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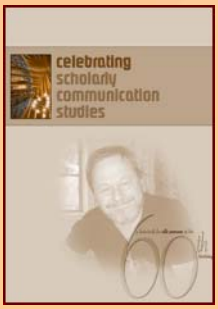
EDITORIAL

■ Celebrating an Extraordinary Gentleman



The great American author, Mark Twain wrote it once *(Notebook, 1902-1903)* that *"On the whole, it is better to deserve honors and not have them than to have them and not deserve them"*. Well, we are in the convenient situation where there is no need for such sophisticated theoretical considerations: Olle Persson deserves *and* has the honour. His friendly "Perssonality" as well as his fundamental and inevitable contribution to the development of scientometrics, has made him our scientific community's well-known and highly respected Swede for many years.

For this reason, four of his close colleagues/friends, together with several other contributors and congratulators, decided to compile a festschrift for him on the occasion of his 60th birthday.

What else could we add to this? Dear Olle, assuming that you consider these as good things rather than punishments, we wish you many more successful years to come – preferably within our friendly scientific community, dashed with ISSI and STI conferences, Nordic Workshops, NORSLIS summer schools, tons of upcoming publications, teaching, refereeing and other academic activities. Last but not least we also wish you many more years to come in order to polish and master your legendary overhead boot-throwing technique even further! And, of course, GRATTIS PÅ FÖDELSEDAGEN!

Best wishes on behalf of all the members of ISSI,
Balázs Schlemmer, technical editor

ps: The ISSI gladly offered to publish this compilation as the second issue of its festschrift series – for free download, please, visit the following URL: http://www.issi-society.info/ollepersson60/

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EDITORIAL BOARD

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2ND INTERNATIONAL WORKSHOP ON UNIVERSITY WEB RANKINGS

José L. Ortega

Spanish National Research Council (CSIC), Spain

The increasing globalization of the higher education system and the fact that universities may internationally compete for economic and human resources are underlying reasons for the proliferation of university rankings. Improving university's position in the educational rankings might increase institutional visibility and attract students, researchers and funds. Due to this fact, several international workshops and conferences that deal with main methods and characteristics of these rankings have been recently held in different countries. The International Conference on World Class Universities in Shangai and the International Symposium on University Ranking in Leiden are a sample of these conferences.

Last April 21st it was held in Madrid the 2nd International Workshop on University Rankings devoted to the scientific discussion of the principal methodological characteristics of the existing rankings on Universities, as well as to the presentation of new ranking developments. The Workshop was organized by the Cybermetrics Lab of the Spanish National Research Council (CSIC) at its new facilities in the Centre for Humanities and Social Sciences (CCHS). Unlike the first 2007 call, focused solely in the technical description of the World Ranking of Web Universities (www.webometrics.info) and including a seminar about search engines optimization for university web pages, the second call had a wider number of speakers and dealt with different university ranking projects. This aroused the interest of scholars from various disciplines (bibliometricians, web researchers, university managers, etc.) and countries, exceeding the organizers' expectations and emerging as an important forum in order to discuss the increasing importance of the university rankings.

After a brief introduction by the Director of CCHS, Eduardo Manzano, the first talk was delivered by Vicente Guerrero Bote from the University of Extremadura in Spain and member of the Scimago research group. His presentation entitled "Scimago Institutions Rankings" was centred in the introduction and description of a new academic ranking which is still in trial period. This ranking is a bibliometric application based on publications and citations which allows building customizable rankings for 2,000 universities and research institutions. These organizations can be ranked according to different criteria (papers, citations, international collaboration, Leiden or Karolinska crown indicators) exclusively obtained from Scopus data. Its main advantage is the possibility of producing customised reports comparing the evolution of several institutions according to those indicators.

Next, we had the opportunity to listen to Martijn Visser representative of the Centre for Science and Technology Studies (CWTS) from the University of Leiden in the Netherlands. He talked about the ranking developed by that research centre. As the previous project, the Leiden Ranking 2008 (www.cwts.nl/ranking/) classifies their scholar institutions only through bibliometric indicators, although these were the result of its long and deep own research. The principal shortcoming of this ranking is its scarce coverage, because it only consists of one European ranking with 250 institutions and one World ranking with another 250 institutions. However, the Leiden Ranking 2008 is built from the Web of Science database, it applies well-known CWTS indicators and a thorough normalization process. It is interesting to remark that the Leiden Ranking 2008 is a research-oriented application which allows an in-depth study of the unequal performance of the US vs. European universities, the impact of the collaborative research or their relationship with other R&D indicators.

The next speaker was Isidro Aguillo, head of the Cybermetrics Lab which publishes the World Ranking of Web Universities. Unlike the two previous ones, this ranking shows the web performance and technological development of 6,000 educational institutions. These institutions are arranged by the Webometrics Rank, a linear indicator combining weighted variables such as number of web pages, inlinks to those web pages and number of scholar documents on the web. These data are extracted using the principal search engines. The main contribution of this ranking is its coverage -the largest university ranking to date- and it provides a different and additional point of view focused in the academic activity on the Web (open access, e-learning, etc.). Isidro Aguillo informed us about new improvements to the World Ranking of Web Universities, because this ranking not only measures e-scientific production (e.g. open access) but also educational activities on the Web (e.g. e-learnig, e-content production). Among the main improvements, one can highlight the new count of links which come only from academic sites, emphasizing the scholar visibility of a university and the building of a new ranking at the level of departments and research groups, showing the more scientific related activity of a university on the Web. Stronger efforts in normalization and aggregation of several domains belonging to the same university were also announced.

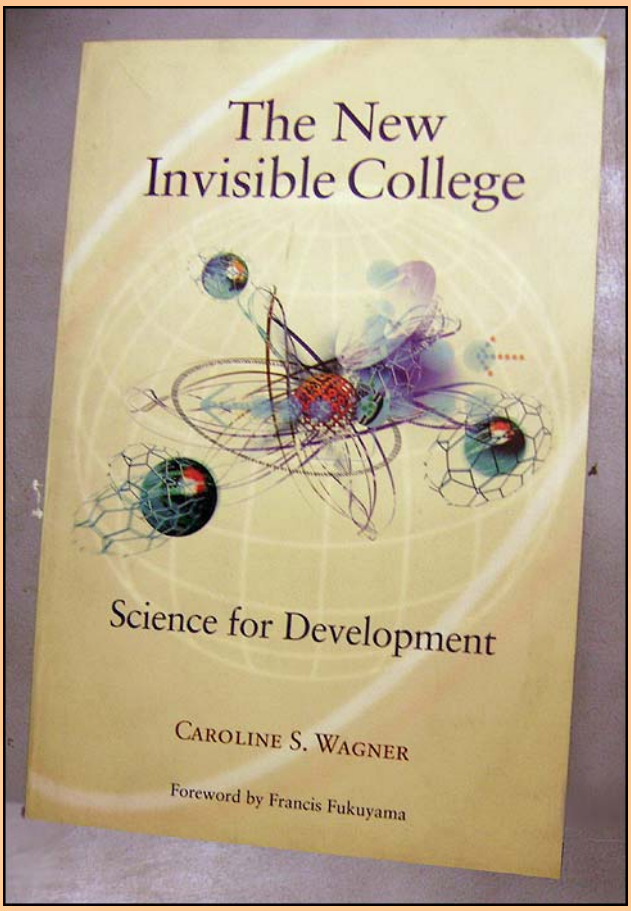
Finally, the last talk was given by Ben Sowter, head of research of QS Intelligence Unit which publishes the Times Higher Education-QS World University Rankings. This commercial ranking tries to measure several excellence aspect of each university. It takes different weighted indicators to classify the higher education institutions, being 40% Peer review, 10% Recruiter review, 20% Student faculty ratio, 5% International faculty, 5% International students and 20% Citation per faculty. Unlike the previous approaches, THE-QS Ranking (www.topuniversities.com) uses both qualitative and

