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CONTENTS

EDITORIAL

page 56

CALL FOR PAPERS

VIIth International
Seminar on the Quan-
titative and Qualitative
Study of Science and
Technology “*prof. Gil-
berto Sotolongo Aguilar*”
page 57

CONF. REPORTS

9th International
Conference on WIS
& I4th COLLNET
Meeting
page 59

esss 2013
– Back to Berlin
page 61

18th Nordic Work-
shop on Bibliomet-
rics and Research
Policy 2013
page 67

Report on the SIG/
MET Workshop
at the 2013 ASIST
Annual Meeting
page 68

The 8th International
Conference on Sci-
entometrics and Uni-
versity Evaluation
page 70

ARTICLES

**H. Lietz &
R. Rousseau:**
A Mathematical
Relationship between
Growth and Scaling
in an Exponentially
Growing Biblio-
graphic System
page 74

EDITORIAL NINETY-NINE.

YEP, AS THE END OF THE YEAR IS APPROACHING it's high time for summarizing the Newsletter's yearly performance again.

Our authors wrote about 170 000 characters (note: 13% of which is mere space! how inefficient and wasteful!) in about 27 000 words this year. It's hardly 60% of the length of *Fahrenheit 451*, but on the positive side our articles are at least 99% less depressing (subjective estimation) than Ray Bradbury's novel. What Bradbury definitely can't compete with (beyond scientific quality, of course) is the non-textual content of the Newsletter: 40 photos, 9 charts and 12 tables scattered the articles in 2013. Lovers of mathematics became richer by no less than 24 equations throughout the year. Not surprisingly our authors' most frequently used digit was one but who would have thought that our contributors use 20% more vowels than that is considered regular by *wiki answers* or that they use nearly 4 times as many colons as question marks?

And last but not least another important fun fact: the ISSI Newsletter says good bye to 2013 with just one person short of its hundredth (100!) author. We'll see soon who the lucky one will be!

Dear All, thanks for contributing to and reading the Newspaper. Have a Happy New Year & see you in 2014, too!

[Speaking of what: if your membership has expired recently or is about to expire now, please, don't forget to renew it (<http://www.issi-society.org/join.html>) to maintain access to contents & benefits available for members only.]

Balázs Schlemmer, technical editor

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VIIth INTERNATIONAL SEMINAR ON THE QUANTITATIVE AND QUALITATIVE STUDY OF SCIENCE AND TECHNOLOGY “PROF. GILBERTO SOTOLONGO AGUILAR”

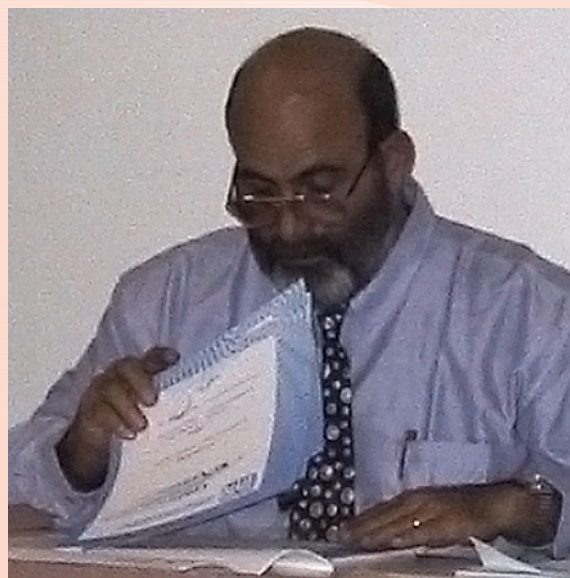
16-17 APRIL 2014, HAVANA, CUBA

CALL FOR PAPERS

This is the seventh edition of the international seminar held under the auspices of the biennial INFO congress. The first seminar took place on April 25, 2002 and has been held every two years since then to provide a forum for the identification of institutions and research interests in the field as well as a space for discussion between the different researchers and actors that participate in this important area of work. Additional information on the seminar and the papers presented in previous editions can be found at <http://www.dynamics.unam.edu/alci/>

Due to the success achieved by the seminar and as petitioned by the participants the organizing committee of INFO considers the seminar as a permanent part of their congress.

The seventh seminar will take place on the 16th and 17th of April within INFO 2014 International Congress of Information, at the Palacio de las Convenciones, Havana, Cuba, from April 14th-18th.



Prof. Gilberto Sotolongo Aguilar

The scientific committee invites interested researchers and colleagues to send research studies, review papers and case studies completed or in progress, related to the quantitative and/or qualitative studies of science

and technology. Bibliometric, Scientometric, Informetric, Patentometric, and Webometric studies are of particular relevance, without discounting the importance of qualitative analytical methods and approaches.

