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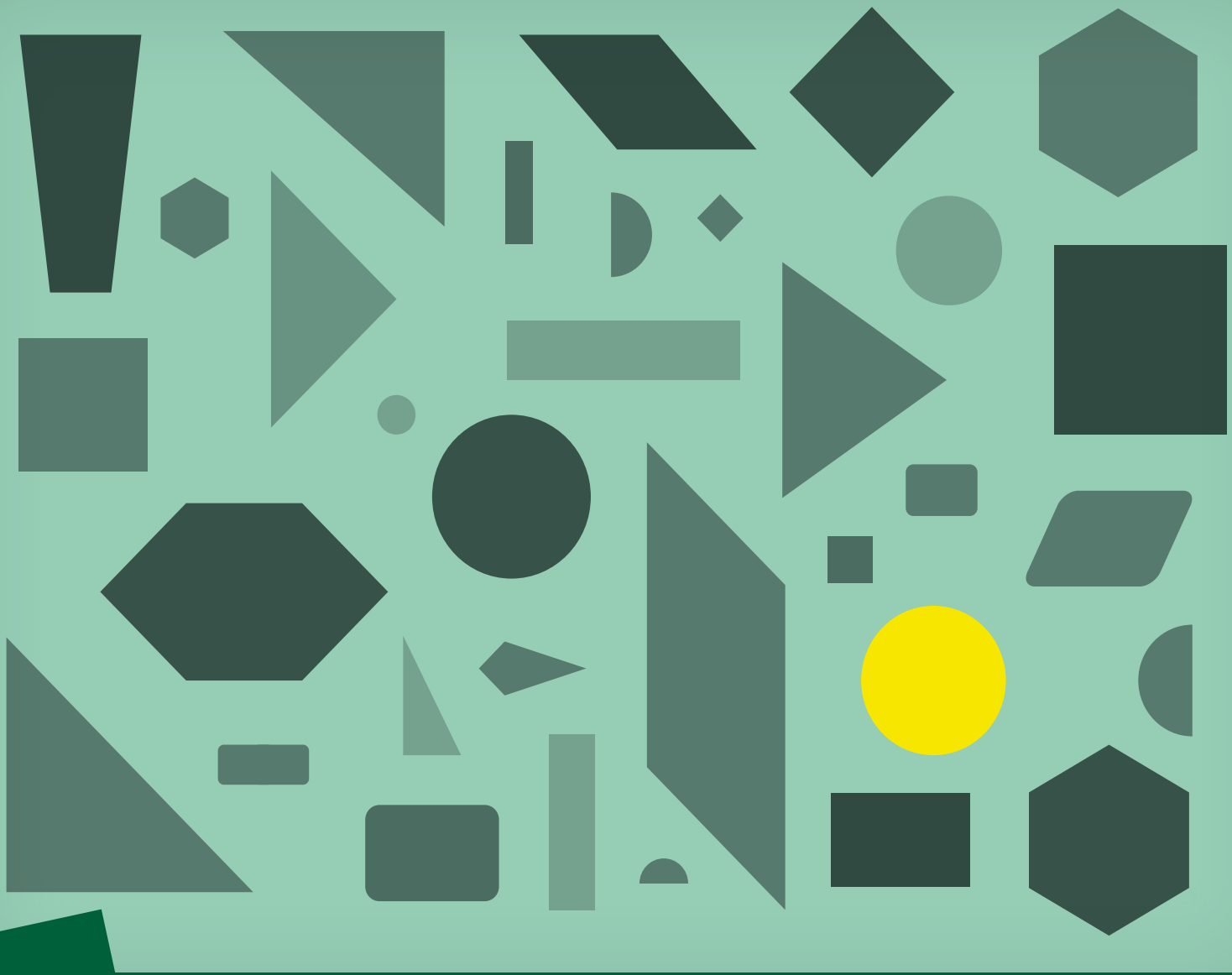

Identifying the Best – Theory, Methods, Practice

Proceedings of the 9th Forum on the Internationalization of Sciences and Humanities

October 18–19, 2015 • Berlin

SPECIAL duz

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Preface

Helmut Schwarz
President
Alexander von Humboldt Foundation

Helen F. Siu
Chair
International Advisory Board

Dear Reader,

Rising numbers of excellent researchers mean rising competition for grants and positions in academic systems worldwide. At the same time, the selection committees and funding organizations tasked with identifying the very best among the many candidates are competing for the limited time and resources of reviewers. The traditional system of assessing quality, which is largely based on peer review, is stretched to the limit. Reviewers are increasingly turning to quantitative measurements.

