ISSI Newsletter

QUARTERLY E-NEWSLETTER OF THE INTERNATIONAL SOCIETY FOR SCIENTOMETRICS AND INFORMETRICS
ISSN 1998-5460

#48 / VOLUME 12 NUMBER 4
DECEMBER 2016

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SEMINAR REPORT

THE VIII INTERNATIONAL SEMINAR ON THE QUANTITATIVE AND QUALITATIVE STUDY OF SCIENCE AND TECHNOLOGY "PROFESSOR GILBERTO SOTOLONGO AGUILAR"

JANE M. RUSSELL

MARÍA VICTORIA GUZMÁN

The biennial *International Seminar on the Quantitative and Qualitative Study of Science and Technology "Professor Gilberto Sotolongo Aguilar"* was held last November in Havana, Cuba, once again as part of the larger Information Congress, INFO2016. The initial activity of the Seminar on November 2nd was the poster session followed by oral presentations over the next two days. Contributions were grouped by subject: thematic scientific production; institutional scientific output; information flows; research

ISSI e-Newsletter (ISSN 1998-5460) is published by ISSI (http://www.issi-society.org/).
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collaboration indicators; citation studies; methodological questions and proposals; S&T evaluation; tools for metric analysis; scholary evaluation. Sixteen posters were presented and 27 talks giving a total of 43 contributions. In addition, there were two keynote addresses. The majority of papers were from Cuba and Mexico with important contributions coming also from other regional countries such as Brazil and Peru. Europe was represented by Spain and Belgium/Hungary. Authors affiliated to universities were the most active participants as in previous editions of the Seminar.

The first keynote address was given by Dr. Wolfgang Glänzel from Belgium/Germany/Hungary in coauthorship with Lin Zhang of China and titled "Scientometric research assessment in the developing world: A tribute to Michael J. Moravcsik from the perspective of the 21st century". The second was presented by Dr. Jaime Aboites and his coauthor Dr. Claudia Díaz both from Mexico and entitled "Academic mobility in Mexico in the context of globalization from the study of patents". As a way of recognising and building on the pioneering work of Michael Moravcsik in the 1980s on the development of indigenous scientific capacity and sustainable scientific systems in developing countries, Dr. Glänzel tested three measures in 16 developing nations to examine these issues in the light of today's globalized world, namely: increase in international visibility and reception by the international com-

munity; international collaboration; and participation in research in emerging fields. Dr. Aboites on the other hand addressed the issue of the mobility of highly qualified Mexican inventors in recent decades by analysing data from United States Patents and Trademark Office (USPTO). Preliminary findings show an increase in the flow of Mexican inventors to multinational companies located outside the country following the implementation of the North American Free Trade Agreement (NAFTA).

The most recurrent general theme of the Seminar was Biomedicine. Studies varied from the analysis of scientific production in the field of vaccines and aseptic processing to collaboration networks in the Cuban biotechnology industry; citation patterns and their geographic origin in the biomedical literature and the definition of bibliometric indicators for the evaluation of research in pharmaceutical companies.

An interesting aspect of the Seminar was a focus on transdisciplinarity and the use of metric studies by specialists from other areas. Examples from Cuban participants were: metric analysis of citation and web usage of the BisoGenet tool in Bioinformatics and Systems Biology: a novel approach for the fusion of data by means of vectorial support machines and MOAS-Les as a tool to analyse Spanish texts. The programme also included applications for the analysis of Latin American scientific publications and those of Library Science; proposals for university technological ob-

servatories; geohistorical metric studies; use of photographic material in the press; and the characterization of S & T development of the northeast region of Mexico. The poster session was also very popular and informal discussions were held on the relevance of quality indicators, local and regional database deficiencies, visibility of the science of developing countries, etc.

The following research topics were proposed going forward to give continuity to the Seminar and to the network of metric studies professionals.

1. In-depth approaches to the metric analysis of information provided by databases that is not routinely analyzed, particularly from a regional standpoint and derived from national or regional sources.
2. Analysis of the devaluation of knowledge and the mobility of local talent from a scientometric perspective.
3. Endorsement of critical historical bibliometric studies as a fundamental element to "depict" the history of the emergence of scientific disciplines in Latin America.
4. Creation of a bank of problems or questions of interest to the region from a scientometric viewpoint or related to the application of metrics.
5. Organization of a workshop to explore new software tools for the analysis and visualization of metric data.