RELEVANT TOPICS FOR THE VIIth SEMINAR ARE:

- ▶ Scientific communication models (systems approaches, mathematical models, etc.)
- ▶ Patterns of communication, collaboration, information flows in S & T, migration (citation analysis, journal impact factors, national and international flows, etc.)
- ▶ Scientific production (disciplines, gender studies, research departments, institutes, countries, etc.)
- ▶ Literature dynamics (history, growth, obsolescence, scattering, S&T relations, etc.)
- ▶ Indicators to support decision making in science policy (economics, organization and management, information and communication technologies, resource management, foresight, impact, evaluation)
- ▶ Visualization and organization of information for bibliometrics, scientometrics and webmetrics/cybermetrics.
- ▶ Theoretical aspects of the qualitative and quantitative study of science and technology.
- ▶ Analysis, design and application of software.
- ▶ Data and text mining techniques in indicator construction.

Colleagues interested in presenting their work at the Seminar should send their contributions clearly indicating the names of the authors, their institutional adscriptions and including: (1) abstract (2) background (3) objectives (4) methodology/focus (5) main results (final or expected) and conclusions (6) references.

Although Spanish is the official language of the seminar papers in other languages (Portuguese or English) will be accepted at the discretion of the Organizing Committee.

IMPORTANT DATES:

Submission of full papers:

by January 15th, 2014

Notification of acceptance:

by February 15th, 2014.

Contributions should be sent electronically to seminario@finlay.edu.cu. For more information on formatting requirements for the full papers (length, font, structure, summary, keywords, etc.) as well as general information on the INFO Congress (registration, hotel reservations, etc.) please visit the official congress website: <http://www.congreso-info.cu>.



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THE 9th INTERNATIONAL CONFERENCE ON WEBO- METRICS, INFORMETRICS AND SCIENTOMETRICS (WIS) & 14th COLLNET MEETING

15-17 AUGUST 2013, TARTU, ESTONIA

HOSTED BY ESTONIAN RESEARCH COUNCIL AND COLLNET

<http://www.etag.ee/international-research-cooperation/collnet-2013/?lang=en>



ÜLLE MUST
Local Chair



HILDRUN KRETSCHMER
General Chair

INTRODUCTION

The 9th International Conference on Webometrics, Informetrics and Scientometrics & 14th COLLNET Meeting took place in Tartu, Estonia, on 15-17 August 2013. This joint meeting was organised under the auspices of the international organisation COLLNET and by the Estonian Research Council, Tartu, Estonia.

This event is part of a successful conference series. Previous COLLNET meetings (www.collnet.de), part of which were jointly organised with other events, such as for nine years with the international conferences on Webometrics, Informetrics and Scientometrics (WIS), had been held in Berlin (Germany) in 2000, New Delhi (India) in 2001, Sydney (Australia) in 2001, Beijing (China) in 2003, Roorkee (India) in 2004, Stockholm

(Sweden) in 2005, Nancy (France) in 2006, New Delhi (India) in 2007, Berlin (Germany) in 2008, Dalian (China) in 2009, Mysore (India) in 2010, Istanbul (Turkey) in 2011 and in Seoul (South Korea) in 2012.

ABOUT THE CONFERENCE

The 9th International Conference on Webometrics, Informetrics and Scientometrics (WIS) & 14th COLLNET Meeting attracted more than 80 participants from more than 24 countries. At the conference, six keynote lectures were presented, in particular, Wolfgang Glänzel (Belgium) delivered a talk on “Characteristics of co-authorship patterns of individual scientists”, Hildrun Kretschmer, Theo Kretschmer & Johannes Stegmann (Germany) on “Growth and special change of collaboration patterns obtained from PNAS, the Journal of Experimental Medicine and from SCIENCE”, Ronald Rousseau (Belgium) on “The outgrow index and related indicators – including a dedicated software program”, V. A. Markusova (Russia), Libkind, A.N. (Russia), Mindeli, L.E. (Russia) and Jansz, M. (The Netherlands) on “Bibliometric performance in two main research domains: The Russian Academy of Sciences and the Higher Education Sector”, I.K. Ravichandra Rao (India) on “Weak relations among the Impact Factors, number of citations, references and authors” and Jean-Charles Lamirel (France) on “The exploitation of feature maximization metric in scientometrics: a global survey”. The variety of topics given by the keynotes is also mirrored by the about 40 oral and poster contributions. The parallel sessions were mainly focused on the following topics: Theoretical Approaches and Methodology, Citations and Evaluation, Communication and Collaboration, World Wide Web, Webometrics, and Networking, Technology Oriented Studies, National Oriented Studies and Miscellaneous.

Besides the Proceedings of the WIS & COLLNET Meeting provided to the par-

ticipants of the conference in Seoul, a selection of keynote and contributed papers will be published in 2014 in dedicated issues of the international COLLNET Journal of Scientometrics and Information Management (Taylor & Francis Group, UK co-published by TARU Publications) Vol.7#1 (June 2013) issue of COLLNET Journal of Scientometrics and Information Management, (ISSN 0973-7766), half-yearly, was released at the Conference. The journal publishes original research papers. The journal is available in print and online at www.tandfonline.com.

