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EDITORIAL

■ 15 Years of ISSI - 15th Issue of the Newsletter

It is now fifteen years ago that the board of the 4th International Conference on Scientometrics and Informetrics decided to found the International Society for Scientometrics and Informetrics (ISSI) to contribute to the advancement of the theory, methods and explanations with regard to Scientometrics, Informetrics and related fields.

Several years (and by mere coincidence, 15 issues) ago we have launched the ISSI Newsletter to help the Society achieve her mission by supporting communication and publishing reports and pieces of common interest. But now it is time to remember and to celebrate. So, besides conference reports and research notes the reader will also find reminiscences in this issue.

Wolfgang Glänzel
Editor-in-Chief

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EDITORIAL BOARD

MEMORABILIA AND REFLECTIONS

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I was there when the Society was conceived.

The professional association was established after three very successful conferences: at Diepenbeek, London Ontario and Bangalore at the Berlin conference in 1993, late at evening in a dark room at the Academy of Sciences. From that time on, the conferences have been held under the auspices of the Society every second year. While the Society was founded only 15 years ago, Scientometrics and Bibliometrics are now at least half a century old. The field can be traced to early quantitative studies in the early 20th century, in the thirties it evolved to the "Science of Science".

In the introduction to the First Proceedings of the Diepenbeek Conference, 1987 Egghe and Rousseau wrote:

"We hope that the Conference at issue has been of some help in speeding up the process in which Bibliometrics is becoming a scientific discipline where researchers interact through all formal and informal channels of communications, including meetings, symposia and international conferences".

They sure were ahead of time.

From the first conference in Diepenbeek, 1987, with 80 participants from 22 countries and 48 presentations to the last one in Madrid in 2007 with over 220 participants, from 36 countries, 170 lectures and poster sessions and an international doctoral forum. As Bernard Shaw said: "We met young and grew up together".

It has become somewhat of a tradition that host nations alternate between "old" world and "new" world countries. On looking at the list of conferences and host countries, we can see that the idea of north-south / east-west distribution has been upheld, even if not to the letter of strict geography. The alternating distribution of locations gave opportunities for host nations to encourage and showcase Scientometrics and Informetrics research in their home institutions to an international audience. The conferences did stimulate the kind of scholarly discussions that lead to international cooperation and interaction among the community of Scientometric-Informetric researchers. As a result, an interesting community of cooperation has been born. To mention just a few: between China Belgium and Germany; Hungary and USA; Belgium and Germany; Spain Brazil and Puerto Rico; UK and Finland; Bulgaria and Saudi-Arabia.

With its additional annual international conferences on: Indicators on Science, Technology and Innovation; the Collnet meetings; The Nordic Workshops on Bibliometrics the field has produced an enormous quantity of extremely valuable research and publications, creating methodologies, tools and models which are widely used.

Although the field and its conferences are growing in size and new participating countries are joining all the time, this is not reflected in the number of the Society's members. As for today, after fifteen years of its existence, the Society numbers only 90 members from 25 countries. I was expecting an exponential growth over the years, but this phenomenon did not occur. The small number of members is probably based on the "old and faithful" and we need more "young and faithful".

The recognition and power of a Society is based on its growing, development and expanding services to all members. The lack of budget is damaging the Society.

We need a noisy call for members!

FOUNDATION OF THE INTERNATIONAL SOCIETY FOR SCIENTOMETRICS AND INFORMETRICS (ISSI) DURING THE FOURTH INTERNATIONAL CONFERENCE ON BIBLIOMETRICS, INFORMETRICS AND SCIENTOMETRICS, BERLIN, SEPTEMBER 11-15, 1993

Since several decades the development of information and library sciences together with science studies was and will, among other things, be fashioned by the development of the traditional quantitative studies conducted in this field called scientometrics or informetrics.

Quantitative aspects of science of science – important for science and science policy – are studied as well as communication and collaboration in science and in technology.

Therefore, in the year 1993 the time was ripe for the foundation of the International Society for Scientometrics and Informetrics (ISSI) during the Fourth International Conference on Bibliometrics, Informetrics and Scientometrics held in Berlin, September 11-15, 1993.

The Berlin conference was the largest Scientometrics/Informetrics meeting so far. Rather 190 scientists from more than 30 countries from all over the world attended this event.

However, a long time before the conference was starting; famous scientists in our field as for example, Eugene Garfield, Leo Egghe, Ronald Rousseau or Wolfgang Glänzel have already mentioned the necessity to establish an international society. This kind of discussion has inspired the Organiser of the Berlin conference to create a corresponding questionnaire for distribution among the members of the International Programme Committee. The result was a positive reply by rather all of these 35 members.

Following many important persons in our field were sitting together in Berlin when the foundation of ISSI was decided. Most of these experts can be found at the ten photos below. (These photos were made during the time of decision.) In alphabetical order:

- S. Arunachalam, India
  (Photo 4: first scientist from left)
- A. Bookstein, USA
  (Photo 2: first from left, photo 4, third from left)
- Q.L. Burrell, Isle of Man
  (Photo 9: second from left)
- H.J. Czerwon, Germany
  (Photo 1: first from left, photo 10: second from right)
- L. Egghe, Belgium
  (Photo 2: third from left, photo 9: first from left)
- H. Englisch, Germany
  (Photo 10: first from left)
- H. Eto, Japan
  (Photo 7: second from left)

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Photo 1

Photo 2

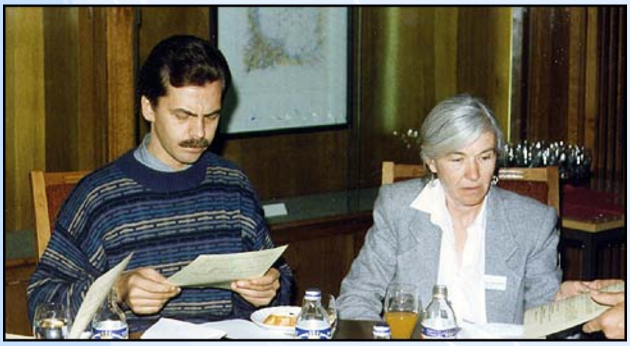

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

- W. Glänzel, Hungary
  (Photo 5: second from left)
- W.E. Mc Grath, USA
  (Photo 8: first from left)
- M.E.D. Koenig, USA
  (Photo 1: third from left)
- H. Kretschmer, Germany
  (Photo 5: third from left)
- L. Leydesdorff, The Netherlands
  (Photo 7: third from left)
- V. Markusova, Russia
  (Photo 6: third from left):
- H.F.Moed, The Netherlands
  (Photo 5: first from left, photo 8: third from left)
- C. le Pair, The Netherlands
  (Photo 6: second from left)
- I.K. Ravichandra Rao, India
  (Photo 4: second from left)
- R. Rousseau, Belgium
  (Photo 2: second from left)
- H. Small, USA
  (Photo 8: second from left)
- J. Tague Sutcliffe, Canada
  (Photo 3: first from right)
- A. Welljams-Dorof, USA
  (Photo 3: second from right)

The society was incorporated with formal Articles of Association in 1994 in Utrecht, The Netherlands (Acting members of the ISSI board: C. le Pair, H. Kretschmer, M.E.D. Koenig, L. Egghe, Ravichandra Rao, J.Tague-Sutcliffe, Bluma C. Peritz).

