issi newsletter
international society for scientometrics and informetrics
quarterly e-zine of the international society for scientometrics and informetrics
vol. 01 / nr. 4
december 2005

# EDITORIAL

Dear Reader,

The fourth issue of the ISSI e-Newsletter you are holding in your hands (having on your screen) is the last one in 2005. This serves as a good apropos to look back what we have done this year. Let's see some playful year-end statistics!

## ■ Newsletter

In connection with the administration of the newsletters, the technical editor alone (not including the other editors) had a traffic of 221 e-mails throughout the year.

> By the way, in connection with the e-mail traffic we experienced an interesting phenomenon, namely that car manufacturer's first law stood the test of time once again: people tend to work rather in the middle of the week; at least according to our calculations, more than 50% of the messages were sent us on Tuesday and Thursday. Well, we are still working hard on the explanation of why Wednesday has a relatively low share (14%), which is even lower than Mondays' and Fridays' shares – 18.6% and 15.1%, respectively. Whatever the reason is, never buy a car rolled down from the conveyor belt on Monday or Friday!

Back to the newsletter statistics: Our valued contributors published 31 items this year, distributed by the followings:

- 3 editorials;
- 9 news, announcements & short communications;
- 3 book reviews;
- 3 introductions of individuals and
- 13 newsletter articles.

No less than 69 graphical elements (photos, figures, charts, cartoons) illustrated or accompanied the texts.

# CONTENTS

**Editorial** (B. Schlemmer) ..... **1**

**A look back for 2005**
(M. Meyer) ..... **3**

**News, Announcements** ..... **6**

**A Centennial 1906-2006**
(B. Godin) ..... **7**

**Escher Staircases Dwarfed**
(R.Rousseau & H. Small) ..... **8**

**Book Review** (A. Basu) ..... **11**

**H-Index for Price Medalists**
(W. Glänzel & O. Persson) ..... **15**

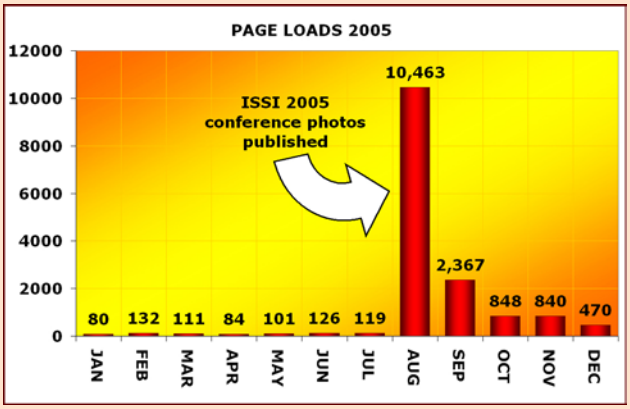
# Editorial Board

The contributions are composed of more than 23 000 words, that is, more than 144 000 characters altogether. (See table 1 for more detailed statistics.)

Although these impressive facts and figures clearly show that the ISSI e-Newsletter was surrounded and supported by a devastating amount of available brainpower this year, we hereby would like to grab the opportunity to encourage you sending contributions to us also in the future. Being up-to-date is the number one goal of any newsletter; consequently we especially need hot news, announcements and current short communications. If you happen to be aware of a professional event, please do not hesitate to inform us, and through the Newsletter, our scientific community as well. (The next issues of the e-Newsletter will be coming out in March, June, September and December 2006.)

| | Total | | | Average | |
|---|---|---|---|---|---|
| | items | words | char's | words | char's |
| *Editorial* | 3 | 1222 | 6921 | 407 | 2307 |
| *News* | 9 | 1544 | 10314 | 172 | 1146 |
| *Book Review* | 3 | 4678 | 28810 | 1559 | 9603 |
| *Introd. of an Individual* | 3 | 3811 | 23290 | 1270 | 7763 |
| *Other Article* | 13 | 12289 | 74692 | 945 | 5746 |
| ***Total*** | **31** | **23544** | **144027** | | |

Table 1 Lengths of Articles

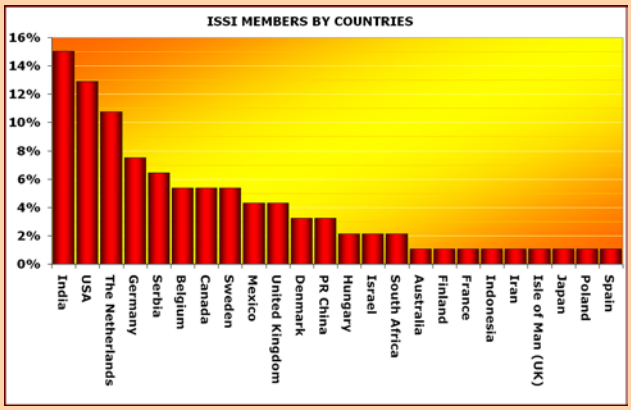




## ■ ISSI website

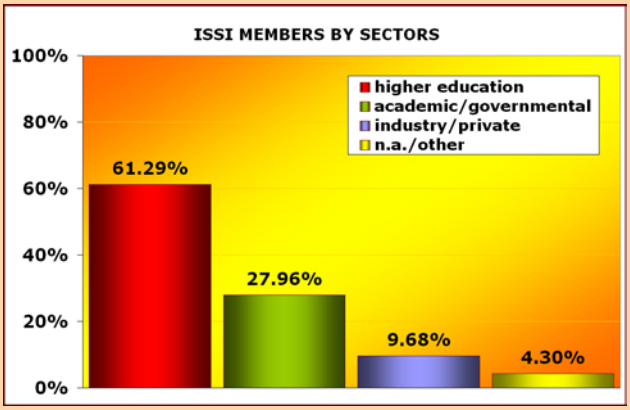
Here it is the time to mention the website of ISSI (http://www.issi-society.info/) as well. Whereas issuing of our quarterly e-zines does not seem to have any significant impact on the site's traffic (let's say euphemistically that the pageloads are evenly distributed over time), publishing our photos after the ISSI 2005 conference resulted in a huge peak, both in pageloads and number of visitors (as it is shown in the two charts on the right).

## ■ ISSI

According to our database, although 39 countries have been represented in the ISSI, there are active members from 24 countries only.

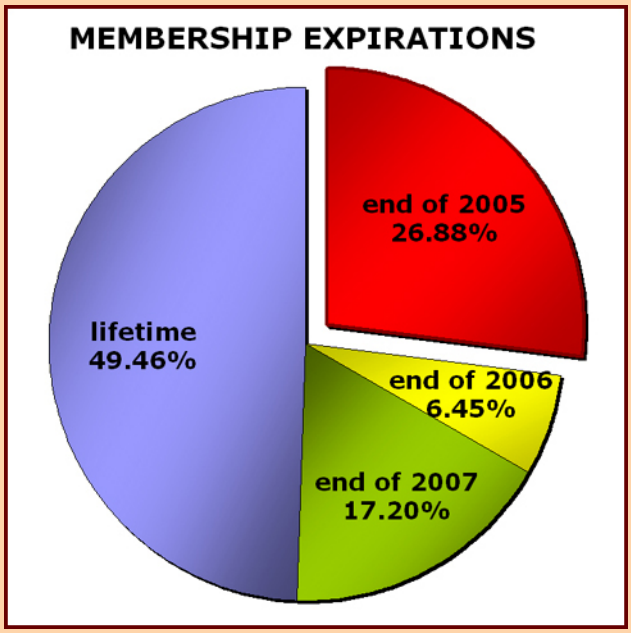



Almost the half of our active members are from four countries: India, USA, the Netherlands or Germany; the remaining 54% is shared by 20 other countries.




Once we had the Triple Helix conference in Turin this year, it might be worth to have a look also on the sectoral distribution of the ISSI members (see above).

And finally, let us remind you that if you happened to belong to that 27% whose membership expires by the end of this year, it is the great opportunity to renew it. ISSI offers 20% reduction for those paying their membership fee for 3 years in advance. Please consult the ISSI website for further details: http://www.issi-society.info/membership.html.




