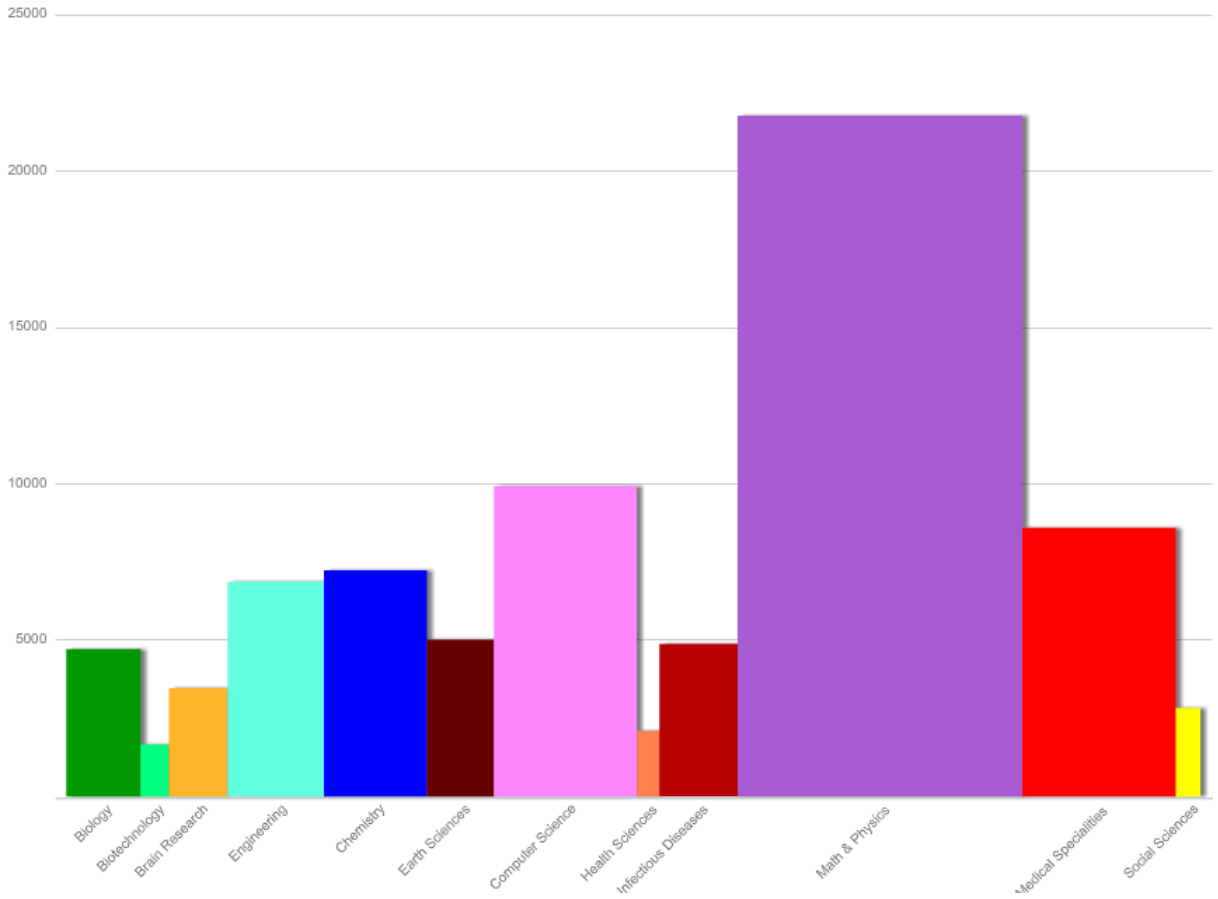
Articles by French Authors:
citations received and citations given

Country	Citations	% Citations received
France	91540	26.61 %
United States	88970	25.86 %
Germany	36375	10.57 %
United Kingdom	34786	10.11 %
Italy	23454	6.82 %
China	20386	5.93 %
Spain	17800	5.17 %
Canada	16839	4.89 %
Japan	16489	4.79 %
Switzerland	12040	3.50 %
Netherlands	11794	3.43 %
Australia	10505	3.05 %
Belgium	9204	2.68 %
Sweden	6886	2.00 %
Russian Federation	5999	1.74 %
Brazil	5935	1.73 %
India	5670	1.65 %
Korea, Republic of	5292	1.54 %
Poland	4751	1.38 %
Austria	4500	1.31 %

Country	Citations	% Citations given
United States	108196	24.45 %
France	91540	20.69 %
United Kingdom	38719	8.75 %
Germany	36940	8.35 %
Italy	21961	4.96 %
Canada	18990	4.29 %
Japan	17940	4.05 %
Spain	15035	3.40 %
Netherlands	14067	3.18 %
Switzerland	13570	3.07 %
Australia	10246	2.32 %
China	9780	2.21 %
Belgium	9295	2.10 %
Sweden	8244	1.86 %
Russian Federation	5248	1.19 %
Denmark	5152	1.16 %
Korea, Republic of	4649	1.05 %
Austria	4394	0.99 %
Israel	4386	0.99 %
Brazil	4167	0.94 %

Source: MAS SCOPUS

Leading-articles by French Authors and by Subject Area



Each bar represents a high-level competency.

The height of each bar (y-axis) indicates the number of articles from the currently selected country.

The width of each bar (x-axis) shows the total market size at the currently selected region level.

Click on any bar to view the main authors and keywords of that high-level competency.

Subject areas

- Math & Physics
- Chemistry
- Engineering
- Earth Sciences
- Biology
- Biotechnology
- Infectious Diseases
- Medical Specialities
- Health Sciences
- Brain Research
- Humanities
- Social Sciences
- Computer Science
- Other

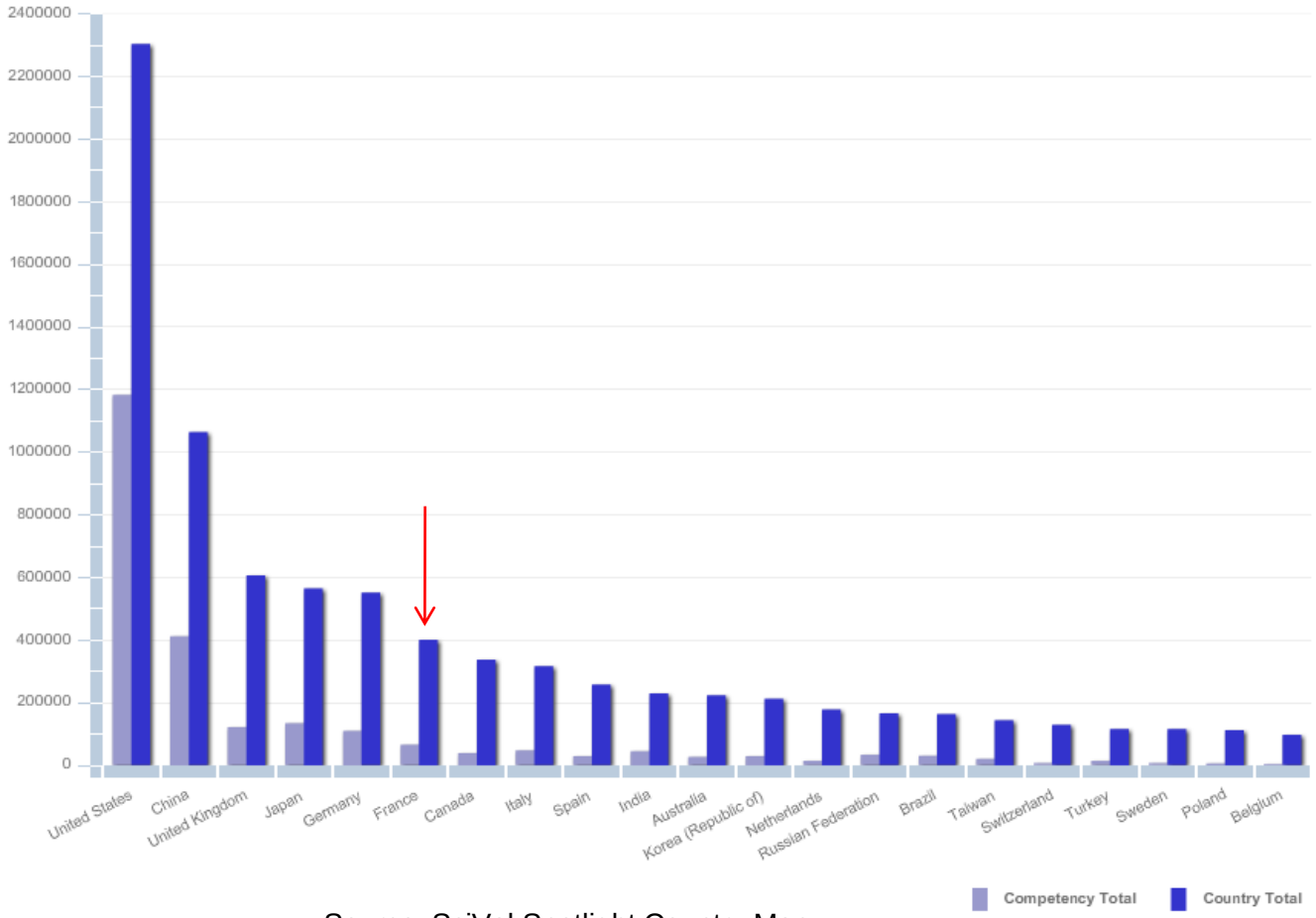
Source: SciVal Country Map France 2009

Global Science &Technology Output *(1996-2008)*

	Country	Documents	Citable documents	Citations	Self-Citations	Citations per Document	H index
1	United States	4.318.928	4.052.816	75.766.251	35.474.244	18,08	1.048
2	United Kingdom	1.244.316	1.134.839	18.030.898	4.476.611	15,48	636
3	Japan	1.224.465	1.198.879	12.485.837	3.920.215	10,53	492
4	China	1.223.278	1.215.927	4.328.817	2.240.814	4,83	246
5	Germany	1.134.216	1.078.356	15.140.549	4.116.637	14,07	558
6	France	824.601	781.988	10.475.265	2.511.263	13,46	510
7	Canada	630.525	599.602	8.825.916	1.803.543	15,54	495
8	Italy	609.192	579.114	7.169.107	1.732.478	12,86	442
9	Spain	449.406	423.791	4.623.796	1.225.409	11,59	347
10	Russian Federation	405.499	402.701	1.856.149	577.757	4,61	245

Source: SJR SCImago Journal & Country Rank

Global Science &Technology Output *(2005-2009)*



This graph lets you compare France to its top 20 competitors worldwide.