Hildrun Kretschmer
Organiser of the Berlin Conference 1993
Former First President of ISSI (1993-1995)

A FAIRLY RECENT ACA MAP OF INFORMATION SCIENCE – 2003-2007

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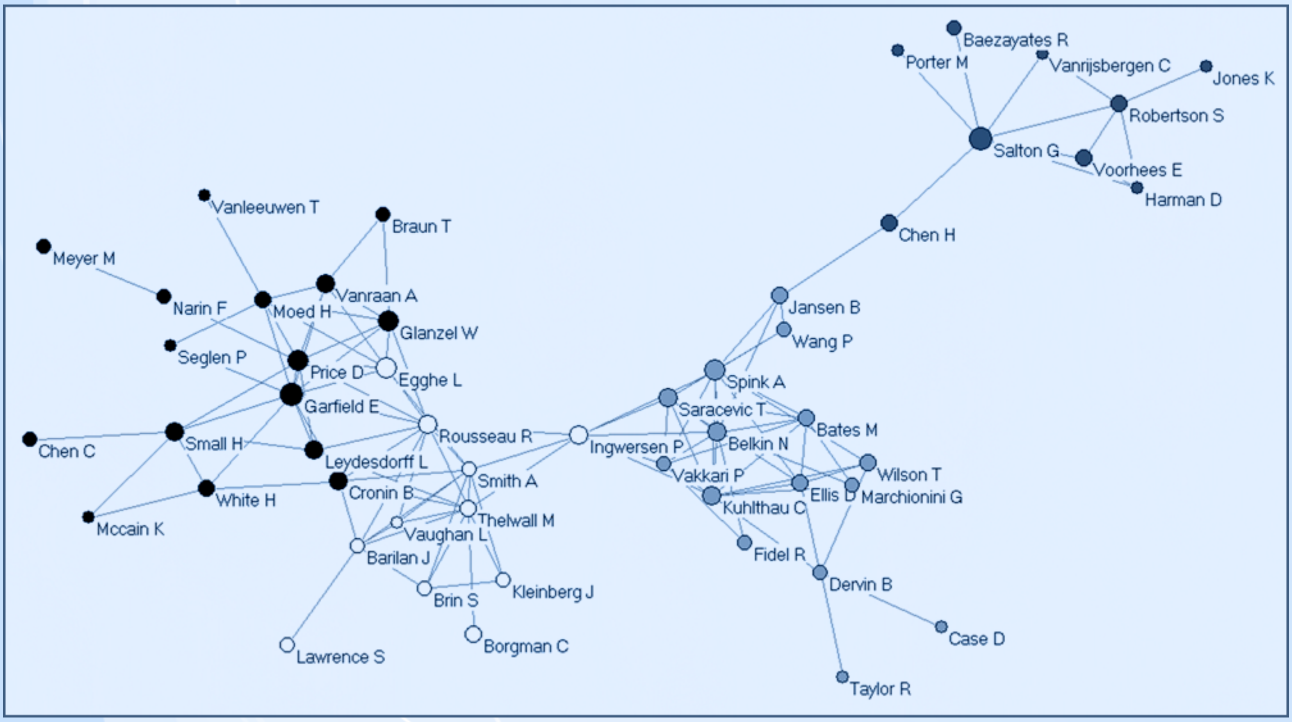
To get a fresh picture of our research field, downloaded 2542 genuine articles published in 2003-2007 from the same journals included in the well known study by Howard White and Kate McCain (1998). The author co-citation (ACA) map shows an interesting structure.

To the left we find the informetric subfield, to the very left bibliometrics and right of that webometics. Webometrics is linked via Peter Ingwersen to soft IR (information retrieval). Then soft IR is linked to hard IR via Bernard Jansen and Hsinchun Chen who are specializing in internet related IR research. It feels like information science is getting more integrated and some of our colleagues are doing the job. All this make sense, doesn't it? White&McCain said that their map looks like Australia. This one looks like my seventeen year old dog! Bibliometrics is the head!

This is how the map was made. I selected 63 authors (1st cited author last name plus first initial) cited in at least 50 papers. Using BibExcel the ACA links were heavily reduced, only allowing for the strongest links. In order to find one cohesive network, the maximum number of links connected to a node was gradually raised to 11 (degree). Then to further increase readability, the link strength was set to 1 before taking the data to Pajek and the Kamada-Kawai layout. The map has 51 of maximum 63 authors. To include



more we would have to raise the degree, but at the cost of the map becoming crumbled up. On the other hand, the names on the map indicate research orientation and structure, rather than it being a true reflection of all important actors (Persson 2001). The sub clusters were also found using BibExcel.

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CHINESE COLLEAGUES AT THE FIRST CONFERENCES ON BIBLIOMETRICS AND SCIENTOMETRICS

Ronald Rousseau, KHBO&KULeuven, Belgium

Nowadays Chinese colleagues play an important role in the field of informetrics and in 2003 the Ninth International Conference on Scientometrics and Informetrics was held in Beijing with Jiang Guohua as chair. However, during the eighties and beginning nineties the situation was different. Few Chinese colleagues from Mainland China published in the core journals of our field such as the American Society for Information Science, or Scientometrics. Exceptions are the most famous (Mainland) Chinese bibliometrician of that period, namely Zhao Hongzhou, who published four articles in Scientometrics, one as a sole author (1984), two with Jiang Guohua (1985, 1986) and one, later, with Liang Liming, Wang Yuan and Wu Yishan (1996).

When the first conference was announced in 1987 Leo Egghe and I were expecting many Indian colleagues, as we knew that they were very active in the field, but we were not expecting Chinese colleagues, for the simple reason that at that time we did not know any. Yet, to our surprise, one Chinese colleague, namely Xiang Dong from the Nanchang Information Research Center of

Science & Technology registered and sent an English text on Price's logistic law. However, he did not arrive on time and when he finally arrived it turned out that his hand luggage, including his passport, visa and conference presentation had been stolen in France. It took quite some effort before all administrative formalities involving the French and Chinese embassies were carried out and Xiang Dong could return to his homeland. However, the problem of the stolen conference presentation had yet to been solved. It turned out that colleague Xiang did not speak English, hence could not understand his own text (the English one submitted for presentation). Contact was made with a Chinese student who translated the English text back to Chinese. However, colleague Xiang had great difficulties understanding the Chinese translation, but finally he managed to make an oral presentation in Chinese. This was then - usually after some discussions between the two Chinese - translated in English so that the audience could try to grasp the meaning of the talk. Honestly, although I had the original English text, it seemed to have little to do with the actual presentation and this first ever Chinese presentation at a bibliometrics and scientometrics conference was not a success.

At the London (Ontario) Second International Conference on Bibliometrics, Scientometrics and Informetrics (5-7 July, 1989) there were a number of Chinese participants. These could be subdivided into three groups: well-established colleagues from Chinese origin working in the United States, such as Miranda Lee Pao, doctoral students of Chinese origin, studying at the University of Western Ontario, and finally one colleague arriving directly from Mainland China. The group of students consisted of Clara Chu, now a professor at UCLA (and actually from Peruvian-Chinese descent), Lu Xin, now a senior administrator with LexisNexis and Qiu Liwen, nowadays, after her marriage, known as Liwen Vaughan, professor at the University of Western Ontario (London). Clara Chu and Lu Xin, in collaboration with Dietmar Wolfram presented an article on the growth of knowledge. The participant from Mainland China was Ms. Xu Wenxia from Shanghai University. Ms. Xu had already published several articles (in Chinese) about informetrics and scientometrics and was to present a paper about Zipf's law. It turned out, however, that her English was not really up to standard, and that she did not intend to return to China but wanted to stay in the West instead. These two things made her very nervous, and despite attempts by the other Chinese to put her at ease (leading to sleepless nights on both sides) she was unable to deliver the talk. As far as we know she indeed stayed in Canada.