quantitative indicators which intend to assess not only the research performance but also the teaching quality, employability and international outlook. Ben Sowter also commented future developments in this ranking such as to go in depth in the creation of rankings at the level of subjects, to go from global rankings to regional (Southeast Asia) and national ones, to redesign the arrangement criteria introducing new indicators (Papers per faculty) and redistributing the weight of each variable accordingly.

After lunch, the Workshop finished with a practical session by Isidro Aguillo. The aim of this session was to describe cybermetric techniques and skills which facilitate the management of academic web sites, improving their visibility on the Web. This was organized in three parts: Cybermetrics Indicators, in which he explained the main operators to extract data from the major search engines; Applied Cybermetrics, related to the web positioning and search engine optimization; and Web traffic analysis, about techniques and software in order to monitor the visits that a web site receives.

For more information about this event visit: www.webometrics.info/workshop.html

NOTE: Isidro F. Aguillo, co-organizer of the 2007 ISSI Conference at Madrid and head of the Cybermetrics Lab (CSIC), has been awarded the degree of Doctor Honoris Causa by the University of Indonesia. In an event chaired by the Minister of Education, the Rector of Universitas Indonesia mentioned his contributions to Cybermetrics and the innovative Webometrics Ranking of World Universities as the main reasons for this recognition in the field of Information Science. The ceremony took place in Jakarta, April 16 2009 as part of the International Conference on World University Ranking 2009 (http://wur2009.ui.ac.id/).



CAROLINE S. WAGNER:
The New Invisible College
Science for Development
The Brooking Institution, 2008, 156 pp.
ISBN-13: 978-0815792130

BOOK REVIEW

by Sujit Bhattacharya
Centre for Studies in Science Policy, Jawaharlal Nehru University and NISTADS

The central thesis/argument the book makes is that "Science operates at the global level as a Network - an Invisible college". This, the author visualizes is fundamentally changing the structure of science in the twenty-first century. The rise of networked science makes knowledge creation more efficient and creates opportunities for developing countries to participate in global scientific activity and tap resources to solve local problems. But to take advantage of the networked structure, countries need to design new science policy framework that moves beyond national orientation. In advancing these arguments the author uses both qualitative and quantitative perspective.

Francis Fukuyama's forward provides a perfect setting for this book. He succinctly provides a glimpse of the changing landscape of science and articulates why this book is important. The book is in three parts. Part 1 covers three themes: The emergence of the new invisible college (Chapter 1); The topology of science in the twenty-first century (Chapter 2); Network character of science (Chapter 3). Part II makes an analytical introspection of the Network dynamics. Three themes cover this section: Tectonic shifts: The rise of global networks (Chapter 4); The virtual geography of knowledge (Chapter 5); Scientific capacity and infrastructure (Chapter 6). Part III dwells upon how the emerging configuration requires innovative policy framework and governance. These aspects are covered under the title "Governing the new invisible college" (Chapter 7). Appendix helps explain the construction of the index used by the author to assess scientific capacity. For scholars, the Notes section in the end provides rich source of reference material.

To advance the different arguments, author brings in concepts that span a wide disciplinary matrix; borrowing extensively from Network Theory and Innovation Studies. For a lay reader the concepts are introduced in a manner that can be easily assimilated. For example the author uses the language of network theory to visualize the structure of Invisible College (Chapter 3 Networked Science). Using this world view, the author argues that Invisible College is a complex adaptive open emergent system (pp. 35). But to make readers have deeper insights into the

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meaning of each of the concepts she uses the metaphor of a forest. Later when other network concepts are introduced such as scale free network, power law that are common language in network theory but are esoteric concepts for others (pp. 39); the author moves beyond the metaphor of forest to explain mathematical underpinning behind these concepts. This innovative style makes the arguments more compelling.

Author also provides glimpse, evolution and functioning of scientific activity across the world through empirical and qualitative investigation. Concepts such as preferential attachments (that defines collaborations), weak links, lock-in, path dependency, cumulative advantage are used to construct the story. As interactions (among different fields) grow more complex and become institutionalised, new area/subfield emerges. Even though, the activity within the invisible college is largely self directed, it is not random. It follows identifiable patterns and rules. Social Capital (shared ethical values, mutual trust) is instrumental in emergence and fruition of collaborations; it motivates scientists to self organize into teams, and share resources to solve scientific problems.

Wagner touches upon some of the key issues that can help developing countries to participate in the global science. Each nation including advanced countries has to enter the global system as participants so that valuable information (reciprocity) or/and resources (complementarity) can be exchanged. Developing countries need to identify and exploit unique local conditions; need to link to larger world community but should not be at the expense of local connections. The new emerging structure of science requires new governance of science that can facilitate knowledge creation and problem solving by involving experts from different countries and diverse disciplinary backgrounds. Developed and developing countries should design science policies that can accommodate the new structure. Science policy should take into account the different levels at which scientific network operate, align incentives to increase opportunities for local participation and democratize decision making about scientific investments and resource allocation. Science policy should treat S&T as an emergent networked system that can facilitate global scientific exchanges rather than as a national asset.

Although the author's views are compelling but still there are other dimensions that can't be ignored. The book does not take into account the changing contours of knowledge production. Increasingly it is being observed that the locus of knowledge production is becoming enlarged with firms and other actors apart from universities actively participating in this process. This is more so with the advent of science based technologies. There is reference to new modes of knowledge production, interactions among different actors ('Triple Helix'), but these are not expounded further.

Science is going through new tensions. A substantial portion of public science is becoming private knowledge. Firms treat scientific knowledge created by them as 'private good' ? a commodity that can be traded or exchanged like other market goods. In public funded organizations (universities and public research institutes) new institutional structures for example technology transfer offices, proprietary protection (through various intellectual property instruments), are also

trying to create fences in public knowledge. The non-rival, non-excludable character of knowledge is eroded by these activities. The author's policy framework does not factor in these dynamics.