One possible outcome of the VIII Seminar is the edition of a special issue of the journal Scientometricis featuring a selection of the papers presented during the event.

The Organizing Committee would like to thank the group of colleagues who acted as reviewers and chairpersons and whose efforts were vital to the success of the Seminar. We would also like to congratulate Jane Russell one of the founding members of the Seminar, on her designation as invited speaker in the opening ceremony of the INFO2016 Congress, in recognition of professional achievements.

For the next edition of the Seminar in 2018, we hope for an increased representation of countries from the Latin American region and other parts of the world, as well as a broader range of topics for discussion.

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WORKSHOP REPORT:

THE 21st NORDIC WORKSHOP ON BIBLIOMETRICS & RESEARCH POLICY

AALBORG UNIVERSITY COPENHAGEN
2–4 NOVEMBER 2016

Initiated by professors Olle Persson and Peter Ingwersen, bibliometric researchers in the Nordic countries have arranged annual Nordic workshops on bibliometrics since 1996. The general scope of the Nordic Workshop on Bibliometrics and Research Policy is to present recent bibliometric research in the Nordic countries, to create better linkages between the bibliometric research groups and their PhD students, and to link bibliometric research with research policy. The workshop language is English and the workshop is open to participants from any nation.

The 21st Nordic Workshop on Bibliometrics and Research Policy (NWB'2016) was organized by Aalborg University (Copenhagen branch), in collaboration with University of Copenhagen and Copenhagen University Library. It was held at the University of Aalborg, in Copenhagen, on November 2-4th, 2016 with more

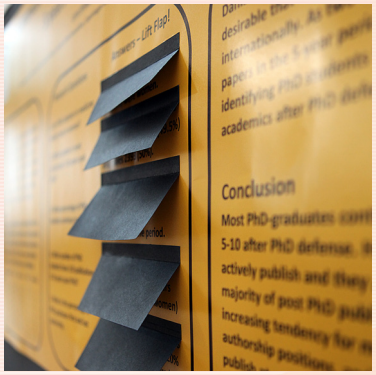
than 100 participants. About half of the participants were from Denmark, a third from the remaining Nordic countries and the rest from the UK, the Netherlands, Germany, Belgium, France, Poland, Ireland and Russia.

Due to an unusually large number of submissions, presentations were split into oral and poster presentations as an innovation at the Nordic Workshops. In total, we received 37 submissions, and after review, the program committee decided which papers were to be presented orally and which as poster presentations. 19 papers were accepted as oral presentations, and 12 posters were presented at the workshop.

Each main workshop day on November 3-4 began with a keynote. Two distinguished and hyper-active researchers were invited to give keynote talks on a topic that might interest, inspire or provoke NWB'2016 participants. Professor Ronald Rousseau, associated with University of Antwerp and at KU Leuven, talked on 'Diversity measurement, knowledge integration and heterogeneity of networks'. He discussed the notion of inequality, and what is needed to design "true" diversity measures that take variety, balance and disparity into account. He showed that a whole family of such measures exists, and that they can be fruitfully applied to measure e.g. the interdisciplinarity of articles based on their references and can be valuable in comparative studies of emergent fields such as nanotechnology and synthetic biology where claims of novelty and interdisciplinarity are often heard but rarely substantiated.

David Budtz Pedersen, Associate Professor and Co-Director of the Humanomics Research Centre, at Aalborg University Copenhagen, gave a keynote talk on 'Responsible Metrics for Open Human Science'. He reflected upon the significance of the open science movement and the necessity of adjusting impact assessment frameworks to accommodate open science policy. He discussed how openness in contemporary research practices may be used to create a set of more humane metrics (which referred to

as 'humetrics'), in order to gain a broader perspective on the impact of science. He argued for a more procedural, dynamic and responsible approach to research metrics, which includes 'productive interactions' rather than focusing merely on outputs and products. Among other things, this shift in emphasis requires a new understanding of knowledge circulation, which acknowledges the interconnectedness of research institutions, companies, civil society and public authorities.