In 2014, the 8th Forum on the Internationalization of Sciences and Humanities came to the conclusion that bibliometrics – the quantitative analysis of written scientific output – is plagued by shortcomings and is not the quick, easy, and objective solution which it is sometimes advertised to be. The 9th Forum in 2015 tried to explore further solutions.

Convened under the headline "Identifying the Best – Theory, Methods, Practice" by the International Advisory Board of the Alexander von Humboldt Foundation, the Forum discussed three broad questions: First, what defines "the best" scientists and scholars in today's globalized and culturally diverse academic world? Secondly, what are the most appropriate methods for selecting the best or the most promising researchers across disciplines? And thirdly, what can and should be done by funding organizations and other actors to improve the practice of identifying "the best"?

Leading scholars, science managers, and journal editors from across the globe gave their input to these questions. This special supplement documents the discussions of the Forum and makes them available to a wider audience in Germany and beyond. We hope that the contributions in this publication spark further debate within the global academic community.

Sincerely,

Helmut Schwarz

Helen F. Siu

Identifying the Best – Theory, Methods, Practice

"Identifying the Best – Theory, Methods, Practice" was the topic of the 9th Forum on the Internationalization of Sciences and Humanities held in Berlin from October 18 to 19, 2015. The Forum was convened by the International Advisory Board of the Alexander von Humboldt Foundation.

The Board came to the following conclusions:

1. The definition of who is "the best" is dependent on several contextual, largely qualitative, factors. Among the most important of these factors are the specific task the candidate is supposed to fulfill and the intellectual environment to which he or she is expected to contribute. High-quality past research, the proven ability to cooperate with other disciplines, and performance that suggests the candidate will continue to inspire those in his or her intellectual environment are qualities that characterize "the best".

2. Methods for identifying the best should be inclusive. When selecting the best, the net should be cast as widely as possible in order to strive for diversity and avoid staying within the narrow confines of one's own school of thought or paradigm. When diverse, interdisciplinary selection committees reach an overwhelming consensus, this ensures that a high-quality candidate is selected.

3. Given the fact that peer review is extremely labor-intensive and that many senior scientists and scholars are overburdened with requests for reviews, the incentives for contributing to evaluation processes should be stronger. Currently, incentives are particularly insufficient for reviewers who specialize in subject areas further away from the one being evaluated. In general, little credit goes to reviewers. Since science is driven by reputation, not money, measures that could lead to enhanced visibility of reviewers might increase the incentives for them to become part of the process.

4. Established peer review methods tend to favor proposals which are scientifically correct but not ground-breaking. Funding organizations therefore need to reconsider their risk-taking management. Innovative ideas need to be discussed. These might include new selection formats, such as "selection fairs", or dedicating a specific portion of the budget to funding risky projects proposed by younger scientists for longer periods of time.

5. There are cultural dimensions and development dimensions to "identifying the best". Especially in emerging and developing economies, the overriding challenge is to provide incentives for people to remain in research in their own country. Selection processes have to consider the additional challenge of brain drain. In those regions, different criteria for "what defines the best" may also apply, e.g. the place where candidates have received their education may play a larger role than in industrialized countries.

Daya Reddy, Academy of Science of South Africa with IAB member Guinevere Kauffmann, MPI for Astrophysics, and Carlos F. O. Graeff, UNESP

IAB Chair Helen F. Siu, Yale University, and Helmut Schwarz, Alexander von Humboldt Foundation

Philip Campbell

Editor-in-Chief
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Challenges in Research Excellence

As the research community grapples with some of today's major societal challenges – climate change, health, or even lower-profile challenges such as preserving our cultural heritage – the positive societal impact of research emerges as an increasingly important factor in assessing excellence. This puts a premium on a multidisciplinary approach in both the research and assessment phases. | by Philip Campbell

In 2002, Nature published the first observation of an anti-atom: antihydrogen - with a positron orbiting an antiproton.[1] This was achieved after years of careful technical development at CERN. Subsequently those researchers have trapped antihydrogen atoms and performed measurements that test laws of symmetry which state where antimatter and matter behave identically. So far those standard laws add up.