There is a serious attempt to bridge the gap between qualitative and quantitative perspective but one still finds the author comfortable with the rationalistic, uncritical view of science. The author does not exploit the rich theoretical literature on dynamics and structure of science emerging from sociological and philosophical traditions. The book is sometimes prescriptive!

Overall the book is a very important scholarly work. The book addresses a large community and is not restrictive to a narrow domain of scholars in STS studies. It helps to bride the gap between the qualitative and quantitative perspectives. It is a must read book for scholars in collaboration studies and those involved in science policy framework. The narrative style the author uses to glue the different pieces together makes the arguments appealing and entices the readers to agree too many of the arguments she provides.

INFORMETRICS IN THE EYES OF WEB

Judit Bar-Ilan

Department of Information Science, Bar-Ilan University, Ramat Gab, Israel

In this article we try to explore how the field of informetrics looks in the "eyes of the Internet" as of the beginning of June 2009. Of course, we cannot examine the whole Web, and we are not able examine even the whole list of results retrieved by search engines.

We base our impressions on the top-ten results of the most popular search engine, Google (www.google.com). Why Google? According to the latest available data from Nielsen, in the US, more than 64% of the searches are conducted through Google (Nielsen Wire, 2009), and Google is the most popular parent company in all countries monitored by Nielsen Online (2009). Why do we consider only the top-ten results? Most Internet users visit only the first search results page; usually displaying ten results, thus we also limited our examination to the top-ten results (Spink & Jansen, 2004).

In addition to Google, we also looked at the results produced by WolframlAlpha (wolframalpha.com), the newly launched question answering service, whose aim is "to accept completely free-form input, and to serve as a knowledge engine that generates powerful results and presents them with maximum clarity" (WolframlAlpha, 2009). The following queries were selected:

- informetrics
- bibliometrics
- scientometrics
- webometrics
- "citation analysis" (as a phrase)

All the queries were submitted to Google and the WolframlAlpha on June 8 and 9, 2009.

■ Google's views on informetrics

informetrics

For this query 99,500 results were reported. The top-ten results were as follows:

1. The homepage of a commercial company whose site resides at informetrics.com
2. The Wikipedia entry on informetrics, with very little information, pointing to the entries on bibliometrics, scientometrics and webometrics
3. Journal of Informetrics
4. The homepage of ISSI
5. An article published by Dietmar Wolfram in Informing Science entitled "Application of informetrics in information retrieval research" (cited 7 times according to Google)

6. A page from the journal site of Cybermetrics, describing its scope and topics
7. A duplicate of the above page
8. A page authored by Birger Hj?rland with a definition of "informetrics"
9. A page from the University of Hasselt's document repository, which turns out to be the page for the book "Introduction to Informetrics" by Leo Egghe and Ronald Rousseau (cited 181 times as reported on the search results page)
10. Call for papers for the Fourth International Conference on Webometrics, Informetrics and Scientometrics that took place in Berlin in 2008.

Altogether we can be satisfied, except for the first result; all the results are related to the research field. All the pages, except the page from the University of Hasselt have the word informetrics in their title. In the top two results, the word informetrics appears in the URL as well. Title and URL words and the number of links pointing to the given page are known to influence the ranking.

The placement of the society's homepage may be improved if there are more links to this page. Currently Google reports 27 links to the ISSI homepage, with only three of them from homepages of ISSI members. It is well known that Google does not report all the links pointing to a given page (e.g. Bar-Ilan, 2005) thus we checked the number of links reported by Yahoo as well (359 links to the homepage), but only 12 links from personal webpages of informetricians. This number can be easily increased by requesting all ISSI members to mention ISSI and link to the homepage (issi-society.info) of the society. Note, that it is important that we all link to the homepage and not to some other page on the society's site. One more page that is clearly missing from the top ten results is the homepage of the forthcoming 12th ISSI conference (issi2009.org). This page is clearly more relevant than the call for papers of a previous conference.

bibliometrics

For this query 12 million results were reported.

1. Wikipedia entry on bibliometrics
2. A course on bibliometrics at the University of Texas at Austin by Ruth Palmquist
3. Course handouts of a course held by Wolfgang Glänzel on bibliometrics as a research field
4. A word file named "bibliometrics information kit" prepared by Cathrine Harbor-Ree for the Council of Australian University Librarians
5. A powerpoint presentation by Tefko Saracevic from Rutgers University prepared as one of the lectures for a seminar course in information studies
6. A news item published in 2007 in the Guardian on "bibliometrics can distort research assessment", related to the RAE
7. A page from the Cybermetrics site, describing the journal's scope and topics (this page also appeared for the query informetrics)
8. A list of links related to bibliometrics maintained by Matthias Winterhager from the Institute for Science and Technology Studies at the University of Bielefeld in Germany
9. A page on bibliometrics from the Central Library of the Jülich Research Center, Germany
10. A note on bibliometrics by Antoine Danchin, Director of the Genomes and Genetics Department at the HKY Pasteur Research Centre in Hong-Kong

Most of the pages in this set serve as general introduction to bibliometrics, and as such they provide relevant answers for such a general query.

scientometrics

Google reported 250,000 results for this query.

1. Links to the Springer site of the journal Scientometrics
2. The Wikipedia entry on scientometrics (the research field)
3. Another page from Springer which turned out to be a blank page
4. A page from Ovid, a commercial information service provider, describing the journal Scientometrics
5. A page on scientometrics and bibliometrics from Science-Metrix, a company dedicated to the evaluation of STI in Montreal, Canada
6. The homepage of ISSI
7. A page from the Cybermetrics site, describing the journal's scope and topics – the same page that was retrieved for the queries informetrics and bibilometrics

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8. A page by Olle Persson with maps of papers from volume 1 to volume 44 (1978-1999) of the journal Scientometrics
9. A paper by Steven Harnad on "open access scientometrics and the UK Research Exercise" from arxiv (cited 23 times according to Google)
10. This page is identical to the top page for the query, and links to the Springer site of the journal Scientometrics

For this query we see a mix of results, some relate to the journal and others to the research field. The homepage of ISSI appears, but it is ranked lower than for the query informetrics, probably because of the prominence of the journal Scientometrics.

webometrics

Google reported 213,000 results for this query.