AWARDING CEREMONY OF THE “FELLOW OF INSTITUTE OF SCIENTOMETRICS AWARD”

The “Fellow of Institute of Scientometrics Award” is awarded on August 17 by the members of the organizing committee of the 2nd National Conference on Scientometrics and Knowledge Management, Karnataka University Library and the Coordinator of the Institute of Scientometrics, Dharwad, S.L. Sangam to Hildrun Kretschmer for her dedicated services to Scientometrics and Informetrics.

ABOUT THE ORGANISER

Estonian Research Council is a governmental foundation with responsibilities to distribute of institutional and personal grants and handle of grant applications, to assess of grants’ effectiveness, coordinate the international research cooperation and science communication activities, process of Estonian Research Information system

The following event of this conference series will be organised in the coming year. The 10th International Conference on Webometrics, Informetrics and Scientometrics (WIS) & 15th COLLNET Meeting will be held at the Ilmenau University of Technology, September 3-5, 2014, Ilmenau, Germany: www.tu-ilmenau.de/collnet2014/

esss 2013 – BACK TO BERLIN



CHRISTIAN
GUMPENBERGER¹



JUAN
GORRAIZ¹



WOLFGANG
GLÄNZEL²



KOENRAAD
DEBACKERE²



STEFAN
HORNBOSTEL³



SYBILLE
HINZE³

¹ University of Vienna, Vienna, Austria

² Katholieke Universiteit Leuven, Leuven, Belgium

³ Institute for Research Information and Quality Assurance (iFQ), Berlin, Germany

According to the annual rotation idea the fourth esss (European Summer School for Scientometrics) took place in Berlin from 8-13 September, 2013. It was again jointly organized by the University of Vienna (Austria), KU Leuven (Belgium) and iFQ (Institute for Research Information and Quality Assurance, Germany).

Like in the previous years, the whole week event was fully booked (50 seats) shortly after registration opened. The esss conference part was attended by 70 persons (excluding organizers, speakers and several representatives from industry).

This year's programme ran six days including a free pre-programme, a conference, seminars, hands-on sessions and a workshop. The conference took place in the Auditorium – Central Lecture Hall of the Jacob-und-Wilhelm-Grimm-Zentrum, a magnificent building named after the famous Brothers Grimm and planned by architect Max Dudler. The tutorial day as well as all esss seminars and hands-on sessions took place in seminar

room of the Institute for Social Sciences of the Humboldt University in Berlin.

esss 2013 started officially with a tutorial day on 8 September, which was a bibliometric crash course for esss participants. The attendees were familiarized with the main terms and concepts of bibliometrics by Wolfgang Glänzel (ECOOM & KU Leuven, Belgium), followed by a short discussion with the participation of other members of the esss steering committee.

His presentation was followed by Thomson Reuters and Elsevier database tutorials.

Tihomir Tsenkulovski (Customer Education Specialist, Thomson Reuters) gave a user-oriented introduction to “Navigation, search and analysis features of the Web of Knowledge Platform”. Then

Arthur Eger (Elsevier) presented Scopus as “A Tool for Bibliometricians”.

esss 2013 was officially opened on 9 September by Sybille Hinze (iFQ, Germany), who gave a warm welcome to the attendees of the two days esss conference. Conference



Picture 1. Tutorial Day



Picture 2. Sybille Hinze and Éric Archambault

day 1 was as usually dedicated to “Theoretical and Practical Aspects” of scientometrics. Stefan Hornbostel (iFQ, Germany) started with a concise overview of the “History and Institutionalization of Scientometrics”, followed by Sybille Hinze, who gave a brief introduction to “Scientometric indicators in use: an overview”, and Wolfgang Glänzel, who presented the “Mathematical Foundation of Scientometrics”.

After the lunch break, Éric Archambault (Science-Metrix, Canada) briefly examined the origin and current state of the art of journal classifications in bibliometrics, followed by Wolfgang Glänzel who pointed out which bibliometric methods can be used for a satisfactory subject or field delineation.

After the coffee break, Bart Thijs (ECOOM & KU Leuven, Belgium) focused on different measures of relations between



Picture 3. Leuven's group: Koenraad Debackere (foreground), Bart Thijs and Wolfgang Glänzel (not in picture)



Picture 4. Christian Gumpenberger and Anthony van Raan

entities tackling both the classical approaches as well as the new techniques of network analysis and mapping science in an application-oriented approach within a solid theoretical framework. Finally, Koenraad Debackere (KU Leuven) analysed the “Policy Use of Bibliometric Evaluation and its Repercussions on the Scientific Community”.