The paper had 39 authors from 11 institutions in Italy, Switzerland, Denmark, the UK, Brazil and Japan. In those days we did not insist, as we do now, on authors listing the contributions, i.e. who was involved and what did they contribute.

When I googled the paper in preparation for this talk, it had been cited 752 times over the last 13 years. By comparison, a typical landmark genome paper will attract that number of citations within two to three years.

Measuring excellence

Does the number of citations measure the authors' academic excellence? In an obvious sense, there is no question that in the natural sciences, a higher number of citations is an indicator of significance, and usually of positive significance. But it is not a measure of excellence in the direct sense that the expansion of mercury measures temperature. To any academic that statement is obvious, but to outsiders it may not be. So I'd like to offer two sets of considerations that back up this point.

First, Nature's own citations. My colleagues tell me that we are the world's most highly cited journal, which is a source of pride for me and for those of my colleagues who spend their working lives choosing which of the 11,000 papers submitted to us every year to publish. We publish about 800. If you count the citations of those papers at the end of the second year after their year of publication, you typically end up with a few papers with hundreds of citations, quite a few with over 50 citations, the bulk with less than 50, and many in single figures.

"A higher number of citations is an indicator of significance, and usually of positive significance. But it is not a measure of excellence in the direct sense that the expansion of mercury measures temperature ."

But we select papers on the basis of their scientific significance as we judge it, with the help of referees. When we selected those low-cited and high-cited papers, we did not predict their citations – indeed it would have been pointless to try and do so, because it is so unpredictable. But we do look at the low-cited papers in retrospect, and we usually can still stand by the reason that we decided to publish them.

"There are papers that we publish just because we think they are 'neat' and intriguing."

Some of the papers are gems for textbooks – classic results that beautifully illustrate a principle, but which will not themselves be highly useful for others. Others are unique findings in, say, archaeology that do not attract high citations within a small field. There are papers that we publish just because we think they are "neat" and intriguing. One example: a demonstration that ripping sticky tape off a surface emits X-rays by which one can take X-ray pictures of fingers. The physics at that time couldn't quite explain the energetics. That paper still has only a few citations but went viral in social media. We're still proud of having published it.

Another similar selection: a provisional explanation by capillary theory of why spilled coffee on certain surfaces forms a ring with a concentration at the edges. For many years this paper had low citations until it was discovered to be important for certain types of computer printers, and its citations soared.

I am highlighting here the reality of citations that underlie our very high impact factor (41.5), and also the subjectivity of the judgements of Nature's editors. I first wrote an editorial in 2005 about how applying our Impact Factor as a measurement of an individual researcher's quality is bad practice, based on these considerations.

No substitute for judgement and experience

I will mention one other experience. Last year, Britain's then-science minister David Willets set up a panel to see whether the expensive and burdensome Research Excellence Framework – a national assessment of research conducted every few years – could save costs by an increased use of metrics. I was privileged to be a member of that panel, and in the report we published in the summer we made it clear, having reviewed the bibliometric literature carefully as well as alternate metrics, that there is no substitute for peer assessment.

Metrics have their place – they flag key impacts of various types, whether in the academic literature or in the social media – and need to be considered by assessment panels. But the assessment panels' qualitative judgements and experience are essential. Bad news for experts who are fed up with assessing others and want to get on with their research![2]

The social factor

Now I want to turn to impacts assessment. In 2014, Britain implemented the most recent of its periodic research assessment projects, the Research Excellence Framework (REF). Its disciplinary panels assessed universities by department, and weighted their entries by 65% for academic quality and impacts, 15% for the quality of the research environment and 20% for societal impacts.

This last aspect was pioneering. The submissions – 6,975 societal impact case studies submitted by research groups – can all be seen and searched online.[3] Cynics can speculate that these narratives, written by the academics themselves, will inflate and distort what was accomplished, but the case studies have the added value of giving corroboration of the impacts from documentation and from partner organisations who helped accomplish the impacts. It is also notable that the disciplinary panels, as they describe it in their retrospective reports on the REF website, found ways of assessing the submissions.

It is notable and inspiring how broad and diverse these societal impacts have turned out to be, how international, and how unpredictable.

