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Beyond Bibliometrics – Identifying the Best

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SPECIAL
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Beyond Bibliometrics – Identifying the Best

The 8th Forum on the Internationalization of Sciences and Humanities

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Preface

Dear reader,

Many research funding and research performing institutions all over the world are facing the same challenge: with budgets becoming tighter, the pressure to make the right funding decisions and to hire the right researchers increases. However, there is a striking lack of generally agreed criteria for evaluating scientific output and the individual researchers who create it.

Bibliometrics – the quantitative analysis of written scientific publications – seems to offer a quick, easy, and objective way out. But a large number of actors within the scientific community are deeply skeptical, as the 8th Forum on the Internationalization of Sciences and Humanities in November 2014 showed very clearly.

Convened under the headline “Beyond Bibliometrics – Identifying the Best” by the International Advisory Board of the Alexander von Humboldt Foundation, the Forum aimed to reach a better understanding of the (unintended) consequences that the application of bibliometrics has on science and research systems worldwide.

Leading scholars, science managers, and journal editors from across the globe discussed the following questions: What are the limitations of bibliometrics as a merit system? What are the implications of bibliometrics for the scientific system as a whole? And how can bibliometrics be complemented or superior systems be found which take into account the emergence of new research products and the societal impact of research?

The heated debates at the Forum were an unmistakable sign that there is a need for a broader discussion on the role of bibliometrics in science and academia. This special supplement documents the discussions of the Forum and makes them available to a wider audience in Germany and beyond.

Sincerely,



Helmut Schwarz



Peter Chen



Helmut Schwarz
President
Alexander von Humboldt Foundation



Peter Chen
Chair
International Advisory Board



Beyond Bibliometrics – Identifying the Best

“Beyond Bibliometrics – Identifying the Best” was the title of the 8th Forum on the Internationalization of Sciences and Humanities hosted in Berlin from 6 to 7 November 2014 by the International Advisory Board of the Alexander von Humboldt Foundation. Together with a panel of international scholars the Board called for a possible paradigm shift – a new way to define and identify academic excellence that avoids the pitfalls of statistics-based measurements but, at the same time, accommodates diverse cultures, the increasing mobility of researchers and the sheer volume of today’s academic output around the world.

The International Advisory Board came to the following conclusions:

1. **Bibliometrics is a frequently applied tool that increasingly is shaping today's academic landscape world-wide and is influencing behavior.** Bibliometrics is criticized for contributing to a homogenization of sciences, a lack of true objectivity, a tendency to intensify managerialism, and bias with regard to gender and country. This calls for a discussion of the potential need of a paradigm shift.
2. **Bibliometrics is a useful "filter".** The sheer mass of researchers and publications in the global system make it necessary to involve IT-supported judgments when questions are asked at the level of whole institutions, national research systems, and even transnational collaborations. Research and policy communities are faced with the necessity to find a set of core values to accommodate varying scholarly and institutional cultures and increasingly mobile researchers. Bibliometrics and impact factors are not acceptable tools for researchers at all levels, and are particularly problematic with regards to early-stage researchers and tenure decisions. Bibliometrics may not be appropriate at all for certain subject fields. Additional methods, e.g. interviews and peer review, need to be predominant in these cases.
3. **Depending mainly on bibliometrics has far-reaching consequences for research systems as well as for individuals, especially young scientists.** It is about deciding on the value of scientific output in an environment where there are connections between publishing, funding, and ultimately the success of individual careers, as well as of entire research markets. Bibliometrics creates an environment where especially a young generation of researchers is encouraged to adopt mainstream positions. This constitutes a danger for knowledge-based societies highly dependent on cutting-edge scientific output. Especially funding organizations are called upon to use their leverage to fund scientific risk.
4. **Finding appropriate ways of identifying "the best" is – and will remain – one of THE central questions of science and research.** There is a widespread desire in the academic community for guidelines that clearly limit the use of bibliometrics and allow for their measured, intelligent incorporation into evaluations appreciative of different cultures in subject fields and also in countries; additional methods for identifying "the best" are needed. However, existing means (such as interviews and peer reviews) can be labor-intensive and may be reaching their own breaking point. The International Advisory Board will continue its discussions along the two central questions: How do we define the best? What are the procedures to find them – beyond bibliometrics? ■



IAB Vice Chair Helen F. Siu (Yale University) with Helmut Schwarz, President of the Humboldt Foundation, and IAB member Yuan-Tseh Lee (Academia Sinica)



IAB members Sarah Stroumsa (The Hebrew University of Jerusalem) and Joseph S. Francisco (University of Nebraska)



John Ball

Sedleian Professor
of Natural Philosophy
University of Oxford
United Kingdom

Measuring Science

Although inappropriate use of bibliometrics abounds, most researchers use them in one way or another, and it is essential to have ways of measuring science and scientists. As we look to the future, and acknowledge the value of contributions such as datasets, software, code, blogs, wikis and forums, a discussion is needed on whether bibliometrics can be used to recognize the important contributions of open science. | [Dinner Speech by John Ball](#)

Let me begin with a story, which may resonate with experiences of your own. A few years ago I received an email from a university that I had not previously heard of in the Middle East. They said that they were writing to me as a highly cited researcher to offer me a part-time position. They said that they were a university devoted to high-quality research, and invited me to consult their website to see the names of others who had accepted such a position. Conveniently they attached the very attractive salary scale. I could visit from between 1-5 months a year and would need to give the university as my institution on some of my papers.

I took a look at the website, and found only one person who had accepted such a position, someone who has published some 1,200 mathematical papers over a period of 40 years – that is a rate of one every 12 days! Some 500 of these papers are co-authored with another professor who has written a similar number of papers, though at the somewhat faster rate of one every 10 days. These are incredible outputs, with citation counts that dwarf those of most Fields Medallists. But are they an indication of quality?

“Bibliometrics should encourage practices that are beneficial for the scientific process.”

Because I am interested in mathematics in developing countries, I arranged to talk by phone with the head of department at this university, and gently suggested that there might be better ways of improving the research level of the department, such as forming an international committee to visit and give advice. “I completely agree with you,” he said “but our government has given us this money that can only be spent on highly cited researchers.” So there is an international market in citations.

Although such inappropriate uses of bibliometrics abound, most researchers do use bibliometrics in one way or another. For example, when writing letters of recommendation for someone I often find it helpful to look up their citations, even though I rarely mention them in the letter itself and find it inappropriate when letters of recommendation focus on citations. And it is essential to have ways of measuring science and scientists, as well as social science and other areas of the humanities. Peer review is vital, but heavy in its demands on time. In the UK we are soon to learn the results of the latest research assessment exercise, which goes by the name of the Research Excellence Framework and evaluates all university departments. This has involved almost all UK academics in one way or another in a hugely time-consuming effort. Interestingly, the funding council that organizes the exercise had initially decided to use bibliometrics as an aid in the evaluation, but after consultation with the community decided not to. If the whole exercise had been done using an agreed set of bibliometrics and without peer review then much time would have been saved. But for statistical reliability evaluations it would then need to have been

“Citations are statistics and should be treated as such. Applying them to a sample of one, such as an individual researcher, is dangerous.”

made at the level of large units, such as whole universities, with consequent lack of granularity and recognition, and perhaps funding, for some high quality small departments.

Citations as statistics

An excellent 2008 report entitled “Citation Statistics”¹ by the International Mathematical Union, the International Council of Industrial and Applied Mathematics, and the Institute of Mathematical Statistics, makes this point forcibly, that citations are statistics and should be treated as such. Applying them to a sample of one, such as an individual researcher, is dangerous. A former student of mine, Stefan Müller from the University of Bonn, an internationally illustrious applied mathematician, sent me a message after the semi-final of the World Cup with the statistics of the game in terms of possession, shots, corners etc. Although Germany won 7 to 1, you would have difficulty knowing the winner from these statistics. As he wrote: “It is a nice example of how carefully collected statistics can beautifully hide the real story.”

The Citation Statistics report took particular aim at the impact factor, an easy target nowadays perhaps, pointing out, for example, that if Journal A has an impact factor twice that of Journal B, the probability that a paper chosen at random from Journal A has more citations than one chosen at random from Journal B, can be small. This is because the distributions of citations per paper are typically highly skewed – a journal may have a high impact factor not because the average paper has many citations, but because it published a very small number of very highly cited papers. Of course, now we know that impact factor manipulation – a form of academic corruption in which editors of journals adopt practices designed to artificially inflate their impact factor – is common.

The whole idea of assessing the impact of papers by citations to other papers in the journal in which they appear, rather than by journal-independent article level metrics, has a distorting effect on researcher behaviour, and we all know that not all citations are equal, so that metrics that ignore the semantic content of citations are a blunt instrument.

Bibliometrics and open science

Recently I chaired a working group of the International Council for Science (the umbrella organization whose membership consists of international scientific unions and national academies) that produced a report entitled “Open access to scientific data and literature and the





assessment of research by metrics". You may wonder why these two topics – open access and evaluation by metrics – were linked in the title. In fact there are strong connections between the two. Metrics affect the behaviour of researchers, such as their choice of journals, as they seek to maximize their performance as measured by the metrics used. Metrics can contribute to the maintenance of high journal prices, and promote intense competition rather than openness and sharing, and fail to recognize research contributions such as the production of datasets, software, code, blogs, wikis and forums. Governments might argue that they also do not recognize the impact of research on society at large.

It was very interesting to be involved with the writing of this report, which was approved by a large majority at the General Assembly of the International Council for Science in Auckland in September, in particular because it drew from the experience of many different subject areas and both rich and poor countries. The perspectives on metrics of different parts of science and social science differ markedly, faster moving sciences (e.g. experimental as opposed to theoretical) tending to be more positive about evaluation by metrics. In theoretical subjects such as mathematics citations may not build up fast enough to be helpful in providing evidence for appointments of young researchers. Particular concerns surround how the production of datasets can be recognized as a potentially first class scientific output, and in particular how data is cited. Effective citation of data can act as an incentive not to delay the release of data for the purpose of deriving maximum personal benefit from it, and as an incentive to encourage the publication of negative results, whose suppression can distort science. On the other hand, there are serious issues concerning the amount of time required to routinely archive data in a readable format with suitable metadata, and concerning the protocols for deciding exactly what data should be archived.

Here are some of the recommendations of the report relevant to bibliometrics:

"In research evaluation and assessment, metrics should be regarded as an aid, and not a substitute, for good decision-making. They should not normally be used in isolation to assess the performance of researchers, to determine appointments, or to distribute funds to individuals or research groups, for which expert review is indispensable."

"Science publishers and chief editors of scientific publications should require authors to provide explicit references to the datasets underlying published papers, using unique persistent identifiers. They also should require clear assurances that these datasets are deposited and available in trusted and sustainable digital repositories. Citing datasets in reference lists using an accepted standard format should be considered the norm."

And similarly:

"Science publishers and chief editors of scientific publications should require authors to provide explicit references to the software or code used in published papers."

The International Council for Science also endorsed the San Francisco Declaration on Research Assessment.²

Finally, I wanted to emphasize that the relation between bibliometrics and open science is potentially very important. Bibliometrics should encourage practices that are beneficial for the scientific process. For example, in my own subject I frequently put a mathematical question that I do not know the answer to into Google. Very often I am led to Wikipedia, which has some remarkably high quality articles, or to websites such as MathOverflow or Mathematics Stack Exchange, where questions are asked and answered, often by top mathematicians. There are also a number of fine blogs, such as the one by Terry Tao, one of the world's leading mathematicians. I am not sure how one can easily recognize such important contributions through bibliometrics, or whether that is the right way to recognize them, but it is an important discussion to have.

"Metrics that ignore the semantic content of citations are a blunt instrument."



I am conscious that I have spoken mostly about bibliometrics as they apply to science, rather than the hu-

manities, because I understand the issues better, though the distinction between science and the humanities is becoming less and less clear-cut as cooperation between them on issues facing the planet becomes more necessary by the day. In any case I hope that I have managed to provoke some thoughts, and look forward greatly to the discussions, and hope to learn much from them. ■

¹ See www.mathunion.org/fileadmin/IMU/Report/CitationStatistics.pdf

² The full report is available at www.icsu.org/general-assembly/news/ICSU%20Report%20on%20Open%20Access.pdf

“Arguments that bibliometrics should never be used in the assessment of academic merit are as erroneous as arguments that bibliometrics alone can be used to measure academic merit.” (Aidan Byrne)

Panel 1 International Perspectives of Science Managers



Aidan Byrne

Chief Executive Officer
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Bibliometrics and Academic Merit Assessment

To provide a comprehensive evaluation of research quality across all academic disciplines, the Australian Research Council has applied a broad set of indicators, including bibliometrics, together with detailed peer evaluation. Their efforts so far suggest that the appropriate granularity and normalization of citation data can go a long way to avoid some common pitfalls of using bibliometrics as a judge of academic merit. | by Aidan Byrne

The notion of academic activity as something exclusively internal to universities is less defensible now than it ever was. Research outputs are multidimensional in both quantity and quality and there is no universally accepted indicator of academic merit. Nonetheless, some indicators are impossible to ignore. One of the drivers of the Open Access movement across the world is the nearly universal view that high quality research must not only encompass activity at a high standard of excellence, but that it must also be communicated effectively. For this reason alone, bibliometric indicators provide a revealing measure of academic performance. Arguments that bibliometrics should never be used in the assessment of academic merit are as erroneous as arguments that bibliometrics alone can be used to measure academic merit.