The keynote talks, as well as the 19 oral presentations and 12 posters, are presented as abstracts in the NWB'2016 proceedings, which may be downloaded from the workshop website. Most posters and oral presentation slides are also available for viewing and peer-feedback at *figshare* (with citable DOIs)—all linked from the workshop website.

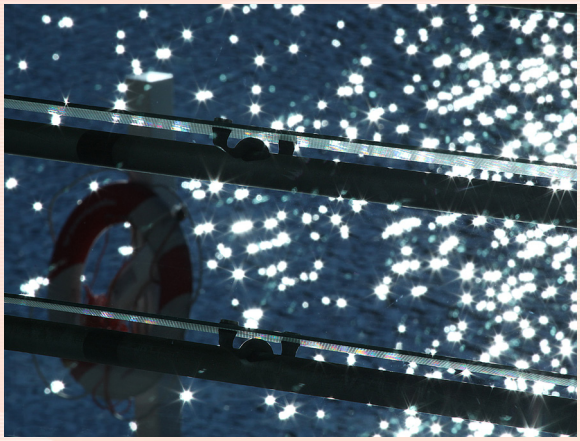
In addition to the main program, a pre-workshop on the 'Appropriate use of research metrics for the evaluation of academic, and broader social, economic and environmental impact' was organised in collaboration with Digital Science and Plum Analytics on November 2nd. The workshop also featured an intimate in-the dark wine reception with stunning night-time harbour views, a 'Meet & Greet' pre-workshop pay-for-yourself networking dinner at Riz-Raz restaurant, and a well-attended lavish workshop dinner at Restaurant SULT.

We would like to thank all authors for their submissions, the session chairs and the keynote speakers, Ronald Rousseau and David Budtz Pedersen, for their contributions to the workshop, photographer Balázs Schlemmer and the student volunteers, Annika, Halle and Lejla, for their diligent efforts during the workshop. Further, we would like to thank the sponsors for their generous financial support, without which the Nordic workshops could not be organised in their current form.

The NWB'2016 website is at http://nwb.aau.dk. Follow on twitter as @nwb2016 / #nwb2016, and on flickr as nwb2016.

The 22nd Nordic Workshop on Bibliometrics and Research Policy will be in Helsinki, November 9-10, 2017. WB'2017 will be organised by a consortium consisting of the Federation of Finnish Learned Societies (FFLS), University of Tampere Research Centre for Knowledge, Science, Technology and Innovation Studies (TaSTI) and Helsinki University Library (HULib).

Birger Larsen & Toine Bogers, workshop chairs
Lorna Wildgaard, program responsible



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METRICS 2016

SIG/MET ANNUAL WORKSHOP ON INFORMETRIC AND SCIENTOMETRIC RESEARCH

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SIG/MET is the Association for Information Science & Technology (ASIS&T) Special Interest Group for the measurement of information production and use. It aims at promoting the development and networking of all those interested in the measurement of information which includes bibliometrics, scientometrics and informetrics, but also measurement of the Web, social media, and metrics related to network analysis, visualization, scholarly communication and the design and operation of Information Retrieval Systems. The role of SIG/MET is to encourage the promotion, research and application of metrics topics.

SIG/MET held its sixth annual METRICS workshop on October 14, 2016 during ASIS&T Annual Meeting in Copenhagen, Denmark. The METRICS 2016 workshop marked an important year for SIG/MET which was named SIG of the Year by ASIS&T. This award recognizes every year outstanding accomplishments and activities of a Special Interest Group. The 2016 workshop was organized by the Special Interest Group chair Stefanie Haustein, University of Montreal, and officers Isabella Peters, ZBW Leibniz Information Centre for Economics and Timothy D. Bowman, Wayne State University. Nine papers, four peer-reviewed posters

and three open posters were presented during the full-day event. METRICS 2016 presentations attracted twenty-three participants and covered the topics of bibliometrics, scientometrics and informetrics. More specifically focusing on metrics application in the context of individuals' evaluation as well as authoring, reading, citing and mentioning scholarly work.