Please do not forget that current issues of our newsletter are password-protected and available only for ISSI members. Passwords belonging to an expired membership will be invalidated at the end of February. (Of course, lifetime memberships, or memberships paid for the next years in advance, do not expire!)

On behalf of the editorial board, I wish you a happy and prosperous new year!

Balázs Schlemmer,
technical editor

---

TECHNOMETRICS:

# OUTLOOK THROUGH THE REAR VIEW MIRROR…

## A look back at events of the past year & some ideas about future developments

by Martin Meyer

When I was asked to look back at the past twelve months and write a short piece on important developments, I looked back at the conferences I had attended. What is to follow has to be a very personal review of the year s events. By no means it can claim to be comprehensive. However, I hope that many of us will agree that the ISSI 2005 in Stockholm was the highlight this year. Also, the Triple Helix Conference in Turin saw many of us who are interested in patent indicators, science-technology linkage, or university-industry-

government relations. Sadly, one of us who is usually so active in these two events, has not been able to participate. Fortunately, Loet has recovered and is now back to old speed. We all look forward to seeing him again next year.

Apart from ISSI and the Triple Helix, the Academy of Management Meeting in Hawaii should be mentioned not just for its location but also the interesting papers that were presented there in our area. Also, I was surprised by a small but rising number of contributions in the engineering management area that appreciate the benefits of bibliometrics and patent-based analyses.

But apart from the conferences and the pleasant venues in which they were held, what is it that will remain from the past year in terms of substantial contributions to our field and also what are the contributions our field makes to science and technology policy research at large? At times, people outside our field view our activities with quite a dose of scepticism. I firmly believe this scepticism is not justified. There have been substantial developments in the past year, mainly in three broad areas:

- Studies that are likely to enliven science and technology policy debate
- New work improving our understanding of the science-technology linkage
- More approaches exploring bibliometric and patent-based measures for studying and evaluating the entrepreneurial university

Many of the contributions were presented at the above conferences but have not been published in the journal literature yet. So, in a way, reflecting on these recent studies allows us also to have a peek in the near future.

## S&T Performance of Nations and World Regions remains a major topic

At least from a European viewpoint, recent work about the various relationships between science, technology and their industrial exploitation promises to provoke some debate in science policy work. Work by *G. Dosi, P. Llerena* and colleagues challenges the well-established notion of the European paradox, suggesting that Europe is not only a poor performer in terms of translating research results into technology but also not doing well in science. In a way, another line of research is challenging the European Paradox conjecture from another perspective. Studies on academic inventions in a number of European countries seem to indicate that the level of academic contributions is considerably higher than previously assumed. Some analysts begin to argue that the US-EU performance difference is not necessarily as large as often suggested and at least partially be one of different transfer modes.

However, some may argue that the preoccupation with comparing Europe to the US is increasingly out of place as it fails to take into account the emergence of new players, mainly in Asia but also otherwise. Here, the bibliometric data is much clearer a number of noteworthy contributions on this topic have been or will soon be published. Currently, some of us analyse developments on the technology side. The combined analysis promises to be interesting and might refocus debates.

## Multitude of studies exploring science-technology linkage

As the many conference presentations on related topics illustrated last year, science-technology linkage analysis is still on our agenda. While there several interesting contributions using mainly patent citation data, co-activity studies appear to be blossoming. Especially, patent-publication trade-offs seem to be a theme a host of studies seek to explore. Not always the evidence points strongly in one direction. It seems that patenting researchers are not predisposed to perform as poorly as some observers may have expected even though or if there is a trade-off it tends to be relatively weak. Having said this, one must be extremely not careful not to rush into conclusions. The next year will see a number of these studies published, extending our evidence base to yet more case studies of individual universities, technology

fields, and countries. So, this debate will stay with us for a while. Interesting approaches in developing more automated methodologies of science technology linkage have also been presented over the past 12 months.

### More and more indicator-based work to address the entrepreneurial university in its many facets

The emergence of the entrepreneurial university has captured the attention of science policy and higher education analysts for at least ten, if not twenty years. Certainly, this years conferences have shown that this theme has also reached our field. Contributions from developed as well as developing countries addressed topics related to this broad area. The entrepreneurial potential of research systems attracted as much attention as approaches that are dedicated to one specific aspect of academic entrepreneurship, be it university spin-outs, patenting or licensing. We have seen many case studies in this area, comparisons of academic with corporate patents, as well as contributions that raise questions about how to appropriately measure entrepreneurial activity in institutions of higher education. In the light of government policies in a number of countries that seek to encourage and reinforce the development of a Third Mission beyond education and research, devising appropriate indicators is certainly a topic that will stay with us in the coming months and years.

### Other developments

As mentioned this look back at the past year is necessarily subjective and excludes many other topics that are also important. For instance, there has been substantial work on the knowledge base of regional innovation. Also, emerging technologies have received considerable attention. More and more researchers in other fields try to adopt bibliometric approaches to analyse developments in the technology area. At times, these efforts are related to identifying value or technological opportunities. That extends to Foresight-related work. There were also several other studies that addressed important questions of patent statistics, such as home-bias of non-US patent data. As always, there is neither enough time nor enough space to really deal with all of them in a way that does justice to all the excellent work. I hope that we can explore some of these issues further in the forthcoming year. There should be plenty of opportunity for this at the next S&T Indicators Conference in Leuven and SPRUs 40th Anniversary Conference in Brighton.

## CARTOON

**The 9th International Conference on Science and Technology Indicators**

"New Challenges in Quantitative Science and Technology Research"
Leuven, Belgium, 7–9 September 2006

The 2006 S&T Indicators Conference to be organised by the Katholieke Universiteit Leuven is the ninth conference in a successful series of international scientific meetings on policy relevant aspects of quantitative S&T research and its applications. Previous conferences have been held in Leiden (1988), Bielefeld (1990), Leiden (1991), Antwerp (1995), Cambridge (1998), Leiden (2000), Karlsruhe (2002) and Leiden (2004).

The 9th International Conference on S&T Indicators organised by the Katholieke Univesiteit Leuven will focus on new challenges in quantitative science and technology research. Electronic communication, the worldwide emphasis on the knowledge-based society, increasing internationalisation and globalisation, on one hand, and the strengthened role of regions, on the other hand, result in more complex and dynamic S&T systems with the demand for more sophisticated instruments of measurement. Taking into account these latest developments, the S&T Indicators conference 2006 will be focussing on the following main themes:

- Trends and challenges in the development of novel, advanced S&T Indicators;
- Use and limitations of advanced S&T Indicators in a policy relevant context;
- Web Indicators and S&T Indicators in the electronic environment;
- Combining quantitative and qualitative methods;
- The challenge of EU extension;
- Repercussions of policy use of S&T Indicators;

In order to achieve these objectives, the conference programme will offer:

- Invited papers to be presented in plenary sessions;
- Special sessions on new challenges in S&T Indicators research and application;
- Contributed papers of high quality to be delivered in parallel sessions;
- Poster sessions with "short communications" of high quality;

The conference will be of interest to:

- Policy makers and politicians concerned with the design and implementation of national and international S&T policy;
- R&D managers in funding agencies, in universities and research institutes, and in the business sector;
- Researchers in the field of S&T studies;
- Information scientists and statisticians interested in S&T data;
- Science publishers and editors, writers and journalists.

The conference language will be English.
Please, visit the conference website for more information:

http://www.steunpuntoos.be/leuvenconference/

**Dear Society Member,**

Those members, whose membership will expire this calendar year, are kindly requested to update their membership in time. This is also necessary to guarantee continuous access to the Newsletter. You can find the expiration date on your white or green membership card. Nonetheless, if you have any question concerning your membership status, please, contact me by email. Please, also note that membership dues have changed this year. For detailed information consult

http://www.issi-society.info/membership.html.

Owners of a gold membership card are, of course, subscribed for lifetime.