One of the entries was from the physics department of Swansea University and described the impact of the anti-hydrogen experiments I referred to above, in 2002 and after. The scientists made much of the huge public visibility of their results, directly through media coverage, through visits to the labs in CERN, through YouTube, and through the uptake of these results in the Hollywood blockbuster Angels and Demons.

What is more interesting to me is the longer-term initiatives that they drew attention to. Here is an extract from their statement:

"We have hosted two annual events for high school students for a number of years: Particle Physics Masterclasses [C14] and Schools Lectures designed to inspire young people to study physics. Both these events are heavily over-subscribed: 2,500 students have attended our Schools Lectures since 2008 and last year, there were over 150 students registered for the Masterclasses. As a result of this demand, we have doubled the number of Schools Lectures and trebled the number of Masterclass events we hold each year.

Having established this foundation in our engagement work with school students, we broadened and refined our events by creating a virtual ALPHA experiment "Hands on Antihydrogen". This bespoke software was written by a programmer employed within the UoA by an EPSRC "Pathways to Impact" grant totalling £39k. It is analogous to the Atlantis event display software developed by the LHC's ATLAS collaboration, but is interactive rather than static. The user injects positrons, antiprotons and electrons and manipulates the electromagnetic trap parameters in order to confine and then cool the particles before antihydrogen can be produced, recreating virtually the actual CERN experiment.

Using questionnaires, we measured the impact of using this software and the associated antimatter lectures on the students' understanding. The statistics show that, as a result of our antimatter Masterclasses, the students' knowledge of antimatter increased by 150%, there was a 50% increase in the number who understood both the relevance of antimatter and where it is produced, and a significant increase in the number who understood its interactions."

Note the attention, required for the REF, to assessing and corroborating their impact.

How to assess this work as a whole? First, any panel of physicists would acknowledge the technical achievement of isolating antimatter in a lab. Secondly, this was a first – the first creation of an antiatom. No one doubted that it could exist and in that sense it wasn't a fundamental breakthrough. But it did open up a route for those tests of fundamental laws, as well as techniques for trapping and studying antimatter.

Do they deserve credit for that impact? Undoubtedly. How to apply that societal impact in assessment? If a government wishes to enhance citizens' engagement with and understanding of science, that project can be seen to have repaid investment in impact terms, as well as in the cultural achievement of fundamental scientific understanding. How the societal impact should weigh in terms of academic assessment will depend on the context of the judgement. Such initiatives will play well with the REF which in the UK is very tightly linked to subsequent funding. A traditional academic learned society considering awards for academic excellence will possibly ignore it, deliberately. A body that awards prizes for initiatives in education or public engagement would consider it positively.

Assessing impact

Thus qualitative assessment remains absolutely crucial for academic and societal assessment. So far I have given just one research example in the arena of fundamental research that happens to have an impact. I now want to draw attention to a type of research where impact is the whole point, which is highly multidisciplinary, which is completely taken for granted, and yet is of economic and cultural importance.

"Qualitative judgements and experience are essential."

That is 'heritage science' – the science and technologies of understanding and conserving the objects of our heritage such as documents, paintings, sculptures and buildings. The physics, chemistry and materials science understanding of these objects and of measurement devices, the biology of organisms that can cause degradations, the understanding of the climate and environment – all of these contribute to the short- and long-term strategies for preservation. The social sciences and humanities also inform our understanding of the significance and strategies.

Philip Campbell, Nature,
Helmut Schwarz, Humboldt Foundation

How to measure the societal impact? The top down, macroscopic view is that this research enriches our understanding (see how artworks and documents have been illuminated by hyper-spectral imaging from the infra-red to the ultra-violet) and reduces the rate of heritage depletion by natural and human influences. It thereby underpins the tourist industry and the sense of well-being of the population. It also sustains iconic objects such as Magna Carta, the extant versions of which have all been subjected to intensive scientific analysis. For example, how does its iron-gall ink interact with its parchment?

I am chair of an advisory panel for a centre for doctoral training in heritage science. Its co-director, Professor May Cassar at University College London, tells me that from the REF case-studies database of heritage science in the UK, one can find examples of citizen science and other forms of public engagement, industrial collaborations and technological development, and insights into cultural heritage.