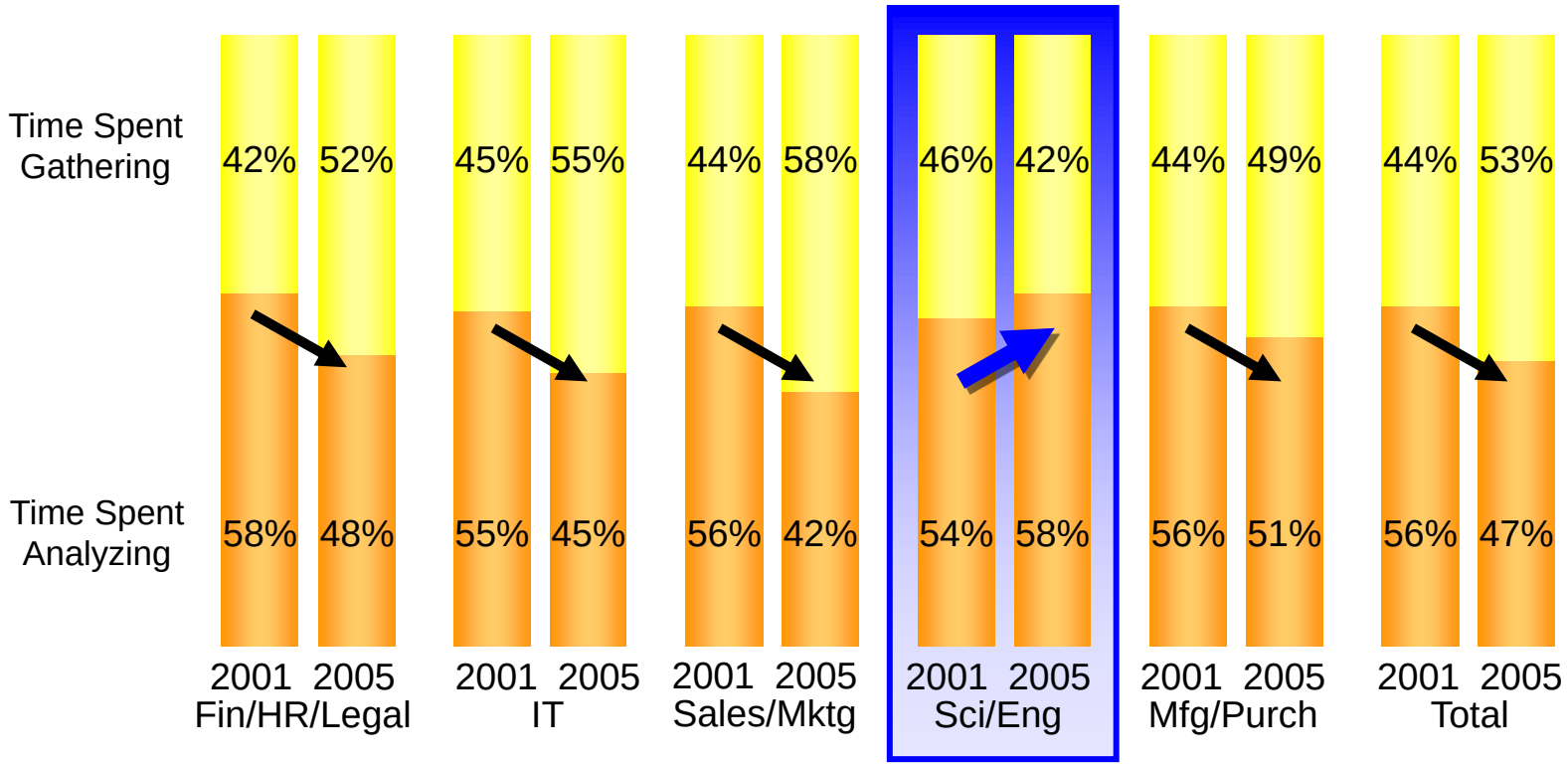
The dark blue bars represent the total number of published articles from each country (2005-2009).

The purple bars show how many of those articles are in a competency for that country.

Source: SciVal Spotlight Country Map

Global trends - Productivity Increasing following "print to electronic-migration"

Scientists can now spend more time analyzing information than gathering it

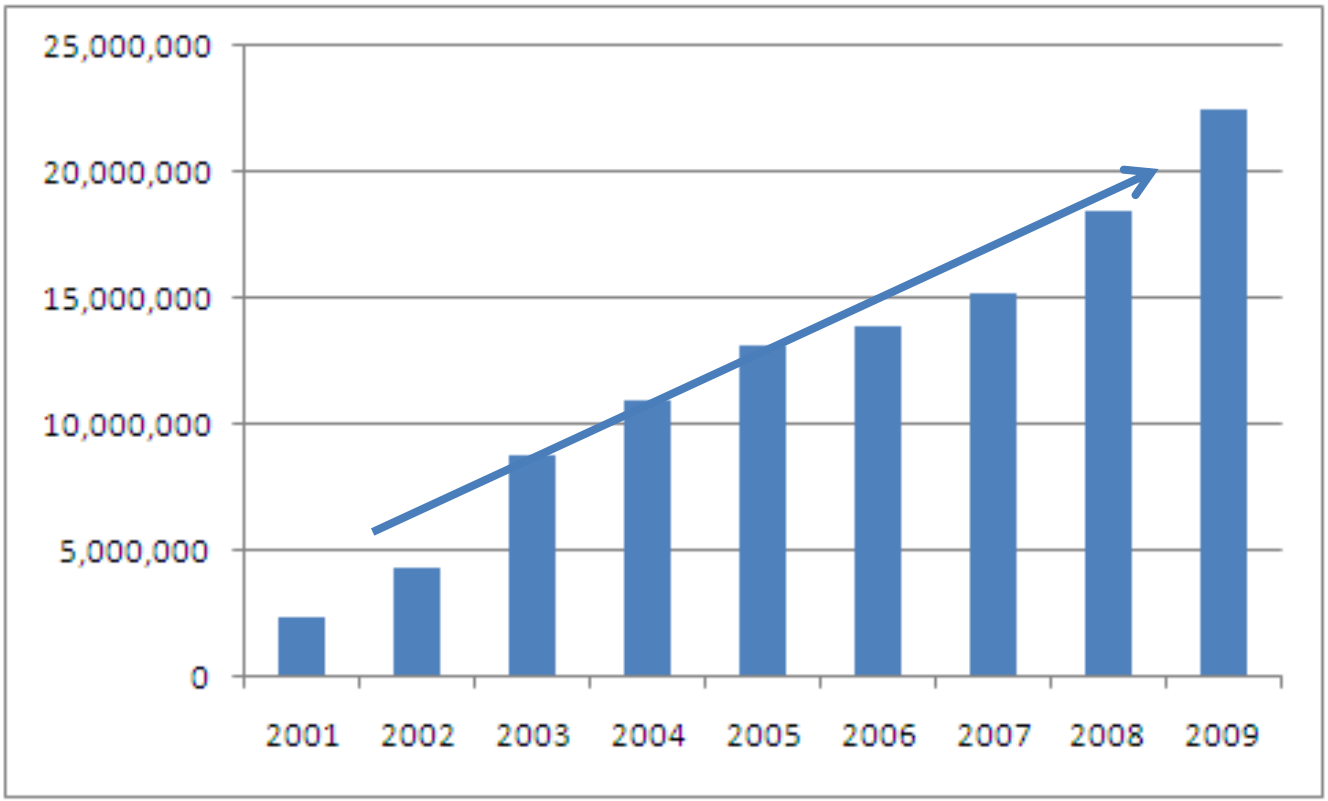


Compared to print-only era

- Scientists now read 25%+ more articles per year
- Scientists now read from almost twice as many journals

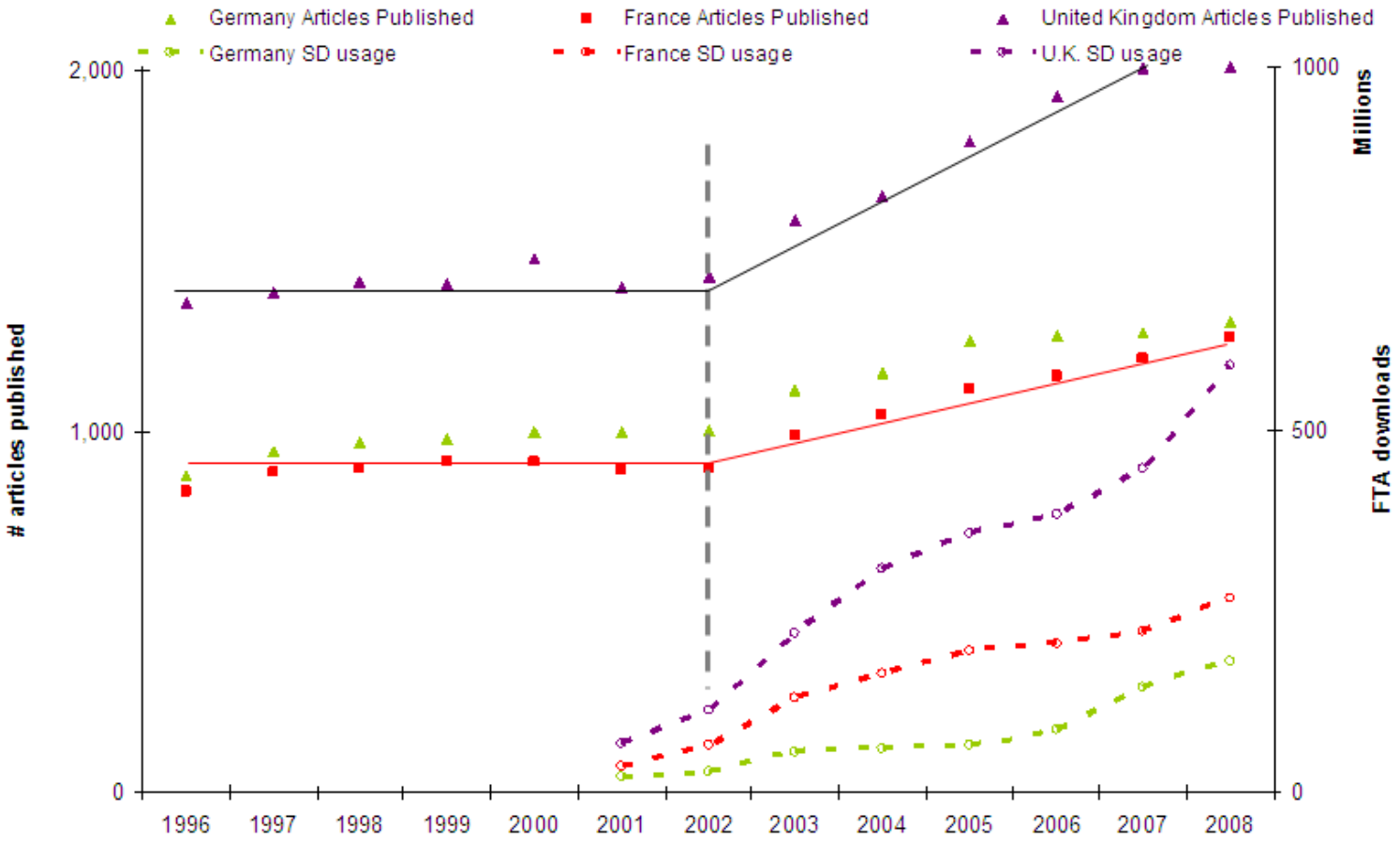
ELSEVIER

French Usage Growth on ScienceDirect *



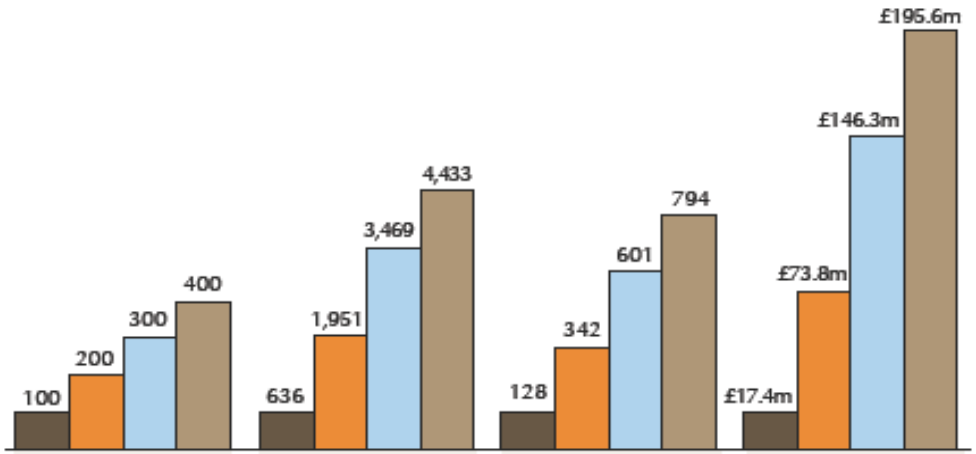
* This represents usage on Elsevier's e-journal and e-book platform ScienceDirect, which may represent well over 25% of the total usage in France

Indications of Correlation Between Use of e-Content and Research Output



Source: Elsevier Usage Data and Scopus

University College London Study Confirms Strong Correlation between e-Journal Usage, Research Output and Funding in the UK