With very best wishes for 2006,
I remain, yours sincerely,
Wolfgang Glänzel
Secretary-Treasurer ISSI
Wolfgang.Glanzel@econ.kuleuven.ac.be

# A CENTENNIAL 1906-2006

– by Benoît Godin –

2006 marks a centennial: that of statistics on science, technology and innovation. In 1906 James McKeen Cattell, an American psychologist and editor of *Science* for fifty years (1895-1944), published the first edition of a directory of scientists entitled *American Men of Science*. Based on the directory, Cattell published regular statistical analyses for thirty years on the demography, geography and what he called the performance of scientists. Because of this systematic work, Cattell can be considered as founder of scientometrics. At the same time (early 1900s), American psychologists developed bibliometrics as a statistical tool for measuring the progress and advancement of psychology as a science.

Since these very first exercises, the measurement of science, technology and innovation has changed considerably. At its very beginning, statistics was concerned with measuring the size of the scientific community (counting the number of "men of science") and scientists' activities (counting papers). The measurements were conducted by scientists themselves, among them psychologists and geographers. In the early 1920s, these statistics and their sources became institutionalized and, from the 1940s to the 1950s, new ones were constructed. It was no longer scientists, but government departments and national bureaus of statistics that produced these statistics (B. Godin, *Measurement and Statistics on Science and Technology: 1920 to the Present*, London: Routledge, 2005). The main works conducted by these public institutions, unlike previous measurements, dealt with measuring a "national budget for science" by counting the money devoted to R&D. The focus was no longer exclusively on universities, as Cattell's had been, but on all economic sectors: industry, government, university, and non-profit. The focus was no longer on "men of science" either, but on organizations and their R&D activities. Above all, the focus was on measuring the efficiency or "productivity" of the science system, defined as the output arising from research activities.

This new perspective brought about new indicators, which were soon placed within an accounting framework known as the input-output model. Inputs were defined as investments in the resources necessary to conduct scientific activities, like money and scientific and technical personnel, and outputs as what comes out of these activities: knowledge and inventions. The following accounting framework defined the relationship between input and output:

Input → Research activities → Output

More recently, output, or production of a "good", came to mean outcomes or productivity of an economic type: the impacts of research on economic progress and productivity, including that from innovations. Most OECD policy documents, as well as national policies, now use increased productivity as the aim of innovation policy. The whole of the European Union's innovation strategy is directly linked to the rhetoric on gaps in productivity between European countries and the United States. It is specifically statisticians, academic as well as official, who feed the policy-makers with statistics on productivity and who develop models linking research and productivity.

In order to celebrate the centennial of statistics on science, technology and innovation, a series of events will be organized in 2006, and a series of papers will be published on what has been accomplished so far in statistics on science, technology and innovation:

1. **An international conference** celebrating the centennial will be held in Europe in the fall of 2006. Key players from the past fifty years will be invited as speakers. A call for communications will be launched shortly.

2. **A series of papers** looking at different aspects of statistics over the past hundred years will be published, among them on
   - The origins of scientometrics and the work of J.M. Cattell
   - The origins of bibliometrics
   - The history of the concept of scientific productivity and its measurement
   - The historical steps towards measuring the quality of research
   - The conception of science according to official statistics
   - The history of the OECD Frascati manual.

3. **A book** on the history of statistics on science, technology and innovation over the period 1906-2006.

Consult the CSIIC website (see http://www.csiic.ca/centennial.html) regularly for more information, or contact Benoît Godin.

For available papers (over thirty working papers) in the series on the History and Sociology of S&T Statistics, consult http://www.csiic.ca/Pubs_Histoire.html

# ESCHER STAIRCASES DWARFED

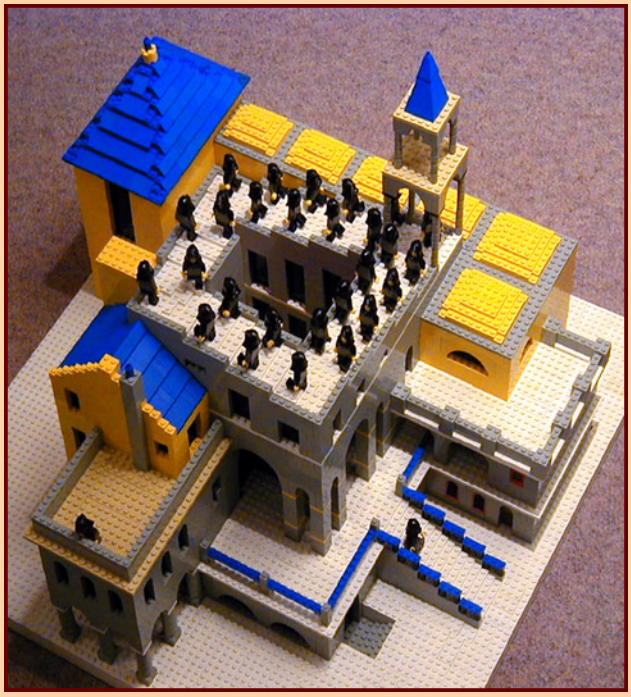
by Ronald Rousseau and Henry Small

In (Rousseau & Thelwall, 2004) we introduced the notion of an Escher Staircase in link analysis. An Escher Staircase in a directed network is defined as a set of four nodes arranged in a cycle through reciprocal links, see also (Thelwall, 2005, p. 214). So, if the nodes are denoted as A, B, C, and D then there exist bi-directional links from A to B, from B to C, from C to D and from D to A. This structure was termed Escher Staircase because of its resemblance with Eschers famous lithograph "Ascending and Descending". In (Rousseau & Thelwall, 2004) we showed the existence of Escher Staircases on the Internet, and suggested, moreover, that they are a kind of building blocks for web structures. Links between University web pages in New Zealand were presented as examples of Escher Staircases.

In that same article it was mentioned that Ronald Rousseau had been looking for many years for this phenomenon in article citation graphs. Of course, in that context an Escher Staircase would be a rare and counterintuitive phenomenon. Indeed, if article A cites article B then, logically, article B is written earlier (or maybe at the same time) than article A. An Escher Staircase in such a citation graph can only come to existence due to a (very active) invisible college (referring to the exchange of preprints among colleagues necessary for such a citation graph to materialize).

Now, while studying clusters of co-cited papers containing very current papers and not looking directly for Escher Staircases, Henry Small (2005) happened to encounter difficulties with falsely emerging research areas due to the activities of some editors of special issues who made sure that all contributors of the special issue received preprints of all other contributors and were actually encouraged to cite the other contributions of these special issues. While in some instances this might signal a co-discovery, in these cases it is an aberration. In this way such a journal special issue resembles an edited

handbook. This resulted in abnormalities in the resulting citation graph. Under such circumstances Escher Staircases, and even more dense structures do appear. An example is given below.



Issue (7-8), a double issue, of volume 43 of the *Australian Journal of Experimental Agriculture* is a special issue about the Sustainable Grazing Systems Program (SGSP). It contains 26 articles, shown in Table 1.

Table 1. *Articles published in the Australian Journal of Experimental Agriculture,* 43 (7-8):2003