From the third conference on less adventures happened and more and more Chinese colleagues participated. Wu Yishan from ISTIC (Institute of Scientific and Technical Information of China) attended the Bangalore conference and presented "Bibliometrics Studies in China and ISTIC's Approach". Zhang Qiaoqiao from CABI (my first Chinese co-author) attended the Berlin conference giving a presentation on a model for the optimum allocation of information resources within a library network. Also Shan Shi (Shanghai University), who talked about the Waring distribution, Wu Yishan, Qiu Liwen and Zhao Dangzhe were present in Berlin. In later conferences we welcomed Liang Liming, Ding Ying, Jin Bihui, Chu Heting, Jiang Guohua, Ren Shengli and many others.

Twenty-years have passed since the first conference and fifteen years ago ISSI has been established. Colleagues from all over the globe have participated and, surely, during the next conferences new countries will for the first time be represented. Participation may at times be difficult, like for our Chinese colleagues, but we hope that the society will continue to be a truly international group of colleagues.

(Note: All Mainland Chinese names are written according to Mainland China customs, namely Name followed by First Name.)

THE 13TH NORDIC WORKSHOP ON BIBLIOMETRICS AND RESEARCH POLICY IN TAMPERE, FINLAND

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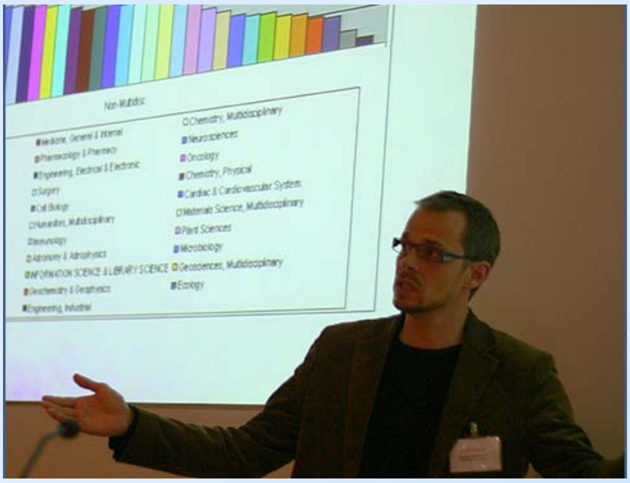
University of Tampere

The Nordic workshop on bibliometrics has been arranged annually since 1996, alternating between Sweden, Norway, Denmark and Finland. In 2008, the workshop was organised by the Unit for Science, Technology and Innovation Studies at the University of Tampere, Finland.

The general idea of the workshop is to present recent bibliometric research in the Nordic countries and to create better linkages between bibliometric research groups and their PhD students. The workshop language is English and the workshop is open to participants from any nation. Following the example of last year's workshop organisers, the Call for Presentations was circulated widely on relevant mailing lists. As a result we were happy to announce the workshop program with 18 presentations and welcome more than 40 participants from 9 different countries to Tampere. The full program can be found at http://www.uta.fi/conference/nwb2008/ .

This year's keynote speaker was Professor Ben Martin from the University of Sussex. His presentation, Bibliometric research, indicators and science policy making, gave us a good overview on the workshop's subject matter and generated much discussion. All in all, in keeping with the Nordic workshop's traditions, the atmosphere of the workshop was informal and interactive – lots of feedback was given to presenters, sometimes even during the presentations. None of the presentations are published as full papers, but all of the slide shows as well as abstracts of the presentations are available on the workshop webpage.



We were given a challenge last year in Copenhagen regarding the venue of the workshop dinner. According to a very particular tradition, the workshop dinner takes place near water. In fact our challenge was to organise the dinner to take place under water. Unfortunately this turned out to be beyond our organising abilities, so we decided on a restaurant by Tammerkoski. Tammerkoski is a rapid right in the centre of Tampere and on its banks are some of the oldest industrial milieus in Finland. Maybe the next year's organisers at the Swedish Research Council will find a way to take us under water?

© Photos: Balázs Schlemmer – more to come soon!

SCIENCE IN INDIA. A BIBLIOMETRIC STUDY OF NATIONAL RESEARCH PERFORMANCE IN 1991-2006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Abstract

In the present paper, an analysis of Indian S&T has been presented using its publication output in international peer reviewed journals covered in Web of Science database. It analyses India's publication activity in terms of global share, share of international collaborative publications, and visibility & citation impact for the period 1991-2006. It explores how far the trends in India S&T output mirror those of the other up-coming countries and what the main differences among those countries are. It discusses the find-ings in the light of the above-mentioned ongoing discussion on decline or emergence of Indian science.

1 Introduction

The global landscape of science and technology is undergoing radical changes. The old world picture of the 20th century has already been upended. Technological and scientific development is closely following the economic changes. Emerging and re-emerging economies have very soon been brought into the focus of both the public and the experts' interest. In 2003, Jim O'Neill coined the term BRIC (as abbreviation for Brazil, Russia, India, China) and only two years later, in 2005, he extended this idea by introducing the conception of the Next-11 (N11) comprising a larger list of eleven upcoming economies. This alone indicates the tremendous speed with which the development takes place. Reports on economic research have soon been followed by science policy and technology related studies which attempted to capture also the growth of science and technology mirroring the economic dynamics of these countries. All evidence points to the fact that the centre of gravity of scientific and technological advancement is moving to regions outside Europe and North-America.

Beyond any doubt, China has achieved the most spectacular progress in economy, science and technology among these emerging countries. Already two years ago, China has announced to have overtaken France as the world's fifth largest economy. Now China is challenging Germany as World's export leader. This trend is paralleled by its growth of science. Since 2006 China ranks second in terms of the world's publication output in the sciences as reflected by the Web of Science database and China strives to become the world's leading science power by 2050. This most spectacular development cannot, however, disguise that, overshadowed by China's rise, other countries emerged as well; and these nations are gaining or re-attaining the position as main global players in economy, research and technology. Recently O'Neill (2005) forecasted that India might become the world's third largest economic power.

In an earlier study by Glänzel et al. (2008) light was shed upon the dynamics of five emerging countries (China, Korea, Taiwan, Brazil and Turkey) in the mirror of bibliometric indicators. This paper and the study of research performance of the 'BRIC' countries by Zitt et al., (2006) pointed at quite different situations among the emerging countries. Besides the somewhat ambiguous and debated situation of Russia and Brazil, also India's evolution is a matter in dispute (e.g., Arunachalam 2002; Gupta and Dhawan 2006, 2008; Kedamani et al. 2007; Basu 2007).

In the present paper, the evolution of publication activity, visibility and citation impact of India is studied for the period 1991-2006. In this study India's bibliometric profile is analysed in the context of global trends as well as in comparison with five other emerging economies of comparable weight, particularly, with Korea, Russia, Brazil, Taiwan and Turkey. We will attempt to answer the question of in how far the trends in India mirror those of the other upcoming countries and what the main differences among those countries are.

2 Data sources and processing

All bibliometric data are based on bibliographic data extracted from the Web of Science (WoS) of Thomson Scientific (Philadelphia, PA, USA). The period for publication activity and scientific collaboration comprises the years 1991-2006. In order to obtain stable and reliable results, the underlying publication period is split up into several sub-periods of 2-3 years each. For the citation analysis, we used a three-year window each for papers published in 1992-2004. Only document types indexed in the Science Citation Index Expanded (SCIE) named as Articles, Letters, Notes and Reviews were taken into account.

Publications are assigned to countries on the basis of their corporate addresses as indicated in the by-line of the publication. An integer counting scheme is applied, i.e., all countries appearing in the address field are considered and multiple occurrence of a country within the same publication is de-duplicated. This approach results in counting publications with (at least) one author with an affiliation in the corresponding country. This counting scheme is best suited for analysing both the countries' weight and their international co-publication links, but as a consequence of its application, publications cannot be summed up over countries to the world total (cf. REIST-2 1997).