The fair assessment of individuals for academic merit is a challenging process and the use of bibliometrics, simple or complex, always requires careful exposition.

Treating citation data with care

For assessments at a systemic level the case for bibliometrics becomes stronger, and indeed necessary. The Australian Research Council (ARC) is responsible for an evaluation exercise, Excellence in Research Australia (ERA), which is designed to provide a comprehensive evaluation of research quality across all discipline areas in all universities in Australia. The ERA is characterised by the seamless weaving together of two different evaluation regimes; firstly, a wide suite of indicators which includes bibliometrics and, secondly, the use of detailed peer evaluation by discipline experts. A full range of indicators used in the ERA process are described in previous National Reports from 2010 and 2012.

The ERA exercise analyses all academic outputs (traditional and non-traditional). In the most recent exercise this involved 400,000 outputs over a six-year window. It uses citation data for approximately half of the disciplines reviewed in the exercise. The ERA methodology has a number of features that allows it to address many of the criticisms of the use of bibliometrics:

“The absence of bibliometric data as a common reference increases the tendency for reviewers to erroneously use very crude indicators.”

Impressions

- 1 Rocky Skeef (NRF South Africa) and Wolfgang Rohe (Stiftung Mercator)
- 2 Thomas Hesse, Humboldt Foundation, and the Chairman of the Board of the American Friends of the Alexander von Humboldt Foundation, Daniel Fallon (University of Maryland)
- 3 IAB member Sarah Stroumsa (Hebrew University) and Dale G. Medearis (Northern Virginia Regional Commission)



- It collects citations at an article level. This means the shortcomings of journal impact factors can be stepped over.
- Citation data is normalised at a fine grained discipline level. The ERA uses a discipline hierarchy that evaluates disciplines at two different levels: one that provides a high level classification of 22 discipline areas; and a more detailed level that has 157 sub-disciplines. Article level citation data is normalised using appropriate sub-discipline reference data.
- Citation data is also normalised temporally. The rate at which academic work is recognised and acknowledged is highly discipline dependant. The ERA analysis recognises this variation.

In addition to these key elements, the core methodology of the exercise is one of a peer review process, irrespective of whether bibliometrics are used or not. While relative citation data is provided for the unit of evaluation, it is only one of a suite of indicators that is looked at by an evaluation panel of peer experts. The translation from relative citation data to quality ranking is not formulaic and panels are encouraged to look at all indicators in a holistic way.

“Arguments that bibliometrics should never be used in the assessment of academic merit are as erroneous as arguments that bibliometrics alone can be used to measure academic merit.”

In cases where bibliometrics were determined not to provide sensible proxy information, the approach is to use peer evaluation and review of individual outputs. We currently sample 30% of all submitted outputs, with this fraction chosen to provide a compromise between minimising the burden on external assessors and having a sufficient coverage of outputs. These evaluations are similarly looked at by the evaluation panel of peer experts as part of a suite of indicators. Interestingly, the absence of bibliometric data as a common reference makes the evaluations in these disciplines more difficult and increases the tendency for reviewers to erroneously use very crude indicators such as journal outlet as proxy for research quality.

The rigour of the process is assisted by having panels review across a range of disciplines to enable the moderation of ratings between disciplines. The final ratings for each unit of evaluation are made public and the complete ‘dashboard’ of information for each institution is made available to the institution at the end of the process.

At the completion of the second full round of ERA in 2012, the ARC commissioned an independent review of the benefits of ERA. The review report, which was released in 2013, concludes that ERA has had a range of beneficial effects in the relatively short time that ERA has been in operation. The report projects further benefits as universities and others move to respond to the ERA approach and outcomes continue to flow from future ERA rounds – the next is scheduled to report in 2015. ■

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The Measure of Research Merit

Establishing a reliable predictor of the future performance of researchers is a trillion-dollar matter. Existing bibliometric approaches are inappropriate, especially when assessing young scientists. | by Marcia McNutt

Each year, \$1.4 trillion are invested in research by governments, foundations, and corporations. Hundreds if not thousands of high-profile prizes and medals are awarded to the best researchers, boosting their careers. Therefore, establishing a reliable predictor of future performance is a trillion-dollar matter. In November 2014, the Alexander von Humboldt Foundation convened an international assembly of leaders in academia, research management, and policy to discuss “Beyond Bibliometrics: Identifying the Best.” Current assessment is largely based on counting publications, counting citations, taking note of the impact factor of the journals where researchers publish, and derivatives of these such as the h-index. These approaches were severely criticized for numerous reasons, with shortcomings particularly apparent when assessing young scientists for prestigious, interdisciplinary awards. It is time to develop more appropriate measures and to use the scientific method itself to help in this endeavor.

The difficulty with assessing young scientists is well known. Their short career to date yields a brief publication record, making differences in the numbers of publications between candidates statistically questionable. Faced with the challenge of gauging the worth of limited publications, evaluators might turn to journal impact factors. Using this as a proxy for the importance of a paper is just plain wrong. As compared with a paper published in a higher-impact journal, there is no assurance that a paper published in a lower-impact journal is less important.

“It is time to remedy a flawed bibliometric-based assessment for young scientists.”



Citations are a better proxy for how much impact a paper is having, but for young scientists and interdisciplinary awards, this metric also has several limitations. For example, recent publications from young scientists have not yet accumulated citations. Altmetrics have been proposed as a possible solution: measuring downloads, page views, tweets, and other social media attention to published research. Analyses conducted by HighWire Press, the publisher of Science and many other academic journals, suggest that downloads of online papers poorly track eventual citations. This could indicate that some papers were found unworthy of being cited, or that some papers were influential, but just not cited because the author did not feel that the concept required a citation. Adding more context in referencing could reduce some ambiguity and encourage more appropriate referencing, but such proposals have not gained traction. Counting citations is also quantitatively inconsistent. If an author publishes a better method or an improved estimate for a physical parameter, other researchers who use those improvements are obligated to cite that paper. On the other hand, if a researcher publishes a novel idea, it can rapidly move from unknown to common knowledge such that its citation lifetime is exceptionally brief. Furthermore, citation counts scale with the publications in a field. The lowering of quality barriers by some open-access publishers has generated a citation explosion in some fields, boosting citation counts by publishing papers that otherwise might not have been published.

Consider a rather outrageous proposal. Perhaps there has been too much emphasis on bibliometric measures that either distort the process or minimally distinguish between qualified candidates. What if, instead, we assess young scientists according to their willingness to take risks, ability to work as part of a diverse team, creativity in complex problem-solving, and work ethic? There may be other attributes like these that separate the superstars from the merely successful. It could be quite insightful to commission a retrospective analysis of former awardees with some career track record since their awards, to improve our understanding of what constitutes good selection criteria. One could then ascertain whether those qualities were apparent in their backgrounds when they were candidates for their awards.

It is time to remedy a flawed bibliometric-based assessment for young scientists. After all, the future performance of a trillion-dollar enterprise is at stake. ■

Reprinted from the Dec. 5, 2014 issue of “Science” with permission from author Marcia McNutt.

Impressions

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Proper Use of Bibliometrics in Academic Evaluation

While bibliometrics cannot replace the critical role of peer evaluation, we also cannot ignore the clear advantages and efficiency gains it provides. The keys to a balanced approach include appropriate use of evaluation models, the use of newly developed metrics (e.g. webmetrics) and a proper understanding of bibliometric terms. | by Haiyan Hu

“It is appropriate to use bibliometrics in the evaluation of global academic performance of a group of institutions of the same type.”

The concept of bibliometrics came into Chinese academia at the beginning of the 1990s, after Nanjing University began to announce university publications indexed by SCI. Since then, bibliometric terms, such as the impact factor of a journal and the h-index of a scientist, have become increasingly popular topics among scholars. Bibliometrics has played an important role in evaluating the performance of research teams and individuals in Chinese universities, including Beijing Institute of Technology (BIT). Furthermore, bibliometrics has also served as a criterion in university rankings and discipline rankings.

The practice at BIT shows that bibliometrics exhibits the advantages of low cost and high efficiency in academic evaluations. For example, it is informative to use bibliometrics to identify the whole status of the university regarding both publications and citations. It is also useful to use bibliometrics to check and predict the academic performance of BIT schools, especially those in physics, chemistry and life sciences. The statistics from Thomson Reuter’s Essential Science Indicators show a strong correlation between the bibliometric increase and the research quality of those schools. It is relatively easy for university authorities to evaluate the performance of those schools, to identify their cutting-edge research and highly-cited authors, and to allocate more research resources to those schools. Furthermore, it is also helpful to use bibliometrics to select a few talents from thousands of candidates during the recruitment of young faculty members.

However, bibliometrics may be dangerous if it is not properly used. The first danger is likely to lead the evaluating committee to pay more attention to the impact of the journal where the paper was published, rather than the impact of the research, since it is easy to identify top journals from impact factors. The second danger is to stimulate research teams and individuals to focus excessively on publication productivity and hot research topics. Thus, it is quite natural for a Ph.D. student studying laser manufacturing in mechanical engineering, for instance, to submit his paper to journals of applied physics, instead of a journal of mechanical engineering, because the journals of applied physics have higher impact factors. The third danger is the strong pressure put on journal editors, who then try to increase the impact factor of their journals artificially. For example, I received the submission acceptance from a good journal in last May, but the only requirement for paper revision was to cite some relevant papers published in that journal. Therefore, bibliometrics has been faced with the challenge of whether it can maintain its status as a real metric.



Former IAB member Wilhelm Krull (Volkswagen Foundation) and IAB member Gerhard Casper (Stanford University)





A more balanced approach

From the perspective of a university president, I would like to make three suggestions.

First, bibliometrics should be cautiously and correctly used in academic evaluation. Different objects should be evaluated by using different evaluation models and criteria. For example, it is appropriate to use bibliometrics in the evaluation of global academic performance of a group of institutions of the same type, instead of individuals, especially those in different fields. It is more appropriate to evaluate the academic performance of individuals, especially those in mathematics and the humanities, through peer review of their selected publications. Bibliometrics in conjunction with peer review serves as a tool for quick evaluation of a group of scholars in the same field.

Second, bibliometrics should be further improved in academic evaluation. For example, it is reasonable to use normalized bibliometrics, such as the non-self citations per paper and the h-index per paper, to characterize the publication quality of a research team or an individual. Furthermore, it is possible to take some new metrics, including webmetrics and cybermetrics, into consideration to measure the influence of publications in social science and humanities. It is also helpful to utilize network data to measure the social influence of academic publications.

Third, bibliometrics should be properly advocated among management staff and scholars. For example, it is necessary for a project manager to understand what each bibliometric term implies and to support excellent research. It is necessary for university authorities to understand bibliometrics-based evaluation in the rational allocation of research resources. On the other hand, it is better for scholars to pay attention to the functions of bibliometrics in scientific monitoring and disciplinary analysis, instead of the evaluation index of personal documents only.

Finally, I would like to refer to the words of Garfield and Russo as concluding remarks. "Scientometric indicators are not intended to replace the experts, but enable them to observe and comment on the research work, so that the experts can obtain sufficient information to form fully based on opinions, which are more integrated and authoritative." ■

Sandra L. Schmid

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Negative Consequences of the Misuse of Journal Impact Factors for Scientific Assessment

The research community has largely "bought in" to the hype surrounding Journal Impact Factor – a marketing tool which does not measure the actual quality or impact of a given work. The negative consequences for the scientific enterprise are many. It's high time we reassert our own rigorous scientific standards and re-establish control over how we conduct and evaluate our research.

| by Sandra L. Schmid

Impressions

- 1 Sandra Schmid (University of Texas Southwestern Medical School), Shiyi Chen (Peking University), IAB Vice Chair Helen Siu (Yale University)
- 2 Rocky Skeef (NRF South Africa) and Ray Medhurst (Embassy of the Republic of South Africa)
- 3 Marcia McNutt (Science) and Aidan Byrne (Australian Research Council)



Scientific journals and their editors play an important role in overseeing rigorous peer review and as curators of the complex and voluminous scientific literature. Each journal has defined objectives and styles that shape its content, and each is targeted to a different audience (e.g. broad and interdisciplinary, or more focused and specialized). Over the past 30 years the number of journals has grown exponentially, as for-profit companies like Wiley, Elsevier, Springer and the Nature Publishing Group seek ever-increasing revenues. Enter the “journal impact factor” (JIF), which

“Individuals and institutions are being spuriously judged based indirectly on JIF, rather than directly on the quality and impact of their work.”

was devised and commercialized by Eugene Garfield (and now marketed through Thomson Reuters) to help librarians decide to which journals they should subscribe and commit precious library resources. JIF provides one measurement, based on citation data, of a journal’s impact; it was never intended to and indeed does not measure the quality or impact of the individual papers in that journal. Nor does it accurately reflect the scientific impact of our highest quality ‘specialty’ journals, most of which are run by working scientists who oversee the review and publication of high quality manuscripts most relevant to their areas of research. Yet individuals and institutions are being spuriously judged – by other scientists, funding agencies, governing bodies and administrators – based indirectly on JIF, rather than directly on the quality and impact of their work.