1. The world universities' ranking on the Web, also called the "webometrics ranking of world universities", a project of the Cybermetrics Lab of CSIC, headed by Isidro Aguillo
2. Another page from the above site, displaying the top 50 universities according to this ranking
3. The Wikipedia entry for webometrics
4. The Wikipedia entry on the Webometrics Rankings of World Universities project
5. Mike Thelwall's blog on webometrics, last post from January 2008
6. Another blog, named "webometric thoughts" by David Stuart from the University of Wolverhampton
7. A Finnish /English site named webometrics maintained by Kim Holmberg from Abo Akedemi University, covers other areas of his interests as well
8. Kim Holmberg's blog on the above site
9. A report on "Webometrics and Self-Organization of the European Information Society" by Moses Boudourides, Beatrice Sigrist and Philippos Alevizos from 1999 for the EU funded SOEIS project
10. The last page is a subproject of the World University Rankings project (top-two sites) and it is a page on ranking web repositories

The information on webometrics, a user can get when viewing the first result page, is about rankings of universities and repositories based on webometric data, a few blogs on the topic and some basic definitions.

citation analysis

Google reported 193,000 results for the query "citation analysis" (phrase search). On top of the organic results, there are links to three highly cited "scholarly articles" that Google (see Figure 1). However the first item is not on related at all to citation analysis. It is perhaps included because one of the versions of the article displayed by Google Scholar, links to a research day handout (http://dspace.library.drexel.edu/retrieve/3527/Research_Day_handouts_materials_sci.pdf) on Drexel's highly cited papers on materials science, and the Barsoum & Elraghy paper is the most cited paper on the list. top results for the query are as follows:

1. The Wikipedia entry on citation analysis
2. The Wikipedia entry on bibliometrics
3. A link to a preprint by Lokman Meho on the "Rise and rise of citation analysis". The paper was published in the Physics World (cited 23 times according to Google)
4. Eugene Garfield's article "Citation analysis as a tool in journal evaluation" published in Science in 1972 and cited 812 times according to Google.
5. An article in the summer 2005 issue of Issues in Science and Technology Librarianship by Kristen LeBonte on "Citation analysis: a method for collection development of a rapidly developing field" (cited 5 times)
6. Summary of a lecture on citation analysis in the information system principles course held in 2002 by the New Jersey Institute of Technology's College of Computing Sciences
7. An article by Jeffrey Perkel on the future of citation analysis that appeared in the Scientist in 2005
8. A page by Dima Verner entitled: "The Astrophysical Journal Letters - Citation Analysis". It is a reference analysis of the articles published in the journal in 1996.
9. The page of a workshop that will take place in August 2009 in Singapore on text and citation analysis for scholarly digital libraries.
10. A page from the library of the University of Ottawa, Canada on citation analysis.

Among the five topics examined by us, the results for this query were most research oriented, with four scientific papers in the top-ten results and links to Google Scholar for additional research papers. Interesting to note

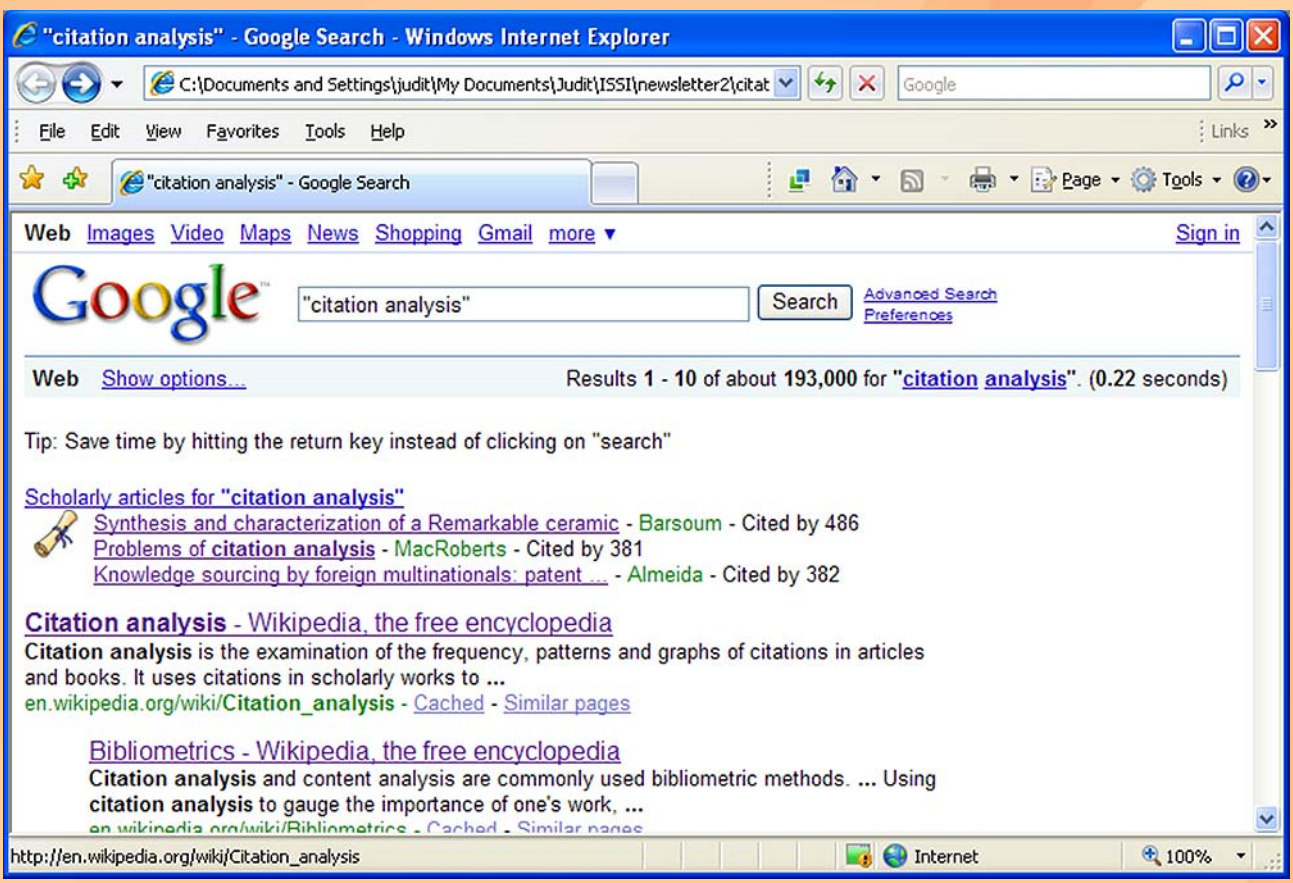

Figure 1 Google's top results for the query "citation analysis" as of June 8, 2009