	Article downloads	Research papers	PhD awards	Research grants and contracts
1 million downloads	100	100	100	100
2 million downloads	200	307	268	424
3 million downloads	300	545	471	841
4 million downloads	400	697	622	1,124

INDICIES

"Doubling in downloads, from 1 to 2 million, is statistically associated with dramatic - but not necessarily causal - increases in research productivity"

Papers up 207%
PhD awards up 168%
Research grants and contract income up 324%

Even stronger as downloads increase further

"Electronic Journals: Their use value and impact." Research Information Network Report

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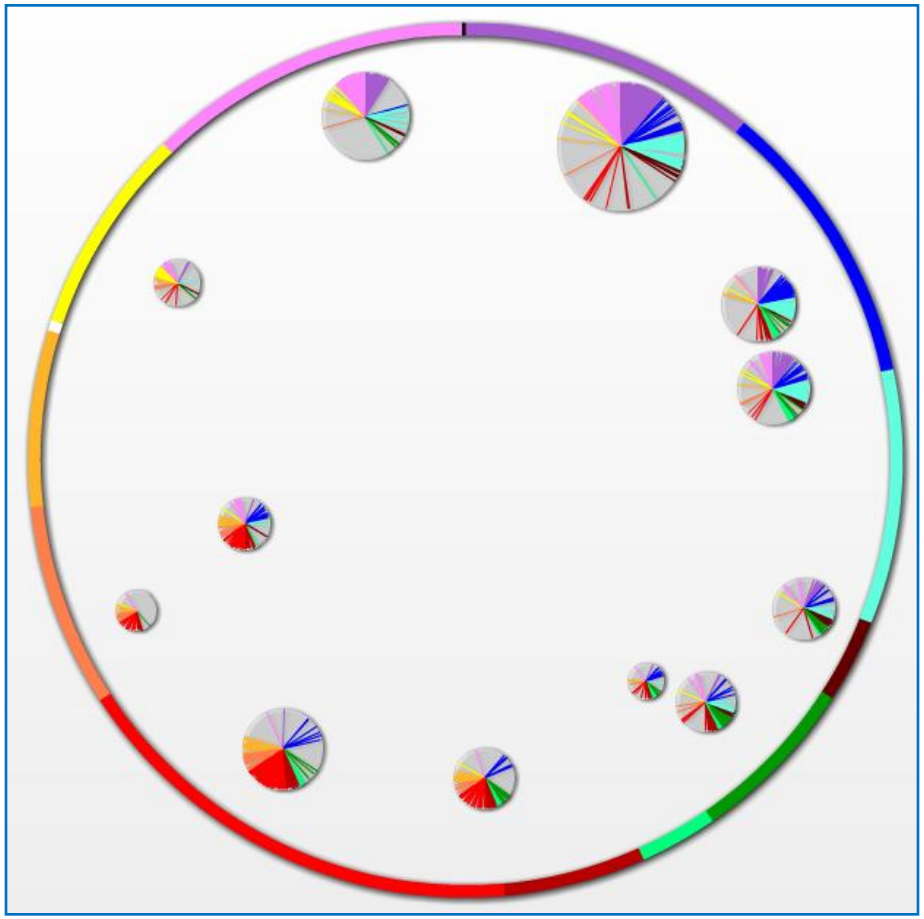
Bibliometrics at Country level:

Assessment often highly based on publications and citations



Each circle represents a high-level competency of France.

- The larger the circle, the more articles are in that competency.
- The location of each circle is determined by the primary subject area of that competency. Circles closer to the center are more interdisciplinary.

Subject areas

- Math & Physics
- Chemistry
- Engineering
- Earth Sciences
- Biology
- Biotechnology
- Infectious Diseases
- Medical Specialities
- Health Sciences
- Brain Research
- Humanities
- Social Sciences
- Computer Science
- Other

Source: SciVal Spotlight Country Map France 2009

Government and Funding Agencies use Publications and Citation Data

GOVERNMENT AGENCIES USE SCOPUS DATA

KISTI – Korea Institute of Science and Technology Information

- KISTI is using Scopus Custom Data to analyze the trend of science & technology with bibliometric method and the status of international joint research activities. KISTI found that **Scopus covers more comprehensive coverage than WOS and has well-organized data structure,** for example, good mapping between authors and their institutions

iFQ – Institute for Research Information and Quality Assurance

- iFQ is using Scopus Custom Data to quantify German research output and evaluate the global impact. "We will work with Scopus for the **depth and international breadth** of its citation database," **Professor Stefan Hornbostel** of iFQ.
- "The **analytical capabilities** that the content provides will help us achieve our mission of supporting the German science system with carefully examined and relevant information feeding into policies that will allow Germany to continue to be a global scientific leader."

Australian Government – Australian Research Council

- The Australian Research Council (ARC) uses Scopus citation information for the Excellence in Research for Australia (ERA) initiative. Professor Sheil said. "ERA will **evaluate research in Australian higher education institutions** using a combination of indicators and expert review." When selecting Scopus, the ARC regarded the **coverage of relevant journals and potential costs to the sector."** The Scopus team will work directly with institutions, to match publication records with unique article identifiers in the Scopus database."

Government and Funding Aencies use Publications and Citation Data

ASSESSMENT AGENCIES USING SCOPUS DATA

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

OECD

- "Science and technology play a crucial role in a country's economic growth," said Mr. **Hiroyuki Tomizawa**, Principal Administrator, Economic Analysis and Statistics Division, Directorate for Science, Technology and Industry, with the OECD.
- "We **selected Scopus for its breadth of coverage including journal titles from over 100 nations as well as its advanced features**. Together, these advantages will enable the OECD to execute more sophisticated statistical analyses to guide our member countries."

Perspektywy

- "The national university rankings in Poland have been organized and published by "Perspektywy" for over ten years. In 2009 Perspektywy ranking, for the first time, included data found in SCOPUS. We were very pleased with a favorable reaction of the Polish universities to the new criterion. The academic community believes that SCOPUS based criterion being measurable in nature, added credibility to the ranking process and made it more objective."

– **Waldemar Siwinski**
President, "Perspektywy" Education Foundation, Poland

SCOPUS

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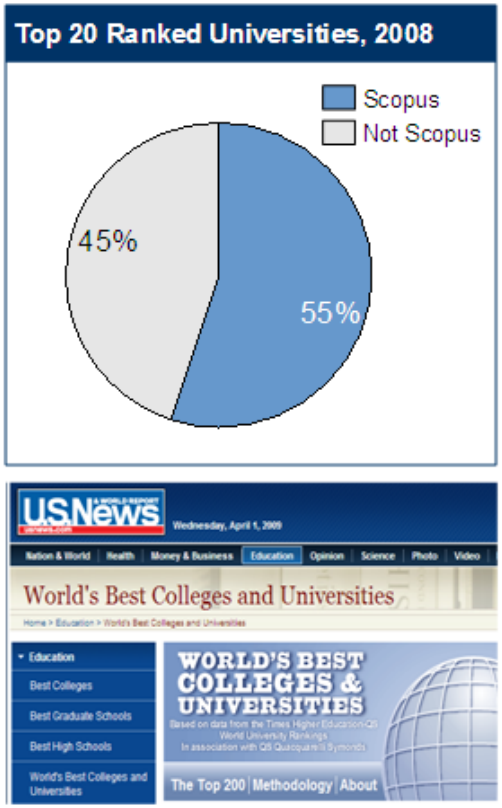
Bibliometrics at University Level:

- Why ?
  - Funding
  - Rankings (students, funding)
- How? Universities Measure
  - Publication
  - Citations
  - Students
  - Graduates
  - Funding

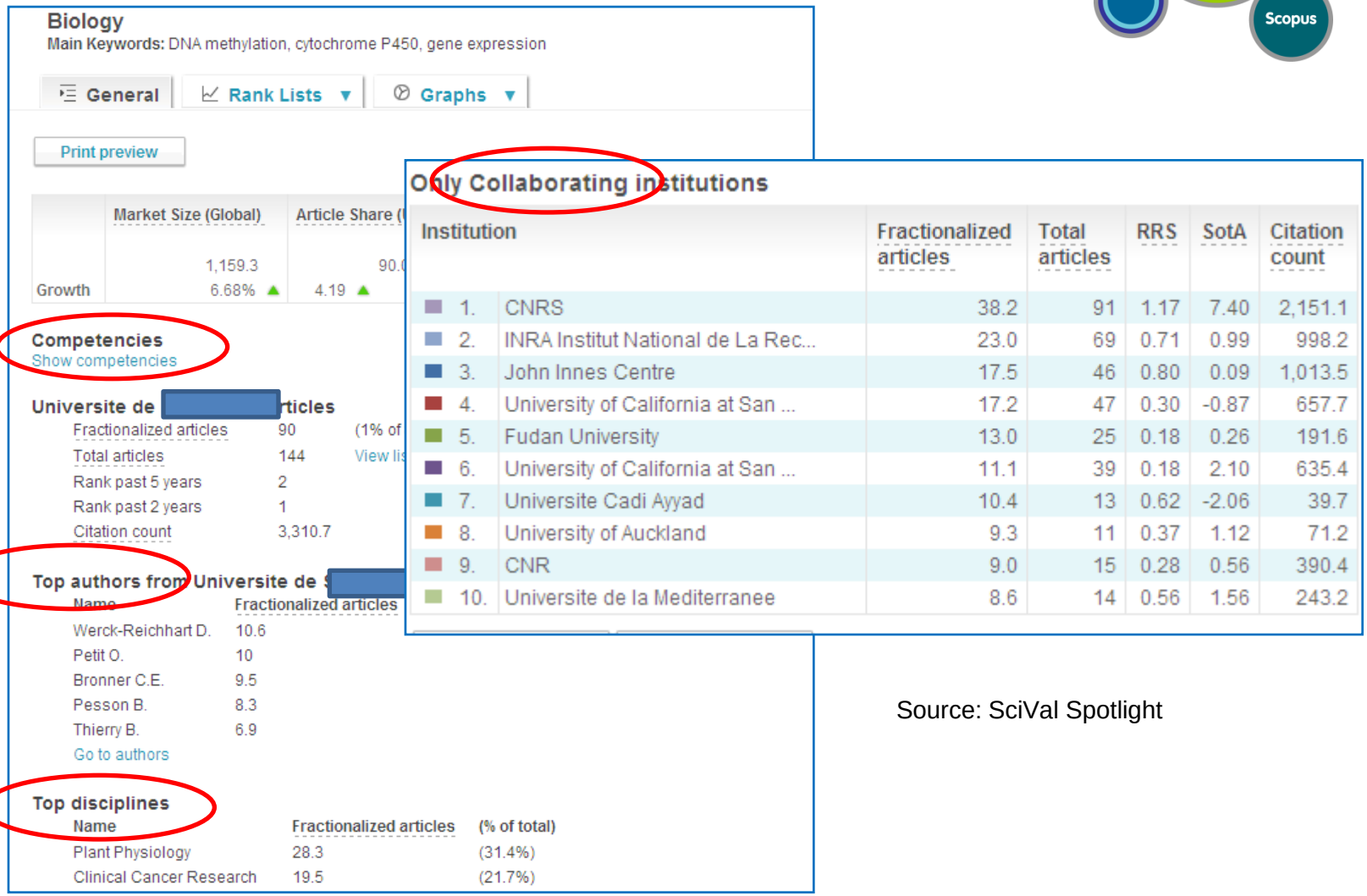
For Universities: Pubs and Citations = $ and Rankings

LEADING RESEARCH INSTITUTIONS RELY ON SCOPUS

2008 Rank	Name of Institute	Country
1	Harvard University	US
2	Yale University	US
3	University of Cambridge	UK
4	University of Oxford	UK
5	California Institute of Technology	US
6	Imperial College London	UK
7	University College London	UK
8	University of Chicago	US
9	Massachusetts Institute of Technology	US
10	Columbia University	US
11	University of Pennsylvania	US
12	Princeton University	US
13	Johns Hopkins University	US
13	Duke University	US
15	Cornell University	US
16	Australian National University	Australia
17	Stanford University	US
18	University of Michigan	US
19	University of Tokyo	Japan
20	McGill University	Canada