A skewed view

An imprecise measure of scientific impact, JIF simply reports the average number of citations received per paper published in that journal during the two preceding years. Any scientist knows that the average of a highly skewed data-set is statistically flawed and often meaningless. Indeed the distribution of individual citation rates is extremely broad (ranging from >1000 citations/paper to zero for papers published in Nature in 2012) and overlaps with other top journals, despite apparently large differences in their reported JIF. For example, according to Thomson Reuter’s Web of Science, the highest cited paper published in PLoS One in 2012 received more citations (367) than the highest cited paper published that year in Cell (287), despite an almost ten-fold difference in JIF. Moreover, many of the most forward-looking and eventually highest impact papers are not immediately recognized

by the masses as such, and hence the arbitrary two-year window is much too early to accurately judge a paper’s eventual impact. Worse, the data upon which JIF is based are opaque, and no information is provided as to the distribution of the individual paper citations, the contribution of reviews vs. primary literature, or the statistical significance (or lack thereof) of the often small journal-to-journal differences in JIF. Indeed, Nature, which flaunts its JIF (reported to three decimal places) in its marketing to authors, would ironically not accept papers reporting such flawed statistics!

Unintended consequences

The abuse of JIF as a tool to assess the quality of an individual’s or even an institute’s research efforts, and the resulting perceived importance of publishing in ‘high-impact’ journals has many unintended detrimental consequences for the scientific enterprise. Specifically:

- 1) Competition to publish in the small subset of the highest impact factor journals is perversely intense. This, coupled to the recent phenomenon of online supplemental materials (see Schmid, 2011a), has led editors and referees to demand increasingly more information per paper. These experiments, which are invariably buried as supplemental material, often waste valuable resources and time that would be better spent addressing higher priority questions that offer the possibility of new discovery. Together these factors can delay communication of important discoveries that could launch new fields, and/or bury important details or potential incongruities that could spur new discoveries in infrequently-read, often under-scrutinized, and not readily searchable supplemental material.
- 2) This same, unhealthy competition can lead to the over-interpretation of findings or, on rare occasions, fraud. Moreover, the ‘appearance’ of a complete and definitive story discourages others from conducting follow-up and augmentative studies necessary to verify findings.
- 3) JIF is used as a marketing tool and sadly scientists are literally buying into the hype at great expense. For example, PLoS, a non-profit publisher, launched PLoSOne as among the first, general subject open-access journals aimed at accelerating publication of rigorously peer-reviewed papers, without a subjective filter of the findings’ potential impact. They charge \$1350/paper (for those researchers able to afford publication costs) and published >20,000 papers in 2012. Seeing a lucrative business opportunity, for-profit publishers





introduced their own 'open-access' journals, piggybacking on their parent journals' JIF and name 'cache'. Star-struck and JIF-obsessed authors are paying \$5000 – one-third of a typical annual supply budget! – to publish their papers in Nature Communications and Cell Reports. Funding agencies and institutes that use JIF are paying a steep price.

- 4) In the short term, JIFs and even individual publication citation metrics are incapable of measuring the long-term or combinatorial impact of a body of work, which are the true measure of scientific progress. Thus, their use in assessing graduate students for competitive postdoctoral fellowships, postdoctoral fellows for Assistant Professor positions, or junior faculty for promotion is especially spurious and detrimental.
- 5) The greatest detriment to the obsession of publishing in high impact journals is the waste of time and resources that inevitably delays career progression of students and postdocs, causes young faculty to divert their programs to the whim of anonymous referees and pro-

“JIFs and even individual publication citation metrics are incapable of measuring the long-term or combinatorial impact of a body of work, which are the true measure of scientific progress.”

fessional editors, and entices postdocs and students into 'hot' subjects, away from other essential areas of research. Packaging a complete PhD thesis or a four-year postdoctoral study in a single paper is detrimental to a young scientist's career. The best predictor of future career success for pre-doctoral and post-doctoral trainees is evidence of consistent productivity. Thus, young (and old) scientists benefit from the 'cumulative impact' of a series of papers that open up and develop new areas of research or solve a complex problem (Schmid, 2011b). Learning how to write, submit and publish papers and the experience of completing and publishing these individual 'stories' provides both needed motivation and essential training for future success. Similarly, young faculty members who seek publication in these journals often do so at the expense of demonstrating the consistent productivity that is necessary for promotion and sustainable funding.

Beyond bibliometrics

Thankfully the scientific community is awakening to the dangers and damages caused by the misuse of JIF to assess individual re-

“Young faculty members who seek publication in these journals often do so at the expense of demonstrating the consistent productivity that is necessary for promotion and sustainable funding.”

searchers and their institutions. Led by the American Society for Cell Biology (ASCB), a prominent group of scientists met in San Francisco in December 2012 and issued a Declaration on Research Assessment (DORA) decrying the use of JIF as a criteria and issuing a set of best practice recommendations for funding agencies, publishers, scientists and their institutions (see <http://www.ascb.org/dora/>). Now signed by over 12,000 individuals and 547 organizations, DORA has raised awareness. New practices are being designed, implemented (see for example Schmid, 2014), and shared with the community (see: http://www.ascb.org/dora/?page_id=2542). The Alexander von Humboldt Foundation Forum on “Beyond Bibliometrics – Identifying the Best”, from which this volume arises, is another shining example. As a scientific community, it is critical that we apply our own rigor and scholarly abilities to re-establish control over how we conduct and assess our research programs. ■

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Impressions

- 1 Haiyan Hu (Beijing Institute of Technology)
- 2 Gale A. Mattox (Georgetown University)
- 3 Cathleen S. Fisher, Robert E. Norton, and Jeffrey Peck (American Friends of the Alexander von Humboldt Foundation)

1



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Risks of the Use of Bibliometrics at the System Level

Heavy use of computer-based bibliometrics can reflect and even exacerbate certain structural imbalances in academic life. They can obscure both the potential for innovation and the potential for the practical application of new research. | by Arto Mustajoki

Publishing and citations reflect the very essence of science. The results and findings of research are relevant only after they have been published. In this way they are distributed to other researchers for their assessment and use. Citations tell the author of a publication that someone has used the results and ideas he or she has presented. The number and quality of publications has traditionally played a central role in competitions where people have been selected to positions in universities and research centres.

So, 'handmade bibliometrics' has been a natural part of academic life for centuries, whereas a relatively new phenomenon is what can be called 'computer-based bibliometrics'. It became possible after the building of large databases with exact information about publications. When calculation techniques developed, databases also enabled us to count numbers of citations concerning individual researchers, depart-

"There is a risk that concentrating on the competition for publication and citation points reduces researchers' interest in thinking of the potential practical use of scientific findings."

ments, universities, countries and journals. More and more sophisticated tools have been created. They make it possible to rank researchers by using one single figure like the h-index. The method itself is clear, but it is unclear what these indexes in fact reflect: quality of research, relevance and prestige within the research community, or just visibility. Now we have reached the situation where dozens of research activity indices are available. At this point, it is reasonable to pause and consider the consequences all this has for research practices and for the course of development of research.

Beyond the 'salami technique': four potential weaknesses

When talking about the problems caused by the heavy use of bibliometrics in the contemporary research environment, people generally mention such concrete negative consequences as splitting research results into several articles (the so-called 'salami technique') and concentrating on topics that can be pursued in line with the demand for quick results. I would point out four phenomena that concern the development of research on a larger scale.





First, when trying to guarantee high effectiveness of their work, researchers prefer methods and topics which are at the current moment the most popular ones. When all researchers follow the mainstream approach, it is strengthened further. As a result, it is ever harder to find space for research that deviates from the common line. This leads to an underutilisation of the main driving force of research, which should be creative thinking and the search for revolutionary ideas.

Second, as long as they have a substantial enough researcher community, even small subfields that concentrate on a particular topic and use a common methodology may have prestigious journals of their own. This helps them to gain high scores in publishing and citations. When such a situation continues, this small researcher community gradually isolates itself from other researchers. They write for each other in their own specific language that researchers outside this group find difficult to comprehend. Representatives of this subfield keep attaining fine results when publications and citations are counted, but have no real impact on the development of science as a whole.

Third, good results in bibliometrics may create an imbalance between the branches or fractions of a research field. An example of this is medicine, where genetics is the hottest area today. It attracts the most talented students, has the journals with the highest impact factors, and receives the largest share of research grants. Here bibliometrics is only part of the game, but it does play an important role in the high prestige of this subfield of medicine. As a result, some other subfields that are important from the point of view of society suffer from the situation. The most striking example of this is psychiatry, which differs from other branches of medicine in its approach to the application of strict scientific methods. At the same time, psychiatry has a huge societal significance.

Fourth, concentrating on the scientific competition may deflect attention from the possible applications of research. I am not arguing that possibilities for quick applications should always determine the choice of topics in basic research, but the contrary is also not desirable. There is a risk that concentrating on the competition for publication and citation points reduces researchers' interest in thinking of the potential practical use of scientific findings.

Quantity over Quality?

I would mention one more aspect of the use of bibliometrics, namely the unbalanced treatment of research fields. It is a commonplace fact that there is a big difference in publishing practices between the natural sciences and the humanities. However, there are also major discrepancies within these two camps. Even neighbouring fields, e.g. physics and mathematics, may differ from each other substantially in their publishing habits. It is possible to eliminate this inconsistency by using techniques based on field-normalised figures. Nevertheless, high numbers of publications and citations may influence researchers' overall impression about the quality of research in various fields. Consequently, this may be reflected in assessments based on peer review.

Finally, I do not think that totally avoiding the use of bibliometrics is a reasonable option in assessing research achievements. However, we should be aware of the potential risks of such measurements. ■

Impressions

- 1 IAB members Yitzhak Apeloig (Technion) and Joseph S. Francisco (University of Nebraska) with Eva Wille (Wiley-VCH) and Martin Quack (ETH Zürich)



“Serious evaluation is time-consuming and somewhat subjective, but the alternative is a mindless exercise that reduces the art of academic assessment to a crude calculus.” (Elizabeth Perry)

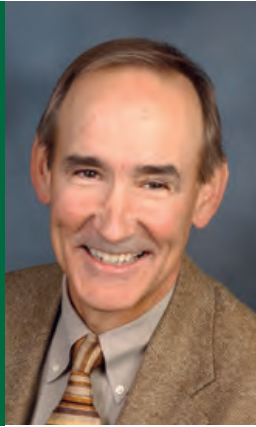
Panel 2 International Perspectives of Scientists





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Beyond the Bibliometrics We Have to the Bibliometrics We Need

How do we develop more inclusive and effective bibliometrics for the challenges of the twenty-first century? Traditional peer review is collapsing under its own weight, and existing bibliometrics don't properly measure excellence. Creating genuinely open global fields of research will demand some rethinking. | by William W. Kelly

“What was intended as a historiographical tool has become, without reflection, an assessment and accountability bludgeon.”

Do bibliometrics accurately measure scholarly excellence? No. From my standpoint as an academic researcher and teacher in an American university, they are crudely distorting as presently defined and deployed. Their dangers are three: what they mean, what they measure, and how they are used. Bibliometrics themselves are spuriously objective and falsely standardizing across many of the disciplines in which they are making inroads, including my own field of Anthropology. Their increasing role in processes of scholarly and academic evaluation is driving out a broader mix of peer review that must remain robust and equitable.

Bibliometrics are presented as a means of “auditing impact” – “auditing” being measurement based on a single or a few quantifiable metrics and “impact” being the effect of research products. However, even the very thorough and thoughtful London School of Economics 2011 Handbook on Maximizing the Impacts of Your Research modestly defines impact by “occasions” rather than by “outcomes.”¹ That is, bibliometrics can only quantify the number of times a scholarly publication is cited, not determine its substantive impact on subsequent work. This is the first problem: “impact” does not equal creativity or distinction or influence, themselves often incommensurate ambitions of the best research.

Mission creep: from citation indexes to Google Scholar

The second danger is “mission creep.” Eugene Garfield formulated the notion of citation index in his 1955 article in *Science* initially as a quantifiable strategy for researching the history of science.² It was only in the 1970s that the Science Citation Index was used to evaluate the relative impact of journals, and only from the 1990s have such metrics been taken up as measures of individual and collective research productivity. The h-index only dates from 2005 (the proposal of physicist Jorge Hirsch), and Google Scholar, formulated in 2004 by Anurag Acharya, has just more recently refined its ranking metrics. What was intended as a historiographical tool has become, without reflection, an assessment and accountability bludgeon.

Peer review too subjective? Bibliometrics are also biased

At my own university, faculty candidates for hire and promotion have long been evaluated by the senior faculty of their departments and then by a supra-department divisional faculty committee. At both stages, there is thorough debate using our own evaluations of the

Impressions

- 1 Former IAB member Choon Fong Shih (National University of Singapore) and IAB member Liqiu Meng (TU München)
- 2 John Ball (Oxford University) and Arto Mustajoki (Academy of Finland)
- 3 Sandra Schmid (University of Texas Southwestern Medical Center) and Susanne Arning (Humboldt Foundation)



candidate's publications, teaching, and service portfolios together with written assessments from outside academic reviewers. Some of my colleagues now consider this too imprecise, too subjective, and too unaccountable. Bibliometrics have been inserted into the Yale University process at both levels under the innocuous pretense that they provide just "one more" form of evidence.

But numbers are never neutral; they are not merely available tools. This is the third danger. Bibliometrics at Yale are quickly becoming normative and regulative. Why? They fit certain locally dominant disciplines, and they are, frankly, a lazy excuse for what used to be a more time-consuming local exploration and discussion of the body of work. Sadly, bibliometrics are not supplementing but rather are supplanting multi-faceted peer review as the fundamental principle of evaluating scholarly excellence.