As for subject classification, the hierarchical classification scheme developed by Glänzel and Schubert (2003) on the basis of ISI's journal assignment to Subject Categories is applied: Agriculture & Environment (AGRI), Biology (BIOL), Biosciences (BIOS), Biomedical research, Clinical & Experimental Medicine I (CLI1), Clinical & Experimental Medicine II (CLI2), Neuroscience & Behaviour (NEUR), Chemistry (CHEM), Physics (PHYS), Geosciences & Space Sciences (GEOS), Engineering (ENGN) and Mathematics (MATH). The level in between these major fields and the ISI Subject Categories comprises further 60 subfields. A science field has five subfields on average and a subfield aggregates about three ISI Subject Categories each.

For the citation analysis, a three-year citation window beginning with the publication year is applied for selected sub-periods of the above-mentioned publication period. Citations received by these publications have been determined on the basis of an item-by-item procedure, using special identification keys, made up of bibliographic data elements.

3 Methods and results

3.1 National research performance

■ Publication growth

In this section we focus on the trends and dynamics in the publication activity, the national publication profile, the evolution of citation impact and the patterns and network international scientific collaboration of India. The set of advanced and standard indicators developed at ISSRU (Budapest) and SOOI/KU Leuven is used for the analysis. These measures comprise besides basic indicators and measures of activity and co-operativity, observed, field- and journal expected citation rates and relative citation rates, measures of high-impact activity and attractivity as well.

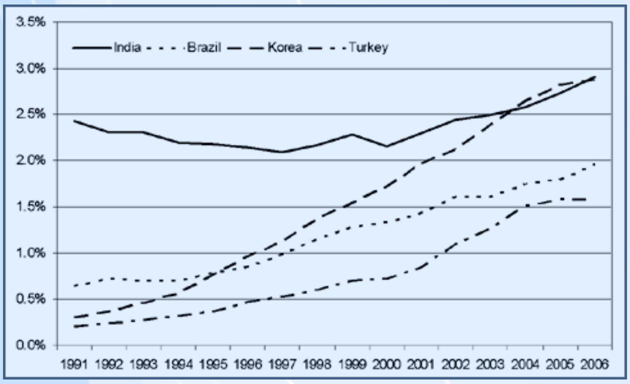

Figure 1 Evolution of India's publication output in terms of global share in the sciences in 1991-2006

The evolution of India's publication is long a matter in dispute output as has already mentioned in the outset. Indeed, the evolution of Indian publication activity with respect to the world total publication output does not provide an un-ambiguous picture. In particular, a period of decline (1991-1997) is followed by a short phase of stagnation around 1999 which, in turn, is followed by a period of strong growth (see Figure 1). It is not clear, in how far changes in the underlying database have contributed to these trends, but the pit in 1997-2000 cannot be explained with structural changes in the database alone. India's growth is not unambiguous; all one can conclude from the bibliographic data is that the increase of India's share in the world total of 19.4% during the last 15 years does simply not keep pace with the growth of others whose relative growth rate of their share amounts to even several 100% in the same period (cf. Figure 1).

The assessment of the evolution on the basis of ranks is certainly a difficult, even precarious endeavour. Nonetheless, we will have a look at the national ranking according to publication output in different years in the period 1991-2006 in order to gain insight in the changes of the global landscape of science and technology.

Table 1 presents the 20 countries contribution most to the world total publication output. The observed sharp rise of the share of national publication output in the world total of countries like of China, South Korea, Brazil, Taiwan and Turkey is certainly unambiguous, and has already been largely discussed in the relevant literature (e.g., Zhou and Leydesdorff 2006; Zitt et al. (2006); Glänzel et al. 2008; Glänzel 2008). The same unambiguousness applies to Russia, however, indicating a negative development. Relatively slight changes as found for India can be due to several external factors, too, as, for instance, changes of database coverage as pointed at above. The discussion of the evolution of India's position was mainly a matter of national concern (e.g., Arunachalam 2002; Gupta and Dhawan 2006, 2008; Kedamani et al. 2007; Basu 2007). Nonetheless, India holds a firm position around rank ten according to the world's most important producers of scientific literature (cf. Table 1).

Country	Rank			
	1991	1996	2001	2006
USA	1	1	1	1
China PR	15	13	7	2
UK	2	2	3	3
Germany	4	4	4	4
Japan	3	3	2	5
France	6	5	5	6
Canada	7	6	8	7
Italy	8	7	6	8
Spain	12	10	10	9
Australia	10	9	11	10
India	**9**	**12**	**13**	**11**
South Korea	33	20	15	12
Netherlands	11	11	12	13
Russia	36	8	9	14
Brazil	22	22	17	15
Switzerland	14	15	16	16
Taiwan	25	19	18	17
Sweden	13	14	14	18
Turkey	38	31	25	19
Poland	18	18	19	20

Table 1 Changing ranks of the world's leading contributors in publication output according to the SCIE

■ Publication profile

National publication profiles can preferably be measured and visualised using the Relative Specialisation Index (RSI). This measure indicates whether a country has a relatively higher or lower share in world publications in a particular science field than its overall share in the world total (see REIST-2 1997), and is closely related to the Activity Index (AI) introduced by Frame (1977). Its definition and interpretation can be found in Glänzel (2001), therefore, a detailed description of these indicators is omitted here. RSI takes values in the interval [–1, +1]; RSI < 0 (RSI > 0) indicates a lower-than-average (higher-than-average) activity. RSI = 0 reflects a completely balanced situation. RSI is an indicator measuring the internal balance, therefore RSI > 0 for some fields implies RSI < 0 for others and RSI = 0 for all fields corresponds to the 'world standard'. National 'publication profiles' are determined on the basis of the twelve major science fields introduced in the Data sources and data processing section. Since subject classification on the basis of journal assignment does practically not result in disjoint subject areas, the classification scheme does not form a partition of the total. The twelve-component profile is therefore preferably visualised in 'clockwork diagrams', where each 'hour' represents

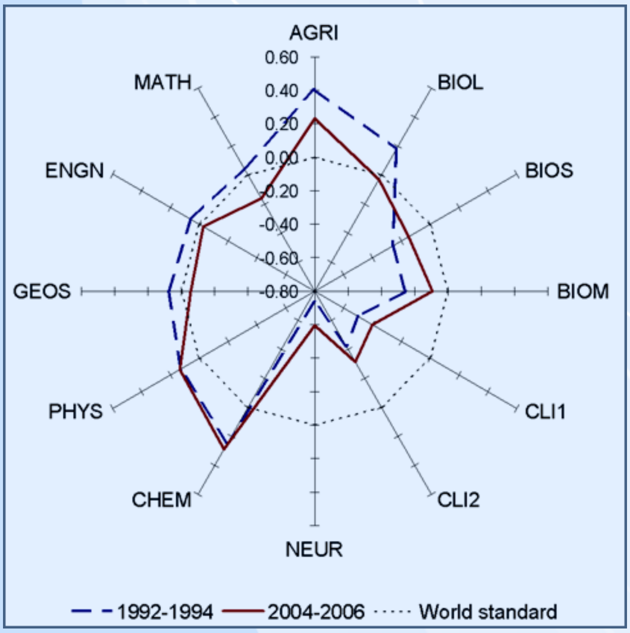

Figure 2 The change of India's publication profile over time

one field. The graphical presentation of the 'world standard', i.e., RSI = 0 for all fields, is a regular dodecagon. Deviations from this standard result in to some extent characteristic deformations of the regular octagon. In earlier studies (e.g., REIST-2 1997), four basic paradigmatic patterns in publication profiles could be distinguished, particularly,

I. the 'western model' with clinical medicine and biomedical research as dominating fields,
II. the characteristic pattern of the former socialist countries with prevailing activity in chemistry and physics,
III. the 'bio-environmental model' with biology and earth and space sciences in the main focus,
IV. the 'Japanese model' with engineering and chemistry being predominant.