Metrics Universities are Assessing



Biology
Main Keywords: DNA methylation, cytochrome P450, gene expression

General | Rank Lists | Graphs

Print preview

	Market Size (Global)	Article Share (U
	1,159.3	90.(
Growth	6.68% ▲	4.19 ▲

Competencies
Show competencies

Universite de [redacted] rticles

Fractionalized articles	90	(1% of
Total articles	144	View lis
Rank past 5 years	2	
Rank past 2 years	1	
Citation count	3,310.7	

Top authors from Universite de [redacted]

Name	Fractionalized articles
Werck-Reichhart D.	10.6
Petit O.	10
Bronner C.E.	9.5
Pesson B.	8.3
Thierry B.	6.9

Go to authors

Top disciplines

Name	Fractionalized articles	(% of total)
Plant Physiology	28.3	(31.4%)
Clinical Cancer Research	19.5	(21.7%)

Only Collaborating institutions

	Institution	Fractionalized articles	Total articles	RRS	SotA	Citation count
1.	CNRS	38.2	91	1.17	7.40	2,151.1
2.	INRA Institut National de La Rec...	23.0	69	0.71	0.99	998.2
3.	John Innes Centre	17.5	46	0.80	0.09	1,013.5
4.	University of California at San ...	17.2	47	0.30	-0.87	657.7
5.	Fudan University	13.0	25	0.18	0.26	191.6
6.	University of California at San ...	11.1	39	0.18	2.10	635.4
7.	Universite Cadi Ayyad	10.4	13	0.62	-2.06	39.7
8.	University of Auckland	9.3	11	0.37	1.12	71.2
9.	CNR	9.0	15	0.28	0.56	390.4
10.	Universite de la Mediterranee	8.6	14	0.56	1.56	243.2

Source: SciVal Spotlight

Bibliometrics at Journal Level

Multiple ways to assess journals

Subjective

- reputation
- local interest
- core audience

“Objective”

- Impact Factor
- SCImago journal Ranking (SJR)
- Source-Normalized Impact per Paper (SNIP)

Bibliometrics at Journal Level:

Impact Factor (IF)

- The Impact Factor measures all citations (numerator), irrespective of article types.
- Abstracts, Editorials and Letters have positive effects on the Impact Factor.
- The Source Item count (denominator) includes only Research Articles, Reviews and Notes.
- All types of self-citations are included.

Bibliometrics at Journal Level

Impact Factor (IF)

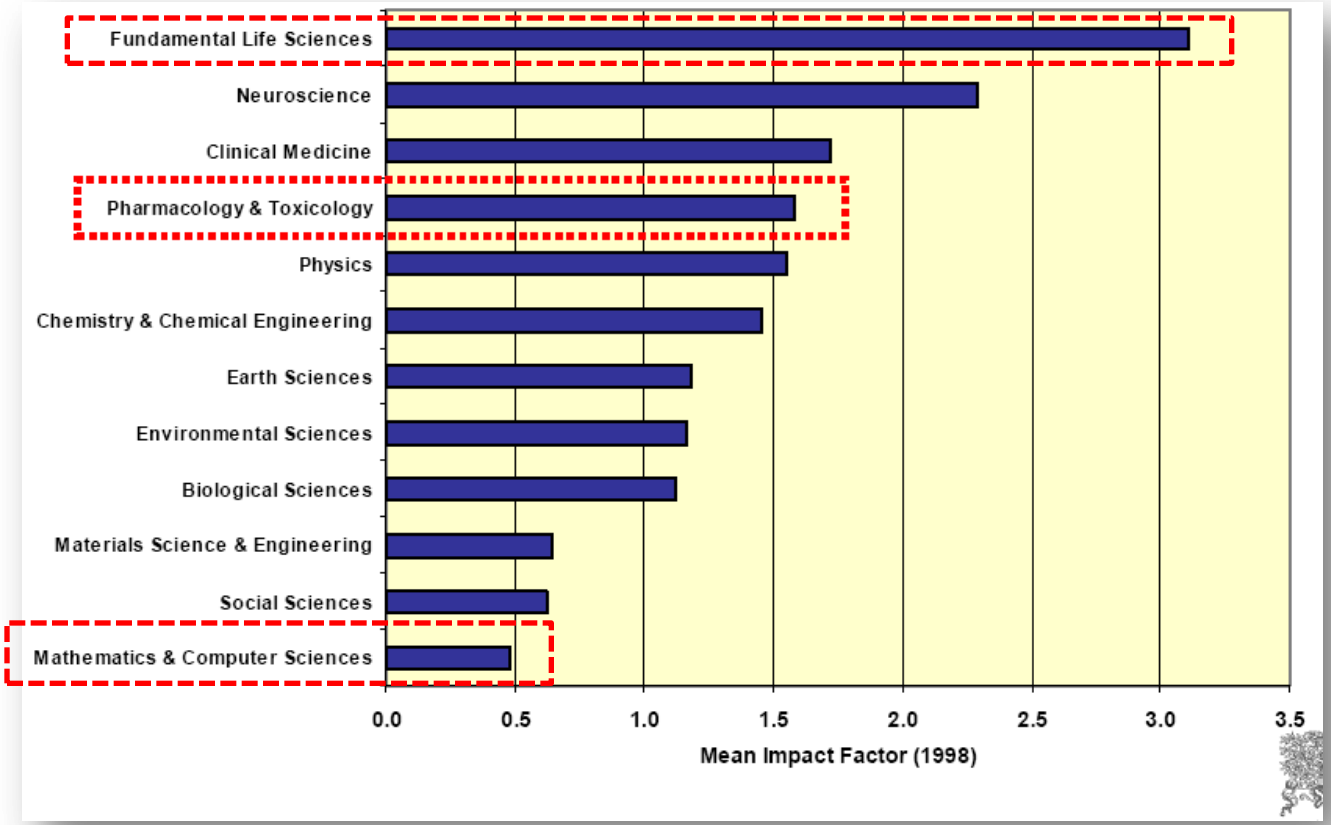
[the average annual number of citations per article published]

- For example, the 2009 impact factor for a journal would be calculated as follows:
  - *A* = the number of times articles published in 2007 and 2008 were cited in indexed journals during 2009
  - *B* = the number of "citable items" (usually articles, reviews, proceedings or notes; not editorials and letters-to-the-Editor) published in 2007 and 2008
  - 2008 impact factor = *A*/*B*
  - **e.g. $\frac{\text{600 citations}}{\text{150 + 150 articles}}$ = 2**

Bibliometrics at Journal Level

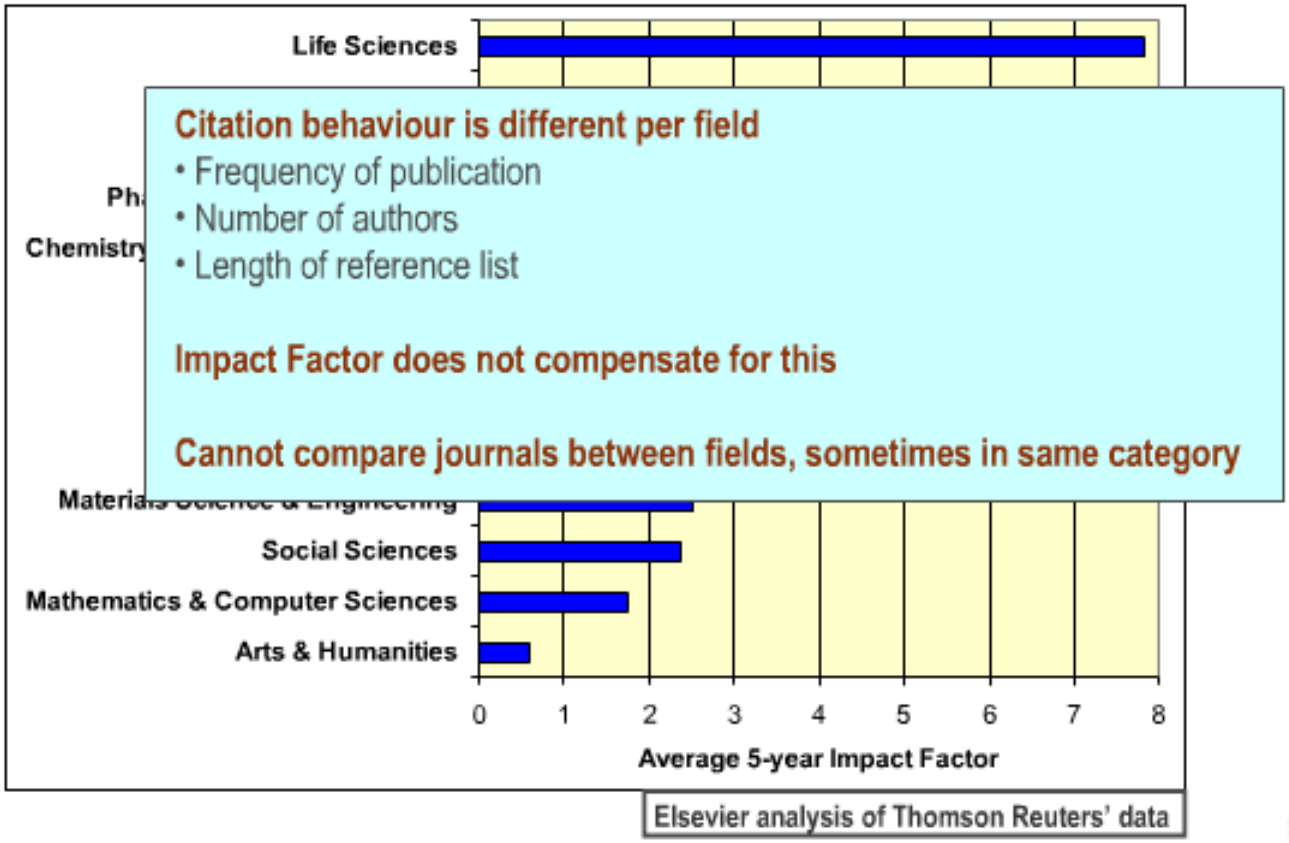
average IF varies per subject area

Researchers in life sciences tend to publish more often and sooner than those in mathematics