Let me offer a distressing, symptomatic anecdote. Recently, a leading scholar in environmental anthropology from another research university came to lecture at Yale. She is known and respected by many of us for her several books and innovative, cutting-edge research. She gave a fascinating presentation of her latest work, but one of my faculty colleagues reported to me that, as he was leaving the lecture room, he overheard two of our first-year doctoral students dismissing our visitor with the view, "Her Google Scholar citation index is really low!" All three dangers of such bibliometrics as assessment are revealed in that one comment.

So what is to be done? Of course as scholars, we want to make a difference – with our minds, with our research, with our publications – and we want to hire and retain those scholars and teachers who make a difference and who we judge will continue to make a difference. We share, with administrators, funding agencies, and the public, a fundamental motivation to identify, measure, and reward relevant accomplishment. Our differences are not with the "why" of assessment but with the "what" and the "how."

Evening out unequal landscapes

In closing, let me suggest two such imperatives for developing new bibliometrics. The first is the urgent challenge to create genuinely open global fields of research and disciplinary communities – which we have yet to achieve 150 years after the nineteenth-century formation of professional academic disciplines. There are anthropologists in

every country of the world that has a national university, but world anthropology is still a highly unequal landscape on whose lofty heights sit those bastions of privilege like, well, my own university, Yale! We have yet to develop fair measures of non-metropolitan journals, presses, and scholarly associations necessary for a poly-lingual, global community. We must think creatively about how bibliometrics might help us – not in spurious comparisons of anthropologists and electrical engineers, but in fashioning more inclusive, more equitable, and more motivating standards of achievement within global research communities.

A second challenge faces our commitment to peer expert review. We researchers and scholars have long valued and protected peer review as the essential process for judicious assessment, but the fact is that the process has broken down in many ways in all disciplines. Many of us are swamped with constant requests and suffer from chronic reviewer fatigue. There are too many pro forma requests and recycled letters and hasty prose. To preserve peer review we must reform it, and in so doing, we must try to figure out just where in the many uses and multiple stages of peer review some types of bibliometrics might be justified and deployed.

"We have yet to develop fair measures of non-metropolitan journals, presses, and scholarly associations necessary for a poly-lingual, global community."

Scholars and scholarly associations must seize the initiative in debating and defining more responsible standards of excellence and accountability, both qualitative and quantitative (an important illustration of which is the 2012 San Francisco Declaration on Research Assessment). Only then can we move from the bibliometrics we have to those that we actually need for the real challenges that face every field of research and scholarship in the twenty-first century. ■

¹ http://www.lse.ac.uk/government/research/resgroups/LSEPublicPolicy/Docs/LSE_Impact_Handbook_April_2011.pdf

² Eugene Garfield: "Citation Indexes for Science: A New Dimension in Documentation through Association of Ideas", In: Science 15 July 1955: Vol. 122 no. 3159 pp. 108-111





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Impact of Research Funding and Scientific Production on Scientific Impact: Are Quebec Academic Women Really Lagging Behind?

Using bibliometrics, while controlling for inequalities, reveals that women academics in the natural sciences and engineering in Quebec do not really lag behind their male counterparts in ability, quality or overall performance. | by Catherine Beaudry

A recent Nature paper confirms that women are lagging behind in terms of worldwide scientific production and in terms of citations, taking into account the authors' ranking (first or last) and collaboration patterns. It therefore seems that the glass ceiling is still very much present despite more than a decade of specific policies aimed at supporting women in science. It is often suggested that male scientists publish more papers than women because men are more likely to have the personal characteristics, academic rank and resources that are favourable to scientific production. Furthermore, inequalities are generally noted regarding access to research funding and equipment, but that is generally where the argument stops. In our research, we control for all these factors to compare the quality of scientific production of men and women and to provide a different portrait of the performance of women, i.e. to examine whether it is still worse than that of their male colleagues.

Where are the discrepancies, and how do we reverse them?

The province of Quebec is generally identified as one of the regions closest to achieving gender parity and as such we expect that female scientists would be in a better position than in other countries. With 14.5% women working in the natural sciences and engineering fields, and 26.5% women in the health fields (medical and health sciences) in our Quebec sample, one could argue that this still remains far from gender parity. While we acknowledge the rarity of women in science in Quebec and their slightly inferior performance, our goal is to try to elucidate where the discrepancies are, to explain the differences and to propose avenues to reverse the tendency.

Comparing the overall characteristics of men and women, we find that Quebec men are more cited, produce more papers, occupy more often the last-author rank and the middle-author rank, raise more funds from public, private and philanthropic sources and their funding is more diversified, an observation that finds echo in much of the rest of the world. For instance, Quebec women have raised \$35,000 per year less in the health fields and around \$12,000 per year less in the NSE fields. In addition, the amount of private funding raised by women is reduced fourfold in the health fields and almost twofold in the NSE fields. But all hope is not lost; women have a slightly greater number of first-author papers than their male colleagues.

Impressions

- 1 Michael Matlosz (ANR France) and Daniel Fallon (American Friends of the Humboldt Foundation)
- 2 John Ball (University of Oxford)
- 3 IAB member Ute Frevert (MPI for Human Development, center) with research funding organization representatives: Wilhelm Krull (Volkswagen Foundation), Chien-Jen Chen (Academia Sinica) and Rocky Skeef (NRF South Africa)



Quality over Quantity

It has also been suggested that women publish in journals with lesser impact factors. While we observe that this is generally true in the health fields, it is not at all clear that this is the case in the NSE fields. Comparing the number of articles published by men and women in the NSE fields and the five-year impact factor of the journals they both target, one would be inclined to think that women aim for quality and not necessarily quantity.

Despite these unfavourable indicators, using the most simple regression analysis, the difference between men and women in health and NSE fields is not significant. Hence our results do not give credence to the hypothesis that Quebec women are less capable in terms of science. Considering the differences identified in the previous paragraphs, we examined every factor individually for both men and women to try to disentangle the forces that may be at play here.

“In the NSE fields, women appear to benefit less from the networking that generally comes from large author lists.”

First, we found no effect that would indicate that women are less cited given the same amount of funding as men. Our results further show that women in the health and NSE fields with the same number of publications are equally cited as compared to their male colleagues. Breaking down the number of publications into first- last- and middle-author articles implies that women are equally cited as men, regardless of their rank in the author list.

Concern about differences in impact, influence, and fundraising

The influence of the five-year impact factor of journals is where the gender differences between the health and NSE fields are the most striking. Female natural scientists and engineers that publish in the same journals get the same level of citations. In contrast, for medical and health scientists, when publishing in similar impact factor journals, women are less cited than men, suggesting that women gain less from the visibility

provided by high impact journals. To investigate whether this could be due to the inclusion of nursing, or other health science fields dominated by female scientists, we removed these disciplines from the regressions, but the results remain the same.

“The observed result that, given the same amount funding or similar publication record, women are equally cited as men, tends to argue against Lawrence Summers’ remarks.”

Another discriminant factor between the genders is the length of the author list. The general wisdom dictates that a wider visibility provided by a larger author base has a positive impact on the propensity to attract citations. While the picture is similar for both men and women in the health fields, in the NSE fields, women appear to benefit less from the networking that generally comes from large author lists. Their impact for women is about 5% smaller than that of men on their citation rate. Although not a very large difference, it is nevertheless there, and remains a significant difference when nursing and other female dominated health science disciplines are removed from the sample.

The observed result that, given the same amount funding or similar publication record, women are equally cited as men, tends to argue against Lawrence Summers’ remarks at the now infamous NBER conference of 2005 to the effect that few women in academia had reached the highest echelons of the profession because of a lack of aptitude for science and not because of discrimination. The fact that women in the health fields are less cited when they publish in journals of the same impact factor would tend to argue otherwise. Is it possible that in promoting women in science for a great number of years now, we have neglected women in the health fields? All things being equal, however, women generally perform as well as men. Lagging behind? Not really. ■





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Inclusiveness: A Challenge for Bibliometrics

Because bibliometrics tends to reinforce academic exclusiveness, a number of crucial issues must be addressed, including editorial bias, publication bias and language bias, as well as improper “across-the-board” comparisons between disciplines. | by Abdelhadi Soudi

“A fair evaluation of performance presupposes a strong ‘no’ to exclusiveness: no to editorial bias, no to publication bias, no to language bias, and no to ‘routine’ comparison of disciplines!”

While bibliometrics has been used as the standard evaluation approach to measure scientific publications and scientific research in general, there are several limitations to this approach. Some scientists strongly oppose any form of systemic evaluation; on the other hand, funding organizations and research institutions are claiming the right to evaluate the scientific output of their awardees/researchers. In this presentation, I outline some issues with regard to a fair evaluation of performance based on bibliometric data. These issues are completely against the very purpose of research. A fair evaluation of performance presupposes a strong “no” to exclusiveness: no to editorial bias, no to publication bias, no to language bias, and no to “routine” comparison of disciplines!

Publication bias, editorial and citation analysis across regions

First, I would like to say a few words about what has been referred to in the literature as “the file drawer problem” whereby scientists refrain from submitting their work because they think that their findings are not positive or significant (Bodenheimer 2000, Rosenthal 1979, Song et al. 2010). They think so under the assumption that journals favor the publication of papers with positive results because the latter are much more likely to be cited and, hence, increase the journal’s impact factor. Many studies have shown that the file drawer problem is particularly common in publications in the area of medicine (McGauran et al. 2010). These studies have also reported that this publication bias can have serious consequences on public health as well as on the very purpose of research. By way of example, a work which reports negative results on a new treatment is unlikely to be widely disseminated. Several studies have also reported that some industry-based research with unfavorable results does not reach the public because it is withheld by the sponsors (Bodenheimer 2000, Bekelman et al. 2003).

Another related problem is the scholars’ “migration” to domains with a high citation rate, but also to areas of research recommended (or rather imposed) by funding agencies. While many scientists do not care for citation indices, some researchers would try to adapt their work to a domain with a high citation rate, which does not encourage creativity.

Language bias in the use of citation analysis for evaluation

Several studies have demonstrated that language bias underrates the scientific output of non-English speaking countries with domestic journals (Van Leeuwen et al. 2000, 2001). In his influential Science paper, May (1997) addresses this problem by claiming that journals published

Impressions

- 1 Abdelhadi Soudi (École Nationale de l'Industrie Minérale Rabat) and William Kelly (Yale University)
- 2 Michael Matlosz (ANR France), Marcia McNutt (Science) and IAB member Ute Frevert (MPI for Human Development)
- 3 Ingrid Wüning Tschol (Robert Bosch Stiftung)



in languages other than English are underrepresented in the Science Citation Index (SCI). This results in a lower impact of the scientific output, especially from larger countries, such as Germany and France.

Another study by Van Leeuwen et al. (2001) addressed the problem of language bias from another interesting dimension: they claim that language bias is also present “within the boundaries of the SCI” and that it seriously lowers the impact score of countries, such as France and Germany. Van Leeuwen et al. analyzed the scientific output (including non-English language papers) at the Faculty of Medicine at the University of Münster, Germany. More precisely, they compared the impact of papers written in other languages than English to that of articles written in English. The results of the study have empirically shown that the citation impact of the faculty at this university significantly increases if the non-English language papers are removed from the citation analysis. The study concludes that language bias plays a crucial role not only in the evaluation but also in the comparisons and rankings of major scientific nations.

Citation analysis across disciplines

Different disciplines publish in different ways and have different citation rates. Accordingly, results of citation analysis of different disciplines cannot be compared routinely. By way of example, publications in the engineering sciences are not easily found by search engines. While some disciplines are well-established mainstream areas for the web of science (e.g. Chemistry) and as such the accuracy of bibliometric analysis is very high, other disciplines, such as the engineering sciences, are not. Engineering papers, in general, are published in conference proceedings and search engines sometimes cannot find them. Accuracy is discipline-dependent.

Bibliometrics is also inadequate to evaluate the scholarly and research output of social scientists and those working in the humanities. These disciplines are not dominated by international peer reviews. In the humanities and social sciences, there are many works that are invisible: for example, in the social sciences, works are published in the form of monographs, reports, textbooks. These works, unfortunately, are not “bibliometrically” captured.

Studies have also shown that monographs and books which are the main publication form in these disciplines are “threatened species”, because the publication of a book or monograph has a negative impact on the author’s h-factor. This is particularly regrettable for a discipline such as anthropology. In fact, a monograph on an ethnic group, a village or a group of individuals is the royal means for this discipline. Discovering a culture, a language or ritual cannot be easily expressed in an article. ■

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Scaling China's Ivory Tower

As part of a big push to improve the global ranking of its research universities, China has relied heavily on bibliometrics as a measure of performance. In the humanities and social sciences, this has been highly problematic for intellectual growth. | by Elizabeth Perry

Fifteen years ago, China launched a series of ambitious reforms designed to propel its top universities into the upper ranks of so-called "world-class universities." Two major initiatives, known as Project 985 and Project 211, pumped huge amounts of central state funding into a handful of leading universities deemed capable of rising in the global rankings of research universities. Bibliometrics, or the counting of articles published in SCI and SSCI journals, became the gold standard for measuring China's progress in scaling the ivory tower.

As a result of this strategic scaling, armies of post-doctoral fellows were hired by all of China's major universities. These are young scholars (often with considerable overseas research and study experience) who have no teaching duties and are employed on short-term contracts, renewable upon producing a specified quota of SCI or SSCI journal articles. Faculty members are rewarded with generous bonuses for publishing in these outlets as well. In terms of raw output, the results have been impressive. Since 2009, China has been the world's second biggest producer of scientific papers indexed in SCI; in just this

"Contemporary China is surely one of the most important and illuminating sites for developing new theories of politics, yet it is producing scant scholarship along these lines."

past year, China's production of SCI papers leapt by 24%. In terms of measurable impact, however, the results are less impressive, with per paper citations well below the world average.