India's profile does not uniquely fit in any of the above categories (see Figure 2). It can rather be considered a mixture of Types II and III. The evolution is characterised by two general trends, particularly, by growing relative activity in the life sciences (except biology) and decreasing weight of agriculture & environment, geo- and earth sciences, mathematics and engineering. Thus the subject profile steadily evolves towards a more balanced situation but the pronounced predominance of natural sciences to the disadvantage of the life sciences still persists.

■ Citation impact

In this section we will have a look at the evolution of citation impact of Indian research in the life sciences, natural sciences and applied sciences. The following set of standard indicators is used for this analysis.

1. The Mean Observed Citation Rate (MOCR) is defined as the ratio of citation count to publication count.
2. Mean Expected Citation Rate (MECR). The expected citation rate of a single paper is defined as the average citation rate of all papers published in the same journal. MECR is defined as the average of these individual expectations over a given paper set.
3. Relative Citation Rate (RCR). RCR is defined as the ratio of the observed and journal-based expected citation impact. This indicator measures whether the publications of the unit under study attract more or less citations than expected on the basis of the journal impact measures of the journals in which they appeared.
4. Normalised Mean Citation Rate (NMCR). The field-expected citation rate of a single paper is defined as the average citation rate of all papers published in the same subfield. Since subject assignment is often not unique a fractional counting scheme is applied. NMCR is defined as the ratio of the observed and field-based expected citation impact. This indicator gauges citation rates of the papers against the standards set by the specific subfields. This indicator is based on the 60 subfields according to the above-mentioned SOOI/ISSRU classification scheme.

A detailed description of definition, application and interpretation of these indicators can be found in earlier papers (e.g., Glänzel et al 2009). We just mention here that MOCR = 0 implies RCR = 0 and NMCR = 0, and corresponds to uncitedness; RCR (NMCR) < 1 represents a lower-than-the-average, RCR (NMCR) > 1 a higher-than-the-average situation according to the corresponding reference standards. Finally RCR (NMCR) = 1 means that the papers received the number of citations expected on the basis of the average citation rate of the publishing journals (subfields). A large deviation of RCR from NMCR means that the journals in which authors of the country under study are on average publishing, do usually not conform to the corresponding subject standards. This deviation may be positive or negative.

Although the pit found in relative publication activity in the second half of the 1990s is paralleled by a similar in citation impact (see Figure 3), normalised and relative citation impact generally increased during about the last decade after the 'pit' around 1994. However, it did, on an average, not reach the world standard. This latter characteristic is shared with the citation patterns of other emerging countries. Although both relative indicators (RCR and NMCR) show the same trends, RCR always considerably exceeds the corresponding NMCR values. This means, that Indian scientists publish, on an average, in journals with lower impact that the corresponding field standard. In a recent study, we have found similar patterns for other emerging economies, particularly for China, Brazil, Taiwan, Korea and Turkey (Glänzel et al. 2008). Both subject- and journal-normalised impact of these countries increased while the RCR always exceeded the corresponding NMCR value. However, Taiwan and Korea are in a more advantageous situation than the other countries since both relative citation rates are here relatively close to each other (see Glänzel et al. 2008).

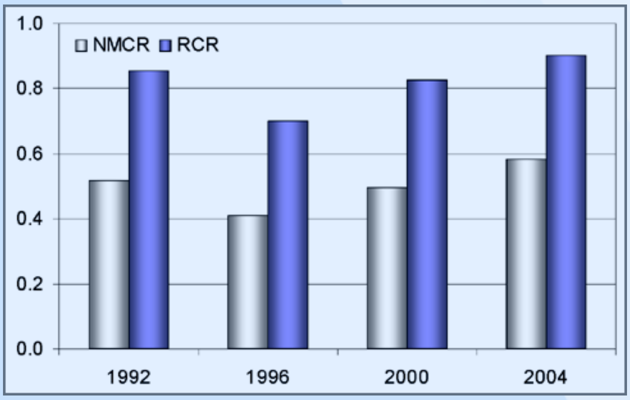

Figure 3 Evolution of citation impact of Indian publications

The breakdown of citation indicators by major fields substantiates that the increase of the relative citation rate has effect on all areas of the sciences. The effect is especially strong in the natural sciences where it

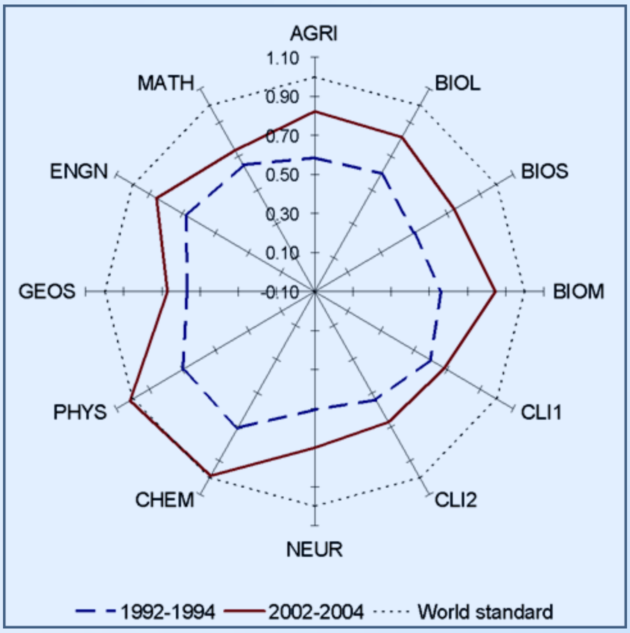

Figure 4 Change of India's Relative Citation Rate over time

already reached the world standard in 2002-2004 where observed citation impact has become in line with the journal-based expectation (see Figure 4).

■ International scientific collaboration

The duality of the co-authorship/co-operation relationship has long been discussed in the bibliometric literature (e.g., Katz and Martin 1997; Laudel 2002). At the level of individual authorship (Laudel) or at the institutional level (Katz and Martin), co-authorship does not depict research collaboration entirely, or might be distorted by scientists' multiple affiliations. Nonetheless, co-authorship proved a good proxy for 'higher-level' research collaboration between institutions, regions, and countries. Above all, international collaboration is usually well acknowledged in the published literature, and therefore a good indicator of co-operation at this level as well (Glänzel and Schubert 2004).

Several aspects of international collaboration are of special interest; besides the extent and share of international co-publications, the geopolitical profile of co-publications and the impact of collaborative research are preferred topics of bibliometric analysis. The dramatic intensification of international co-operation at all levels and the structural changes in the collaboration network has repeatedly been reported by several studies. An overview of this literature can be found, among others, in a recent study by Glänzel and Schubert (2004).

A first look at the publication data reveals a relatively low level of India's international co-operativity. In contrast to the general trend of intensifying collaboration, India's share of international co-publications in all papers has changed little. It ranged between 12% and 20% over the last 16 years and, again, there was a pit in the middle of the 1990s.

According to the regularity concerning the relation between foreign co-authorship ratio and the countries size found by Schubert and Braun (1990), one would expect a similar share of 'international papers' for India as found for countries of like size. Table 2 presents the corresponding percentages for all countries with 15,000-37,000 papers in 2006. India has the lowest co-operativity among these countries. The breakdown by partner countries, however, reveals slight structural changes in collaboration pattern.