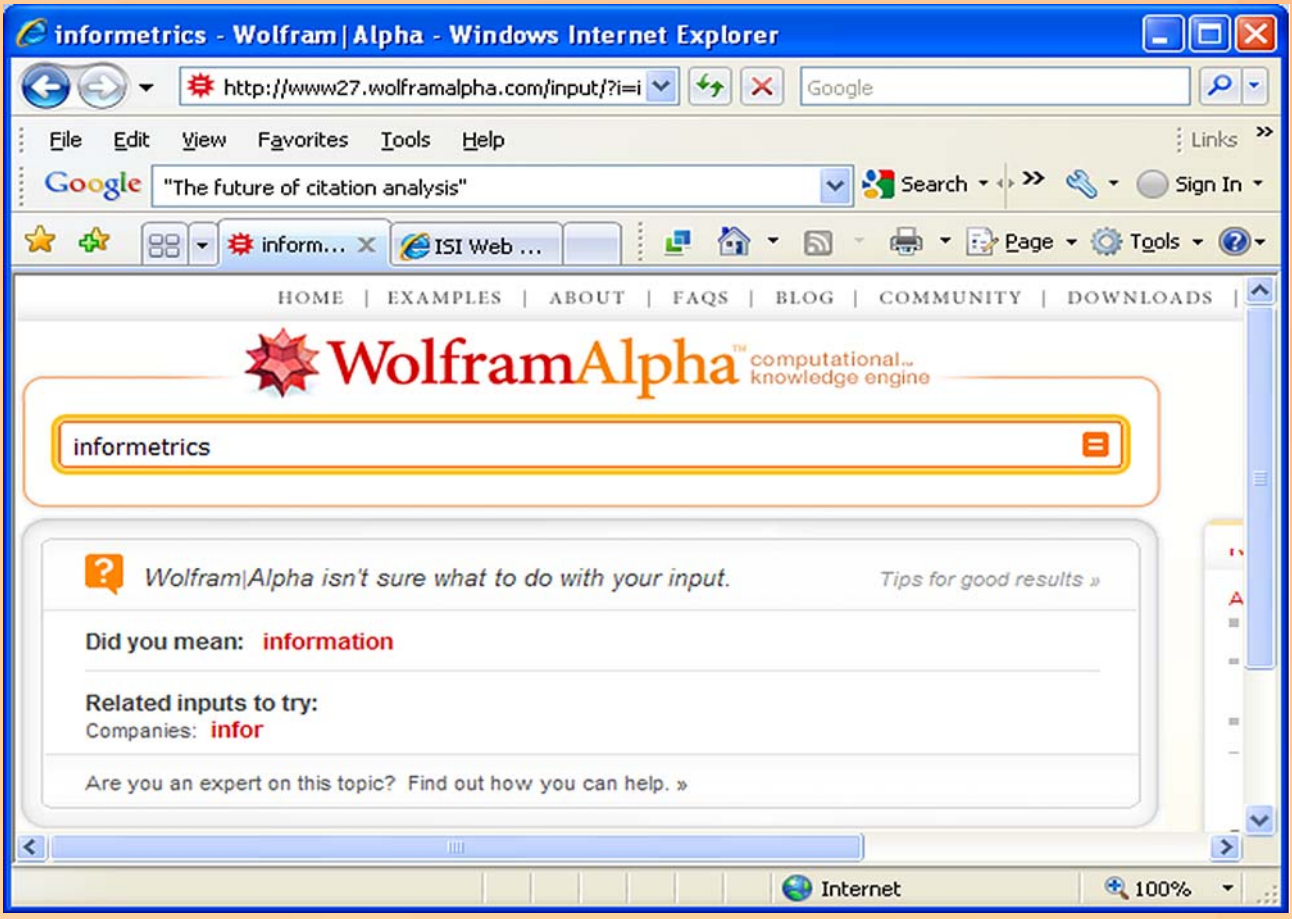

Figure 2 Wolfram|Alpha's standard answer to our queries on June 9, 2009

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that there is a current conference page among the top-ten results.

WolframlAlpha is completely ignorant about all these topics, its standard answer for all the queries is: "WolframlAlpha isn't sure what to do with your input" (See Figure 2), thus at this point of time WolframlAlpha is not serious contender of Google.

■ Conclusions

The top-ten results for all five queries link to a reasonable set of introductory pages on the topics. The ISSI society's homepage appeared among the top-ten results for two queries. It may be possible to improve its position for these queries by requesting the members of the society to link to this page from the members' personal homepages. By the way, for the query ISSI, the society's homepage appears as the fourth result (other ISSI acronyms are placed ahead of it), and is number one for the query: international society for informetrics and scientometrics. The conference homepage of the 12th International Conference on Scientometrics and Informetrics (www.issi2009.org) is also missing from the list, perhaps it would have appeared if the title (I mean the text between the title html tags) would have been ISSI2009 – 12th International Conference on Scientometrics and Informetrics, instead of just ISSI 2009. The title words are known to have considerably influence on the ranking of the webpage. In addition, the full name of the conference on the webpage appears as an image, and images are not indexed by Google. Thus it seems that when almost everyone uses Google and with so many pages indexed by it, search engine optimization (Wikipedia, 2009) becomes a must for a webpage in order to appear among the top-ten results.

■ References

Bar-Ilan, J. (2005). Expectations versus reality: Search engine features needed for Web research at mid-2005. Cybermetrics, 9(1), paper 2. Retrieved June 9, 2009, from www.cindoc.csic.es/cybermetrics/articles/v9i1p2.pdf

Nielsen Online (2009). Free data and rankings. Retrieved June 8, 2009, from www.nielsen-online.com/resources.jsp

Nielsen Wire (2009). Top 10 search providers for April 2009 (US). Retrieved June 8, 2009, from blog.nielsen.com/nielsenwire/online_mobile/top-10-search-providers-for-april-2009-us/

Spink, A. and Jansen, B. J. (2004). Web search: Public searching of the Web. Kluwer Academic Publishers: Dordrecht, The Netherlands.

Wikipedia (2009). Search engine optimization. Retrieved June 9, 2009, from en.wikipedia.org/w/index.php?title=Search_engine_optimization&oldid=295357937

Wolfram|Alpha (2009). About Wolfram|Alpha. Retrieved June 8, 2009, from www47.wolframalpha.com/about.html

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Wolfgang Glänzel:	wolfgang.glanzel(at)econ.kuleuven.be
Judit Bar-Ilan:	barilaj(at)mail.biu.ac.il
Sujit Bhattacharya:	sujit_academic(at)yahoo.com
María Bordons:	mbordons(at)cindoc.csic.es
Jacqueline Leta:	jleta(at)bioqmed.ufrj.br
Olle Persson:	olle.persson(at)soc.umu.se
Ronald Rousseau:	ronald.rousseau(at)khbo.be
Dietmar Wolfram:	dwolfram(at)uwm.edu
Balázs Schlemmer:	balazs.schlemmer(at)gmail.com

IS HIGH IMPACT RESEARCH DOMESTIC OR INTERNATIONAL?

Olle Persson

In science, international collaboration is seen as a good thing. It is increasingly promoted and supported. The share of internationally co-authored papers has been growing strongly over the last two decades, and the citation impact appears to be stronger compared to domestic papers. However, does this also mean that the international collaboration is a necessity for progress in research?