The first session of the workshop was dedicated to the topic of individual evaluation of researchers. Fei Shu, McGill University, presented his proposal for a new indicator based on citations distribution properties, the M-score. According to the author, the proposal aims at improving the inconsistencies and lack of accuracy of the H-index. The presentation raised an animated discussion among the workshop's participants on the need for caution when using indicators at the individual level. Mikko Tuomela, University of Illinois at Urbana-Champaign, introduced an author names disambiguation web service based on PubMed author names, Author-ity Exporter, which was developed with co-authors Brent Fegley and Vetle Torvik. For each author, the database includes publication count, time-span, affiliations, topics, journals, co-authors, citations. In addition, each author's affiliation includes geolocalisation information, which allows the study of geo-temporal movement of researchers during their career. Philippe Mongeon, University of Montreal, presented his method to detect sequences of alphabetical order in scientific papers' byline. Mongeon's proposition, co-authored with Elise Smith, Bruno Joyal and Vincent Larivière, demonstrates that a more accurate identification of alphabetical sequences allows for a better operationalization of "middle authors", offering new possibilities for the study of credit attribution in bibliometric studies.

The second session focused on reading, citing and online mentioning of scholarly work. Kim Holmberg, University of Turku, presented a work in progress analysis of the relationship between the open access status and altmetric event counts of a set of Finnish scientific publications. The study, co-authored with Timothy Bowman and Fereshteh Didegah, found no clear advantage in terms of accumulated altmetric events for open access publications but found important disciplinary differences. The case study presented by Judit Bar-Ilan, Bar-Ilan University, in collaboration with Gali Halevi and Elsa Anderson, investigated the potential relationship between journals' usage and publication patterns of researchers. More specifically, the authors sought to find if researchers from Mount Sinai hospital were reading the same journals they published in. The analysis did not find significant correlation between the most used journals, in terms of views and downloads, and the journals where researchers most published in. Dangzhi Zhao, University of Alberta presented a study, co-authored with Lucinda Johnston, University of Alberta, which aimed at providing an efficient method to filter out perfunctory citations, these non-necessary citations which constitutes a serious source of noise in citations analysis. Zhao and Johnston found that, contrary to the assumption underlying the re-citation analysis method, removing citations that appear only once in a paper is not an effective way to filter out perfunctory citations. They conclude that a method removing citations based on their location might be a promising way to filter out non-essential citations.

In addition to paper presentations, four peer-reviewed posters were presented during the workshop. In their poster, Rafael Aleixandre-Benavent, Antonia Ferrer-Sapena, Antonio Vidal-Infer, Adolfo Alonso-Arroyo, Enrique Alfonso Sánchez-Pérez and Fernanda Peset, University of Valencia, investigated journals policies concerning research data storage and reuse. The authors also analysed the relationship between the aforementioned policies and the impact factor, they found that

journals with a higher impact factor more frequently included an open-data policy. Keiko Yokoi, University of Tokyo Library, analysed the sustainability of open access (OA) journals' using data from Ulrichsweb and found that OA journals are not less sustainable than toll journals. Noriko Sugie, Surugadai University, presented a statistical analysis of users' information-seeking patterns measured through the movement of RFID-tagged items inside the Chiyoda Public Library. Lourdes Castelló-Cogollos, Rafael Aleixandre-Benavent and Rafael Castelló-Cogollos, University of Valencia, used endogamy indicators to examine the relationship between supervisors involved in the academic assessment of Spanish theses. For a second year, SIG/MET invited participants to bring posters to the open poster session. Three authors responded to the invitation and presented their latest findings.

Once again, SIG/MET recognized outstanding student contributions with the Best Student Paper Award, sponsored by Elsevier. Recipients of the prize were invited to present their work during the meeting. Adèle Paul-Hus, University of Montreal, won the first place for her paper co-authored with fellow PhD candidate Philippe Mongeon, and Maxime Sainte-Marie. Her analysis of collaboration patterns using authorship and acknowledgements data, showed that the important disciplinary differences traditionally observed in terms of team size are greatly reduced when acknowledgees are taken into account. Antoine Archambault and Philippe Mongeon, University of Montreal, won the second place for their paper co-authored with advisor Vincent Larivière. Their analysis of the scholarly production of a cohort of German researchers before and after the country's reunification in 1990 showed that East German researchers who had direct ties (e.g. scientific collaboration) or indirect ties (e.g. publications written in English, citations from Western researchers) with the West had better chances of surviving the transition. Lastly, Jennifer Pierre, University of California, Los Angeles, received an honorable mention for her analysis of professor-student relationships using web analysis measurement of mentorship impact.