The overall topic of conference day 2 (10 September) was “Individual and Insti-

tutional Evaluation”, where science policy makers, scientists and librarians shared their gained experiences from their corresponding institutions.

Anthony van Raan (Leiden University, Netherlands) set the stage and talked about “Advanced bibliometric methods for evaluation of research groups, ranking and benchmarking of universities, and mapping of research related to socio-economic issue”.



Picture 5: Erik Arnold and his audience



Picture 6: Bibliometric Agora with Stefan Hornbostel, Rainer Lange and Hans-Dieter Daniel

This year we had the pleasure to welcome Erik Arnold, Managing Director at Technopolis in the UK and Chairman of the Technopolis Group and also Professor of International Innovation at the University of Twente, as a keynote speaker. In his presentation “Evaluating Research-Performing People and Institutions: Bibliometrics in Context” he described trends in R&D evaluation studies over the past 20-30

years, the evolution of evaluation tools and the growing role of bibliometrics. He also provided examples of organizational evaluations at the level of research funders, national performance-based funding systems and programme evaluations.

Afterwards, Henk Moed (Senior Scientific Advisor, Elsevier) spoke about “New developments in bibliometrics and research assessment”. His presentation consisted of

two parts. The first part was an introduction to the use of bibliometric indicators in research assessment, showing the boundaries of the “playing field”, and also highlighting important rules of the game. The second part covered major trends in the field of bibliometrics, and focused on the creation of large, compound databases by combining different datasets. Typical examples were the integration of citation indexes with patent databases and with “usage” data on the number of times articles are downloaded in full text format from publication archives; the analysis of full texts to characterize the context of citations; and the combination of bibliometric indicators with statistics obtained from national surveys.

In the next presentation, Jeff Clovis, who has been working in the field of Information Sciences for the past thirty years at Thomson Reuters (formerly ISI and Thomson Scientific), shed light on German research university collaboration, focusing on the top 10 German Research Universities in several different major categories in different periods of time.

The afternoon session started with Hans-Dieter Daniel, who holds a dual professorship at ETH Zurich and at the University of Zurich. He is director of the Evaluation Office of the University of Zurich (since 2001) and Professor for Social Psychology and Research on Higher Education at ETH Zurich (since 2002). Daniel shared his experiences gained at the Evaluation Office of the University of Zurich with the participants.

In his presentation “Off to New Horizons: the Crucial Role of Libraries in Bibliometric Analyses”, Christian Gumpenberger (Univ Vienna) proved why the Bibliometrics Department in Vienna, implemented within the Library and Archive Services of the University of Vienna, can serve as a role model for other academic librarians who wish to become more engaged in this field or even plan to implement according services.

In the last presentation of the conference part, Rainer Lange (German Council of Science and Humanities – Wissenschaftsrat, Germany) talked about “The Role of Indi-

cators in Informed Peer Review: Practical Observations”. He stressed the fact that professional scientometric analyses need to be taken with a pinch of salt. Indicators do not necessarily speak for themselves, but require further interpretation by experts. Drawing on several years of research assessment practice earned while organizing the pilot phase for a German research rating, he discussed both the added value of indicators for peer review and the corrective function of peer review for scientometric analysis.

Conference day 2 concluded with a Bibliometric Agora moderated by Stefan Hornbostel, offering an open discussion of controversial issues in individual and institutional evaluation and featuring Rainer Lange and Hans-Dieter Daniel as panelists.

The last 3 days (11-13 September) were all about the true nature of a summer school: seminars, hands-on sessions, group work and presentations all taking place in one big seminar room fully equipped with laptops. Like last year a maximum number of 50 people could participate.

11 September was dedicated to “Data sources, Data Cleaning & Impact Measures”. The day started with Matthias Winterhager (Bielefeld University, Institute of Science and Technology Studies (IWT), Germany) who presented “Data cleaning and Processing”. Wolfgang Glänzel then talked about “Author Identification” and Marion Schmidt (iFQ) about “Validation of publication data: Objectives, Tools, Processes and Results”.

In the afternoon, Wolfgang Glänzel and Juan Gorraiz presented “Journal Impact Measures”. The imparted theory was then consolidated in practical hands-on exercises in the afternoon.

The focus topics in the morning of 12 September were “Subject Normalization for Citation Analysis”, by Wolfgang Glänzel, “The Funding Acknowledgements in the Thomson Reuters Database: Potentials and Problems of a New Bibliometric Data Source” by Daniel Sirtes (iFQ) and “Research Collaboration Measured by Co-Authorship” by Wolfgang Glänzel.



Picture 7: Olle Persson & co at Gerichtslaube

In the afternoon, Olle Persson (Sociology Department, Umeå universitet, Sweden) continued with a lecture on Bibexcel, an open-source software for Mapping Science. He introduced the basic required skills in order to produce maps with special reference to bibliometric data.