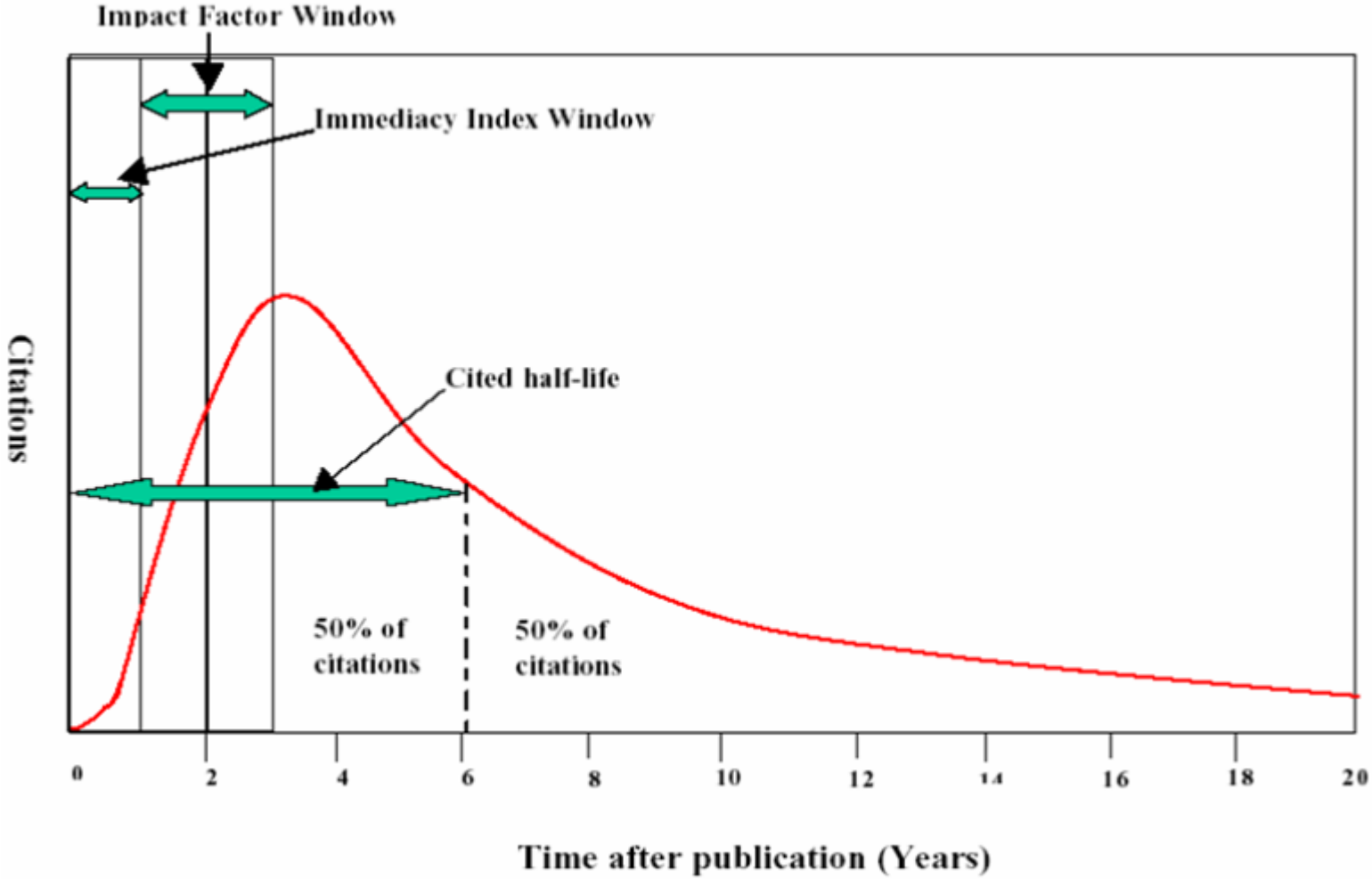
Bibliometrics at Journal Level:

Impact Factor Pros and Cons



Bibliometrics at Journal Level:

Impact Factor and Cited Half-Life



Bibliometrics at Journal Level:

Impact Factor Pros and Cons

Impact Factor pros

- Easy to understand
- Pervasive - stranglehold

Impact Factor cons

(*more on next slides)

- Little transparency – underlying database not publicly available – Impact Factors cannot be reconstructed
- Citation windows available are biased
  - 2 years favours rapidly moving fields
  - 5 years favours slowly moving fields
- Subject field differences*
- Easy to mislead and manipulate*

Bibliometrics at Journal Level:

Impact Factor Pros and Cons

Which journal is best?

Journal	Impact Factor 2008*
Lancet Infectious Diseases	13.165
Social Studies of Science	1.343
Dyes & Pigments	2.507
Expert Systems with Applications	2.596
Progress in Nuclear Magnetic Resonance Spectroscopy	6.162
Communications on Pure & Applied Mathematics	3.806

*Journal Citation Reports 2009

Eigen Factor

- they are all the best – all the top of their subject categories

Beyond the impact factor:

new metrics

- SCImago Journal Rank (SJR)
- Source-Normalized Impact per Paper (SNIP)
- Eigen Factor

New metrics are now available

SciVerse Scopus

SCImago Journal Rank – SJR

- **Prestige metric** – similar to Google PageRank
- **Citations are weighted depending on the status of the source they come from**
- Developed by SCImago – Felix de Moya

Source-Normalized Impact per Paper - SNIP

- **SNIP measures contextual citation impact**
- **Every citation is counted as 1 citation** – similar to Impact Factor
- **SNIP is field normalized, dependent on likelihood of citation in subject field of source**
- Developed by Henk Moed, CWTS

Underlying calculation for both metrics '2009 Impact' = Citations received by journal J in 2009 from A,R,CP to A,R,CP published in 2006-2008 / A,R,CP published in J 2006-2008

SCImago Journal Rank (SJR):

- SJR is a measure of the scientific prestige of scholarly sources.
- High-prestige citations count more than low-prestige sources
- SJR assigns relative scores to all of the sources in a citation network. Its methodology is inspired by the Google PageRank algorithm, in that not all citations are equal. A source transfers its own 'prestige', or status, to another source through the act of citing it.
- A citation from a source with a relatively high SJR is worth more than a citation from a source with a lower SJR.

Bibliometrics at Journal level:

SJR (SCImago Journal Rank)

- SJR is a measure of the scientific prestige of scholarly sources.
- SJR assigns relative scores to all of the sources in a citation network.
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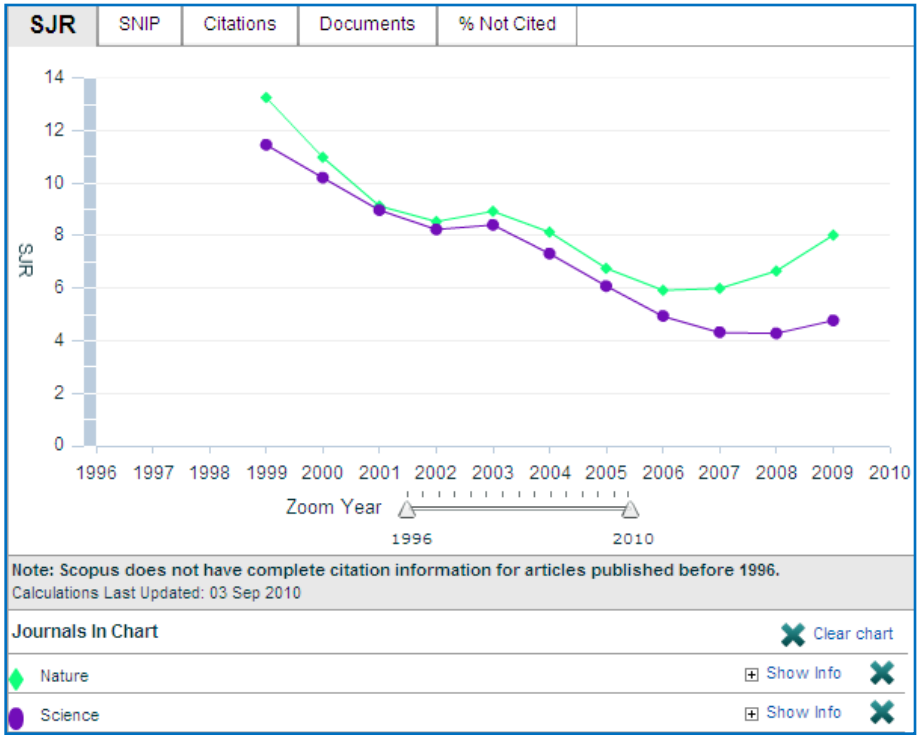
- ***A citation from a source with a relatively high SJR is worth more than a citation from a source with a lower SJR.***



SCImago Journal Rank (SJR):

SJR is a prestige metric – citations weighted depending on where they come from

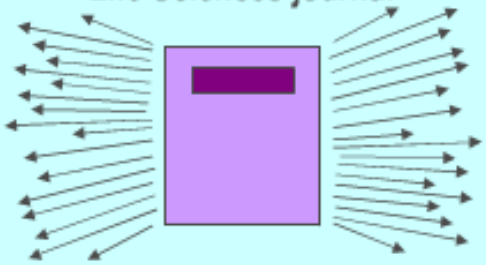
- A journal transfers its prestige by citing
- Prestige transferred = journal's SJR

e.g. **Lancet** SJR 2007 = 1.541 – **high prestige**

e.g. **Scandinavian Journal of Medicine and Science in Sports** SJR 2007 = 0.153 – **lower prestige**

A journal's prestige is shared equally between its citations

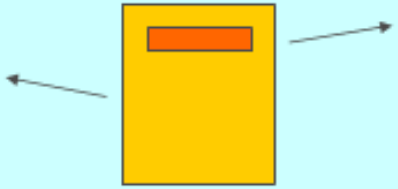
Life Sciences journal



- High impact, lots of citations
- **One citation = low value**

Normalize for differences in citation behaviour between subject fields

Arts & Humanities journal



- Low impact, few of citations
- **One citation = high value**

SCImago Journal Rank (SJR):

Pros and Cons

PROS

- Differentiates between prestige of citations
- Free (via Scopus) to subscribers and non – subscribers
- Only peer reviewed articles count as cited or citing (transparent sources)

CONS

- More difficult to explain/understand than IF
- Does not allow comparisons between disciplines
- Does not differentiate “negative” citations

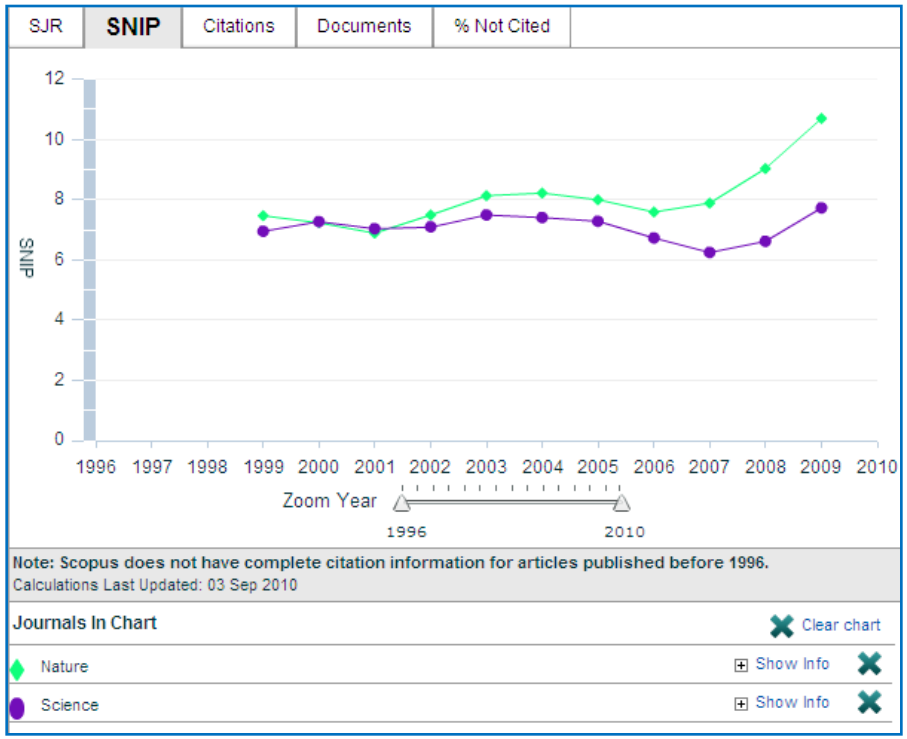
Source Normalized Impact per Paper (SNIP)

- **Source Normalized Impact per Paper** measures a source's contextual citation impact.
- Addresses differences in citation behavior between fields.
- It takes into account characteristics of the source's subject field, especially the frequency at which authors cite other papers in their reference lists, the speed at which citation impact matures, and the extent to which the database used in the assessment covers the field's literature.
- SNIP is the ratio of a source's average citation count per paper, and the 'citation potential' of its subject field.