If we look at the 100 most cited papers in four fields, the majority of the papers are domestic and evenly distributed across the top ranks. The percentage of international papers is low for all years as well as for the years 2001-2008: stem cells 29 % for all years and 22% for 2001-2008, 17% vs. 28% for protein folding, 19% vs. 17% for conducting polymers and 27% vs. 37 % for papers on global warming. Thus the time effect is weak and ambiguous.

For many European countries, cities or universities, the share of international papers among the 100 most cited is quite high and increasing. During 2001-2008 we find that 87 out of 100 most cited papers from Denmark or Norway are international. Why is international collaboration important for high impact research in these countries but not for the research field as a whole?

The answer to this paradox is that there is a very strong country effect in the research fields. The share of US domestic papers varies between 43 to 56%, and, as we all know, USA is a big country with many good universities and researchers within it.

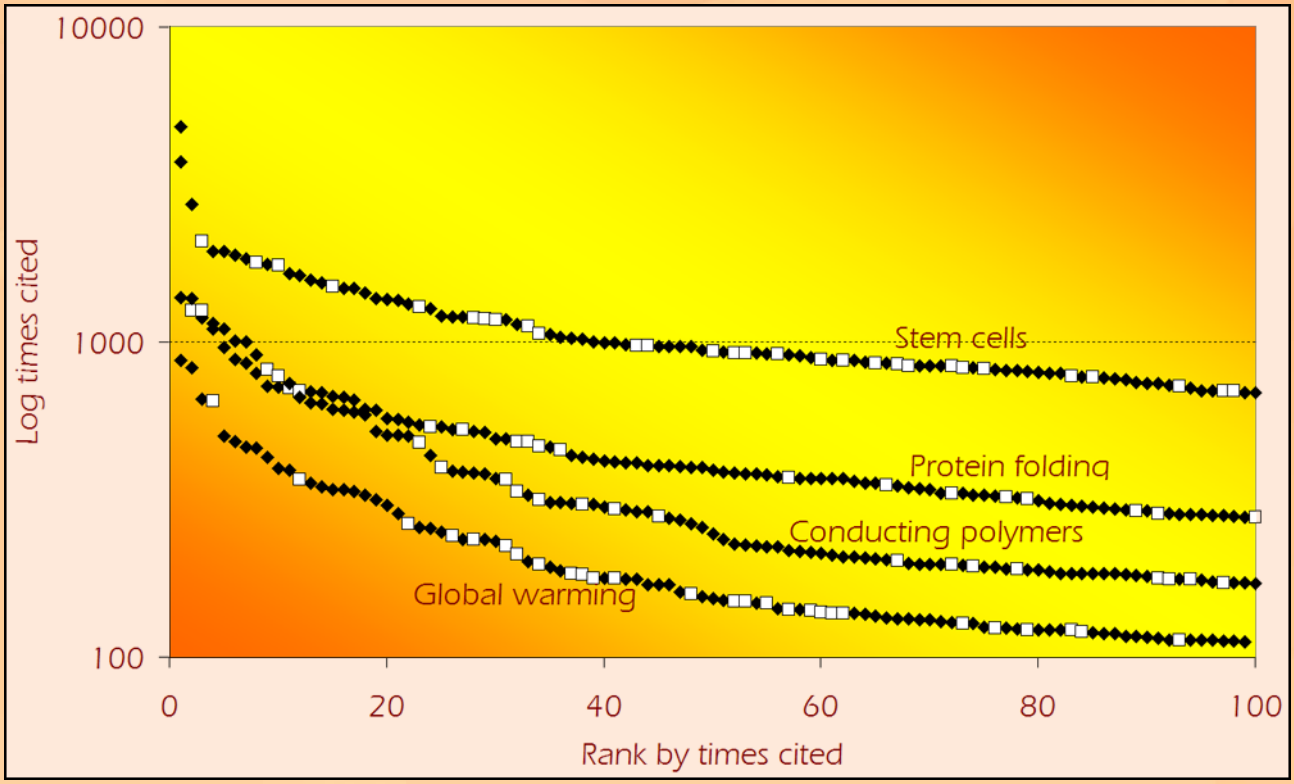

Figure 1 Distribution of domestic and international papers by rank and times cited for four research fields.
(Note: International papers in white squares. Papers were downloaded from Web of Science for the timespan 1945-2008.)

THE RANKING GAME ON THE TOP THE COMPETITIVE WORLD OF NATIONS IN SCIENTIFIC RESEARCH

Tibor Braun*

Information Science and Scientometrics Research Unit (ISSRU)
Hungarian Academy of Sciences, P. O. Box 123, 1443 Budapest, Hungary
and
*Institute of Inorganic and Analytical Chemistry, L. Eötvös University,
Budapest, Hungary
E-mail: braun@mail.iif.hu

■ It's a known fact that scientific progress is stimulated by many components of paramount importance. One of them is competition which can be observed and noticed at many levels of research activity, e.g. individual, institutional, national, and regional ones. The present note deals with the competitive race of science at national and regional levels. It brings arguments indicating the presence of a dominant power in the world science.

Although the progress and development of science is independent of and not influenced by the nationality of the discoverer, due to its self-organizing structure, scientific research as the human activity of "making science" is strongly competitive at personal, institutional and national level. It's no exaggeration to say that scientific research is the most competitive of all human activities, even if we compare it e.g., with sports.

At national level, the distribution of world science i. e. the scientific wealth of nations has a component of national proud and patriotism but it is also of pragmatic importance at government level for ranking, managing and policy purposes. That's why it's no surprise that the scientific well being and health of nations has been for long time one of the most intensively investigated topic of scientometrics. The literature published on it is very comprehensive that's why only a relatively short selection is enumerated here[1-17].

It seems that the real groundbreaker of this type of investigations has been Derek de Solla Price[1-2], who has initiated the count of publications, authors and citations as science indicators. All later authors have followed Price's footsteps in the use of journal publications and citation counts, and some of them have given these data a certain sophistication by their using for building specific, relative, etc., indicators. The whole effort has been made possible by the invention, of the Science Citation Index database by Garfield[18], and its publication, first in hardcopy, and later on in electronic form by the Institute

of Science Information (Philadelphia, USA now Thomson Reuters).
As known the literature of science is the true and visible output of basic research.

However, its determining factor is the working mechanism, which creates this literature. Journal papers and citations are only corollary to this working mechanism. As mentioned, they represent in fact only the result but not the determining cause of a self-organizing selection or the filtering process, which accepts or refuses manuscripts to enter the science journal publication scene.

The determining factor of the whole publication process of journal papers is the so-called journal gate keeping and the decision power of its operators the gatekeepers of science journals.

Motivated by the abovementioned we have introduced a scientometric indicator, which supplements, sometimes avoids indicators based on the counting of journal papers and citations.

For that purpose we have been inspired by a quite remote research by the French scientist de Candolle[19]. Szabó[20] outlines de Candolle's "early scientometics" as follows.