The workshop “Research Evaluation in Practice” was scheduled for 13 September. After a brief introduction, the participants were asked to work on specific tasks in small groups. The students were also encouraged to visualize the results using the mapping tool introduced in the preceding day.

Group work was individually supported by Wolfgang Glänzel, Sybille Hinze, Juan Gorraiz, Christian Gumpenberger, Daniel Sirtes and Marion Schmidt.

Furthermore two social events were offered. The first one was a three hours Berlin boat tour on the Spree river, which included the government district as well as the historic Berlin. The second one was a 3-courses dinner in a historic restaurant named “Gerichtslaube”, which is claimed to be one of the earliest surviving structures of Berlin.

esss 2013 was truly an international event beyond European borders with participants from 35 countries (Armenia, Austria, Belgium, Canada, Croatia, Czech Republic,

Denmark, Estonia, Finland, France, Germany, Greece, Hungary, India, Iran, Ireland, Italy, Japan, Latvia, Lithuania, Luxemburg, Mexico, Netherlands, Poland, Portugal, Russia, Saudi Arabia, Singapur, South Africa, South Korea, Spain, Sweden, Switzerland, United Kingdom, United States).

The overall feedback was again very positive and inspiring to not only maintain, but continuously improve this highly demanded international initiative. The organizers are looking forward to next year’s event held at the University of Vienna in Austria, July 6-11. Participants can expect less theory in favour of more hands-on training. Our focus topic will be “Bibliometric in the Social Sciences and Humanities”. Registration for 2014 will only open after Easter. Further announcements will be made via the esss website (www.scientometrics-school.eu) and via the esss mailing list (to register please send an informal email to office@scientometrics-school.eu).

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18th NORDIC WORKSHOP ON BIBLIOMETRICS AND RESEARCH POLICY 2013



STAFFAN KARLSSON

Kungliga Tekniska Högskolan, Sweden

During two days in late October the 18th Nordic workshop on Bibliometrics and Research Policy was held at the Royal Institute of Technology, Stockholm, Sweden. The interest for this workshop has grown over the years and the 2013-meeting attracted 70 participants. The geographical spread of the participants has also increased. The Nordic participants being in minority, most participants (60%) came from other parts of Europe. The participants came from research institutions, university libraries, founding agencies and the business sector.

As usual for these Nordic workshops a wide spectrum of topics were presented in the 20 talks given.¹ The key-note talk was given by Dr Ismael Rafols, Ingenio (CSIS-UPV) & SPRU, "Towards indicators for 'opening up' science and technology policy". The themes of other talks ranged from methodology, comparing data sources over metrics



Photo: © Balázs Schlemmer

of individuals and gender aspects to performance of universities and countries. Relatively many of the talks addressed the Humanities and Social Sciences. Possibly an effect of last year's meeting in Helsinki when a special workshop on Bibliometrics for the Social Sciences and Humanities was held.²

Next year's meeting will be held on Iceland.

¹ The program and some of the power point-presentations can be found at: <http://www.kth.se/en/ece/2.51737/the-18th-nordic-workshop-on-bibliometrics-and-research-policy-2013-1.372953>

² See: <http://blogs.helsinki.fi/nbw-2012/nordforsk-workshop-on-bibliometrics-for-the-social-sciences-and-humanities-ssh/>

REPORT ON THE SIG/MET WORKSHOP AT THE 2013 ASIST ANNUAL MEETING

SUBMITTED BY THE OFFICERS OF SIG/MET

The American Society for Information Science & Technology (ASIS&T) Special Interest Group for Metrics (SIG/MET) held its third annual Workshop on Informetric and Scientometric Research at the ASIS&T Annual Meeting in Montreal, Canada on November 2, 2013. This full day event, sponsored by Elsevier and Thomson Reuters, attracted 30 attendees. The workshop consisted of two poster and thirteen paper presentations by authors from nine countries. As in previous years, the SIG recognized outstanding student contributions by acknowledging three student submissions with awards. This year's winner was Fereshteh Didegah of the University of Wolverhampton in the United Kingdom. Two additional student submissions, by Ehsan Mohammadi, also of the University of Wolverhampton, and Qi Wang of the KTH-Royal Institute of Technology in Sweden, were recognized for high merit. A summary of the presentations appears below.