Bibliometrics at Journal Level:

SNIP (Source Normalized Impact per Paper)

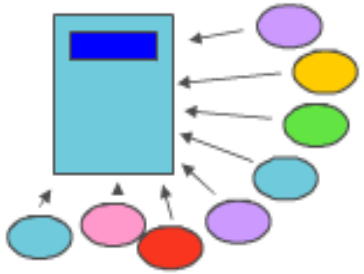
- SNIP is the ratio of a source's average citation count per paper, and the ***'citation potential'*** of its subject field.
- The ***'citation potential'*** of a source's subject field is the ***average number of references per document citing that source***.
- It represents ***the likelihood of being cited for documents in a particular field***.
- ***A source in a field with a high citation potential will tend to have a high impact per paper.***



Source Normalized Impact per Paper (SNIP)

Calculate 'Citation Potential' for 2009

1. Collect papers citing 1-3 year old papers in target journal in 2009



2. Collect reference lists of citing papers

3. Count number of references in citing papers to any (in any journal) 1-3 year old papers

4. Citation Potential = average number of references to any 1-3 year old papers

SNIP = 2009 Impact / 2009 Citation Potential

- Life Sciences – high impact, high Citation Potential
- Arts & Humanities – low impact, low Citation Potential

Normalize for differences in citation behaviour between subject fields

Source Normalized Impact per Paper

Pros and Cons

PROS

- Does not disadvantage smaller or slower-moving fields
- Free (via Scopus) to subscribers and non – subscribers
- Only peer reviewed articles count as cited or citing (transparent sources)

CONS

- More difficult to explain/understand than IF
- Does not differentiate between prestige of citations
- Does not differentiate “negative” citations

Key features of SJR and SNIP

Impact Factor cons

- Little transparency
- Citation window
- Subject field differences
- Easy to mislead and manipulate

SJR & SNIP pros

- **Metrics based on Scopus.com** - underlying database available for transparency
- **3 year citation window** is defensible
- **Subject field differences normalised**
  - Independent of imposed journal classification system
  - Reflects most current journal scopes, takes ongoing changes into account
- **Article type consistency**
  - Only citations to and from articles, reviews, and conference papers are considered

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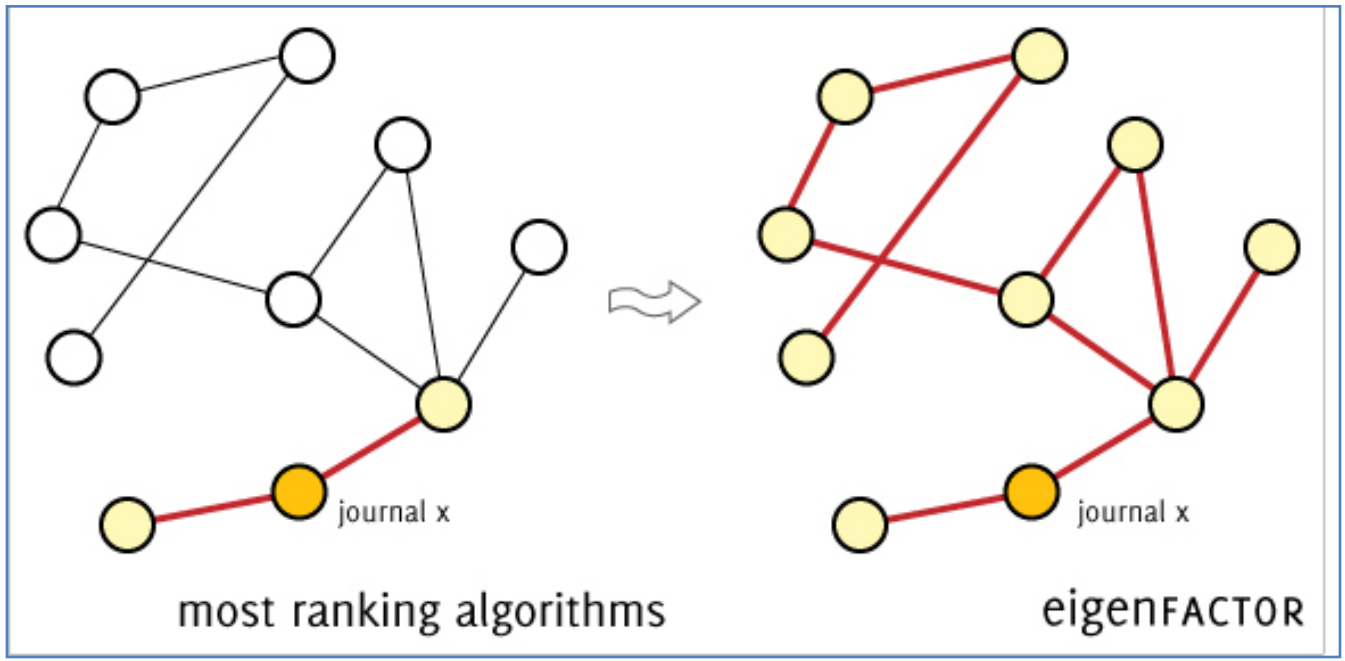
Eigenfactor

- Developed by Carl Bergstrom in 2007 to address some of the weaknesses of the impact factor
- “We can view the Eigenfactor score of a journal as a rough estimate of how often a journal will be used by scholars”
- Uses algorithms to assess importance of each journal (like Google page rank)
- 5 year window (IF is 2)
- Allows citation behavior to set fields, not pre-set fields
- Counts all citations, regardless of source

Eigenfactor

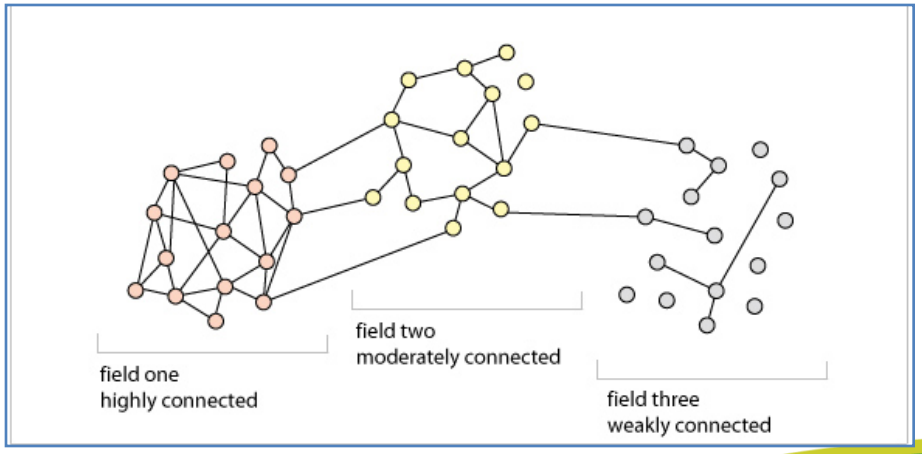
Scholarly references join journals together in a vast network of citations. The “Eigen Factor” algorithms use the structure of the entire network (instead of purely local citation information) to evaluate the importance of each journal.



Source: www.eigenfactor.org

Eigenfactor

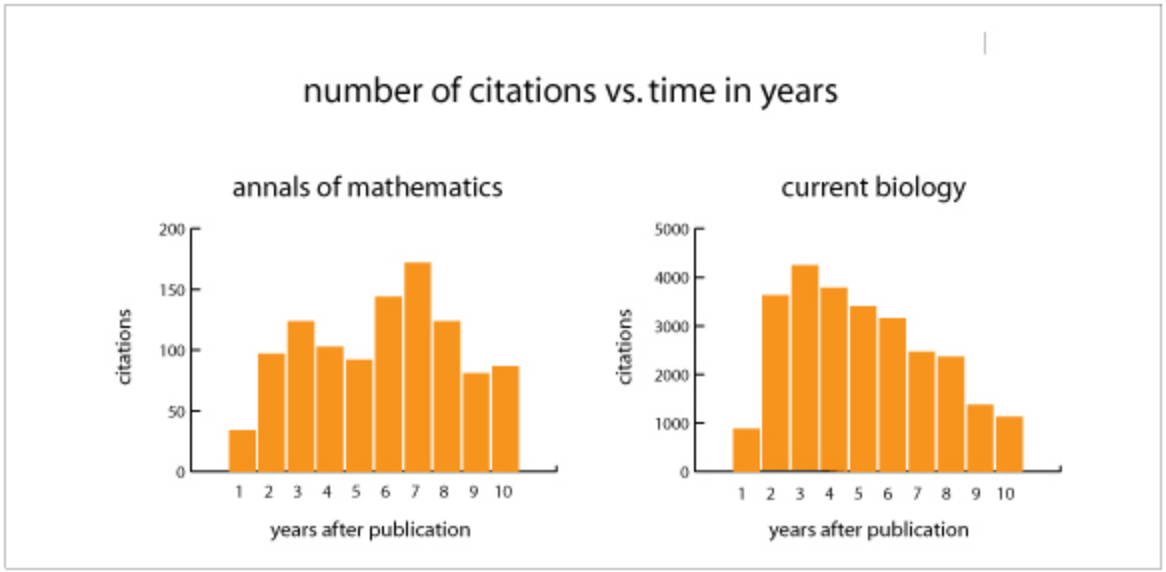
- Different disciplines have different standards for citation and different time scales on which citations occur.
- The average article in a leading cell biology journal might receive 10-30 citations within two years; the average article in leading mathematics journal would do very well to receive 2 citations over the same period.
- By using the whole citation network, the “Eigen Factor” algorithm automatically accounts for these differences and allows better comparison across research areas.



Source: www.eigenfactor.org

Eigenfactor

In many research areas, articles are not frequently cited until several years after publication. Therefore, measures that only look at citations in the first two years after publication can be misleading. The *Eigenfactor* score and the *Article Influence* score is calculated based on the citations received over a five year period.



Source: www.eigenfactor.org

Eigenfactor:

Pros and Cons

Pros

- free
- ranks more than journal articles
- like SJR, scores based on ranking.

Cons

- very large journals will have extremely high *Eigenfactor* scores simply based upon its size.
- “citations” not necessarily articles (peer review article? Editorial? Tabloid?)
- Does not promote cross discipline comparison
- Does not differentiate “negative” citations

Comparing the ranking of top journals

SJR and SNIP depend on:

- Number of citations received per article, review and conference paper
- Number of references in citing journal

SJR also depends on prestige of citing journal

SNIP also depends on degree of focus on recent literature

Differences from **Impact Factor-based rankings** can also result from database differences

We will not enforce ranking or searching of journals within imposed classification system

Journal	Rank Impact Factor*	Rank SJR*	Rank SNIP*
Journal of the American College of Cardiology	2 (Cardiac & Cardiovasc. Systems)	2	1
JACC: Cardiovascular Interventions and JACC: Cardiovascular Imaging stared publishing in 2008, therefore no 2007 metrics available			
Gastroenterology	1 (Gastro. & Hep.)	2	1
Clinical Gastroenterology and Hepatology	8 (Gastro. & Hep.)	7	9
Urology	21 (Urol. & Nephrol.)	14	13

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*2007 ranks within JCR categories

Comparing the ranking of top journals

Journal	Rank Impact Factor*	Rank SJR*	Rank SNIP*
Lancet	2 (Med, Gen & Internal)	4	3
Lancet Oncology	6 (Oncology)	24	6
Lancet Neurology	1 (Clinical Neurology)	10	6
Lancet Infectious Diseases	1 (Infectious Diseases)	7	4
Fertility & Sterility	6 (Obs. & Gynecology)	10	11
Differences for above seem due mainly to higher number of citable items, classified as articles, in Scopus (e.g. Lancet 2007, 803 in Scopus and 305 in WoS)			
Tetrahedron	14 (Chem., Organic)	16	13
Tetrahedron Letters	20 (Chem., Organic)	21	14
Brain Research	116 (Neurosciences)	104	129
Journal Of Molecular Biology	55 (Biochem & Mol Biol)	39	50
Chemical Physics Letters	10 (Physics, Atomic...)	9	10

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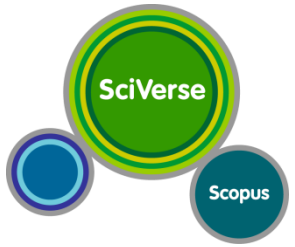
*2007 ranks within JCR categories

Comparing the ranking of top journals



Top rankings within Cell Biology category

Impact Factor 2007	SJR 2007	SNIP 2007
1. Nature Rev Cell & Mol Biol	1. Ann Rev Cell & Dev Biol	1. **Cell**
2. **Cell**	2. **Cell**	2. Ann Rev Cell & Dev Biol
3. Nature Medicine	3. Nature Rev Cell & Mol Biol	3. Nature Rev Cell & Mol Biol
4. Ann Rev Cell & Dev Biol	4. Genetics & Development	4. Nature Medicine
5. Nature Cell Biology	5. Nature Cell Biology	5. Cell Metabolism