1. Mason, WK; Lamb, K; Russell, B
   The Sustainable Grazing Systems Program: new solutions for livestock producers; pp. 663-672
2. Simpson, IH; Kay, G; Mason, EK
   The SGS Regional Producer Network: a successful application of interactive participation; pp. 673-684
3. Nicholson, C; Barr, N; Kentish, A, et al.
   A research-extension model for encouraging the adoption of productive and sustainable practice in high rainfall grazing areas; pp. 685-694
4. Andrew, MH; Lodge, GM
   The sustainable grazing systems national experiment. 1. Introduction and methods; pp. 695-709
5. Johnson, IR; Lodge, GM; White, RE
   The Sustainable Grazing Systems Pasture Model: Description, philosophy and application to the SGS national experiment; pp. 711-728
6. Scott, JM; Lord, CJ
   SGS Database: use of relational databases to enhance data management for multi-site experiments; pp. 729-743
7. Barlow, R; Ellis, NJS; Mason, WK
   A practical framework to evaluate and report combined natural resource and production outcomes of agricultural research to livestock producers; pp. 745-754
8. Sanford, P; Wang, X; Greathead, KD, et al.
   Impact of Tasmanian blue gum belts and kikuyu-based pasture on sheep production and groundwater recharge in south-western Western Australia; pp. 755-767
9. McDowall, MM; Hall, DJM; Johnson, DA, et al.
   Kikuyu and annual pasture: a characterisation of a productive and sustainable beef production system on the South Coast of Western Australia; pp. 769-783
10. Chapman, DF; McCaskill, MR; Quigley, PE, et al.
    Effects of grazing method and fertiliser inputs on the productivity and sustainability of phalaris-based pastures in Western Victoria; pp. 785-798
11. Ridley, AM; Christy, BP; White, RE, et al.
    North-east Victoria SGS National Experiment site: water and nutrient losses from grazing systems on contrasting soil types and levels of inputs; pp. 799-815
12. Johnston, WH; Garden, DL; Rancic, A, et al.
    The impact of pasture development and grazing on water-yielding catchments in the Murray-Darling Basin in south-eastern Australia; pp. 817-841
13. Garden, DL; Ellis, NJS; Rab, MA, et al.
    Fertiliser and grazing effects on production and botanical composition of native grasslands in south-east Australia; pp. 843-859
14. Michalk, DL; Dowling, PM; Kemp, DR, et al.
    Sustainable grazing systems for the Central Tablelands, New South Wales; pp. 861-874
15. Lodge, GM; Murphy, SR; Harden, S
    Effects of grazing and management on herbage mass, persistence, animal production and soil water content of native pastures. 1. A redgrass-wallaby grass pasture, Barraba, North West Slopes, New South Wales; pp. 875-890
16. Lodge, GM; Murphy, SR; Harden, S
    Effects of grazing and management on herbage mass, persistence, animal production and soil water content of native pastures. 2. A mixed native pasture, Manilla, North West Slopes, New South Wales; pp. 891-905
17. White, RE; Christy, BP; Ridley, AM, et al.
    SGS Water Theme: influence of soil, pasture type and management on water use in grazing systems across the high rainfall zone of southern Australia; pp. 907-926
18. McCaskill, MR; Ridley, AM; Okom, A, et al.
    SGS Nutrient Theme: environmental assessment of nutrient application to extensive pastures in the high rainfall zone of southern Australia; pp. 927-944
19. Sanford, P; Cullen, BR; Dowling, PM, et al.
    SGS Pasture Theme: effect of climate, soil factors and management on pasture production and stability across the high rainfall zone of southern Australia; pp. 945-959
20. Kemp, DR; King, WM; Gilmour, AR, et al.
    SGS Biodiversity Theme: impact of plant biodiversity on the productivity and stability of grazing systems across southern Australia; pp. 961-975

21. Graham, JF; Cullen, BR; Lodge, GM, et al.
SGS Animal Production Theme: effect of grazing system on animal productivity and sustainability across southern Australia; pp. 977-991
22. Andrew, MH; Lodge, GM; Mason, WK, et al.
The Sustainable Grazing Systems National Experiment. 2. Scientific outcomes and effectiveness of the research and development processes; pp. 993-1013
23. Andrew, J
Key features of the regional producer network for enabling social learning; pp. 1015-1029
24. Allan, CJ; Mason, WK; Reeve, IJ, et al.
Evaluation of the impact of SGS on livestock producers and their practices; pp. 1031-1040
25. Price, RJ
Identifying social spaces in the Sustainable Grazing Systems Program; pp. 1041-1059
26. Mason, WK; Lodge, GM; Allan, CJ, et al.
An appraisal of Sustainable Grazing Systems: the program, the triple bottom line impacts and the sustainability of grazing systems; pp. 1061-1082

Analyzing citation relations among these articles we found the following 16-node generalized Escher Staircase (Fig.1). This means that article 1 cites and is cited by article 2, article 2 cites and is cited by article 4, and so on, ending with article 16 that cites and is cited by article 1 (numbers refer to Table 1).

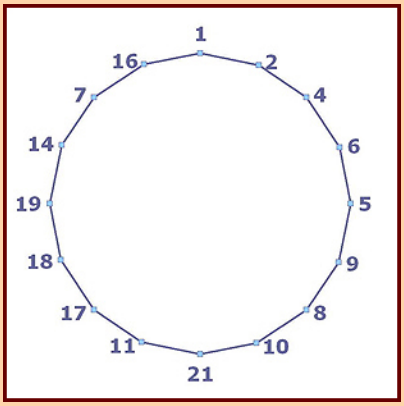



Figure 1 Generalized Escher Staircase:
1 2 4 6 5 9 8 10 21 11 17 18 19 14 7 16 1
(numbers refer to the articles in Table 1)

Note that this generalized Escher Staircase is just a subgraph of the complete citation graph of this particular issue of the Australian Journal of Experimental Agriculture. Nothing is claimed about the existence or non-existence of other citation links. Moreover, we found the following complete subgraphs (each article cites, and hence is cited by, each other article in this subgraph) see Fig.2.

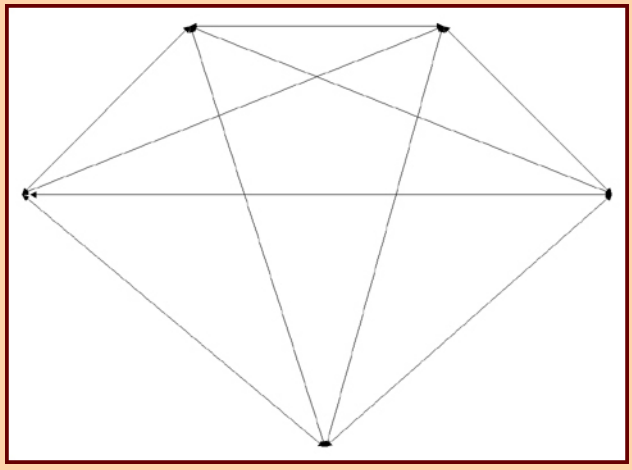


Figure 2 Complete subgraphs {1,4,5,14,19} and {4,5,14,17,19} in the citation graph of the *Australian Journal of Experimental Agriculture*, 43 (7-8):2003

These examples show that, as in biological field studies, we have not yet seen the last extraordinary creature living in citation graphs. As in (Rousseau & Thelwall, 2004) we challenge the reader the find an even larger generalized Escher Staircase. And, by the way, the h-index of this special issue is 11 (situation on November 2, 2005).

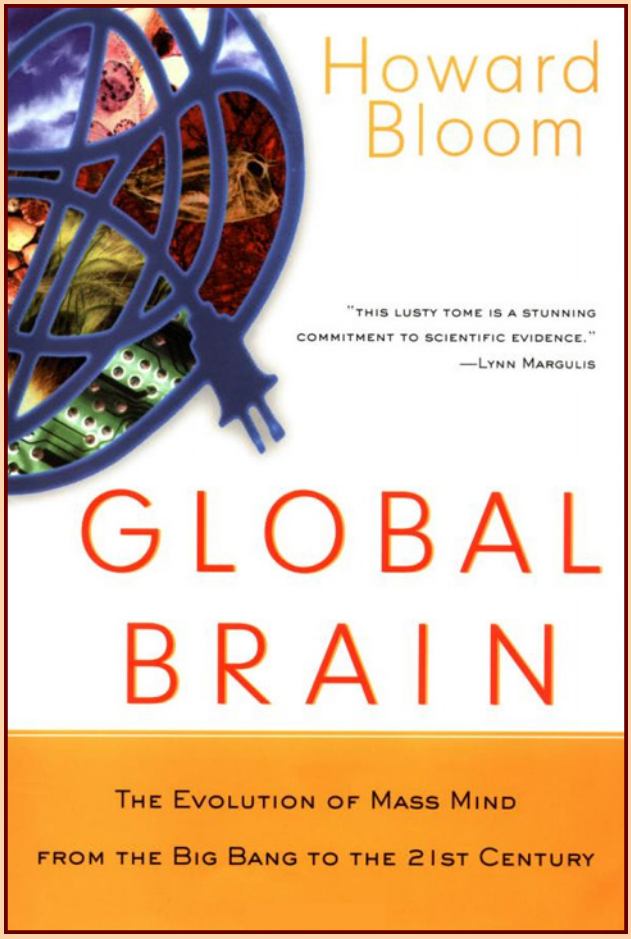
*Acknowledgement:* The authors thank Balázs Schlemmer for drawing Figure 1.