But a key fact about this particular landscape of research is that it is invisible to most of the public and to most policymakers. The science is not necessarily fundamental in disciplinary terms – it is highly applied and often incremental, and appears across a wide spectrum of specialist journals and semi-invisible museum reports. And yet it is every bit as rigorous and robust within the criteria of its technical disciplines as any other research. And its impact is enormous over the long term. Unquestionably, both the quantitative and qualitative judgements are necessary in this field, and if anything a quantitative impact of economic value could only help its prioritization amongst funders and governments.

Growing need for multidisciplinary thinking

Preserving our cultural heritage is a societal challenge. There are other challenges that have much higher profile – for example, health and sustainability. In the Nature group of journals we are exploring how we might develop in this arena.

All of these challenges involve multidisciplinary research. A recent issue of Nature highlighted some of the problems and successes in interdisciplinary research (17 September 2015). A social scientist, Ana Viseu, at the University of Lisbon, highlighted how in a nanotechnology centre in the US, she was incorrectly labelled as an ethicist and was seen by the natural scientists as someone to help them tick the boxes of communication and societal impact, but not someone to help frame the project. More positively, in the same issue, researchers at the Monash University Centre for Water-Sensitive Cities describe what it takes to build a truly interdisciplinary programme in urban water use.

In the same issue, Rick Rylance, head of Research Councils UK, points out that, in the REF, all the societal challenge impacts entries had a very high proportion of multidisciplinarity. But most academics who might have entered multidisciplinary research instead entered disciplinary projects because, he presumes, the academics felt that multidisciplinary panels would have discounted interdisciplinary research.

Our own experience of peer review suggests that this is true. Referees judge projects on their own terms. It takes very knowledgeable editors with a broad overview to counter this tendency and judge the whole. We believe that one of our strengths at the Nature journals is that manuscripts are assessed by professional multidisciplinary teams, all in daily contact with each other.

On thinking about this evening, I tried to imagine a research project that would combine the most multidisciplinarity with the most fundamental intellectual challenges and the most societal benefit. Here's one candidate topic: caring for people with Alzheimer's, including support for their carers and families.

The challenges:

- Psychology and ethics: what most affects the sense of identity of a sufferer as perceived by others? The loss of memory? Or changes in expressed values?
- Ethics, law, psychology: what is more compelling, the wishes expressed in advance or wishes expressed in the illness?
- How do psychiatrists, neurologists, neuroscientists and philosophers view that question of identity and how might their ideas and observations support understanding and care?
- How do cultural anthropology, sociology and economics impinge on models of care?
- How might models of care best be tested and delivery improved?
- How do psychologists and neuroscientists better explore what's going on in the brain?

That sort of agenda is immensely challenging at every level. It requires researchers from the most diverse backgrounds to work together and also to respect each other – which, even with the best will in the world, can be unexpectedly difficult. In project planning terms, it requires pathways from research to implementation – ways to reduce cognitive deficits, ways to help carers cope. That requirement itself in turn necessitates early involvement and buy-in from the agencies that will benefit from the research, and sufferers and their families too.

Part of my understanding of these research issues arose from a chance encounter with a researcher, several years ago now. This person was a philosopher working with a neurologist on an obscure but devastating neurodegenerative disease. They were studying aspects of sufferers' sense of identity. The major point I took away from our conversation was that it took about a year of joint conversations with sufferers for both researchers to truly understand how the research questions should be framed.

Tackling the complexity

We have launched one journal that straddles such trans-disciplinary breadth – Nature Climate Change. Another, Nature Plants, is setting itself up to include the social sciences more substantively. Nature Energy, to be launched in 2016, will include editors to handle social sciences. And we are on track to launch more journals of such breadth within sustainability and health. And in 2017, we will launch Nature Human Behaviour – behavioural issues span every facet of societal grand challenges.

How do we ensure good assessment of such breadth? Our choice of editors! And teamwork, day by day!