Country	Papers	Share
Australia	28778	42.0%
India	**28543**	**20.2%**
South Korea	28187	26.2%
Netherlands	24593	49.4%
Russia	21734	39.8%
Brazil	19135	30.0%
Switzerland	17973	60.0%
Taiwan	17842	18.7%
Sweden	17146	51.5%
Turkey	15392	16.1%

Table 2 Share of internationally co-authored papers in all papers of selected countries in 2006

Coutry/Region	1992-1994		2004-2006	
	Share	Str.	Share	Str.
EU15	*42.1%*	M	*40.6%*	S
USA	37.9%		34.5%	S
Germany	13.4%		14.9%	M
UK	12.8%		11.5%	M
Japan	6.8%		11.4%	M
France	7.1%		7.8%	M
South Korea	0.9%		6.2%	M
China PR	1.7%		5.4%	
Canada	8.9%		5.0%	
Italy	6.0%		4.4%	
Australia	2.8%		4.2%	
Taiwan	0.6%		3.6%	
Switzerland	2.7%		3.5%	
Russia	2.1%		3.2%	
Netherlands	2.9%		3.0%	
Spain	2.0%		2.8%	
Brazil	1.4%		2.4%	
Poland	0.7%		2.2%	
Sweden	2.1%		2.0%	

Table 3 Share in all Indian 'international papers' and strength of co-publications with India's most important partners (S=strong; M=medium)

Table 3 shows the weight of India's ten most important partners in all papers with foreign partners in the two periods 1992-1994 and 2004-2006. The most impressing change concerns collaboration with the US and the EU . Co-operation with the US and the EU weakened but not all members of the EU are concerned. Collaboration with the Germany, France and Spain slightly increased. Another remarkable trend concerns Japan, Taiwan, Brazil, China and Korea; the increase of collaboration with the latter four countries substantiates the growing importance of the emerging economies as partners for India. In spite of these changes, scientific collaboration with the EU and the US prevails.

The strength of bilateral links in the network of Indian international co-publications can readily be measured by Salton's cosine measure r (cf. Glänzel and Schubert, 2004). Two different thresholds ($r = 0.01$ and $r = 0.02$) are used to characterise different intensities of co-operation. The interval $0.01 \leq r < 0.02$ corresponds to medium strong links (M), whereas $0.02 \leq r$ corresponds to strong (S) links. The strength of links with the most important partners has in general increased. The strength of bilateral co-authorship links is given as supplementary indicator in Table 3.

Finally, we have a look at the impact of collaborative research. The comparison of the citation impact attracted by international co-publications with the 'national standard' confirms the expectations according to which international collaboration increases visibility and observed impact. Figure 5 presents the two relative citation rates for international co-publications. The results can directly be compared with those presented in Figure 3. On average, India clearly benefits from foreign co-authorship. The relative citation impact has slightly increased and exceeds the "standard value" of 1.0 during in the period 1992-2004. Except for the most recent available publication year, the impact of the journals where the inter-

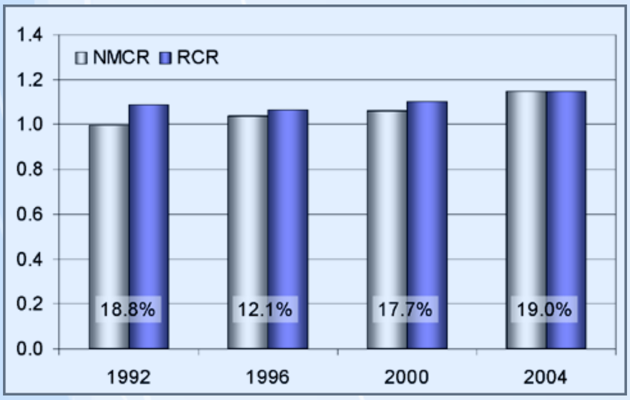

Figure 5 Evolution of citation impact of Indian international co-publications (percentage of 'international papers' is indicated on the bars)

national co-publications appeared still remains somewhat below the corresponding field-expectations.

4 Conclusions

After a down-leap in the middle of the 1990s India's science recovered and turned into steady growth in the new millennium. The growth does, however, not reach that of the other emerging economies like China, Korea, Taiwan or Brazil.

The relative growth with respect to the world total, which extends to all major fields of sciences, is accompanied by an increase of visibility and citation impact; however, the gap between journal and subfield standard still remains. Co-authorship with the EU and the US has lost weight in favour of collaboration with the Far East.

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LUCKILY, SCIENCE FOCUSES ON ACHIEVEMENTS.

SOME THOUGHTS RELATED TO THE H-INDEX

Ronald Rousseau
KHBO, Oostende

It is a fact of (our scientific) life, that scientists do not publish their failures and that the scientific community ignores unimportant publications. No one writes articles stating: I have been trying to prove this fact (and I still believe that it is true) but I failed. Only rarely, when this fact is of the utmost importance it is of sufficient interest to make details of a failed investigation public, in order that colleagues do not waste time and money by going a way that will not lead to the desired goal. Not publishing details of a failed attempt is different from the so-called "file drawer problem", a term which refers to not publishing experiments that led to the rejection of the null-hypothesis (Csada et al., 1996; Scargle, 2000). Related to the "file drawer problem" there is also the fact of not publishing "negative results". These "negative results" are results that can be formulated as follows: "Although I thought that X was correct I have been able to prove that X is false". Note though that there does exist a *Journal of Negative Results in Biomedicine*.

Further, unimportant publications are usually ignored (and hence not cited). It is even so that many errors are not noticed, or not made public, because it does not really matter.

Nobel Prize winners receive the prize for the extraordinary importance of one (or a series) of contribution(s), not because of the large proportion of important publications. This is how science works, and I think this is good otherwise many colleagues would not dare to publish anything. Similarly, the average number of citations per paper is a poor indicator for evaluating scientists, especially if one tries to include all publications (not only those published in journals covered by one of the well-known databases).

What, now, is the relation of all this with the h-index? In a recent (very interesting) publication Thierry Marchant (2008) considers the ***weak independence property*** of rankings. This axiom states the following:

Consider two scientists, *A* and *B*, represented by their publications and the number of citations these publications received. According to some ranking method if turns out that scientist *A* is ranked after scientist *B* (*B* is preferred to *A*). Assume that one adds the same number of publications and the same number of citations to the track records of *A* and *B*. A ranking method satisfies the weak independence property if now scientist *A* is still ranked after scientist *B* (*B* is still preferred to *A*). Intuitively one may agree that any reasonable ranking method must satisfy the weak independence property.

Yet, ranking according to the h-index does not satisfy the weak independence property. Indeed: consider scientist *A* with 12 publications and citations as follows:

$$\left(6,6,\underbrace{0,\ldots,0}_{10\ times}\right)$$

and scientist *B* with 4 publications and citations received as follows: (5,3,3,0). *A*'s h-index is 2 and *B*'s h-index is 3. Consequently according to a ranking based on the h-index *B* is preferred to *A*.

Now add two publications each with 4 citations to the track records of these scientists. Hence *A*'s publication-citation array becomes: (6,6,4,4,0, …,0) and *B*'s becomes: (5,4,4,3,3,0). *A*'s h-index becomes 4 while *B*'s is still 3. Now *A* is preferred to *B*.

Note that colleague Marchant does not claim that ranking according to the h-index is a poor way of ranking. His point is that, whatever method of ranking one uses, one must know the properties and consequences of using this ranking.