## References

Rousseau, R. & Thelwall, M. (2004).
Escher staircases on the world wide web.
*FirstMonday*, 9(6).
http://www.firstmonday.org/issues/issue9_6/rousseau/index.html

Small, H. (2005).
Tracking and predicting growth areas in science. In: P. Ingwersen & B. Larsen (eds.):
*Proceedings of ISSI 2005* (pp.13-23),
Karolinska University Press, Stockholm.

Thelwall, M. (2004).
*Link analysis. An information science approach.*
Elsevier, Amsterdam.




*HOWARD BLOOM:*
*Global Brain: The Evolution of Mass Mind. from the Big Bang to the 21st Century*
*John Wiley and Sons, 2000, 384 pp.*
*ISBN: 0-47129-584-1*

# BOOK REVIEW

In 1993, at the ISSI conference in Berlin I had presented a paper where I had envisaged the research publication process in evolutionary terms. In this paper (which was never written up for publication) I had considered the corpus of research publications as a collective 'library' or brain. Selection is embodied in the reviewing process, which separates 'true' from 'not true' or 'useful' from 'not useful', in the same way as the brain assesses the 'truth value' of a new piece of information by checking its consistency with what is already known. Novel ideas enter the corpus from time to time when they show promise of solving problems that could not be solved within existing knowledge systems. Thus new paradigms could be thought of as 'mutations' that survive. This was before the days of the internet as we understand it today. With the advent of the internet many people are talking of the 'global brain'. Now, 12 years later the parallel seems almost obvious.

With his 2000 book, the GloBal Brain, Howard Bloom argues that a 'mass mind' is not new. It has been operative among various collectives down the ages, even among primitive life forms such as bacteria. He elaborates on his concept of the importance of information sharing and other forms of cooperation in organisms ranging from bacteria to humans. Drawing on information theory, debates within evolutionary biology and research psychology (among other disciplines), Bloom describes the development of life on Earth as a series of achievements in collective information processing.

The debate in the new evolutionary disciplines according to Bloom has major implications for the way in which we view how group behaviour and societies evolve. The debate is essentially between a Darwinian understanding of individual selection, where organisms survive due to their intrinsic 'fitness' on the one hand, and 'group selection', where a group survives as a complex adaptive system.

Individual selectionists believe that the emergence of all behavior must be explained by forms of self-interest. Competition between individual genes and often between individual animals or humans drives the evolutionary process. Group selectionists, on the other hand, say that new evolutionary forms can emerge both from the battle for personal advantage and from the competition between social *coalitions*.

The difficulty with individual selection was that it could not explain altruism very well. Altruism as a form of behaviour is common to humans and animals. An example of altruism is the way in which worker bees in a hive work for the queen, feeding her and attending to her offspring while denying their own reproductive rights. An explanation was provided by Hamilton, who studied bee colonies and suggested that the genes of worker bees were

closely related to the queen, and by helping the queen to reproduce they were in fact promoting the survival of their own gene type. Hamilton's ideas and those built upon them have contributed largely to our understanding of evolutionary mechanisms, not only in the area of animal behavior, but also in fields ranging from psychology, medicine, and ecology to the study of animals in the wild.

Twenty-five years after Hamiltonian, examination of real world bee colonies demonstrated that there was far more genetic variety in clusters of unselfish insects than expected. Individuals were *not* abjuring their interests simply to protect near-clones of their own genomic material. Apparently something else was going on. Nonetheless, concepts based on what came to be known as the 'selfish gene' (a term popularized by Dawkins in his 1976 book by the same name,)became dogma.

In the Global Brain, Bloom makes a strong and extremely well documented case for the coexistence of both group *and* individual selection. According to him, a new breed of evolutionary insights can emerge if one accepts this. In other words, indications are that the social and biological sciences exist in a continuum. That society is in fact like an organism, where individual cells/individuals can be sacrificed for the survival of the whole. In a sweeping stroke, Bloom marshals evidence fom fields as diverse as ancient history, biology, neuroimmunology, to support the theory of group selection in an epic attempt to explain politics, citizenship, emotions, health, ideology, and even the perceptual processes that produce a consensual reality.

Bloom sums up complex adaptive systems into five key elements, which he calls (1) conformity enforcers, (2) diversity generators, (3) utility sorters, (4) resource shifters, and (5) inter-group tournaments.

- **Conformity enforcers** impose sufficient similarity on group members to give the social structure coherence, relative permanence, and the ability to carry out large-scale, integrated, multi-participant projects. In humans, conformity enforcers lead, among other things, to a collective perception, a socially constructed view of reality which influences both childhood brain development and adult sensory processing, and which produces a *Weltanschauung* displaying many of the characteristics of a shared hallucination.
- **Diversity generators** spawn variety. Each individual represents a hypothesis in the group mind. It is vital for the group's flexibility that it has numerous fallback positions in the form of individuals sufficiently different to provide approaches which, while they may not be necessary today, could prove vital tomorrow. According to Bloom, this can easily be seen in the operation of one of nature's learning machines, the immune system. The immune system contains different antibody types, each a separate conjecture about the nature of a potential invader. However diversity generators take on their most intriguing dimensions among human beings.
- Next come the **utility sorters**. Utility sorters are systems which sift through individuals, favoring those whose contributions are most likely to be of value. These pitiless evaluators toss those whose presence represents excess baggage and faulty guesswork into biological, psychological, and perceptual limbo. Some utility sorters are external to the individual, but a surprising number are *internal*. That is, they are involuntary components of a being's physiology.
- Fourth are the **resource shifters**. Successful learning machines shunt vast amounts of assets to the individuals who show a sense of control over the current social and external environment. These same learning machines cast individuals whose endowments seem extraneous into a state of relative deprivation. Christ captured the essence of the algorithm when he observed "For he that hath, to him shall be given: and he that hath not, from him shall be taken even that which he hath" (Mark 4:25).
- And the final component, **intergroup tournaments or** battles which force each collective entity, each group brain, to continue churning out fresh innovations for the sake of survival.

Bloom attempts in a convincing way to outline how these five elements guide virtually every form of social group – from teenage gangs to a multi-national culture – into a collective

intelligence, a complex adaptive system whose powers of perception and invention both utilize and transcend those of the individuals within it. He demonstrates through his immense scholarship and extensive referencing of original studies, how social groups at every level on the evolutionary ladder operate as group brains, and presents examples to suggest how the five principles have the power to put phenomena such as individual passions, mass mood swings, geopolitics, fashion, fads, and health into a surprising new perspective.

To understand how these five principles affect humans and society, he begins with the workings of a group brain in an organism normally thought to have no intelligence at all: the bacterium. Bacteria, which are popularly regarded as loners, are found to be extraordinarily social, clustering in highly structured colonies. A growing body of evidence has accumulated to indicate that bacterial mutations are *not* completely random but may, in fact, be genetic alterations "custom-tailored" to overcome the emergencies of the moment experienced by the group.

In the late 1980s, University of Tel Aviv physicist Eshel Ben-Jacob and the University of Chicago's James Shapiro were perplexed by bacteria. Ben-Jacob detoured from normal physics and spent five years studying *bacterial colonies*. Unlike traditional biologists Shapiro and Ben-Jacob applied the insights they had absorbed from the mathematics of materials science. Their work indicated that, rather than being a mere carrier of construction plans, the package of genes carried by each individual bacteria functions as a computer. The genetic bundle seemed to accomplish something even computers could not achieve. According to this school of thought, "the genome makes calculations and changes itself according to the outcome." Unlike a silicon chip, the genome adapts to unaccustomed problems by *remodeling itself*.