Forced into English

I am not qualified to comment on the effect of these trends for the development of Chinese science and technology. But in the social sciences and humanities – fields that I do know a bit about – it seems clear that the introduction of bibliometrics has been highly problematic for intellectual growth. The rewards for SSCI publications have encouraged Chinese scholars in the humanities and social sciences to publish numerous short articles in English language journals when in fact their scholarship might be better cultivated and communicated through the publication of fewer but longer, more thoughtful works – books instead of articles – written in Chinese rather than English.

Impressions

- 1 Peter Göllitz (Angewandte Chemie)
- 2 Eric S. Koenig (American Friends of the Alexander von Humboldt Foundation)
- 3 Abdelhadi Soudi (École Nationale de l'Industrie Minérale Rabat), IAB member
Stefan Marcinowski (Max Planck Society), and
Catherine Beaudry (Polytechnique Montréal)

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Does it make sense for a Chinese scholar of Tang poetry to struggle to publish her work in English language journals? The problem was recognized and remedied somewhat by the introduction in 2000 of a Chinese Social Science Citation Index, CSSCI, developed at Nanjing University, which covers Chinese language journals in the social sciences and humanities. But the leading universities in China continue to privilege publications in English, with SSCI articles bringing bigger bonuses and faster promotions than CSSCI publications.

“Serious evaluation requires reading and responding to the work, rather than simply counting it or assigning points based upon the prestige of the journal in which it appeared.”

No time for books

Critical as the language issue is, perhaps even more significant for scholarly development is the question of format. Is outstanding work in the humanities and social sciences best presented in article form? It is hard to imagine that most of the great thinkers in the social sciences and humanities would have had the same impact had they presented their arguments as articles rather than books.

But fewer and fewer scholars in China are writing big books these days. Take the field of political science. Contemporary China is surely one of the most important and illuminating sites for developing new theories of politics, yet it is producing scant scholarship along these lines. Part of the blame rests, of course, with the severe constraints placed on academic freedom by the Chinese Communist Party. But an even greater problem may be that most young Chinese scholars (particularly those with overseas training) are too distracted by the rewards of the bibliometric game to devote serious time and thought to the more demanding and less lucrative work of writing big books that place China’s rich experience in a broader interpretive or analytical context.

“Does it make sense for a Chinese scholar of Tang poetry to struggle to publish her work in English language journals?”

What can be done about this, in China or elsewhere? If one is irrevocably committed to bibliometrics, then there could at least be more credit given for books published in major academic series from reputable academic presses. Moving beyond bibliometrics, there could be greater public recognition of scholarly books – in the form of competitive prizes sponsored by scholarly associations, universities, and publishing houses – and reflected in salaries and promotions. Most important, the primary means of assessing the quality and impact of scholarship in the humanities and social sciences must be peer review, through the solicitation of detailed letters of evaluation from noted experts in the field. Serious evaluation requires reading and responding to the work, rather than simply counting it or assigning points based upon the prestige of the journal in which it appeared. Serious evaluation is a time consuming and admittedly somewhat subjective process, which places a heavy burden on leading scholars at major institutions. But the alternative is a mindless exercise that relieves us of the responsibility of engaging with each other’s work and reduces the art of academic assessment to a crude calculus unable to distinguish between quantity and quality. An ivory tower scaled in that manner is unlikely to be one renowned for its humanities and social sciences. ■



"It is important that any evaluation employing bibliometric indicators should be integrated into an approach for selection offering the possibility to estimate future performance." (Michael Matlosz)

Panel 3

International Perspectives of Funding Organizations



Michael Matlosz

President and Chief
Executive Officer
Agence Nationale
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Bibliometrics and Research Funding: What Types of Data and Indicators Would be of Most Use for Selection, Follow-up and Impact Assessment?

While traditional bibliometric indicators can be of considerable use, a funding organization such as the French National Research Agency could benefit greatly from more qualitative indicators and the ability to estimate future performance. | by Michael Matlosz

The choice of performance indicators for a research financing organization, such as the French National Research Agency (ANR), depends to a large extent on the remit expressing the missions and mandates of the organization, and the criteria for selection and assessment will

therefore tend to vary from one organization (or country) to another. Contrary to many countries in which competitive project-based funding is a substantial proportion of public research financing (ranging in many cases from 40 to 60%), recurrent structure-based financing constitutes the majority of funding in France, and as a result the proportion of public research financing on the basis of competitive calls for proposals is rather limited (on the order of 10%). In the French context, therefore, financing of projects offering very high leverage for issues such as development of new research collaborations, new research communities and new, highly promising research pathways (including potentially significant scientific risk) are major funding objectives that may in some cases be more important than traditional research “excellence”.

Although it is doubtful that “pure” bibliometric indicators (such as impact factors and citation indices) can be considered systematically as unique measures of scientific “excellence”, such indicators can nevertheless be of considerable use (in association with expert peer review) to evaluate the scientific productivity of research teams, whether that evaluation be employed for selection processes of a call for proposals, monitoring of project advancement for selected projects, or impact assessment of the extent to which previously funded research has produced scientific results.

Measuring future excellence

Given that an inherent feature of bibliometric indicators for scientific production is the measurement of past performance, it is important that any evaluation employing such indicators be integrated into an approach for selection offering the possibility to estimate future performance for those criteria that are of importance for the financing organization concerned.

In the context of the remit of the French ANR, exclusive use of traditional bibliometric indicators of scientific production related to previous research “excellence” of highly established research teams is unlikely to be sufficient. If feasible through targeted statistical analysis, the availability of more “qualitative” indicators such as “collaborative capacity”, “thematic diversity” or “openness to scientific risk”, would be of great interest. Given the complexity of such qualitative analyses, the reliability of statistical algorithms capable of generating such indicators would need to be examined very carefully, and recourse to peer review for validation will remain essential. ■



Impressions

Choon Fong Shih (National University of Singapore), Shiyi Chen (Peking University), IAB member Liqiu Meng (TU München)





Rocky Skeef

Executive Director
Reviews and
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National Research
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The Use of Bibliometrics in the NRF Review Processes

South Africa's National Research Foundation evaluates applications, funding instruments and research performance based on an extensive peer review process. Bibliometrics is considered useful supplementary information, but contributes no more than 10% to the outcome of the evaluation process. | by Rocky Skeef

The National Research Foundation (NRF) is a state-funded agency of South Africa mandated to support and promote research. The NRF pursues delivery on its mandate through three types of operations, one of which is the Research and Innovation Support and Advancement (RISA) division. RISA provides funding for research, scholarships and equipment, accessed through open and competitive processes. The application of peer review systems using peers sourced nationally and internationally is central to the business of RISA. Accordingly, RISA has a dedicated Reviews and Evaluations Directorate, which is custodian to the development, application and continuous improvement of Reviews and Evaluations tools and systems which primarily serve the instruments of the NRF. The types of reviews and evaluations conducted in RISA are the following:

- I. Evaluation of applications from individuals, for a rating through the NRF Evaluation and Rating System.
- II. Review of applications for research grants and scholarships from funds managed by the NRF.
- III. Periodic evaluation of funding instruments managed by the NRF, for performance and impact.
- IV. Evaluation of research-performing and research-supporting units and institutions for performance.

The standard in the NRF's peer review of applications is a two-stage process.

Stage 1: Postal Reviews

For this stage applications are mailed to reviewers/evaluators who are considered to be experts in the field to assess the applications according to set guidelines, criteria and scorecards. A minimum number of experts per proposal is decided, and this will differ between review types and from instrument to instrument. This is the stage that entails a deep and detailed assessment of the applications, which may include the analysis of bibliometric information. The outcome is a report from each reviewer/evaluator.

Impressions

- 1 Michael Famulok (German Research Foundation)
- 2 IAB member Katarina Boele-Woelki (Utrecht University)
- 3 Elizabeth Perry (Harvard University), Abdelhadi Soudi (École Nationale de l'Industrie Minérale Rabat)



Stage 2: Panel Reviews

For this stage, NRF convenes a panel of sufficiently competent persons in the field, who will consider the experts' reports, in the context of the proposals and review guidelines, criteria and scorecards, and work on arriving at a consensus recommendation to the NRF per proposal.

To give a feel of the magnitude of the peer review exercise run by the NRF for the financial year 2014/15, the NRF will have processed at least the following number of applications, which will have been subjected to peer review, including analysis and interpretation of bibliometric information in some of the cases:

- Applications for bursaries and scholarships – 10,000
- Applications for research grants – 7,000
- Applications for NRF rating – 760

These applications will have been spread across approximately 80 instruments.

The use of bibliometric information as input during review/evaluation of applications within the NRF is most intense and most structured in the rating of individuals. In this case the h-index for applicants is obtained from the Scopus and Web of Science databases and provided to the reviewers as part of the input considerations during their review. They are provided categorised according to the review discipline categories and used with due consideration of its limitations and differences between the disciplines. Note though that even in the case of rating of individuals, bibliometric information analysis probably contributes no more than 10% towards the outcome. The following are the high level definitions of the rating categories of the NRF:

- A** - Leading international scholar in their field.
- B** - Enjoys considerable international recognition by their peers.
- C** - Established researcher with a sustained recent record of productivity in the field.
- P** - Young researcher considered likely to become an international leader in the field.
- Y** - Young researcher with potential to become an established researcher within five years.

Key evaluation criteria

Some key criteria that are applied in reviewing applications from across the instruments managed by the NRF include:

- I. Track record of applicant (rating may be relevant).
- II. Scientific merit of research proposal.
- III. Alignment with national or funder objectives and strategies.
- IV. Alignment with host institution's strategic plans.
- V. Expression of commitment by host institution.
- VI. Potential knowledge or socio-economic impact of expected research outputs.
- VII. Quality and feasibility of research plan.
- VIII. Collaboration record and plans.
- IX. Equity and redress (gender, disability and race).
- X. Novelty of intended research.

As is evident, these are a combination of analysis of past performance as well as an assessment of potential, capability, capacity and commitment for desired performance going forward.

“Evaluation criteria combine analysis of past performance with an assessment of potential, capability, capacity and commitment for desired performance going forward.”

The NRF considers bibliometric information as progressively useful supplementary information during the peer review processes, but does not view it sufficiently mature or sophisticated to replace the existing peer review/evaluation processes.

The NRF will continue to strengthen its ability and actual application of bibliometric information, as supplementary to its standard peer review/evaluation processes, in assessing applications for rating and for grants, as well as in assessing the research performance of research units, entities, or institutions. The use of bibliometrics as a basis for comparative performance assessments seems more palatable to the system at this point. ■





Chien-Jen Chen

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Bibliometrics and its Implications for Funding and Research Organizations in Taiwan

Research bodies in Taiwan have been moving away from simplistic indices and implementing more meaningful evaluation procedures, appropriate for both innovative 'bottom up' research and mission-oriented 'top down' projects. | by Chien-Jen Chen

The bibliometrical method was widely used as an auxiliary tool to evaluate the research performance of organizations and individuals by the Ministry of Science and Technology (until 2014: National Science Council), the major research funding agency, the Ministry of Education, and research universities in Taiwan. Recently, the limitations of using bibliometrics have been debated. Peer review by investigators domestically and internationally is becoming mainstream for project and award review processes without taking bibliometrics as an important component in Taiwan.

Brain drain led to decreased attention to domestic journals

Taiwan has become a country with a rapid progress in science and technology since World War II. From 1950 to 1980, there was significant brain drain from Taiwan to developed countries such as the USA, UK, EU countries and Japan. Each year more than 20,000 students went abroad to pursue their master's or doctoral degrees. The entire academic community in Taiwan started to internationalize when more and more investigators came back to Taiwan after 1970.

In the late 1970s, the number of papers published in international journals was considered an important national issue to promote Taiwan's international visibility in science and technology. Papers published in SCI journals were regarded as an important component in the review of applications for research grants or awards submitted to major education and research funding agencies. Researchers started to publish papers in international journals, and domestic journals that published papers in Chinese became less and less popular.

In the 1980s, bibliometrics was used as an auxiliary indicator for the selection of the best research proposals for grant funding or the best candidates for research awards. For the review of a research proposal, a weight of 70% was assigned to assess the originality, novelty and feasibility of the research project, with another 30% to evaluate the track record of investigators. Each proposal was reviewed by two peers, and their comments and assessments were discussed in the review panel. As the bibliometrical indicator is easy-to-use and time-saving, it was applied more and more widely.

Impressions

- 1 Martin J. Lohse (Leopoldina) and Wolfgang Rohe (Stiftung Mercator)
- 2 Elizabeth Perry (Harvard University) and IAB Vice Chair Helen Siu (Yale University)
- 3 Shiyi Chen (Peking University) and Sandra Schmid (University of Texas Southwestern Medical School)



As it is difficult to compare the competitive investigators in different fields, the ranking and rating of research proposals and investigators across a variety of disciplines has driven bibliometrical methods to become more and more sophisticated. In addition to the impact factor of journals, the type of papers (categorized into editorial, original, review and brief communication articles) and the authorship order (more weight for first and corresponding authors) were also taken into consideration. The Research Performance Index (RPI), which is the sum of the products multiplying the impact factor of journal (Ji) by authorship order (Ai) by article type (Ti) of all papers published in the preceding five years ($RPI = \sum J_i \times A_i \times T_i$), was developed in 1997 and widely used by the Division of Life Sciences of the National Science Council. The RPI has been applied by the Ministry of Science and Technology

“A tool like bibliometrics is regarded as inadequate to meet all needs for identifying the best grant proposals, awardees or faculty members.”

and many research universities to assess the overall performance of investigators who are competing for research grants, awards or faculty appointments and promotion for more than a decade. It was originally considered a useful supplementary indicator for funding decisions, especially for the comparison of research performance of investigators in different disciplines.