POSTERS

- ▶ Jongwook Lee, *Measuring a research dimension of academic mentoring*
- ▶ Burak Özköse, *Conversion of reproductive biology meeting abstracts to publications*

APPLICATION OF METRICS

- ▶ Katherine McCain, *Charting the rise of the zebrafish as a model organism: Persistent co-author networks, 1980-2004*
- ▶ Bradford Demarest, *Measuring identities and differences in epistemic communities in political sub-reddits: A novel-machine-learning-based metric*
- ▶ Kimberly Powell & Shenita Peterson, *Measuring nursing publication impact and faculty metrics: Web of Science vs. Scopus*

NEW MEASURES

- ▶ Dietmar Wolfram, Feifei Wang, & Yuehua Zhao, *The assessment of journal similarity using citation journal topicality: Results from two investigations*
- ▶ Dangzhi Zhao & Andreas Strotmann, *Combining author co-citation and bibliographic coupling analyses for the study of research trends*
- ▶ Masaki Eto, *Document retrieval method using random walk with restart on co-citation network*

Photo: courtesy of © Stefanie Haustein



Photo of Judit Bar-Ilan modeling one of the t-shirts provided by Thomson Reuters

BEYOND THE JOURNAL ARTICLE

- Timothy Bowman, Isabella Peters, Stefanie Haustein, & Kim Holmberg, *#twin-kletweet: Hashtag use of astrophysicists on Twitter*
- Chaoqun Ni & Cassidy R. Sugimoto, *Doctoral mentoring and protégé scholarly performance: A preliminary examination in Sociology*
- Hadas Shema, Judit Bar-Ilan, & Mike Thelwall, *Classifying motivations for research blog posts—preliminary results*
- Staša Milojević, Cassidy Sugimoto, Vincent Larivière, Mike Thelwall, & Ying Ding, *The role of handbooks in knowledge creation and diffusion: A case of science studies*

STUDENT PAPER AWARD WINNERS

- Fereshteh Didegah & Mike Thelwall, *Modelling article citation impact factors using an integrated statistical method*
- Ehsan Mohammadi & Mike Thelwall, *Mendeley readership altmetrics for the social sciences and humanities: Research evaluation and knowledge flows*
- Qi Wang & Ulf Sandstrom, *Cognitive distance and peer review: A study of a grant scheme in infection biology*

The symposium wrapped up with a tel-conference by Gali Halevi, Senior Research Analyst & Program Director of The Informetrics Research Group of Elsevier, Inc., who outlined the availability of a Scopus dataset consisting of bibliographic content from Arts and Humanities journals. The dataset is being made available to researchers for scholarly investigation.

More information about SIG/MET and this year's workshop may be found on the SIG's website at:

<http://www.asis.org/SIG/SIGMET/>

THE 8th INTERNATIONAL CONFERENCE ON SCIENTOMETRICS AND UNIVERSITY EVALUATION

7-10 NOVEMBER 2013, NINGBO (CHINA)



LOET LEYDESDORFF
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While preparing for a visit to my coauthors Fred Ye at Nanjing University and Ping Zhou at the Zhejiang University in Hangzhou, I received an invitation to attend in that same period the 8th International Conference on Scientometrics and University Evaluation which would be particularly dedicated to the celebration of the 15 years of collaboration with Ronald Rousseau. I knew that Ronald had been to China quite a number of times, but I did not know that he had coauthored with more than 50 Chinese colleagues. I jokingly asked whether the meetings would perhaps be in Dutch? Anyhow, Ping, Fred, and I changed our schedule so that we could attend. A number of more than hundred