Reaching this conclusion left a puzzle. Gödel's theorem implies that one computer cannot design another computer with more sophisticated computational powers. How did the individual bacterium's central processing unit tackle this problem so as to confront large-scale catastrophe or natural disaster that dwarfed the bacteria's solo computational abilities? The answer, Ben-Jacob hypothesized, lay in networking – in knitting the colony's multitude of genomic personal computers into something beyond even the massively parallel distributed processor known as a supercomputer. In other words, the "creative net" of the bacillus, unlike a machine, can recast its form to face an unfamiliar challenge.

Analyzing thousands of colonies Ben-Jacob concluded that bacilli were in constant contact, communicating through a wide variety of chemical signals, finally summing the product through collaborative decision. In short, bacilli engaged in many of the basic activities we associate with human beings. Thanks to the synergy of the conformity enforcer, the diversity generator, the utility sorter, and the resource shifter, the colony was capable of something numerous humans never achieve – creativity.

Among bacteria, a built-in comparator mechanism requires each forager to let the world know whether it has succeeded or failed. If its quest has been productive, physiology drives the bacillus to broadcast the message "follow me." If its expedition has failed, it has no choice but to signal "leave me to my fate." Voluminous evidence indicates that comparator mechanisms are virtually standard equipment in all social animals, from the microbial level upwards. At each evolutionary level these internal and external sensors of adaptation become more varied and complex.

Bloom asks whether humans are slaves to similarly implacable biological impulses. Through a variety of means, among them a sense of control over circumstance and the intake of social feedback, comparator mechanisms indicate to every individual their utility to the social group. A sense of being unneeded leads to a collapse of selfesteem in an individual, and causes a range of physiological changes which includes impairment of the immune system, dulled perceptions, diminished sexual drive in males and loss of appetite. The individual's social magnetism evaporates and he experiences a profound sense of lethargy, negativity, and hopelessness. Psychophysiological and psychoneuroimmunological deactivators

contribute to these effects, among them "learned helplessness" and the chronic secretion of glucocorticoids and endogenous opiates. A persistent bath of glucocorticoids, for example, kills tissue in the hippocampus – a part of the brain vital to memory. Comparator mechanisms in those who feel un-needed go a step further. They produce a variety of subtle and not-so-subtle signals which drive others away, thus marginalizing the victim as thoroughly as a bacteria whose quest has failed.

Bloom's fascinating synthesis of information processing at increasing levels of complexity in biological and social organization, and how it guides evolution, is likely to influence thinkers for many years to come, unless he is marginalized by the dominant paradigm. He himself has stayed outside the scientific establishment, and has noted in his book how 'conformity enforcers' operate in scientific research with the case of one Dr. Ling. His example of the octopii and social learning makes fascinating reading. He draws upon ancient history, animal behavior and the paleosciences to support his argument.

Blooms biography makes equally interesting reading. He built his first Boolean algebra machine at the age of twelve and became a dedicated microscopist the same year. He designed a computer which won a Westinghouse Science Award while still in school. At age thirteen he was granted a private discussion session with the head of the Graduate Physics Department of SUNY, Buffalo. At sixteen he became a lab assistant at the world's largest cancer research center, the Roswell Park Memorial Research Cancer Institute, where he helped plumb the mysteries of the immune system. Before his first year of college he had designed and executed research in Skinnerian programmed learning at Rutgers University's Graduate School of Education.

Then came an act of academic heresy. After graduating magna cum laude and Phi Beta Kappa from New York University, Bloom turned down four graduate fellowships and embarked on a 20-year-long urban anthropology expedition to penetrate what he calls "society's myth-making machinery" – the inner sanctums of politics and the media.

His first book, The Lucifer Principle, deals with the genesis of evil in human society, where again he has used biological principles as an underpinning to his thesis.

The Global Brain is a marvelous book that should not be missed by anyone who is interested in information, its uses and its impact on complex emergent structures. Since the author has not identified himself with any one discipline he freely roams in the space of knowledge, achieving a synthesis that is as powerful as it is convincing.

According to Elizabeth Loftus, past president of the American Psychological Society, "Howard Bloom's *Global Brain* is filled with scientific firsts. It is the first book to make a strong, solidly backed, and theoretically original case that we do not live the lonely lives of selfish beings driven by selfish genes, but are parts of a larger whole. It is the first to propose that sociality was implicit in the start of the universe. *Global Brain* is the first book to present strong evidence that evolutionary, biological, perceptual, and emotional mechanisms have made us parts of a social learning machine – a mass mind which includes all species of life, not just humankind. It is the first to take this idea out of the realm of mysticism and into the sphere of hard-nosed, data-derived reality. And it is one of the few books which carry off such grand visions with energy, excitement, and keen insight."

I believe readers of Global Brain would be eagerly looking forward to the next work from the sweeping pen of this unusual author.

**Aparna Basu**
(aparnabasu.dr@gmail.com)
Institute of Genomics and Integrative Biology,
New Delhi

# H-INDEX FOR PRICE MEDALISTS

by Wolfgang Glänzel and Olle Persson

## ■ Introduction

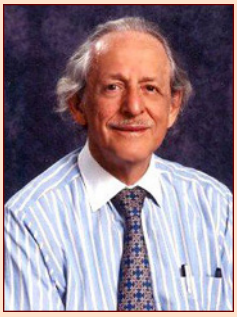
Bibliometrics has become a proven tool in research evaluation and policy relevant science studies – at least what concerns the performance assessment of countries, institutes or research groups. Bibliometricians were always shunning the evaluation of individual scientists. And rightly so. Bibliometricians might be afraid of exposing themselves to possibly heavy reactions on the part of the concerned scientists. Breaking anonymity is only one aspect. The questionability of reliability, the lacking methodological groundwork of how to treat and interpret statistics gained from small publication sets is another one. Scientists at times believe that bibliometric methods – as they are – may not be applied to their particular research field. At least, this is an often-heard argument. However, a remedy seems to be at hand. Recently, Jorge E. Hirsch (2005) has suggested a new indicator, one single index for the assessment of the research performance of individual scientists. The '*h-index*' is an extremely simple and comprehensible indicator that is based on quite long publication periods and variable citation windows. It can be applied to any publication set, and can be reproduced by anybody. Thus nobody could use the above arguments against its application to individual scientists. Thus Hirsch's article has almost immediately provoked reactions on the part of the scientific community (Ball, 2005, Diniz Batista et al., 2005, Popov, 2005, Bornmann and Daniel, 2005, Braun et al., 2005, van Raan, 2005, Glänzel, 2005a,b) and the reception was rather positive. Nonetheless, first concerns were articulated as well (van Raan, 2005, Glänzel 2006). In a recent paper, Glänzel (2006) has summarised some *pros* and *cons* of this indicator.

As mentioned above, the *h-index* has been designed as indicators of individual performance and it is predestined for purpose indeed. According to the definition by Jorge E. Hirsch, *"a scientist has index h if h of his/her N papers have at least h citations each, and the other (N – h) papers have fewer than h citations each"*.

When Hirsch published his paper in August 2005, he had an *h-index* of 49. From his own observations he concluded that in physics an h-index of 20 after 20 years of scientific activity, characterises a successful scientist, h = 40 characterises outstanding researchers and h= 60 or more characterizes unique scientists. Diniz Batista et al. (2005) have shown that the h-index is quite sensitive to the science field. The question arises of what might be the standard in our own field. For an interdisciplinary subfield of the social sciences we expect, in general, a somewhat lower h-index. In order to shed some light on this discussion we have looked at the h-index of all still active Price Medal awardees. Since the Price Medal is periodically awarded by the international journal *Scientometrics* to scientists with outstanding contributions to the fields of quantitative studies of science we expect that their *h-indexes* will characterise them as most profilic and highly cited authors..

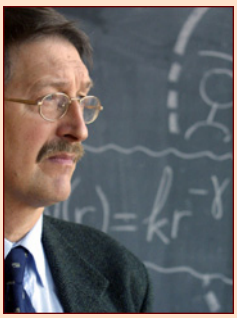
## ■ Methods and results

We have selected all journal papers of the active Price Medallists published in the last 20 years, namely in the period January 1986 – August 2005. Since we have retrieved data in early September, we had to restrict the analysis to the last available update of the Web of Science® (Thomson – ISI, Philadelphia, PA, USA). We have calculated the *h-index* for all Price Medallists who are still active in quantitative studies of science and we have ignored papers that are not relevant for the field. In what follows we are presenting the results of our search in chronological order of awarding below. We would like to stress again that the data reflect the situation of August 2005.