Finally, the workshop concluded with the Best Paper Award, sponsored by Altmetric.com and Digital Science. The best paper was selected by a committee from all accepted workshop papers regardless of their topic. SIG/MET was pleased to award Dangzhi Zhao and Lucinda Johnston for their contribution entitled "To what degree are uni-citations perfunctory? A case study".

[BIR@ECIR 2017]

5th INTERNATIONAL WORKSHOP ON BIBLIOMETRIC-ENHANCED INFORMATION RETRIEVAL

CALL FOR PAPERS

You are invited to participate in the upcoming 5th international workshop on Bibliometric-enhanced Information Retrieval (BIR 2017), to be held as part of the 39th European Conference on Information Retrieval (ECIR 2017).

http://www.gesis.org/en/services/events/events-archive/conferences/ecir-workshops/ecir-workshop-2017/

IMPORTANT DATES

- Submissions:
  31 January 2017
- Notification:
  03 March 2017
- Camera Ready Contributions:
  24 March 2017
- Workshop:
  09 April 2017
  in Aberdeen, Scotland UK

UPDATES

- Joeran Beel will give a keynote titled: "Real-World Recommender Systems for Academia: The Pain and Gain in Developing, Operating, and Researching them". Joeran Beel is an Assistant Professor at the Trinity College Dublin, the School of Computer Science and Statistics.
- Authors of accepted papers will be invited to submit extended versions to a Special Issue on "Bibliometric-enhanced IR" to be published in the journal Scientometrics http://link.springer.com/journal/11192.

AIM OF THE WORKSHOP

In this 5th workshop we aim to engage with the IR community about possible links to bibliometrics and complex network theory which also explores networks of scholarly communication. Bibliometric techniques are not yet widely used to enhance retrieval processes, yet they offer value-added effects for users. Our interests include information retrieval, information seeking, science modelling, network analysis, and natural language processing. The goal is to apply insights from bibliometrics, scientometrics, and informetrics to concrete practical problems of information retrieval and browsing.

See proceedings of the former BIR workshops at ECIR 2014 http://ceur-ws.org/Vol-1143/, ECIR 2015 http://ceur-ws.org/Vol-1344/, ECIR 2016 http://ceur-ws.org/Vol-1567/ and JCDL 2016 http://ceur-ws.org/Vol-1610/.

Retrieval evaluations have shown that simple text-based retrieval methods scale up well but do not progress. Traditional retrieval has reached a high level in terms of measures like precision and re-call, but scientists and scholars still face challenges present since the early days of digital libraries: mismatches between search terms and indexing terms, overload from result sets that are too large and complex, and the drawbacks of text-based relevance rankings. Therefore we will focus on statistical modelling and corresponding visualizations of the evolving science system. Such analyses have revealed not only the fundamental laws of Bradford and Lotka, but also network structures and dynamic mechanisms in scientific production. Statistical models of scholarly activities are increasingly used to evaluate specialties, to forecast and discover research trends, and to shape science policy. Their use as tools in navigating scientific information in search systems is a promising but still relatively new development. We will explore how statistical modelling of scholarship can improve retrieval services for specific communities, as well as for large, cross-domain collections. Some of these techniques are already used in working systems but not well integrated in larger scholarly IR environments.

The availability of new IR test collections that contain citation and bibliographic information like the iSearch collection or the ACL collection could deliver enough ground to interest (again) the IR community in these kind of bibliographic systems. The long-term research goal is to develop and evaluate new approaches based on informetrics and bibliometrics.

The aim of this workshop is to bring together researchers and practitioners from different domains, such as information retrieval, information seeking, science modelling, bibliometrics, scientometrics, network analysis, natural language processing, digital libraries, and approaches to visualize search and retrieval to move toward a deeper understanding of this research challenge.