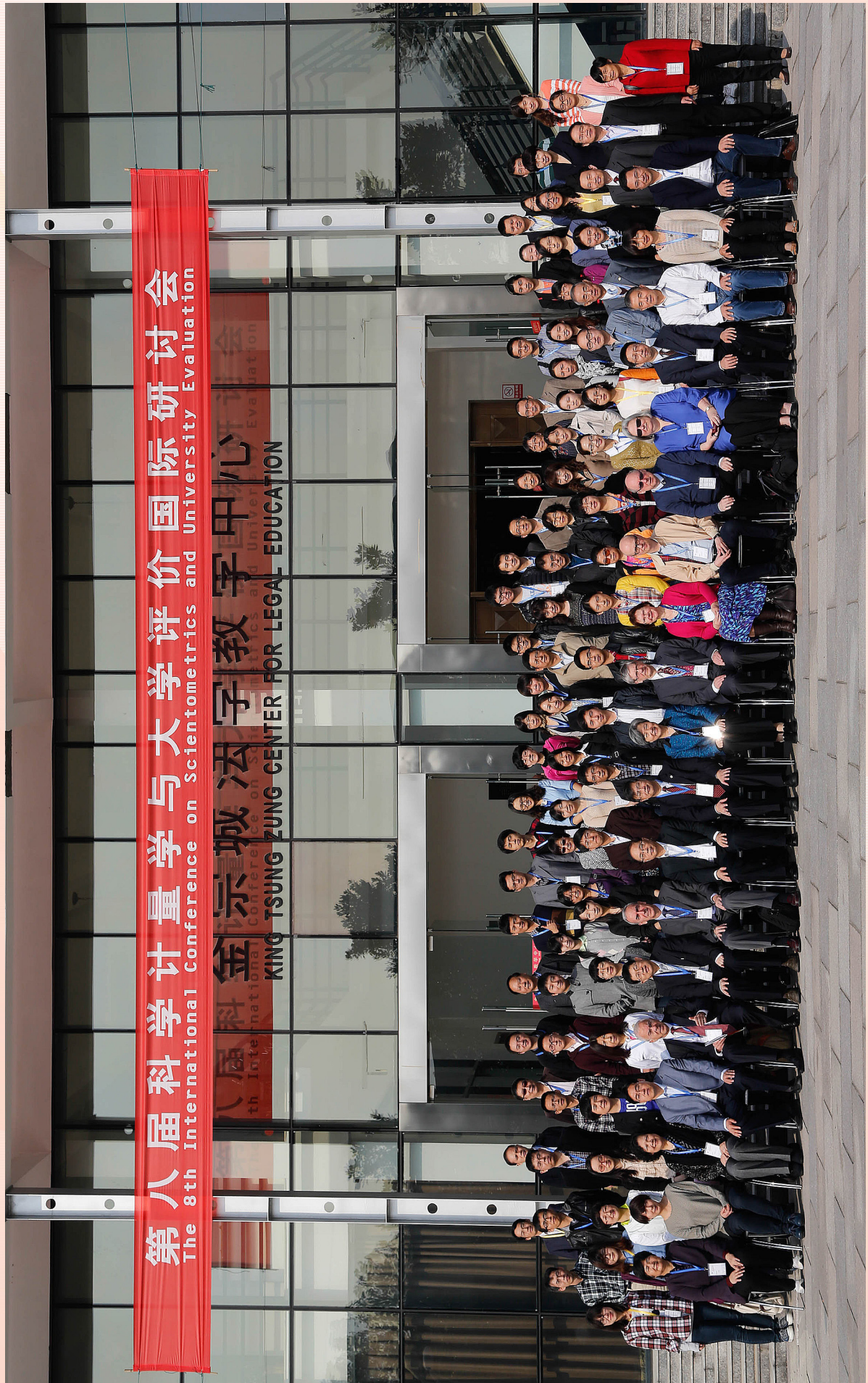
Chinese scholars and a handful of internationally invited speakers gathered for this meeting; we listened to more than 30 plenary presentations on November 7 and 8. The organizers had added a bus tour as a social event on Saturday, November 9.

This 8th Conference in a series that began in Beijing, was organized by the Chinese Association for Science of Science and S&T Policy, in collaboration with the Ningbo Institute of Technology of Zhejiang University and the National Science Library of the Chinese Academy of Sciences. It received financial support from Elsevier and Thomson Reuters. The three organizing institutions were represented by Yishan Wu, Chair



of the special interest group on scientometrics and informetrics, Weiliang Jin, dean of Ningbo Institute of Technology, and Xiaolin Zhang & Zhiqiang Zhang, director and assistant director of the National Science

Library of CAS. Yishan Wu and Liying Yang were the hosts of the conference, supported by many colleagues and students of the Ningbo Institute of Technology and of the National science Library.





Internationally invited speakers included Per Ahlgren (Stockholm), Wolfgang Glänzel (Leuven), Steve Wenbin Liu (Kent), Ronald Rousseau (Oostende), Elias Sanz-Casado (Madrid), and myself (Amsterdam). This conference offered an excellent occasion to hear how Chinese colleagues take part in the international forefront of the field. In addition to those colleagues already mentioned above, speakers further included Rongying Zhao, Yuxian Liu, Xiaojun Hu, Ping Zhou, Li Tang, Hui Ma, Weiping Yue, Junping Qiu (all well-known from their contributions in e.g. Scientometrics) and Ying Cheng (Shanghai Jiaotong University, ARWU ranking).

The second afternoon was devoted to Ronald Rousseau for his 15-year collaboration with Chinese colleagues. In this session Rousseau recalled his many visits to China—illustrated with photographs—while Liang Liming, Bihui Jin, Fred Y. Ye, and Weiping Yue applied informetric tools on Rousseau's career. Guohua Jiang, who was the first to invite Rousseau to China (December 1998) recalled the period of the

first Chinese scientometricians such as Hongzhou Zhao (who published at the time in *Scientometrics*) and how they came into contact with Derek de Solla Price. When Price and Zhao both died early and unexpectedly, Chinese scientometrics entered a second phase, which, according to Jiang, is characterized by the intense collaboration of Chinese colleagues with Ronald Rousseau and many other Western colleagues.

The Chinese contribution to our field can hardly be underestimated: the flourishing of scientometrics (bibliometrics, informetrics) as increasingly a specialty in itself has been made possible by the participation of Chinese scholars, both at the level of PhD students coming to the West and in terms of mutual visits of tenured staff often enabled by scholarships of Chinese funding programs. Needless to say that the organization of this conference was perfect. On behalf of the international guests, I wish to thank the organizers for the opportunity to participate in this event. The exchanges provided an opportunity to explore options for future collaborations.