**Eugene Garfield** is one of the 'fathers' of scientometrics and a scientific information pioneer, awarded the first Derek de Solla Price Medal in 1984. He is Founder & Chairman Emeritus of the Institute for Scientific Information. Garfield is the president and editor-in-chief of the journal 'The Scientist'.

| Rank | Cites | PY |
|---|---|---|
| 1 | 122 | 1989 |
| 2 | 104 | 1986 |
| 3 | 86 | 1990 |
| 4 | 84 | 1988 |
| 5 | 79 | 1988 |
| 6 | 67 | 1987 |
| 7 | 57 | 1999 |
| 8 | 29 | 1994 |
| 9 | 27 | 1987 |
| 10 | 27 | 1987 |
| 11 | 26 | 1987 |
| 12 | 23 | 1994 |
| 13 | 20 | 1986 |
| 14 | 18 | 1986 |
| 15 | 18 | 1986 |
| **16** | **17** | **1996** |
| 17 | 15 | 1993 |



**Anthony F. J. van Raan** is Professor of Quantitative Studies of Science at the University of Leiden, The Netherlands. He is the Director of the Centre for Science and Technology Studies (*CWTS*) at University of Leiden since 1985. He is editor of the international journal *Research Evaluation*.

| Rank | Cites | PY |
|---|---|---|
| 1 | 46 | 1991 |
| 2 | 46 | 1996 |
| 3 | 33 | 1991 |
| 4 | 29 | 1990 |
| 5 | 29 | 1990 |
| 6 | 25 | 1993 |
| 7 | 22 | 1998 |
| 8 | 22 | 1995 |
| 9 | 21 | 2000 |
| 10 | 21 | 1997 |
| 11 | 19 | 2001 |
| 12 | 19 | 1994 |
| 13 | 18 | 1994 |
| 14 | 17 | 1998 |
| 15 | 17 | 1993 |
| **16** | **16** | **1993** |
| 17 | 15 | 1993 |

**Tibor Braun** is director of the *Information Science and Scientometric Research Unit* (ISSRU) at the Hungarian Academy of Sciences. He has founded this Hungarian Research Centre almost 30 years ago. Braun is also Professor of Chemistry at the Loránd Eötvös University. He is the Editor-in-Chief of the journal *Scientometrics* and the international *Journal of Radioanalytical and Nuclear Chemistry*. In 1975, he has also been awarded the George Hevesy Medal which is the premier international award of excellence in radioanalytical and nuclear chemistry.

| Rank | Cites | PY |
|---|---|---|
| 1 | 120 | 1989 |
| 2 | 78 | 1986 |
| 3 | 57 | 1990 |
| 4 | 43 | 1992 |
| 5 | 33 | 1988 |
| 6 | 31 | 1995 |
| 7 | 29 | 1995 |
| 8 | 27 | 1988 |
| 9 | 27 | 1987 |
| 10 | 25 | 2000 |
| 11 | 24 | 1994 |
| 12 | 23 | 1987 |
| 13 | 22 | 1987 |
| 14 | 21 | 1994 |
| 15 | 18 | 1986 |
| 16 | 18 | 1993 |
| **17** | **17** | **2000** |
| 18 | 17 | 1988 |

**Ben Martin** is Professor of Science and Technology Policy Studies and Director of *SPRU* at University of Sussex. He is one of the pioneers of *foresight in science and technology*.

| Rank | Cites | PY |
|---|---|---|
| 1 | 66 | 1997 |
| 2 | 33 | 1987 |
| 3 | 30 | 1995 |
| 4 | 29 | 2001 |
| 5 | 27 | 1996 |
| 6 | 24 | 1988 |
| 7 | 21 | 1999 |
| 8 | 18 | 1986 |
| 9 | 16 | 1986 |
| 10 | 15 | 1996 |
| **11** | **13** | **1991** |
| 12 | 9 | 1987 |

**Henry Small** is Chief Scientist and Director of Research Service Group at Thomson ISI. He is one of the foremost scholars in the area of developing and applying co-citation analysis. This important work has resulted in a better understanding of the structure, relationships, and evolution of the sciences. He has been named the sixth President of ISSI for the period of four years in 2003.

| Rank | Cites | PY |
|---|---|---|
| 1 | 79 | 1985 |
| 2 | 64 | 1999 |
| 3 | 26 | 1986 |
| 4 | 22 | 1993 |
| 5 | 21 | 1997 |
| 6 | 18 | 1994 |
| 7 | 15 | 1999 |
| 8 | 12 | 1986 |
| **9** | **10** | **1989** |
| 10 | 8 | 1998 |

**Francis Narin** established CHI in 1968, an internationally recognized research consultancy specializing in developing evaluation tools and indicators for science and technology analysis. He is recognised as one of the world's leading experts on science and technology analysis. Narin started with the analysis of science in the 1970s, before developing evaluations of patents in the 1980s and later, in the 1990s, analysing linkage between science and technology.

| Rank | Cites | PY |
|---|---|---|
| 1 | 107 | 1997 |
| 2 | 94 | 1987 |
| 3 | 70 | 1991 |
| 4 | 56 | 1992 |
| 5 | 51 | 1991 |
| 6 | 34 | 2000 |
| 7 | 33 | 1987 |
| 8 | 33 | 1999 |
| 9 | 33 | 1989 |
| 10 | 26 | 1994 |
| 11 | 25 | 1988 |
| 12 | 25 | 1996 |
| 13 | 24 | 1988 |
| 14 | 23 | 1995 |
| 15 | 18 | 1994 |
| **16** | **18** | **1998** |
| 17 | 14 | 1996 |

**András Schubert** is Senior Scientist at the *Institute for Science Policy Research,* Hungarian Academy of Sciences in Budapest (Hungary). He is Editor of the journal Scientometrics. Jointly with Tibor Braun and Wolfgang Glänzel, he developed the concept of *Relative Indicators* (1983).

| Rank | Cites | PY |
|---|---|---|
| 1 | 120 | 1989 |
| 2 | 78 | 1986 |
| 3 | 74 | 2002 |
| 4 | 57 | 1990 |
| 5 | 33 | 1988 |
| 6 | 27 | 1988 |
| 7 | 27 | 1987 |
| 8 | 25 | 2000 |
| 9 | 24 | 1994 |
| 10 | 23 | 1987 |
| 11 | 22 | 1987 |
| 12 | 21 | 1994 |
| 13 | 18 | 1986 |
| 14 | 18 | 1986 |
| 15 | 18 | 1993 |
| 16 | 17 | 2000 |
| **17** | **17** | **1988** |
| 18 | 16 | 2001 |

**Loet Leydesdorff** is Senior Lecturer at the Department of Communication Studies, University of Amsterdam. Jointly with Henry Etzkowitz, he developed the Triple Helix model of University-Industry-Government relations.