WORKSHOP TOPICS

To support the previously described goals the workshop topics include (but are not limited to) the following:

- IR for digital libraries and scientific information portals
- IR for scientific domains, e.g. social sciences, life sciences etc.
- Information Seeking Behaviour
- Bibliometrics, citation analysis and network analysis for IR
- Query expansion and relevance feedback approaches
- Science Modelling (both formal and empirical)
- Task based user modelling, interaction, and personalisation
- (Long-term) Evaluation methods and test collection design
- Collaborative information handling and information sharing
- Classification, categorisation and clustering approaches
- Information extraction (including topic detection, entity and relation extraction)
- Recommendations based on explicit and implicit user feedback
- Recommendation for scholarly papers, reviewers, citations and publication venues
- (Social) Book Search
- Information extraction (including topic detection, entity and relation extraction)

We especially invite descriptions of running projects and ongoing work as well as contributions from industry. Papers that investigate multiple themes directly are especially welcome.

SUBMISSION DETAILS

All submissions must be written in English following Springer LNCS author guidelines (4 to 10 pages) and should be submitted as PDF files to EasyChair. All submissions will be reviewed by at least two independent reviewers. Please be aware of the fact that at least one author per paper needs to register

for the workshop and attend the workshop to present the work. In case of no-show the paper (even if accepted) will be deleted from the proceedings AND from the program.

Springer LNCS:
http://www.springer.com/gp/computer-science/lncs/conference-proceedings-guidelines

EasyChair:
https://easychair.org/conferences/?conf=bir2017

Workshop proceedings will be deposited online in the CEUR workshop proceedings publication service (ISSN 1613-0073) - This way the proceedings will be permanently available and citable (digital persistent identifiers and long term preservation).

Authors of accepted papers will be invited to submit extended versions to a Special Issue on "Bibliometric-enhanced IR" to be published in the journal Scientometrics http://link.springer.com/journal/11192.

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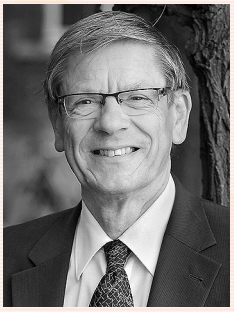
This workshop series is also informed by an ongoing COST Action TD1210 KnowEscape. http://www.knowescape.org

CFP on Twitter:
https://twitter.com/Philipp_Mayr/status/794174720589660160, please retweet!

INEQUALITY IN SCIENCE AND THE POSSIBLE RISE OF SCIENTIFIC AGENTS



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Abstract. We provide a short review of a recent special section in Nature devoted to science and inequality. The gist of the articles in this section is that inequality in academia, and this especially in the United States, is on the rise. We predict that pressures among universities may give rise to scientific agents, negotiating higher salaries for top scientists, hence even more increasing existing inequality. Some technical remarks on how to properly measure inequality are included.

Keywords: inequality measurement; scientific agents

INTRODUCTION

Nature's issue 7621 (21 September 2016) contained a special section on science and inequality. This inspired us to write down some thoughts about inequality in an academic context. While the main topic of our contribution focuses on inequality within the student and researcher population, it is still interesting to briefly discuss the first part of the section in *Nature*. This first part discusses the notions of inequality and class using historic and sociological arguments. Savage (2016) investigates the notion of 'class' or 'scale of socio-economic status'. He recalls Goldthorpe's work (Goldthorpe, 1980) who defined class membership through the nature of one's job, with a focus on formal paid work. This one-dimensional arrangement could then be used to study social mobility, for instance. Yet, Savage points out that nowadays in the West, 'class' is more often considered as the result of three factors: economic, cultural and social. (Those who want to know to which of seven – British – classes they belong can take the test at: http://www.bbc.com/news/magazine-22000973). In another contribution, Milanovic (2016) describes the changes in inequality among citizens over a timescale of centuries and concludes that although inequality is on the rise, after a historically low in the fifties (at least in the USA), there is no reason to think that this state of affairs will continue. Thus

our society knows many forms of inequality with varying size and impact over time.