A MATHEMATICAL RELATIONSHIP BETWEEN GROWTH AND SCALING IN AN EXPONENTIALLY GROWING BIBLIOGRAPHIC SYSTEM



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Abstract: We establish a mathematical relationship between growth and scaling in an exponentially growing bibliographic system with constant growth in citations per normalized number of publications.

Keywords: scaling; exponential growth

1. INTRODUCTION

In bibliometric evaluation, contractees frequently request the quantification of the growth of indicators. That is, they want to

know the growth of certain objects of study over a time span in one number. Sometimes (see e.g. Schmoch et al., 2006), the request for the growth of the number of publications is met by providing the Sharpe Ratio

– a kind of weighted, average, normalized, annual growth rate (Sharpe, 1994).

Recently Lietz and Riechert (2013) have shown that the Sharpe Ratio can also be applied to bivariate indicators such as productivity (number of publications per author) and discussed scaling exponents (Bettencourt et al., 2008) as an alternative to this approach. Scaling analysis can be considered a modeling technique but it can also be used for evaluation purposes. However, it is only applicable to bivariate data. In the case of publications and authors, the scaling exponent is a system-specific descriptor of how productivity changes as the number of authors of an object of study varies over time.

Calculating the Sharpe Ratio and performing scaling analysis are two different perspectives on growth, the former relying on simple parametric statistics, the latter studying systems' not necessarily linear evolutionary dynamics. Recall that the Sharpe Ratio is a normalized and weighted indicator, properties the exponent does not have. Nevertheless, studying the productivity (number of journal articles per author) in 27 scientific disciplines using the *Scopus* database in time windows of up to 13 years, the Pearson correlation of the Sharpe Ratios and scaling exponents was shown to be at least 0.67 (Lietz & Riechert, 2013).

This correlation remains to be explored mathematically. To do so, we relate the simple average annual growth rate of a system to its scaling exponent. Further assuming that growth is constant, our question is: What is the scaling exponent if this constant growth rate is given? Instead of productivity, we use the notation of impact (citations per publication) because CpP is more established as an indicator, but the basic idea is the same. Scaling analysis of impact was pioneered by Katz (1999), be it in a structural, not dynamical sense. Recent applications related to scaling include (Gao & Guan, 2009; Gao et al., 2010).

2. NOTATIONS

Let $p(t)$ be the size of a publication corpus at time t and $p(0) > 0$. Assuming exponential growth we have

$$p(t) = p(0)e^{at} \quad (1)$$

where we assume that $a > 0$ is a constant. We normalize the number of publications by introducing

$$q(t) = \frac{p(t)}{p(0)} \quad (2)$$

leading to

$$q(t) = e^{at}. \quad (3)$$

In this way $q(0) = 1$.

The total number of citations received by this corpus at time t is denoted by $c(t)$. Normalizing in a similar way we introduce

$$d(t) = \frac{c(t)}{c(0)}. \quad (4)$$

Next, we come to our research question by making two more assumptions:

1) $d(t)$ and $q(t)$ scale as

$$d(t) = q(t)^\beta \quad (5)$$

where β is the scaling exponent.

2) d/q has a constant growth rate $g > 0$, expressed as

$$d(t) = q(t)(1+g)^t. \quad (6)$$

3. RELATIONSHIP BETWEEN GROWTH AND SCALING

Our research question stated in the introduction translates into: What is the relationship between the constants g and β ?

From equation (3) we obtain

$$t = \frac{\ln(q(t))}{a}. \quad (7)$$

Putting equation (3) into (6) we get

$$d(t) = e^{at}(1+g)^t = (e^a(1+g))^t \quad (8)$$

or

$$t = \frac{\ln(d(t))}{\ln(e^a(1+g))}. \quad (9)$$

Setting (7) equal to (9) we get

$$\frac{\ln(q(t))}{a} = \frac{\ln(d(t))}{\ln(e^a(1+g))} \quad (10)$$

or

$$\ln(d(t)) = \frac{\ln(e^a(1+g))}{a} \ln(q(t)). \quad (11)$$

Taking the natural exponential of (11) gives

$$d(t) = q(t)^{\frac{\ln(e^a(1+g))}{a}}. \quad (12)$$

Finally equations (5) and (12) lead to the desired relation:

$$\beta = \frac{\ln(e^a(1+g))}{a} = 1 + \frac{\ln(1+g)}{a}. \quad (13)$$

In words, in an exponentially growing publication corpus with a constant impact growth g the scaling exponent β describing the change in the normalized citations per publication is a function of g . Equation (13) provides the exact relation. For example: if $a = 1$ and $g = 0.05$, then $\beta = 1.05$; if $a = 1.2$ and $g = 0.1$, then $\beta = 1.08$.

4. CONCLUSION

We derived a theoretical formula for the scaling exponent in an exponentially growing bibliographic system with constant growth in citations per publications (CpP).

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