Research Performance Index abandoned

However, a tool like bibliometrics is regarded as inadequate to meet all needs for identifying the best grant proposals, awardees or faculty members. Bibliometrics and the RPI have been criticized for their limitations including: the overemphasis of quantity rather than quality of research publications, the assessment of impact of journal(s) rather than paper(s) per se, the different size of investigator pools in various research fields, the shift from “me-first” studies to “me-too” or “me-better” studies, the discouragement of long-term, high-risk, in-depth research projects, and the suppression of minor disciplines with low impact factors. The RPI was finally abandoned by the Ministry of Science and Technology in 2012. Bibliometrics became less and less important in the project review panel in the past two years.

New models, new measures

Today, in addition to bibliometrical data, peer review for grant funding, research awards and faculty appointments and promotion is more focused on the research proposal with preliminary findings, composition of research teams, potential patents and technology transfer, interdisciplinary and international collaborations, and training of post-doctoral research fellows and graduate students.

Different assessment methods are applied to different types of research grants. For bottom-up, investigator-initiated research grants, more emphasis is placed on 1) the novelty and feasibility of the research proposal; 2) the research performance, honors and awards of the researchers; 3) the potential impact of the proposal on the research field; and 4) international competitiveness. For top-down, mission-oriented research grants, reviews focus on 1) the organization and integration of sub-projects; 2) the complementary expertise of investigators; and 3) the potential to fulfill the mission. Furthermore, international review panels have been organized to do the review of prestigious projects such as the Summit projects for high-risk discovery and disruptive innovation, the Center of Excellence projects for outstanding research units with a track record of doing novel creative research, the Outstanding Research Awards for lifetime achievements and the Career Development Award for outstanding young investigators. ■





Daniel L. Goroff

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Remarks on Bibliometrics and the Productivity of Science

Bibliometry has untapped potential, not just for judging documents, but also as a fine-grained tool useful for archiving, tracking impact, finding hidden connections, preserving chains of evidence, and, ultimately, allocating resources. | by Daniel L. Goroff

Collecting new forms of bibliometric data promises new ways of gauging scientific output. Information technology seems to change everything. Particularly fascinating is the way that “filtering” could be made more democratic and timely.

But for all the rhetoric of revolution, it is also striking that the goal of bibliometry does not seem to have changed very much from what the scholarly publication community has been doing all along. Is the idea still to judge documents, only better?

More than a ‘better typewriter’

Technological revolutions often proceed this way. Before computers changed the world of telecommunications, I viewed mine as a typewriter that could cut and paste better. The internal combustion engine was just a better way of drawing a carriage, so it was put in the front of the car where the horses were and its output was measured in “horsepower”.

“Whether bibliometry is fit for a purpose depends on what the purpose is.”

Bibliometry seems similar. So far, it mainly seeks to change who evaluates scholarly communication and when, but not necessarily what happens and why. I do not think such a limited way of viewing bibliometry does justice to its potential or to the potential of science. Whether bibliometry is fit for a purpose depends on what the purpose is.

Weighing risks against returns

My problem is not figuring out better ways of knowing what is popular. The serious questions concern allocation of scarce resources under uncertainty. Here are four examples of difficult but important trade-offs, together with ways that bibliometrics could help significantly.

1. Allocation of public interest funding to science as opposed to other pursuits. Governments and philanthropies face many competing demands on their resources. How much should go to scientific research? Estimates of the social return on investment in basic research vary widely. The respected findings of economists like Zvi Griliches and Robert Solow on this question date back many decades and need revisiting.

Impressions

- 1 Chien-Jen Chen (Academia Sinica) and IAB member Ute Frevert (MPI for Human Development)
- 2 Choon Fong Shih (National University of Singapore)
- 3 IAB member Sarah Stroumsa (The Hebrew University) and Ulrike Albrecht (Humboldt Foundation)



Bibliometrics, linked with administrative and other data, can provide unprecedented ways of tracing the impact of scientific activities with fine granularity. Pursuing such work is the goal of a Sloan-supported Institute for Research on Science and Innovation based at the University of Michigan.

2. Allocation of research positions, grants, and other opportunities to one person or project as opposed to another. The essential aspect of such decisions is that they necessarily involve risk. If we could predict the outcome of a given scientific project *ex ante*, we would not call it research.

Here are three considerations:

- a) While it is important to check that a candidate has the requisite capabilities, most crude measures of this are quite adequate. More detailed bibliometric attempts at prediction may result in not taking enough risk.
- b) In judging worthiness, I feel most confident relying on factors such as: the soundness of methodological planning; commitments to annotating, sharing, and archiving results; and, above all, the quality of the questions being asked. Bibliometric indicators do not necessarily have much to add here.
- c) It pays to think about an investment portfolio as a whole rather than its components one at a time. The way to mitigate risk is through diversification: by assembling a team of people or roster of projects that complement one another because their prospects are, to the extent possible, uncorrelated. Bibliometrics could conceivably help with this.

Based on principles like these, the Alfred P. Sloan Foundation has helped start successful projects like the Sloan Digital Sky Survey and the Census of Marine Life. It has also awarded Sloan Research Fellowships to beginning faculty, 43 of whom have gone on to win Nobel Prizes.

3. Allocation of readers' attention to one scientific result or resource as opposed to another. Finding what you are looking for from among all the information available is a growing challenge. Bibliometrics could be helpful, say by surfacing relationships and connections among various references and resources. That includes datasets, models, code, and other artifacts or papers.

The Sloan Foundation has funded projects including Wikipedia, the Digital Public Library of America, as well as international data citation standards and planning for a global library of mathematics. How to search for mathematical results is a particularly intriguing problem, for example, that for-profit companies have little incentive to address but which could greatly enhance the usefulness of the scientific literature.

4. Allocation of curatorial stewardship to one scientific product as opposed to another. Triage is necessary. Editors, publishers, librarians, and archivists perform important and costly services, arguably ever more valuable given recent advances in information technology. Bibliometry can provide a guide, but the goal should not be conferring or confirming status. I am more interested in the role curators play in preserving important chains of evidence and argument for purposes such as rechecking, replication, and reuse. The Sloan Foundation has been supporting new models for how repositories interact with researchers and publishers through, for example, projects at the Center for Open Science in Virginia or the Institute for Quantitative Social Science at Harvard.

“Let’s not be too enchanted by information technology’s wondrous bounty. The productivity of science will depend on how well we can use bibliometrics and other new technological capabilities.”

Doing more with less

Science is not a popularity contest. Nor does it come free. When bibliometricians speak of “filtering,” the metaphor suggests an oversupply of scientific work. Separating the wheat from the chaff is important. But let’s not be too enchanted by information technology’s wondrous bounty. The productivity of science will depend on how well we can use bibliometrics and other new technological capabilities to cope with the perpetual undersupply of funds, positions, readers’ attention, and curators’ stewardship. ■





Wilhelm Krull

Secretary General
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What is Intellectual Quality in the Humanities? Some Guidelines.

As part of a workshop sponsored by the Volkswagen Foundation, scholars in the humanities and social sciences have developed a set of practical guidelines for assessing intellectual quality in the humanities based on attributes such as significance, relevance, originality and personal voice. | by Wilhelm Krull

The aim of the workshop¹ was to articulate guidelines for assessing intellectual quality in the humanities that could be put to practical use in the evaluation of grant proposals, fellowship applications, and prize nominations. The guidelines should be clear and crisp enough to offer genuine aids to judgment, but they should steer a course between the Scylla of mechanized procedures that depend on proxy indicators (e.g. citations or the amount of grant money previously awarded) and the Charybdis of appeals to ineffable connoisseurship (e.g. “I-know-it-when-I-see-it” pronouncements).²

These guidelines are exactly that: guidelines, not a rulebook or a checklist or a catalogue. Mindful of the historical and cultural diversity of the humanities (which an attempt to translate the term even into other European languages immediately makes clear), we do not imagine that all criteria will apply equally to all humanistic disciplines, let alone to newly emerging activities such as the digital humanities, the environmental, or medical humanities; in most cases, probably only some will apply. Nor are these criteria comprehensive or static: in the humanities as in the sciences, standards of intellectual quality are the product of history and are still evolving. Although some features may well distinguish at least some humanities from at least some sciences, such as cultural rootedness and the cultivation of a personal perspective, there is considerable overlap in some core criteria. The guidelines attempt to make clear where these areas of convergence and divergence lie. Their envisioned use lies in the assessment of individuals or collectives of scholars, not institutions. Finally, these guidelines are meant to orient judgment, not replace it.

Guidelines

- Scholarly solidity:** All good work in the humanities (and the sciences) should meet the standards of clarity in expression, consistency and rigor in argument, familiarity with the relevant sources, adequacy of the evidence to support claims made, thoroughness and fairness in the treatment of existing literature on the topic, honesty and civility in the consideration of rival views, care in quotation and citation, mastery of the methods (and languages) necessary to do justice to the topic, fidelity to the sources, and the coherence of the project as a whole. These constitute the backbone of solid research and provide the necessary but not sufficient conditions for intellectual quality.
- Well-chosen problem:** Is the problem significant and can the researcher explain why, preferably in terms that make sense also to scholars outside that specialty? Novelty is neither necessary nor sufficient to prove significance: some significant research returns to problems that have preoccupied scholars in a discipline since its inception; novelty for its own sake degenerates into eccentricity. There are many possible dimensions of significance, but almost all of them point beyond the problem at hand: a truly significant problem promises insights that others can build on, the more broadly the better.

Impressions

- IAB Vice Chair Helen Siu (Yale University) with the Secretary General and the President of the Humboldt Foundation, Enno Aufderheide and Helmut Schwarz
- Wilhelm Krull (Volkswagen Foundation) on the Research Funders' Panel
- Cathleen S. Fisher, President of the American Friends of the Alexander von Humboldt Foundation, with Andrea Binder (Humboldt Foundation) and IAB member Joseph S. Francisco (University of Nebraska)

1



“Criticism that spots errors is useful; criticism that exposes heretofore unsuspected limitations, invaluable.”

3. **Critical stance:** Criticism in the humanities proceeds at many levels: most obviously and superficially, criticism of the claims and interpretations of other scholars, but also criticism of methods and sources, of prevailing assumptions, of forms of argument, and of the topics that dominate research. Criticism that spots errors is useful; criticism that exposes heretofore unsuspected limitations, invaluable. At its best, the latter form of criticism opens new vistas for research, either supplementing what is already known or transforming it. In contrast to criticism of errors, which subtracts what has been shown to be faulty, criticism of limitations adds a new way of understanding.
4. **Perspectival suppleness:** This is closely related to the critical stance, since both involve conscious distancing from the assumptions that come most naturally to scholars embedded in a particular disciplinary, cultural, and historical context. The effect of both criticism and perspectival suppleness is decentering: the cautions against anachronism in history and against ethnocentrism in anthropology are examples of such deliberate decentering. In contrast to criticism, however, perspectival suppleness is practiced with the aim of understanding rather than transcending a particular perspective: the goal is not to achieve the view from nowhere but rather the view from here, there, and everywhere. It respects the specificity of context and the rootedness of a way of experiencing the world in a time, a place, a language, a history, and an identity.
5. **Originality:** This is a, not the criterion of intellectual quality in the humanities, although it is the one probably most emphasized in current North American and European discussions of evaluation. Other traditions may find the preservation of continuity (e.g. in commentary lineages of canonical texts) at least as valuable. Whatever its kind, originality should shed light beyond its own focus, both backwards (previous scholarship must be rethought) and forwards (subsequent scholarship will probably change direction). Authors should make clear not only what is new but also what is at stake beyond their own topic.

6. **Personal voice:** This is probably the criterion most specific to the humanities (rare though by no means absent in the modern sciences) and the one most subject to abuse. A strongly voiced work of scholarship carries the imprint of a personality – choice of problem, approach, literary style, mode of argument, shape of narrative, underlying intuitions are distinctive (sometimes to the point of making nonsense of double-blind refereeing: “by the claw thou shall know the lion”). The reasons for valuing a distinctive voice are both cognitive and aesthetic: that individual’s insights are inimitable and penetrating like no others; the individual style in which they are expressed gives pleasure to both writer and reader alike.
7. **Relevance:** Relevance in the humanities is defined by a deeper understanding of human experience, often but not exclusively in the context of the particular community to which the scholar feels a primary responsibility. Such deepened understanding can remake society, especially in the medium to long term. The humanities contribute new knowledge and new perspectives to civic debate among all citizens, beyond the confines of official politics. For this reason, publishers, editors, and critics as well as fellow scholars may sometimes also be judges of relevance. The relevance of the humanities can be and has been amplified by an alliance with the arts, as when museum curators, filmmakers, and artists have translated the findings of humanists into powerful interpretations that challenge the public to rethink what they thought they knew. Relevance in the humanities should be assessed by the potential to change not only what scholars, but also citizens at large, think, debate, and value. ■

1 The guidelines are the abridged results of discussions conducted at a small workshop funded by the Volkswagen Foundation and held in Hannover, Germany, 10-11 September 2014. Participants included humanists and social scientists from a range of fields, various countries, and at different stages of their careers.