"De Candolle, as a very productive research biologist particularly in botany and heredity, fully realized that no single person can appreciate completely and impartially all works published in different languages and in different fields of science. The diversity of subjects and the possible subjectivism in value judgments made him to search for more objective analytical tools. He found them in the numerical analysis of eminent scientists participating actively in international scientific life."

De Candolle tabulated data on the national distribution of the members of the following scientific societies: Academie des Sciences de Paris, Royal Societies of London and Edinburgh, Academie des Sciences Berline, Academie des Sciences Morales, Institute de France, Academie dei Lincei of Rome and Turin, Academie de Bruxelles (1885). In the case of the academies, data were tabulated for every research scientist. De Candolle based his work on counting scientists chosen according to the judgment of an "eminent and knowledgable" body[20].

De Candolle himself realized that he was the first in the history of science to undertake this kind of analysis. He also accentuated the essential advantage of the eminent membership analysis, because it explores the collective judgement of a professional community.

It would have been quite difficult to repeat de Candolle's methodology today. That's why we have initiated research in 1982, based on the following.

For the satisfactory operation of the international working mechanism of the sciences, the control and screening activity of journal editorial boards, which guarantee the professional standard of science journals, is of paramount importance. It is considered, the critical mentality and decisions of journal editors have so far protected and will also warrant in the future the social and intellectual integrity of science. The members of the editorial and advisory boards of science journals are rightfully considered the gatekeepers of the science journals. The gatekeepers, in controlling the systems of manuscript evaluation and selection, occupy powerful strategic positions in the collective activity of science[21-26]. Taking into account their vital strategic importance in the orchestration of science, we hypothesize that similarly to the "invisible colleges"[27-28] of individual researchers, in the world science there is at work also an "invisible college" of journal gatekeepers as an eminent group of scientists weakly hold together by the self-organizing system of science.

Price redefined the seventeenth-century term "invisible college" as being an informal, widely dispersed group of people with a common scientific interest who "effectively solve a communication crisis".

The gatekeeping process has a built-in automatic feedback mechanism that works to increase its strength and influence within science in relation to social and political forces.

Gatekeeping has, of course, not to be viewed as some gathering of conspirators, but along with the characterization of Price's and Crane's[28] invisible colleges, we consider that gatekeepers automatically and instinctively share a common goal of which the main component is the value system and the national educational background they were socialized in.

We have built a machine readable database of journal gatekeepers.

Science journals were defined as "international" if their editorial board included scientists

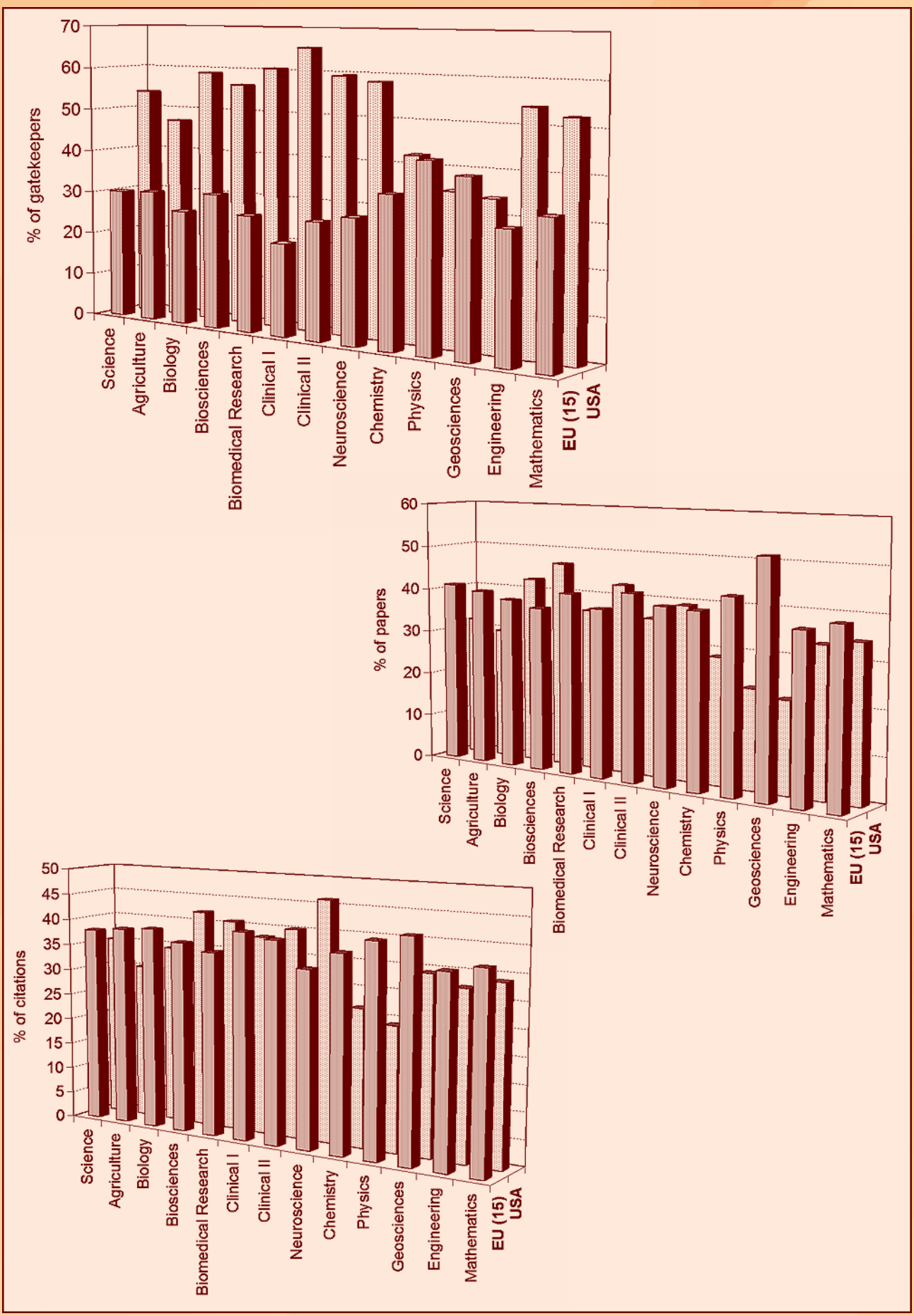

Figure 1 Percentage distribution of journal gatekeepers, papers and citations in 20 core journals per field in 12 fields. Data for US and EU(15). Gatekeepers: 2003; Papers: 2003; Citations: Citations in 2000-2002 to papers in 2000

from e.g., eight countries at least, irrespective of the title of the journal in question. The "international" label in the title of some journals may hide a truly national journal. On the contrary, in the editorial board of, e.g., the *American Heart Journal* there are, in addition to US, scientists from ten, mostly European countries.