I will now illustrate that this ranking is a consequence of the fact that we focus on top achievements. For this I will use another ranking and will show that this ranking leads to the same conclusion (in this example) as the ranking based on the h-index.

Assume we concentrate on a scientist's top X% publications ((in terms of citations) and we rank according to the average number of citations of these top X%. Concentrating on highly cited publications is a typical scientometric approach, see e.g. (Small, 2004; Basu; 2005). For simplicity I will use the top 25%. For scientist *A* (before the addition of the two extra articles) this average is 4, while for scientist *B* this is 5. Hence, scientist *B* is preferred to scientist *A*. However, after the addition of two articles with four citations this top 25% average becomes 5.14 for *A* and 4.67 for *B*. Now *A* is preferred to *B*.

This shows that, from a scientometric point of view, ranking according to the h-index is not unusual. Let me stress again that I fully agree with Marchant's opinion that one must know the properties and consequences of any ranking method.

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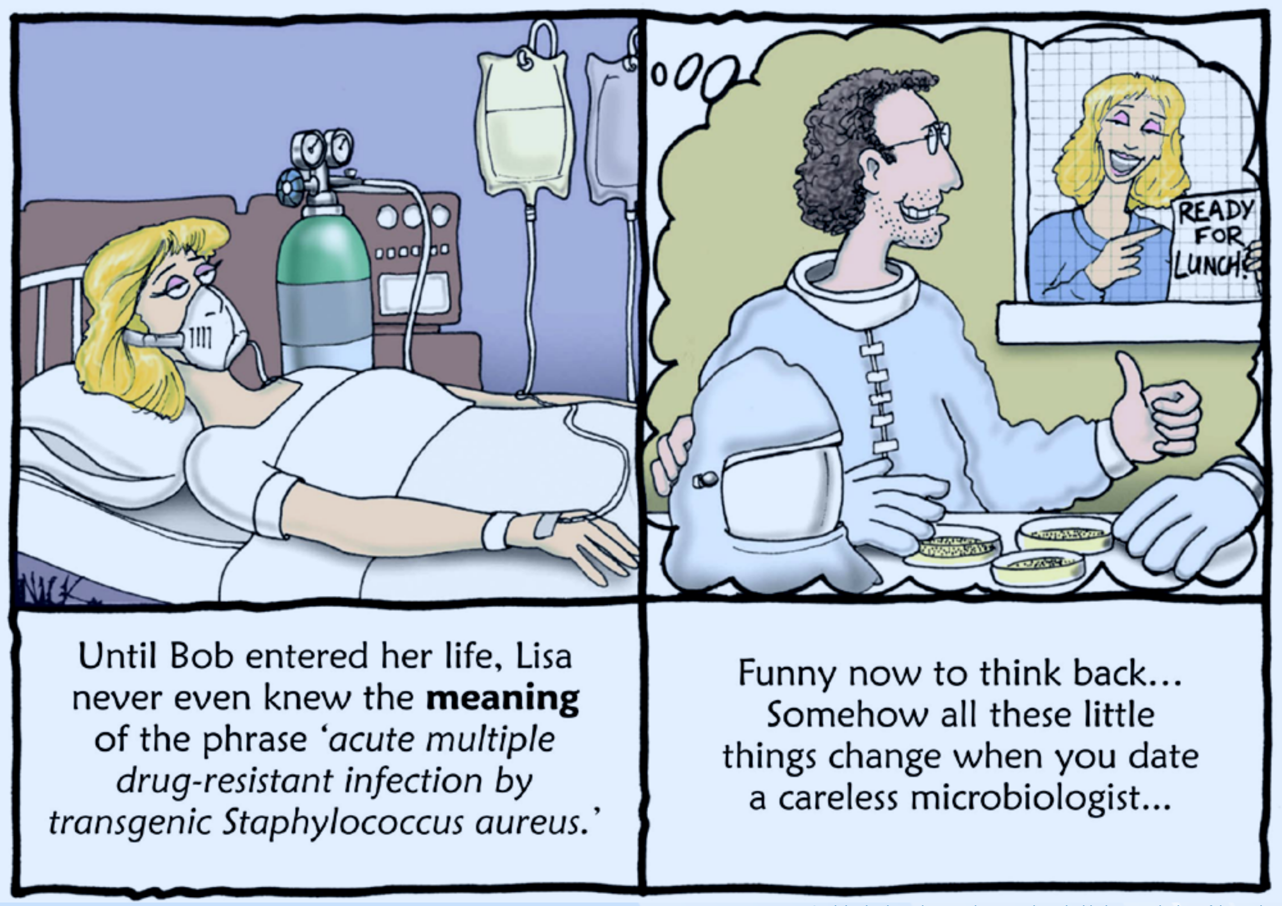
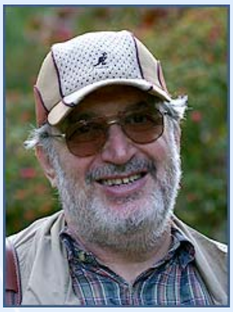
CARTOON



TERNARY PLOTS OF SCIENCE IN A TRIPOLAR WORLD



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SOOI, KULeuven, Belgium

The concept of the *Triad* (EU-USA-Japan) conceived by Kenichi Ohmae [1] in the eighties, became widely used in international analyses either in economics [2] or in S&T [3], and became a cliché by the turn of the millennium. Attempts were even made to extend the concept to a *Tetrad* including also China [4]. Nevertheless, at the beginning of the 2000's – particularly in the world of S&T - the Triad served for the rest of the world as main orientation poles.

In the present work the position of the "rest-of-the-world" countries relative to the Triad is studied as co-authoring partners and as source of citations. This position can be impressively presented in ternary plots. Such diagrams were originally developed for visualizing the composition of ternary systems (in physical chemistry and geology, among others; see Wikipedia insert). Several commercial and non-commercial softwares aid the construction of such "triplots"; for our purposes the freeware "Triplot 4.0.2" by Todd Thompson Software (http://php.indiana.edu/~tthomps/programs/html/tnttriplot.htm) was found to be a perfectly satisfactory tool.

The data used in our analysis were retrieved from the Web of Science database (presently owned by Thomson-Reuters); source data for the years 1992, 2000 and 2002 were considered, citations to the publications of the year 2000 were retrieved in the period 2000-2002. Both cited and citing papers were assigned to countries on the basis of the institutional affiliation of their authors. In case of international co-operation, on the cited side, each contributing country was credited by a full count; on the citing side, counts were fractionated equally among the contributing countries. This way, citation counts can easily be partitioned into regional components by direct summation. To ensure comparisons in time, EU15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK) was regarded as "EU" independently of the actual situation in the given year.

Wikipedia: Ternary plot

A ternary plot, ternary graph, triangle plot, simplex plot, or de Finetti diagram is a barycentric plot on three variables which sum to a constant. It graphically depicts the ratios of the three variables as positions in an equilateral triangle. It is used in petrology, mineralogy, metallurgy, and other physical sciences to show the compositions of systems composed of three species. In population genetics, it is often called a de Finetti diagram. In game theory, it is often called a simplex plot.

In a ternary plot, the proportions of the three variables a, b, and c must sum to some constant, K. Usually, this constant is represented as 1.0 or 100%. Because a + b + c = K for all substances being graphed, any one variable is not independent of the others, so only two variables must be known to find a sample's point on the graph: for instance, c must be equal to K – a – b. Because the three proportions cannot vary independently, it is possible to graph the intersection of all three variables in only two dimensions.