2 The full version of the guidelines can be found on the website of the Max Planck Institute for the History of Science (www.mpiwg-berlin.mpg.de/en/resources/index.html) and the Volkswagen Foundation (www.volkswagenstiftung.de/en/foundation/publications.html).



Contributors

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Aidan Byrne is the CEO of the Australian Research Council. Previously, he was professor and Dean of Science as well as the Director of the ANU College of Physical and Mathematical Sciences. He was a Humboldt Research Fellow in 1986 and 87.

Chien-Jen Chen is a distinguished research fellow at the Genomics Research Center and a Vice President of Academia Sinica. A recipient of the Taiwanese Presidential Science Prize, a member of the World Academy of Sciences and an honorary member of the Mongolian Academy of Science, he previously served as Minister of Health and Minister of the National Science Council of Taiwan.

Daniel Goroff is Vice President and Program Director at the Alfred P. Sloan Foundation and a Professor Emeritus, former Vice President and Dean of the Faculty at Harvey Mudd College. Before that, he was a faculty member at Harvard University and worked for the President's Science Advisor in the White House Office of Science and Technology Policy, most recently as Assistant Director for Social, Behavioral, and Economic Sciences.

Haiyan Hu is President of the Beijing Institute of Technology. Previously, he was a Professor, Vice President and President at Nanjing University of Aeronautics and Astronautics, President of the Chinese Society of Theoretical and Applied Mechanics, and Vice President of the Chinese Society of Aeronautics and Astronautics. He held a Humboldt Research Fellowship from 1992 to 1994.

William W. Kelly is Professor of Anthropology and the Sumitomo Professor of Japanese Studies at Yale University. He has served as chair of the Council on East Asian Studies and as chair of the Department of Anthropology. He has also served on the Governing Board of the Kyoto Center for Japanese Studies, the Advisory Board of the Japan-US Student Conference, and on the Japan Committee of the Social Science Research Council and the Northeast Asia Council of the Association for Asian Studies.

Wilhelm Krull is the secretary general of the Volkswagen Foundation. Previously, he held leading positions at the Wissenschaftsrat (German Science Council) and at the headquarters of the Max-Planck-Gesellschaft (Max Planck Society). He was and still is a member of numerous national, foreign and international boards and committees, such as the International Advisory Board of the Alexander von Humboldt Foundation (2007 – 2013).

Impressions

- 1 Thomas A. Campbell (Virginia Polytechnic Institute and State University)
- 2 Rainer Lange (German Council of Science and Humanities)
- 3 IAB member Selçuk Esenbel (Boğaziçi University) and Robert E. Norton (University of Notre Dame)



Michael Matlosz is the President and Chief Executive Officer of the French National Research Agency (ANR) in Paris, a distinguished professor in process engineering at the National School for Advanced Study of the Chemical Industries, the chemical engineering and applied chemistry faculty of the University of Lorraine in Nancy (France), and a member of the National Academy of Technologies of France.

Marcia McNutt is a geophysicist and the Editor-in-Chief of Science. Previously, she was the Director of the U.S. Geological Survey. She is a member of, among others, the National Academy of Sciences, the American Philosophical Society and the American Academy of Arts and Sciences.

Arto Mustajoki is a member of the Board of the Academy of Finland, which he chaired from 2010 to 2014, and of the Research and Innovation Council of Finland. Previously, he served as President of the Finnish Academy of Science and Letters, as a Vice-Rector of the University of Helsinki, and has held numerous international academic positions of trust. He is now Dean of the Faculty of Arts at the University of Helsinki.

Elizabeth J. Perry is the Henry Rosovsky Professor of Government at Harvard University and Director of the Harvard-Yenching Institute. She holds a PhD in Political Science from the University of Michigan and taught at the Universities of Arizona (Tucson), Washington (Seattle), and California (Berkeley). She sits on the editorial boards of over a dozen major scholarly journals and holds honorary professorships at eight Chinese universities.

Sandra L. Schmid is Professor and Chair at the Department of Cell Biology, and holds the Cecil H. Green Distinguished Chair in Cellular and Molecular Biology at the University of Texas Southwestern Medical School. She pursued undergraduate studies at the University of British Columbia and graduate studies at Stanford University, and was a Helen Hay Whitney postdoctoral fellow and Lucille P. Markey Scholar at Yale, going on to become Professor and Chairman of the Department of Cell Biology at The Scripps Research Institute.

Rocky Skeef was the first biochemistry Ph.D. graduate at Rhodes University, South Africa, and pursued a career in research before joining the South African National Research Foundation, where he now is the Director of Reviews and Evaluations. Dr. Skeef also serves on a number of industry and academic boards.

Abdelhadi Soudi is a professor at the École Nationale de l'Industrie Minérale in Rabat, Morocco, where he leads the multidisciplinary research team "Ingénierie Linguistique, Technologie et Handicap". He received a Humboldt Postdoctoral Research Fellowship in 2003. Dr. Soudi is an Advisory Board member of the Arab-German Young Academy of Sciences and Humanities, Ambassador Scientist of the Alexander von Humboldt Foundation in Morocco and Founding President of the North African/Maghreb-Alexander von Humboldt Alumni Association. ■



»The Forum's truly international profile is what makes it so unique«

With its Forum on the Internationalization of Sciences and Humanities, the Humboldt Foundation has established a unique event format for international dialogue on issues relevant to the science and research system. Dr. Enno Aufderheide talks about the Forum and how it came to be.

| Interview by Veronika Renkes

The Humboldt Foundation conducted its "Forum on the Internationalization of Sciences and Humanities" for the eighth time in the fall of 2014. What does the Forum mean for the Humboldt Foundation, and what does it mean for Germany as a center for science and research?

Enno Aufderheide: The Humboldt Foundation brings outstanding researchers from around the world to Germany for extended research stays. In order to remain attractive for these international scholars, and to get the most out of their work here in Germany, we must have a very clear understanding of their needs, as well as the conditions under which they conduct research around the world today. And we also need to share this knowledge with our partners in Germany. The Forums, each with their own thematic focus, are an important tool for achieving this. We know from our discussions with other academic and research organizations that the Forums are much appreciated for the new perspectives they provide, and that the insights gained by Forum participants serve them well in their own work.

The Forum is actually hosted by the Humboldt Foundation's International Advisory Board. What is the role of this board?

The International Advisory Boards (IAB) consists of 14 experts from around the world. It advises the Humboldt Foundation on issues that are important both for us as a research funding organization, and for the larger science and research system. The IAB serves a brainstorming function; it does not make decisions for the Humboldt Foundation, but shares its wealth of experience – with us and, through the Forum, with our partner organizations.

What prompted the Humboldt Foundation to establish its International Advisory Board of leading experts?

The International Advisory Board was born out of the German-American Academic Council (DAAK), which was founded in 2001. At the time, "fireside chats" facilitated bilateral transatlantic exchange between Germany and the US. This led to the creation of the International Advisory Board in 2007. The IAB allows us to conduct international-level discussions on political issues and conditions related to the funding of science and research, to initiate valuable brainstorming, and to provide international expertise on how best to improve conditions for scientists and researchers.

How is the Forum different from other such science and research events?

The Forum's truly international profile is what makes it so unique. We invite some 70 guests from around the world – from all five continents – who then come together to discuss some of the big issues impacting the science and research system. We have a very strong international network and this allows us to organize the Forum so that it gives voice to many different points of view. The resulting mix includes

input from established scholars, young researchers, and managers of funding/research organizations, layered with perspectives from developing, emerging and industrial countries. As an example, our most recent

"Only if we are able to integrate these new countries and their scientists into our network can the network realize its full potential in support of Germany as a center for science and research."

Forum "Beyond Bibliometrics – Identifying the Best" reminded us that scholars from developing and emerging countries are at a tremendous disadvantage when it comes to "breaking in" to the top academic journals or "citation networks". This presents extraordinary challenges to evaluating a person's academic performance.

Why are these kinds of forums so indispensable for your work?

I think the need is clear. An institution such as the Humboldt Foundation funds top-level international research, and needs to constantly scrutinize and reflect on its own work and methods. If we do not do this, we run the risk of deeming certain constructs to be "correct" only because they seem convincing. So we really need an ongoing reality check, and this is partly why we established event formats such as the Forum. Moreover, as an international organization, we must make sure to maintain our broad perspective i.e. beyond the national scale. Today, countries around the world are emerging as new centers of scholarship with tremendous potential for research. Only if we are able to integrate these countries and their (young) scientists into our network can the network realize its full potential in support of Germany as a center for science and research.

How do you share your ideas with the international science community?

Our invite list for the Forums includes representatives from government ministries, research institutions and partner organizations.

Dr. Enno Aufderheide has served as General Secretary of the Alexander von Humboldt Foundation since July 2010. A biologist by training, Aufderheide previously held senior positions at leading science and research institutes in Germany, including the Max Planck Society, the German Aerospace Center (DLR), the German Council of Science and Humanities and the Helmholtz Association.



Participants regard the Forum as a good opportunity to gain new insights and fresh input for their own work. We also make sure to communicate relevant results and core messages to the larger scientific community – with the duz Special for example.

Each Forum focuses on a different theme. How do you decide on this and who is involved in the process?

First, Advisory Board members introduce and discuss topics internally that they themselves consider particularly relevant or interesting. We also engage with the board members, feeding them ideas and asking questions. The IAB members are at home in many different regions of the world; they occupy key positions and are very much involved in current developments in science, research and science management. So in our discussions with them we are able to identify the truly international issues that are of interest to the global scientific community.

When you look back, which Forum topics were most interesting to you?

Our most recent Forum “Beyond Bibliometrics – Identifying the Best” generated particularly lively and provocative discussions. In fact, interest in the 2014 Forum was so great that the next Forum, on October 19, 2015, will take a deeper dive into the issue and consider more concretely possible alternatives to bibliometrics and/or ways to improve the current system. The 2013 Forum “Postdoctoral Career Paths 2.0”, which focused on the situation for young researchers today, was also very well received and generated tremendous interest. An earlier Forum in 2007 had also addressed this topic, and after taking stock again in 2013 we saw that the postdoc “population” continues its steady growth around

the world while the number of available professorships remains more or less the same. This is a real problem and our Forum discussions concluded that broad changes to the postdoc culture would be necessary in order to affect the necessary change. We plan to initiate an ideas competition among German universities in 2016 as a way to help our universities jump start a new postdoc culture. The goal is to improve career opportunities for postdocs and this will have to include opportunities outside academia. In the end, Germany’s ability to keep up with stiffening international competition will also depend on what kinds of career paths and opportunities are available beyond the realm of academia. And this is an area where Germany’s universities and research institutes need to position themselves better.

And finally, a quick look ahead. What are you planning next for the Forum?

We will definitely maintain our current format – the strong thematic focus combined with a broad perspective through the eyes of established researchers, young researchers, policy makers and science/research managers. This is a highly effective format, and we believe it will allow us to promote and facilitate international dialogue well into

the future on the big issues relevant to science and research. Our job, and one that we embrace, is to make sure the Forum maintains the wide-angle view.

We will continue to invite speakers from around the world to join the discussion so that we have a truly international perspective on these important themes. ■

“The IAB serves a brainstorming function; it does not make decisions for the Humboldt Foundation, but shares with us its wealth of experience.”

Veronika Renkes works as a science journalist in Berlin and Düsseldorf.

The International Advisory Board of the Alexander von Humboldt Foundation

The IAB was established in 2007 and supports the Alexander von Humboldt Foundation's strategic planning.

The Alexander von Humboldt Foundation is a non-profit foundation established by the Federal Republic of Germany for the promotion of international research cooperation. It enables highly qualified scholars residing outside of Germany to conduct extended periods of research in Germany, and promotes subsequent academic networking. The Humboldt Foundation maintains an active, worldwide network of scholars. Sponsoring individual academic stays in Germany and fostering the resulting relationships over the long term have been hallmarks of the foundation's work since 1953.

The International Advisory Board of the Alexander von Humboldt Foundation is an independent group of international experts. The Board meets once a year to discuss strategic issues relating to the global mobility of researchers and the internationalization of research. In addition, the Board provides a forum for debate on global developments in science and academia, science policy, and science administration.

History and mission

The International Advisory Board was established in 2007 in response to an increasing demand for expertise in questions concerning the internationalization of science and scholarship. It is the successor to the Advisory Board of the Foundation's Transatlantic Science and Humanities Program (TSHP), which was established in 2001 with the aim of creating a bi-national network of experienced leaders from German and North American academia, science administration, and science policy.

The International Advisory Board supports the Humboldt Foundation's strategic planning. As an independent expert group, it addresses current developments in global academic markets and identifies topics of special strategic concern for the Foundation and its partners in Germany, the United States, and beyond. ■



The International Advisory Board and Humboldt Foundation staff members at the 2014 IAB Meeting

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An Independent Expert Group

The Members of the International Advisory Board

Chair



Peter Chen, B.S. Chicago 1982, Ph.D. Yale 1987, was Assistant Professor (1988-1991) and Associate Professor (1991-1994) at Harvard University. He was called to the ETH Zürich as Professor of Physical Organic Chemistry in 1994. From September 1, 2007 until September 30, 2009, he was Vice President for Research and Corporate Relations. In 2010, he was elected to the Council of the Swiss National Science Foundation. In addition to other mandates, he is a Director of Clariant Ltd, a leading specialty chemicals company. He has been the President of the Alfred Werner Foundation, which finances Assistant Professors, and a Director of the ETH Foundation. He is the Director of "Society in Science," an international fellowship program created by the entrepreneur and philanthropist, Branco Weiss.