The database[21] contains data for 240 journals in 12 fields. The leading 20 journals were selected (by impact) in each of the 12 fields according to the journal classification system of Glänzel and Schubert.[29]

The necessary data were obtained by counting and country-wise pooling the editors. In so doing, we considered as editors the editor-in-chief, the editor(s), the deputy editor(s) (in–chief), the managing editor and the members of the editorial board and advisory board, excepting only the technical editor(s), i.e., most of those whose name appeared on the covers of the journals.

The percentage of authors of papers for 2003 in the selected journals and citations in 2000-2002 has been calculated.

Fig. 1 compares the percentages of the US gatekeepers, authors and citations in the 12 disciplines to those in the EU (15).

Based on these measurements we are inclined to think that the invisible college of science journal gatekeepers has a decisive influence in the worldwide self-organizing system of sciences.

The national distribution of the gatekeepers seems to be a determining component of the state of health of science in the world's nations.

We also consider that the results published until now on the wealth, impact, performance, etc., of nations, which are based on counting publications and citations, are showing only one face of the medal and are only indirectly related to the real scope of those investigations.

The main factor in the scientific health of nations is the decision power and influence of journal gatekeepers dispose of.

The recent complaints on the decline of US science versus any other competitors of the race,[30-32] seem unfounded and derive from statistics based on citations and papers. The figure shows that as gatekeeping indicators are concerned the US has the leading power and influence in the world of science.

References

1. D. J. de Solla Price, Nations Can Publish or Perish, Science and Technology, 70 (1967) 84.
2. D. J. de Solla Price, Measuring the Size of Science, Proc. Israel Acad. Sci. Human, 6 (1969) 98.
3. T. Braun, W. Glänzel, A. Schubert, Scientometric Indicators. A 32 Country Comparative Evaluation of Publishing Performance and Citation Impact, World Scientific, Singapore, 1985.
4. T. Braun, A. Schubert, Scientometric Versus Socio-Economic Indicators, Scatter Plots for 57 Countries in All Major Science Fields and Subfields, Scientometrics, 13 (1987) 3.
5. A. Schubert, W. Glänzel, T. Braun, Scientometric Datafiles. A Comprehencive Set of Indicators on 2649 Journals and 96 Countries in All Major Science Fields and Subfields, Scientometrics, 16 (1989) 3.
6. T. Braun, H. Maczelka, A. Schubert, World Science Statistics and Trendlines of Major Geopolitical Regions, 1980-1989, Scientometrics, 25 (1992) 211.
7. T. Braun, W. Glänzel, H. Maczelka, A. Schubert, World Science in the Eighties. National Performances in Publication Output and Citation Impact, 1985-1989 versus 1980-1984, Part 1.: All Science Fields Combined, Physics, and Chemistry, Scientometrics, 3(1994)299
8. T. Braun, W. Glänzel, H. Maczelka, A. Schubert, World Science in the Eighties. National Performances in Publication Output and Citation Impact, 1985-1989 versus 1980-1989, Part II: Life Sciences Engineering and Mathematics, Scientometrics, 31 (1994) 3
9. T. Braun, W. Glänzel, H. Grupp, The Scientometric Weight of Nations in 27 Science areas, 1989-1993. Part. I.: All Field Combined, Mathematics, Engineering, Chemistry and Physics, Scientometrics, 34 (1995) 263.
10. T. Braun, W. Glänzel, H. Grupp, The Scientometric Weight of Nations in 27 Science areas, 1989-1993. Part. I.: Life Sciences, Scientometrics, 34 (1995) 207.
11. H. Bonitz, The Scientific Talents of Nations, Libri, 47 (1997) 206
12. R. M. May, The Scientific Wealth of Nations, Science, 275 (1997) 793.

13. J. Adam, Benchmarking International Research, Nature, 396 (1998) 615.
14. S. Rousseau, R. Rousseau, The Scientific Wealth of European Nations: Taking Effectiveness into Account, Scientometrics, 42 (1998) 75.
15. S. Cole, Th. I. Phelan, The Scientific Productivity of Nations, Minerva 37 (1999) 1
16. M. Heylin, Science is Becoming Truly Worldwide, Chem. Eng. News, June (2004) 38
17. D.A. King, The Scientific Impact of Nations, Nature, 430 (2004) 311.
18. E. Garfield, Citation Indexing. Its Theory and Application in Science, Technology, and Humanities, John Wiley & Sons, New York, 1979.
19. A. de Condolle, Histoire des sciences et des savants depuis deux siecles précédée et suivre d'autre etudes sur les sujets scientifiques en particulier sur l'hereditée et la selection dans l'espece humain. Deuxiéme edition considerablement augmenté. H. Georg, Lyon méme Maison, Genéve-Bâle, 1885.
20. A. T. Szabó, Alphonse de Candolle's Early Scientometrics (1883, 1885) with references to recent trends in the field (1978,1988), Scientometrics,8 (1985) 13.
21. S. Zsindely, A. Schubert, T. Braun, Editorial Gatekeeping Patterns in International Science Journals. A New Science Indicator, Scientometrics,4 (1982) 37.
22. S. Zsindely, A. Schubert, T. Braun, Citation Patterns of Editorial Gatekeepers in Chemistry Journals, Scientometrics,4 (1982) 69.
23. T. Braun, Keeping the Gates of Science Journals. Gate Keeping Indicators of National Performance in the Sciences, in H. F. W. Moed, W. Glänzel, V. Smoch (Eds), Handbook of Quantitative Science and Technology Research. The Use of Publication and Patent Statistics on S & T Systems, Springer, Berlin (to be published in October, 2004).
24. T. Braun, I. Dióspatonyi, The Main Players in the International Gate Keeping Orchestration of Analytical Chemistry Journals. Gate Keeping Indicators, J. Am. Soc. Inform. Sci. Technol., accepted for publication, 2004.
25. P. Bakker, H. Rigter, Editors of Medical Journals: Who and From Where? Scientometrics, 7 (1985) 11.
26. Th. E. Nisonger , The Relationship Between International Editorial Board Composition and Citation Measures in Political Science, Business, and Genetic Journals, Scientometrics, 57 (2002) 257.
27. J. de Solla Price, Little Science, Big Science, Columbia University Press, New York, 1953, p. 62.
28. D. Crane, The Gatekeepers of Science: Some Factors Affecting the Selection of Articles for Science Journals, Am. Sociol., November (1967) 195.
29. W. Glänzel, A. Schubert, A New Classification Scheme of Science Fields and Subfields. Designed for Scientometric Evaluation Purposes, Scientometrics, 56 (2003) 357.
30. Science and Engineering Indicators, 2004, National Science Foundation, 2004.
31. R. Roy, Looking the R &D Edge, Chem. Eng. News, June 7 (2004) 5.
32. R. Baum, Pursuing Scientific Excellence, Chem. Ing. News, June 14 (2004) 5.

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