INEQUALITY WITHIN THE ACADEMIC POPULATION

In this part inequality within research itself is discussed. *Nature* correspondents (Lee et al., 2016) examine how class and inequality are affecting science and scientists in eight countries around the world (United States, China, United Kingdom, Japan, Brazil, India, Russia and Kenya). They describe how even the richest countries still struggle with the issue of providing all intelligent children a university education independent of their background. It remains true that universities are more easily accessible by the rich and privileged. The other contribution in this part (Lok, 2016) examines salary data for scientists in several countries, and finds that there is a growing gap between top earners and the rest. As an example she mentions that 29 medical researchers at the University of California earned more than one million US dollars each in 2015. Meanwhile, she writes, thousands of postdocs at those universities received less than 50,000 US dollars. These are American data and surely the situation for young researchers in some developing countries may be worse. The article is illustrated by data from Stephan (2015) showing that income inequality among scientists, as measured by the Gini coefficient, increased substantially among US scientists after 1973, and this at a much higher rate than in US households. Yet, it has remained stable or declined slightly for the past decade.

Nature concludes that science still has a lot of work to do on the subject of inequality. The writers also refer to *Nature*'s annual salary survey (Woolston, 2016), which shows that many scientists think they have made an economic sacrifice in order to pursue an academic career, in the sense that wages are generally higher outside academia. This survey also confirms the salary gender gap in research. Sadly, some scientists even go as far as stating that they would not recommend a career in research to young people.

MEASURING INEQUALITY

Measuring inequality is a challenge. For instance, Milanovic (2016) points out that there are many practical problems, even in industrialized societies, to obtain reliable data on household incomes. He states that it is probably best to combine data from comprehensive household surveys with fiscal data, which often do not include the lowest incomes. As researchers who have studied inequality, concentration, and diversity, we add that in order to discuss inequality and be able to state that inequality decreases or increases, one must, besides obtaining correct data, agree on appropriate measures used as indicators. A recent contribution going far beyond what Gini (1909) and Lorenz (1905) did around the turn of the 19th century is the work of Leinster and Cobbold (2012) in the context of diversity measurement. Following Rao (1982) and Stirling (2007) on the one hand and Hill (1973) and Jost (2006) on the other they propose a set of measures that take variety, balance or evenness and disparity among categories into account and that are in such a form that it makes sense to discuss diversity in terms of ratios or percentages, see also (Zhang et al., 2016).

While measuring income inequality has been a focal point of research over several decades, measuring inequality among scientists has received much less attention. Inequality among researchers can be found along several dimensions: inequality with respect to income, access to funding and publication opportunities spring to mind.

SCIENTIFIC AGENTS

Leaving measurements aside we would like to point out that the possibility of new developments can possibly lead to even more inequality among scientists. Indeed, Lok (2016) pointed out that as a consequence of heightened competition between universities, income inequality between researchers is on the rise. A typical example of competition

results from regular evaluations of research quality as, for instance, performed in the UK (the Research Excellence Framework, REF). Parts of such evaluations refer to the quality of individual researchers. This gives universities an incentive to recruit high-profile researchers, including their teams and research projects (Lok, 2016). These researchers could try to extract an even higher share of the added value created by research activities, and acquire top salaries, by hiring the services of scientific agents. Such persons or groups of persons (agencies) would play a similar role as literary agents do for writers or sport agents for athletes. Indeed, agents could start negotiations with universities, while the researchers use their scarce time and talents on value-creating research activities, stepping in only during the final steps of the negotiations. In addition, top researchers often lack the skills and expertise to excel at such negotiations.

Such scientific agencies could also be beneficial for young scientists as shown by the example of the non-profit organization *Future of Research* mentioned in (Lok, 2016). Scientific agents may reduce the impact of imperfect information about the value of one's CV or about the implications of choosing an academic career. Agents would accumulate knowhow and, using a phrase from (Lok, 2016), have "the privilege to have … information" about the job market.

CONCLUSION

Measuring and explaining inequality will remain an interesting and socially relevant strand of research for many decades. Overall, society aims at reducing inequality based on justice and ethical considerations. Yet several recent trends such as digitalization, globalization and resource scarcity also have an impact on equality. As one example of the future evolution of inequality, we focus on income inequality among researchers. Specifically we highlight the role that scientific agents could play in this setting. Such agents could reduce the information asymmetries that currently exist and thus influence the bargaining power of researchers.

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