Vice-Chair



Helen F. Siu is a professor of anthropology at Yale University. She received an MA in East Asian Studies and a Ph.D. in Anthropology from Stanford University and joined the faculty at Yale in 1982. She has served on numerous university committees, chaired the Council on East Asian Studies and was Director of Graduate and Undergraduate Studies for Anthropology. Since the 1970s, she has conducted fieldwork in South China, exploring rural transformations and the social state, and the refashioning of identities through rituals, festivals, and commerce. More recently, she has explored the rural-urban divide in China, historical and contemporary Asian connections, and global cross-border dynamics.

She served on the University Grants Committee and the Research Grant's Council in Hong Kong, for which she received the Bronze Bauhinia Star. In the U.S. she has served on the Committee for Advanced Study in China and the National Screening Committee for Fulbright awards in the U.S. In 2001, she established the Hong Kong Institute for the Humanities and Social Sciences at the University of Hong Kong, which promotes inter-disciplinary, inter-regional research and cross-institutional collaborations. Siu was the Institute's honorary director from 2001 to 2011, and remains chair of its executive committee.

Members



Yitzhak Apeloig is the former president of Technion – Israel Institute of Technology. He received his B.A., M.Sc. and Ph.D. degrees in Chemistry from the Hebrew University in Jerusalem and was a postdoctoral fellow at Princeton University before joining Technion in 1976, where he is currently a Distinguished Professor, holds the Joseph Israel Freund Chair in Chemistry and is a co-director of the Lise Meitner Minerva Center for Computational Quantum Chemistry. Yitzhak Apeloig is a world-leader in organosilicon chemistry and in the application of quantum mechanics theory to chemistry. He has published widely, was a visiting professor at universities on four continents and has presented some 200 invited lectures at international conferences, universities and in industry. He has received many awards, among them the ACS Kipping Award in Silicon Chemistry, the Israel Chemical Society Prize, the Humboldt Research Award, the JSPS Visiting Professor Award, and Technion Awards for Academic Excellence, Excellence in Research and Excellence in Teaching. He is an Honorary Foreign Member of the American Academy of Arts and Sciences, a Fellow of the American Association for the Advancement of Science, and holds an honorary doctorate from TU Berlin and the Order of Merit (First Degree) of the Federal Republic of Germany.

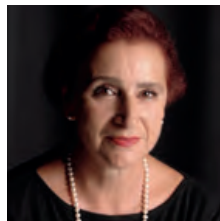




Katharina Boele-Woelki is Professor of Private International Law, Comparative Law and Family Law at Utrecht University, Netherlands, and Extraordinary Professor for Legal Research at the University of the Western Cape, South Africa. She established the Commission on European Family Law (CEFL) and the Utrecht Centre for European Research into Family Law (UCERF). She is president of the Dutch Association of Family Law, member and board member of various other professional associations and institutions, such as the Deutsche Gesellschaft für Völkerrecht, the Royal Dutch Association of International Law and the Swiss Institute of Comparative Law, and serves on editorial boards for Dutch, European and South African law journals, book series and open access platforms. In 2014, she was elected president of the Académie internationale de droit comparé. She was a visiting professor at Columbia University, taught at The Hague Academy for International Law and was awarded an honorary doctorate from Uppsala University and the Anneliese Maier-Forschungspreis from the Alexander von Humboldt Foundation.



Gerhard Casper is President Emeritus of Stanford University. He is also the Peter and Helen Bing Professor, Emeritus, and a Senior Fellow at the Freeman Spogli Institute for International Studies at Stanford. From July 2015, he will serve as President of the American Academy in Berlin. Mr. Casper studied law at the universities of Freiburg, Hamburg, and Yale University, then returned to Freiburg, where he earned his Ph.D. in 1964. After an initial teaching position at the University of California at Berkeley, Mr. Casper was recruited two years later by the University of Chicago, where he spent twenty-six years, served as dean of the law school, and, in 1989, became provost, a post he held until he accepted the presidency of Stanford University in 1992. He has written and taught primarily in the fields of constitutional law, constitutional history, comparative law, and jurisprudence. He is a member of the Council of the American Law Institute, a Fellow of the American Academy of Arts and Sciences, a Fellow of the American Philosophical Society, and a member of the Order Pour le mérite for the Sciences and Arts.



Selçuk Esenbel is a Professor of History at Boğaziçi University, and the Academic Coordinator and Honorary Founding Director of its Asian Studies Center. After studying at International Christian University Tokyo and George Washington University, Washington, D.C., she obtained her Ph.D. in Japanese history from Columbia University, New York City. Since 1982, she has been teaching Japanese and Asian history at Boğaziçi University, where she is also in charge of the Asian Studies Center, Asian studies graduate program and Asian language courses. Esenbel has published articles and books on the history of Asia, with particular focus on Japanese history. Her recent publications include Japan, Turkey, and the World of Islam: Writings of Selçuk Esenbel, "Japan's Global Claim to Asia and the World of Islam: Transnational Nationalism and World Power 1900-1945" in the American Historical Review (October 2004), and Thinking about China in Turkey, (Türkiye'de Çin'i Düşünmek). Her research interests cover Japan and the world of Islam, Japanese pan-Asianism, modernization in Japan and Ottoman Turkey, peasant uprisings in Meiji Japan, and Japanese-Ottoman/Turkish relations. Esenbel is the recipient of various awards, including the Order of the Rising Sun, the Japan Foundation's Special Prize for Japanese Studies, the Japanese Ministry of Foreign Affairs' special award for the promotion of Japanese-Turkish academic relations, and the Alexander von Humboldt Foundation's George Forster Research Award.



Joseph S. Francisco is the Dean of the College of Arts and Sciences and holds the Elmer H. and Ruby M. Cordes Chair in Chemistry at the University of Nebraska at Lincoln. Until 2014, he was the William E. Moore Distinguished Professor of Earth and Atmospheric Sciences and Chemistry at Purdue University. Using laser spectroscopy and computational chemistry methods, his research focuses on understanding, at a molecular level, chemical processes occurring in the atmosphere. It covers the fields of atmospheric chemistry, chemical kinetics, quantum chemistry, laser photochemistry and spectroscopy. Dr. Francisco has served on editorial and advisory boards for renowned journals and received prestigious awards and fellowships from organizations such as the National Science Foundation, the Sloan and the Guggenheim Foundations, the National Organization

for the Professional Advancement of Black Chemists and Chemical Engineers, and the American Chemical Society. A Fellow of the American Chemical Society, the American Physical Society, the American Association for the Advancement of Science, the American Academy of Arts and Sciences, and the National Academy of Sciences, he also holds a Humboldt Research Award and serves on the Board of Directors of the American Friends of the Alexander von Humboldt Foundation.



Ute Frevert is a Director at the Max Planck Institute for Human Development and a Scientific Member of the Max Planck Society. Between 2003 and 2007 she was a professor of German history at Yale University and prior to that taught History at the Universities of Konstanz, Bielefeld and the Free University in Berlin. Her research interests focus on the social and cultural history of modern times, with a special emphasis on the history of emotions. Ute Frevert is an honorary professor at the Free University in Berlin and member of several scientific boards; she was awarded the prestigious Leibniz Prize in 1998. She is a member of the Leopoldina and the Berlin-Brandenburg Academy of Sciences as well as Corresponding Fellow of the British Academy.



Yuan Tseh Lee is President Emeritus and Distinguished Research Fellow of Academia Sinica in Taiwan, University Professor Emeritus at the University of California, Berkeley, and Past-President of the International Council for Science (ICSU). He was awarded the 1986 Nobel Prize in Chemistry with Dudley Herschbach and John Polanyi. He has held positions as Professor of Chemistry at the University of Chicago and UC Berkeley, University Professor at UC Berkeley, Principal Investigator at the Lawrence Berkeley National Laboratory, President of Academia Sinica as well as Chief Scientific Advisor to the Prime Minister of Taiwan. He has served numerous national and international organizations, including the U.S. Department of Energy, the Welch Foundation (USA), the International Scientific Council of the Israeli-Palestinian Science Organization, the Science and Technology in Society Forum (Kyoto), RIKEN (Japan), and the Okinawa Institute of Science and Technology.



Stefan Marcinowski joined the BASF main laboratory in Ludwigshafen following his chemistry studies in Stuttgart and Freiburg and after completing his Ph.D. at the Faculty of Biology in Freiburg. He later moved to various other locations, including São Paulo. From 1997 to 2012, he was a member of BASF's Executive Board. Until 2008, he served as the Board's spokesman for research and oversaw the areas of Plant Protection and Plant Biotechnology, among others. Stefan Marcinowski has been a member of the senate and the Board of Trustees of the Max Planck Society since 2002 and became one of the Society's vice presidents in 2008. He also serves on the Boards of Directors of various corporations.



Liqiu Meng is a Professor of Cartography at the Technische Universität München (TUM). She served as the Senior Vice-President for International Alliances and Alumni of TUM from 2008 to 2014 and as Senator of the Helmholtz Association from 2009 to 2012. Following studies of geodetic engineering in China, she completed her doctorate and a postdoc at the University of Hannover in Germany before moving to Sweden to teach and to work as a consultant while finishing her habilitation in the field of geoinformatics. She is a member of the German National Academy of Sciences Leopoldina and the Bavarian Academy of Sciences. She serves on university councils at Aalto University in Finland and at Tongji University in China, the Senate of the German Aerospace Center DLR, and on the Boards of Trustees at the German Research Centre of Geosciences GFZ and several Max Planck Institutes.





Helmut Schwarz is Professor of Organic Chemistry at the Technische Universität Berlin and President of the Humboldt Foundation. He has worked as visiting professor at a number of research institutions abroad and has served as Vice President of the Berlin-Brandenburg Academy of Sciences and Humanities, Vice President of the German Research Foundation (DFG), Chairman of the Scientific Advisory Board of the German-Israeli Research Programme and Vice-Chairman of the Board of Directors of the Fonds der Chemischen Industrie.



Sarah Stroumsa, the Alice and Jack Ormut Professor Emerita of Arabic Studies, taught in the Department of Arabic Language and Literature and the Department of Jewish Thought at The Hebrew University, where she served as university rector from 2008 to 2012. Her areas of academic focus include the history of philosophical and theological thought in Arabic in the early Islamic Middle Ages, Medieval Judaeo-Arabic literature, and the intellectual history of Muslims and Jews in Islamic Spain. Among her books are: *The Beginnings of the Maimonidean Controversy in the East: Yosef Ibn Shimon's Silencing Epistle*; *Freethinkers of Medieval Islam: Ibn al-Rawandi, Abu Bakr al-Razi, and Their Impact on Islamic Thought*; and *Maimonides in his World: Portrait of a Mediterranean Thinker*.



Raimo Väyrynen, Professor Emeritus of Political Science at the University of Notre Dame, USA and the University of Helsinki, has published extensively on international peace and security, international political economy, and the theory and history of international relations. He was a visiting professor at Princeton University and the University of Minnesota as well as a Fulbright scholar at MIT and visiting fellow at Harvard University. His most recent books include *The Waning of Major War: Theories and Debates* (2007) and *Towards Nuclear Zero* (2010). He has led the Tampere Peace Research Institute, the International Peace Research Association, the Helsinki Collegium for Advanced Studies and the Finnish Institute for International Affairs and was President of the Academy of Finland. Globally sought-after as an expert advisor, he has served on top-level boards and committees for, among others, the United Nations University, the Peace Research Institute Oslo, the Copenhagen Peace Research Institute, the European Union Research Advisory Board, the European Science Foundation, and the European Research Council. ■





Forum on the Internationalization of Sciences and Humanities

The International Advisory Board hosts an annual Forum on the Internationalization of Sciences and Humanities, opening its discussions to a select group of leading international experts and top management officials representing the Humboldt Foundation's partner organizations. Each Forum provides an opportunity for eminent international experts to hold an open exchange of views in a private setting. Important minutes of the proceedings and recommendations are published for the benefit of a wider audience. ■

Forum topics

- 2001** The Role of the TSHP Advisory Board in the Transatlantic Dialogue
- 2002** Trends in American & German Higher Education
- 2003** The Impact of the New Developments within the European Research Area for Transatlantic Scientific Co-operations
- 2004** What Factors Impact the Internationalization of Scholarship in the Humanities and Social Sciences?
- 2005** Bi-national Programs on Shifting Grounds?
- 2006** The Advancement of Excellence
- 2007** Postdoctoral Career Paths
- 2008** Strategies to Win the Best: German Approaches in International Perspective
- 2009** Cultures of Creativity: The Challenge of Scientific Innovation in Transnational Perspective
- 2010** Crossing Boundaries: Capacity Building in Global Perspective
- 2011** The Globalization of Knowledge and the Principles of Governance in Higher Education and Research
- 2012** Networks of Trust: Will the New Social Media Change Global Science?
- 2013** Postdoctoral Career Paths 2.0: The Golden Triangle of Competitive Junior Investigators, Adequate Academic Systems, and Successful Careers
- 2014** Beyond Bibliometrics – Identifying the Best

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