Cell, Nature and Science relative rankings

Impact Factor 2007	SJR 2007	SNIP 2007
1. **Cell**	1. **Cell**	1. Nature
2. Nature	2. Nature	2. **Cell**
3. Science	3. Science	3. Science

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SciVerse Scopus Analytics

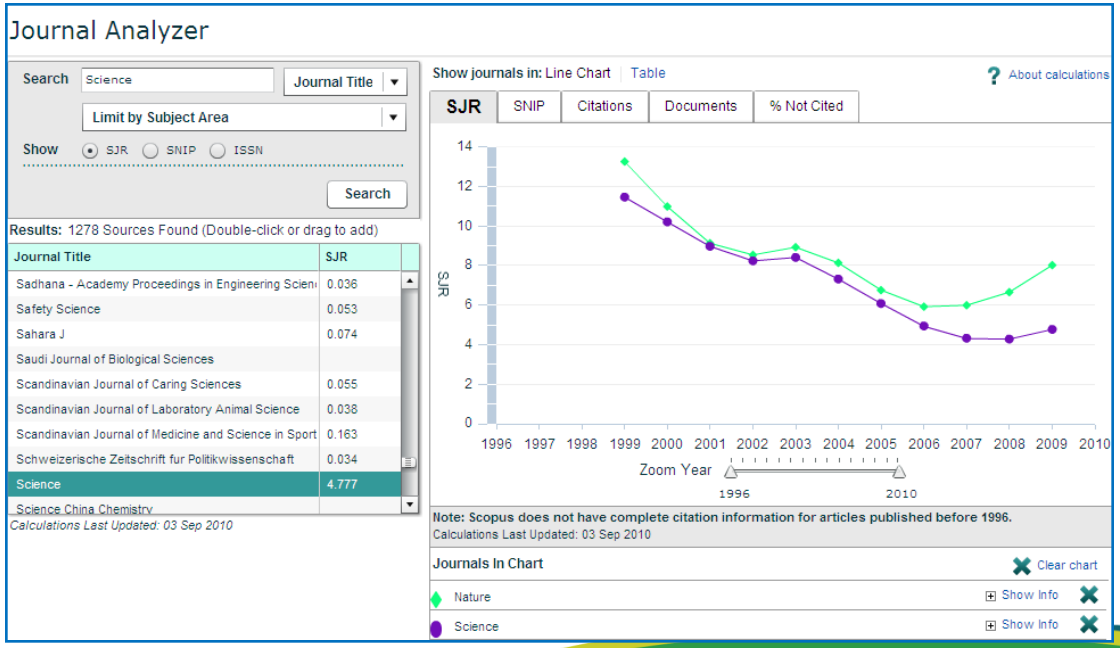
Compare your target journals

You can use the Journal Analyzer to compare up to 10 Scopus sources on a variety of parameters: SJR, SNIP, citations, documents, and percentage of documents not cited.

SciVerse Scopus Analytics

Select the journal(s) you want to evaluate

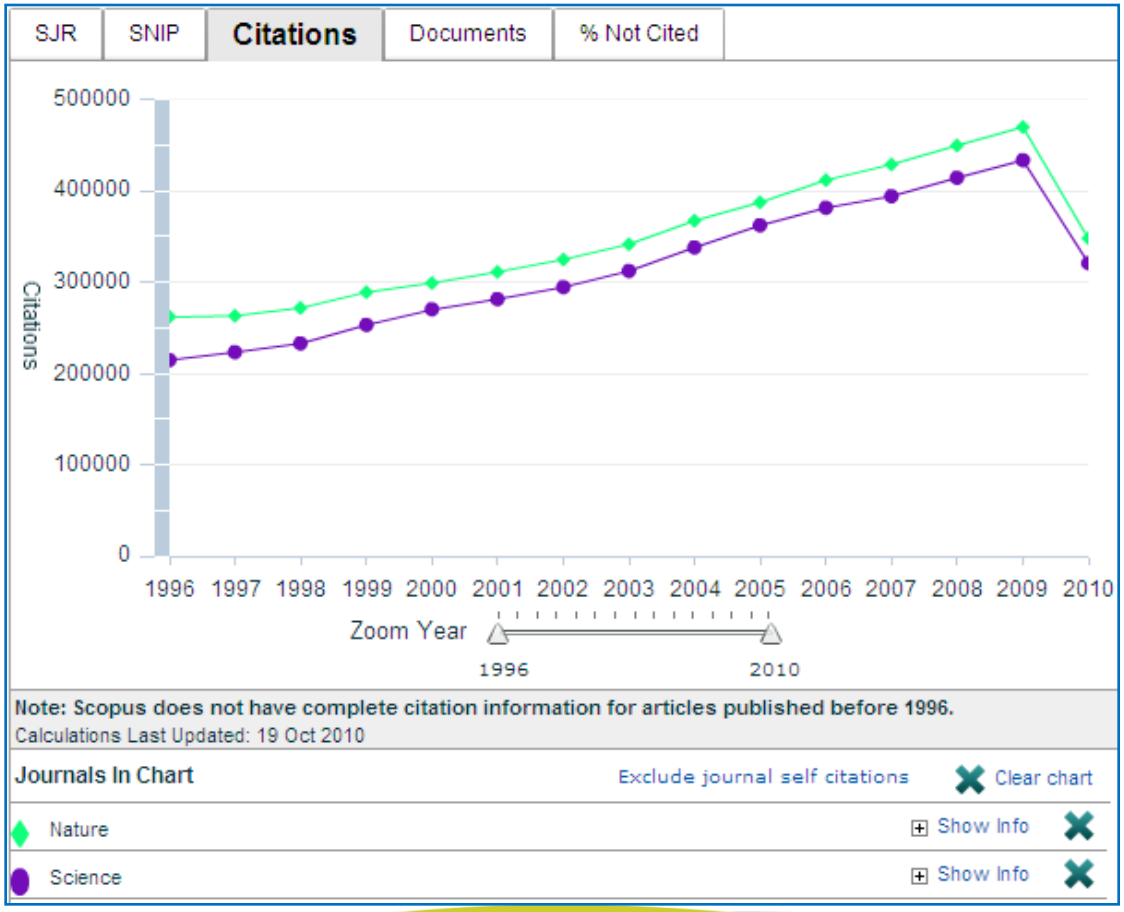
- Click **Sources** on the navigation bar.
- Search or browse for the source that you want to evaluate.
- Click the source title to open it.
- At the source home page, click **View journal analyzer**. The Journal Analyzer opens with the source added to the analyzer.



SciVerse Scopus Analytics

the number of times a source has been cited in a year

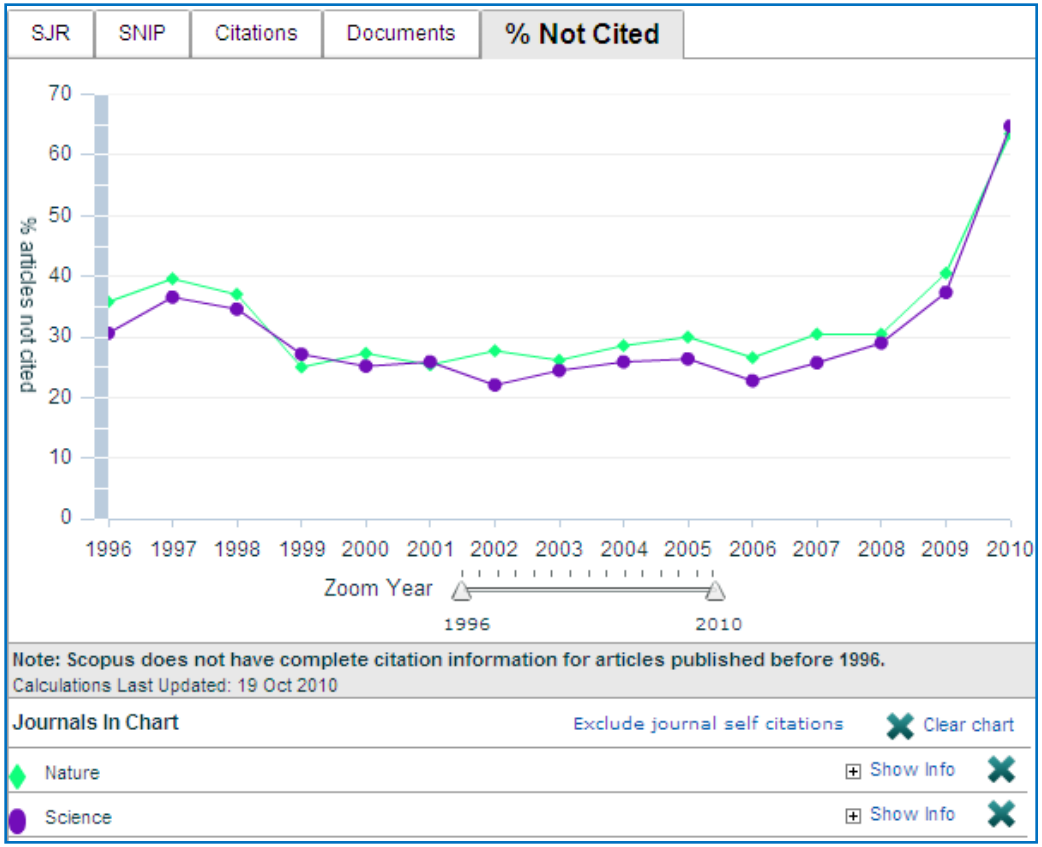
If a total of 50 articles has been published in the source over the last 5 years and 10 of those articles have been cited once in the current year, then the total number of citations for the year would be 10.



SciVerse Scopus Analytics

the percentage of articles not cited

Compare sources by the percentage of documents published in a year that have never been cited to date.

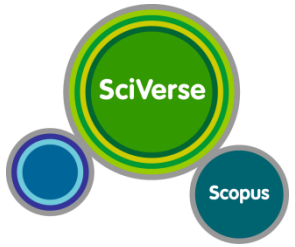


Bibliometrics at the Individual Level: H-index
accounts for a researcher's body of work

It is important to remember that current metrics such as the ***impact factor*** and immediacy index are ***based on journal evaluation***, whereas the ***h-index accounts* for a researcher's body of work** without the influence of other factors

Dr. Jorge E. Hirsch, University of San Diego

Bibliometrics at the individual level: H-index



- Measure proposed in 2005 by the physicist Jorge E. Hirsch.
- Rates a scientist's performance based on their career publications, as measured by the lifetime number of citations each article receives.
- Depends on both quantity (number of publications) and quality (number of citations) of a scientist's publications.
- Official definition: "A scientist has index h if h of their N papers have at least h citations each, and the other (N – h) papers have no more than h citations each."
- Translation of definition: If you list all a scientist's publications in descending order of the number of citations received to date, their h-index is the highest number of their papers, h, that have each received at least h citations. So, their h-index is 10 if 10 papers have each received at least 10 citations; their h-index is 81 if 81 papers have each received at least 81 citations. Their h-index is 1 if all of their papers have each received 1 citation, but also if only 1 of all their papers has received any citations – and so on..