A ternary plot is drawn as triangle. Each base, or side, of the triangle represents a proportion of 0%, with the point of the triangle opposite that base representing a proportion of 100%. As a proportions increases in any one sample, the point representing that sample moves from the base to the opposite point of the triangle.

(Source: http://en.wikipedia.org/wiki/Ternary_plot)

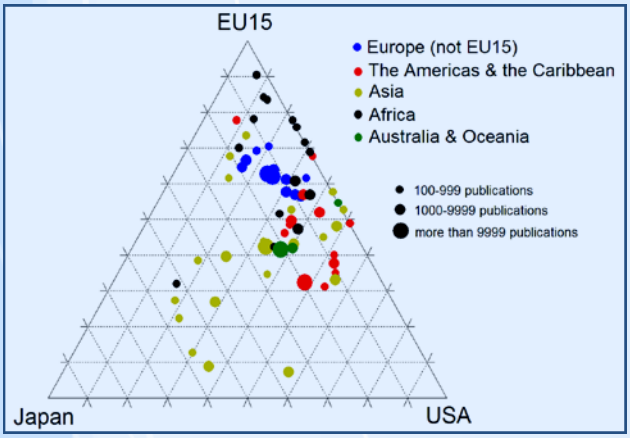

Figure 1a Co-authorship triplot, 1992

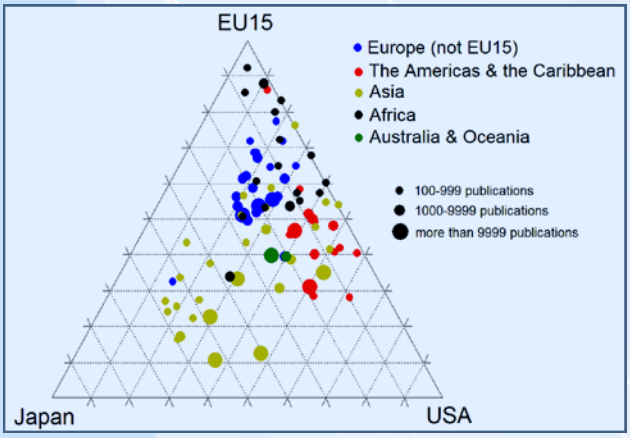

Figure 1b Co-authorship triplot, 2002

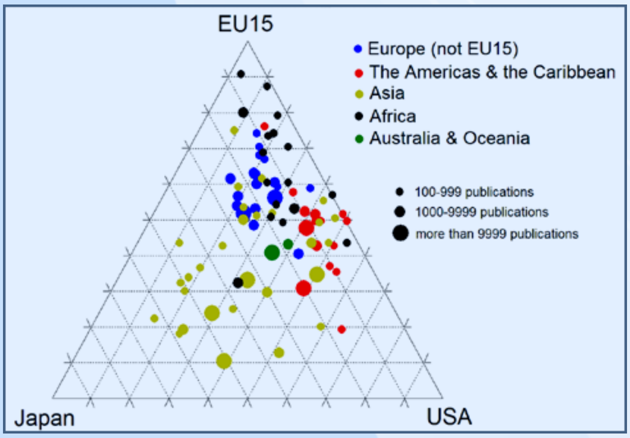

Figure 2a Co-authorship triplot, 2000

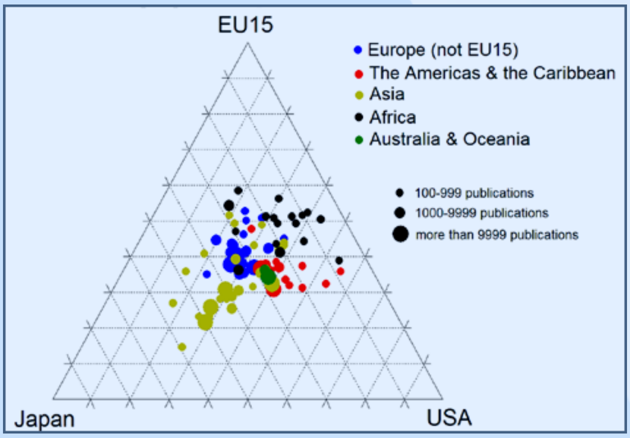

Figure 2b Cross-citation, 2000

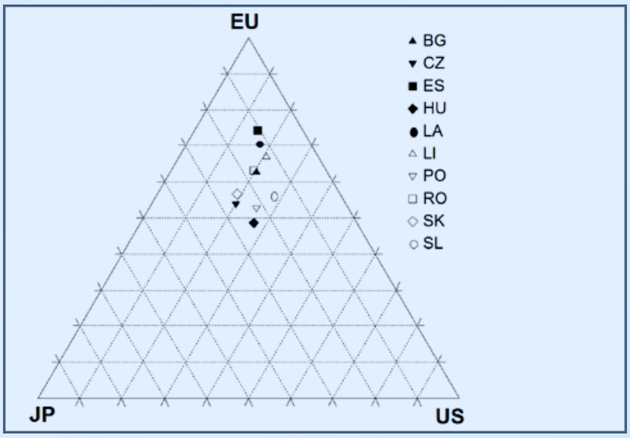

Figure 3 Co-authorship triplot of the ten new member states of the EU, 2000

Figures 1a,b present the co-authorship triplots for the years 1992, and 2002, respectively. Although the general picture shows a remarkable stability, there is a definite drift of several European countries towards Japan.

Figures 2a,b show the co-authorship and cross-citation plots for the year 2000. Although the relative position of the countries of the five regions is fairly similar in both diagrams, the entire cross-citation plot is contracted towards the centre. This means that while the citation preferences parallel the co-authorship preferences, the latter are much tighter bounds - obviously because of the greater significance of geographical distance.

Figure 3 focuses on the ten new member states of the EU (BG: Bulgaria, CZ: Czech Republic, ES: Estonia, HU: Hungary, LA: Latvia, LI: Lithuania, PO: Poland, RO: Romania, SK: Slovakia, SL: Slovenia). In 2000 (then, as candidate states), the Baltic countries showed the tightest co-authorship attachment to the EU15, whereas the Czech Republic, Poland and, most particularly, Hungary had positions closest to the Japan-USA axis.

In summary, the the ternary plot seems to be a useful supplementary tool in the presentation of scientometric indicators. It may reveal relations and changes that otherwise might remain hidden. Its 'Triad'-related application proved to be particularly impressive and instructive.

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WORDLE:
ANOTHER VISUALISATION

Olle Persson has already contributed to this issue with a nice mapping, but he has drawn our attraction to another – more playful and very artistic – visualisation tool, too. As the author, Jonathan Feinberg himself describes his Java Applet on its website (http://wordle.net/), *"Wordle is a toy for generating "word clouds" from text that you provide. The clouds give greater prominence to words that appear more frequently in the source text. You can tweak your clouds with different fonts, layouts, and color schemes. The images you create with Wordle are yours to use however you like. You can print them out, or save them to the Wordle gallery to share with your friends."*

Our valued colleague, Olle Persson did not only recommend Wordle to us, but he also prepared a demo image. For the sake of simplicity, he took the contributors of the ISSI2007 conference and retrieved the most cited first authors in conference papers. See the result à la Wordle below!

As this sample suggests, Wordle is an excellent visualisation toy: very simple, easy to use and fun to play around with. Nonetheless, it is not a professional tool: as the author himself remarks, it's strongest limitation is that it does not deal with inflections and other word variations. But its artistic quality amply consoles us for the lack of this function that would obviously require a huge word database and sophisticated stemming algorythm in the background, which understandably exceeds the aims and possibilities of such a venture as this little applet.

So, go ahead and try it out yourself!

Click on this link to create your own Wordle word cloud: http://wordle.net/create

:: op + bs ::