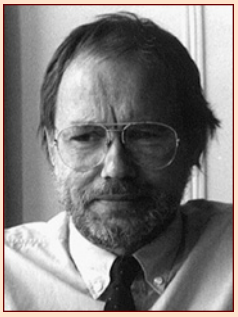
| Rank | Cites | PY |
|---|---|---|
| 1 | 69 | 2000 |
| 2 | 26 | 1998 |
| 3 | 24 | 1986 |
| 4 | 22 | 1999 |
| 5 | 21 | 1989 |
| 6 | 20 | 1987 |
| 7 | 19 | 1989 |
| 8 | 17 | 1991 |
| 9 | 16 | 1996 |
| 10 | 15 | 1994 |
| 11 | 14 | 1997 |
| 12 | 13 | 1993 |
| **13** | **13** | **1989** |
| 14 | 12 | 1994 |

**Wolfgang Glänzel** is Senior Research Fellow at the *Steunpunt O&O Statistieken* and Professor at the Katholieke Universiteit Leuven (Belgium). He is also Senior Scientist at the *Institute for Science Policy Research,* Hungarian Academy of Sciences in Budapest. He is co-editor of the journal *Scientometrics* and Secretary/Treasurer of ISSI.

| Rank | Cites | PY |
|---|---|---|
| 1 | 120 | 1989 |
| 2 | 54 | 1988 |
| 3 | 33 | 1988 |
| 4 | 31 | 1995 |
| 5 | 29 | 1995 |
| 6 | 27 | 1995 |
| 7 | 27 | 1988 |
| 8 | 27 | 1987 |
| 9 | 24 | 1994 |
| 10 | 23 | 1987 |
| 11 | 22 | 2001 |
| 12 | 22 | 1987 |
| 13 | 21 | 1994 |
| 14 | 19 | 1994 |
| 15 | 18 | 1986 |
| 16 | 18 | 1986 |
| **17** | **18** | **1993** |
| 18 | 17 | 1994 |

**Leo Egghe** is Professor and Chief Librarian at Limburgs Universitair Centrum in Diepenbeek (Belgium). He teaches part-time at the University of Antwerp in the Library and Information Science Programme. Recently, he developed the theory of *Lotkaian informetrics.*

| Rank | Cites | PY |
|---|---|---|
| 1 | 43 | 1990 |
| 2 | 35 | 1992 |
| 3 | 35 | 2000 |
| 4 | 21 | 1992 |
| 5 | 18 | 1991 |
| 6 | 17 | 1986 |
| 7 | 16 | 1995 |
| 8 | 16 | 1986 |
| 9 | 16 | 1988 |
| 10 | 15 | 1993 |
| 11 | 13 | 1990 |
| **12** | **12** | **1996** |
| 13 | 12 | 1988 |



**Henk F. Moed** is Senior Researcher at the Centre for Science and Technology Studies (*CWTS*) in Leiden (The Netherlands). Since 1981, he works on science indicators and quantitative studies of science at Leiden University. Current work in projects involves bibliometric analysis in relation to aspects of research performance. Recently, he has published a book on "Citation Analysis in Research Evaluation" (Springer, 2005).

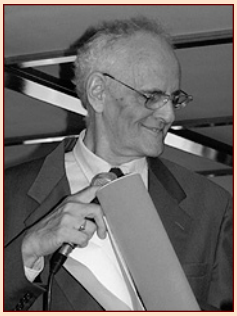
| Rank | Cites | PY |
|---|---|---|
| 1 | 53 | 1995 |
| 2 | 52 | 1996 |
| 3 | 52 | 1995 |
| 4 | 46 | 1991 |
| 5 | 33 | 1991 |
| 6 | 29 | 1990 |
| 7 | 25 | 1989 |
| 8 | 23 | 1998 |
| 9 | 23 | 1999 |
| 10 | 23 | 2002 |
| 11 | 23 | 1996 |
| 12 | 22 | 1991 |
| 13 | 20 | 1999 |
| 14 | 19 | 2001 |
| **15** | **18** | **1989** |
| 16 | 15 | 2002 |

**Ronald Rousseau** is Professor at the Catholic School for Higher Education Bruges-Ostend and Guest Professor at the School for Library and Information Science (University Antwerp). Jointly with Leo Egghe he is one of the leading theoreticians of Informetrics.

| Rank | Cites | PY |
|---|---|---|
| 1 | 23 | 1996 |
| 2 | 18 | 1991 |
| 3 | 16 | 1995 |
| 4 | 16 | 1988 |
| 5 | 15 | 1987 |
| 6 | 15 | 1992 |
| 7 | 14 | 2003 |
| 8 | 13 | 1994 |
| 9 | 12 | 1996 |
| 10 | 12 | 1990 |
| **11** | **11** | **1999** |
| 12 | 11 | 1989 |

**Peter Ingwersen** is Research Professor at the Department of Information Studies Royal School of Library and Information Science (Denmark). His main field of research activity is *information retrieval* in which he has published also several books. Ingwersen is one of the founders of "Webometrics" (1997).

| Rank | Cites | PY |
|---|---|---|
| 1 | 118 | 1996 |
| 2 | 89 | 1998 |
| 3 | 78 | 1997 |
| 4 | 51 | 2001 |
| 5 | 36 | 1997 |
| 6 | 29 | 1987 |
| 7 | 27 | 1997 |
| 8 | 17 | 2000 |
| 9 | 15 | 1996 |
| **10** | **13** | **1997** |
| 11 | 10 | 1992 |



**Howard D. White** He was distinguished professor at Drexel University (USA) till 2002. He is now professor emeritus**.** Jointly with Belver Griffith he developed the *author co-citation analysis* (ACA) in the early 1980s.

| Rank | Cites | PY |
|---|---|---|
| 1 | 105 | 1998 |
| 2 | 100 | 1989 |
| 3 | 43 | 1997 |
| 4 | 21 | 1987 |
| 5 | 19 | 2001 |
| 6 | 15 | 1987 |
| 7 | 14 | 1986 |
| 8 | 12 | 1996 |
| 9 | 10 | 1990 |
| **10** | **10** | **2003** |
| 11 | 10 | 1990 |

## ■ Concluding remarks

The *h-indexes* of the Price Medallists are clearly lower than what Hirsch reported for physics. However, this result does not strike unexpectedly; both publication activity and citation impact in our field is below the "standard" in physics. The h values in bibliometrics/informetrics range roughly between 10 and 20. We have checked the data in November again. The h-index of a few Price awardees increased by one, however, the genera picture has not changed. Furthermore, the "new-fledged" Price Medallists tend to have lower h values than the "old" ones. We have to keep in mind that the starting point was 1986 and that the *h-index* might have become somewhat different, especially for the early Price Medal winners, if we had covered the back years even if we take into account that quantitative science studies were not a truly established discipline with adequate communication channels in the 1970s. Thus one might conclude that a scientist with an *h-index* of 10 and above in quantitative science studies can justly be considered a possible candidate for one of the future awards.

## ■ References


P. Ball (2005), Index aims for fair ranking of scientists, *Nature* 436, 900.

L. Bornmann, H.-D. Daniel (2005), Does the h-index for ranking of scientists really work? *Scientometrics*, 65 (3), 391–392.

T. Braun, W. Glänzel, A. Schubert (2005), A Hirsch-type index for journals, *The Scientist*, 19 (22), 8.

P. Diniz Batista, M. Guimaraes Campiteli, O. Kinouchi, A. Souto Martinez (2005), A complementary index to quantify an individual's scientific research output, arXiv:physics/0509048, accessible via http://arxiv.org/abs/physics/0509048.

W. Glänzel (2005), *The H-index – a new measure of publication activity and citation impact*, unpublished material.

W. Glänzel (2006), On the opportunities and limitations of the H-index; *Science Focus*, No.1, forthcoming.

J.E. Hirsch (2005), An index to quantify an individual's scientific output, arXiv:physics/0508025, accessible via http://arxiv.org/abs/physics/0508025.

S. B. Popov (2005), A parameter to quantify dynamics of a researcher's scientific activity, arXiv:physics/0508113, accessible via http://arxiv.org/abs/physics/0508113.

A.F.J. van Raan (2005), Comparison of the Hirsch-index with standard bibliometric indicators and with peer judgment for 147 chemistry research groups, arXiv:physics/0511206, accessible via http://arxiv.org/abs/physics/0511206.



ISSI Newsletter is published by ISSI ( http://www.issi-society.info/ ). Contributors to the newsletter should contact the editorial board **by email**.
Wolfgang Glänzel: wolfgang.glanzel@econ.kuleuven.be | Ronald Rousseau: ronald.rousseau@khbo.be | Liwen Vaughan: lvaughan@uwo.ca
Aparna Basu: basu.aparna@rediffmail.com | Balázs Schlemmer: balazs.schlemmer@econ.kuleuven.be
Accepted contributions are **moderated** by the board. **Guidelines** for contributors can be found at: http://www.issi-society.info/editorial.html