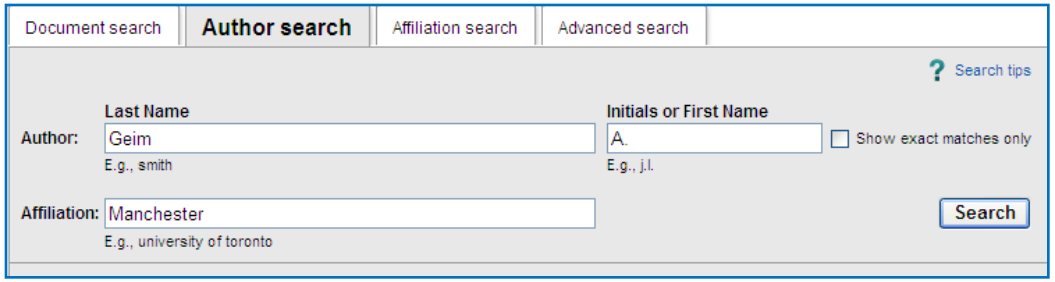
Author Evaluator

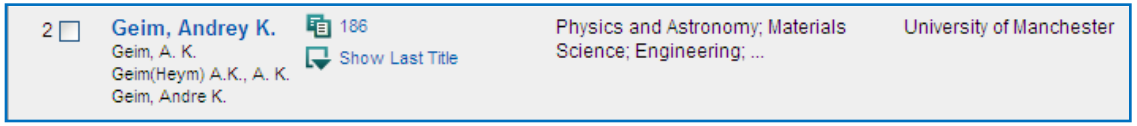
5 October 2010: Professors **Andre Geim** and **Konstantin Novoselov** from the University of Manchester were awarded the Nobel prize for physics. The Russian-born scientists shared the prize for work on the thinnest, strongest known material – a crystalline sheet of carbon one atom thick called graphene Photograph: Jon Super/AP

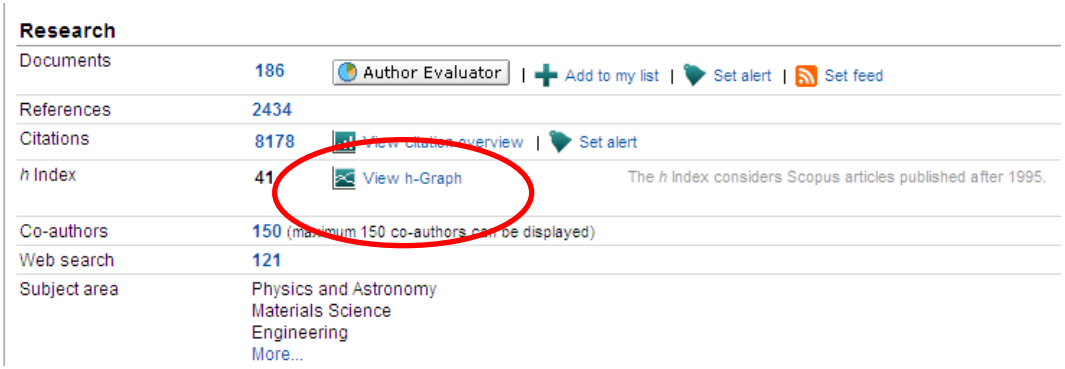
Author Evaluator charts

To view Author Evaluator charts

- At the Author search form, enter and run an author search.
- At the Make Author Selection page, click the name of the author you want to evaluate.
- At the Author Details page, click the "View h-Graph" button in the Research section of the page.



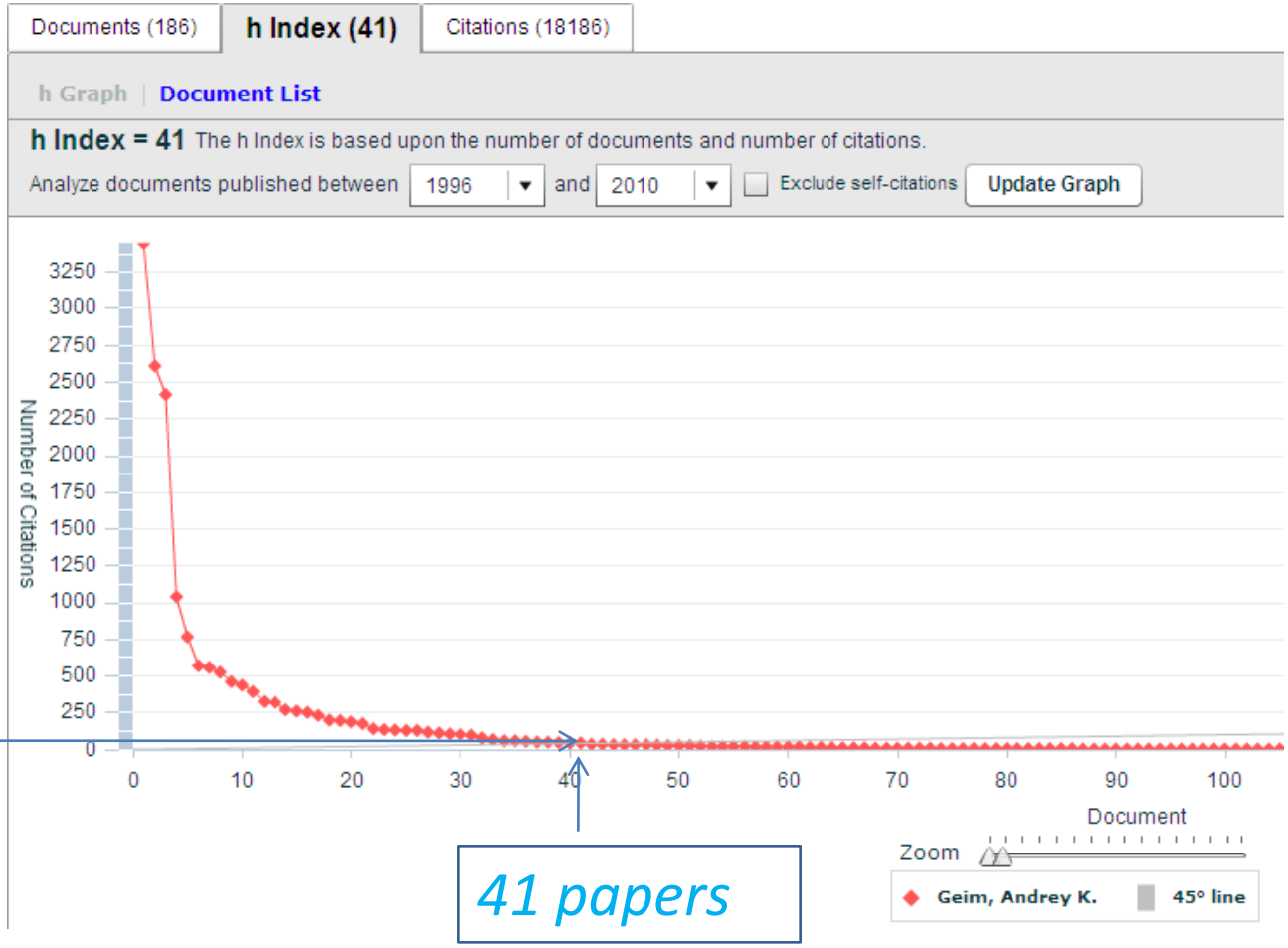




H-Graph

A scholar with an index of *h* has published *h* papers each of which has been cited by others at least *h* times

cited 41 times or more



41 papers

h-Index in the “results list”

Click on the “Citations” button to sort on number of times cited

Ranking number

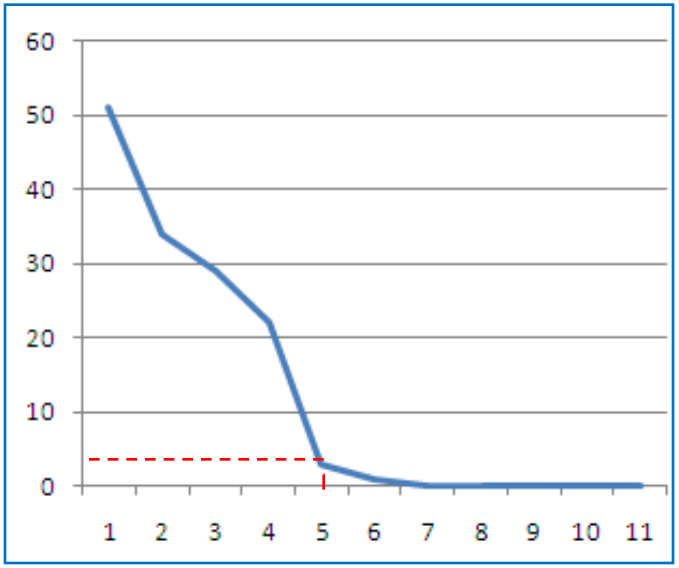
If papers ranked #43/44 are cited 45/43 times, is the author’s h-Index 44

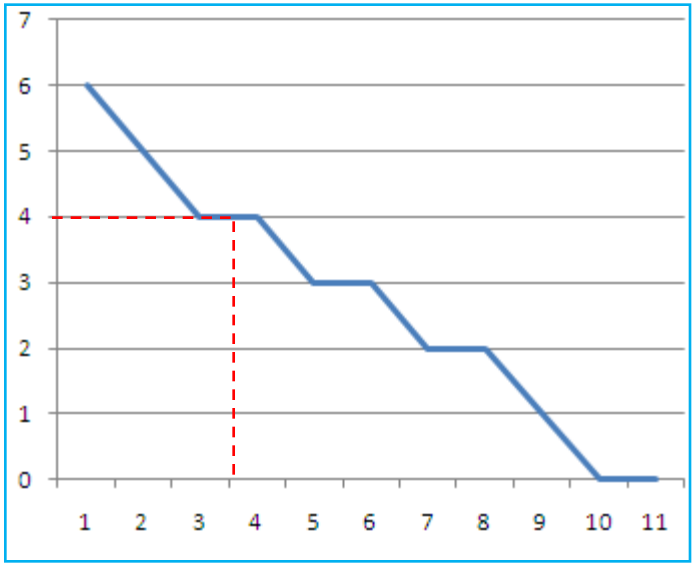
Number of times cited

Bibliometrics at the Individual Level: H-index

Pros and Cons

	Number of Citations	
Paper #	**Scientist A**	**Scientist B**
1	51	6
2	34	5
3	29	4
4	22	4
5	3	3
6	1	3
7	0	2
8	-	2
9	-	1
10	-	0
11	-	0
h	4	4





Scientist A with few, highly cited papers and scientists B with many rarely cited papers: two scientists with the same *h* index

(Lutz Bornmann, Max Planck Institute, 2009

Bibliometrics at the Individual Level: H-index

Pros and Cons

Pros

- Based on citations to author's corpus, not journal
- Credits quantity as well as quality of corpus
- Free
- Easy to understand and calculate

Cons

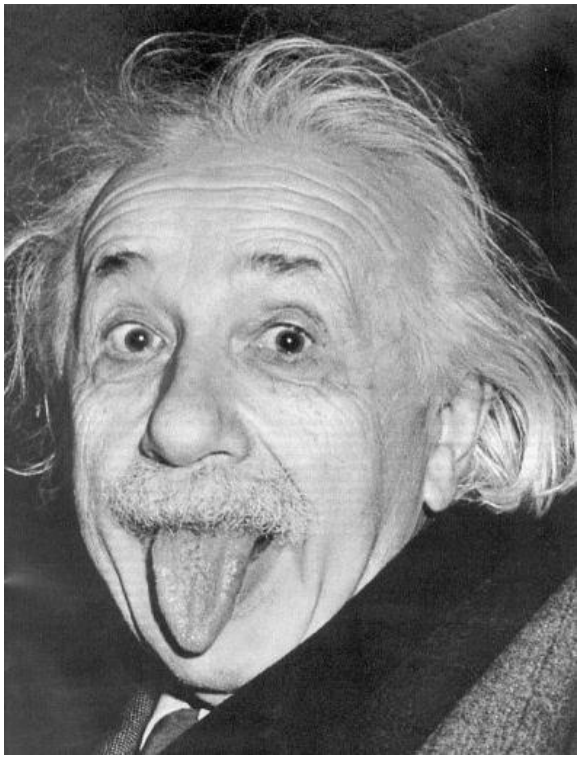
- Can be biased against young researchers
- Does not differentiate negative citations
- Does not differentiate or weight citing source
- Does not address differences per field
- Includes self citations

Bibliometrics at the Country level:

Assessment often highly based on publications and citations

"not everything that can be counted counts, and not everything that counts can be counted"

Albert Einstein (1879-1955)



Thank You

.. à vous maintenant

www.surveymonkey.com/s/BiblioBordeaux

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