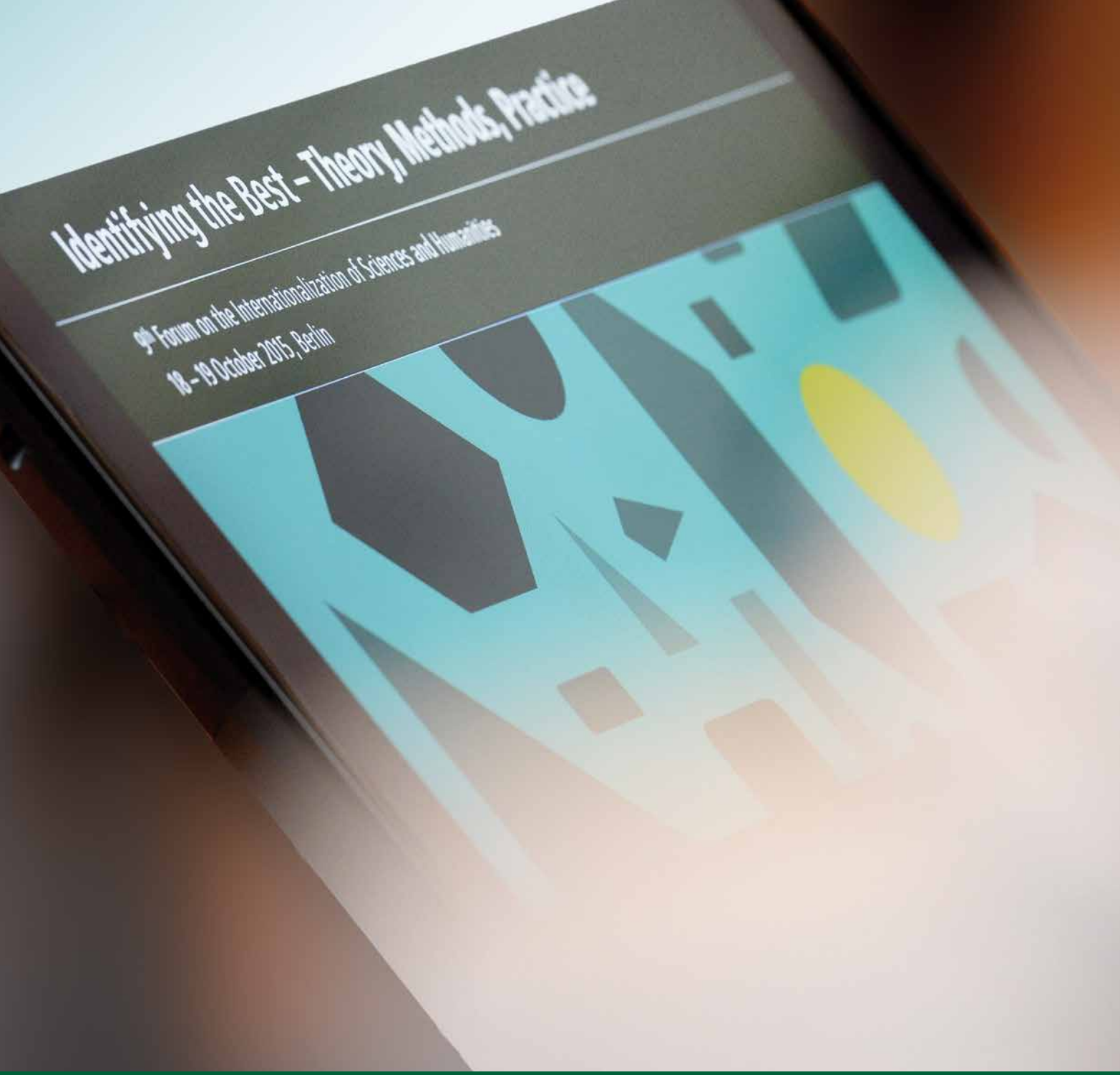
In our exploration of these grand societal challenges, my colleagues and I have visited many institutes and funders and delivery partners, and explored the existing literatures, and considered the criteria of excellence for such research. It is clear that we – publishers, funders, universities, delivery partners and researchers themselves – are all on the same demanding learning curve, as to how to address them, coming as we are from more traditional academic structures and perspectives. But in terms of assessment, it's increasingly clear to me that documenting societal impacts, especially if it provides positive feedback on impacts pathways, is good for everybody – provided that it is not a substitute for valuing outstanding fundamental research.

But there is a final aspect of excellence that I want to address and that is of great concern: robustness of research and its reproducibility. I won't go into detail, but you can see our web collection of many articles over the last two years and more, and the measures we have taken to reduce the irreproducibility in our pages.[4]

"A final aspect of excellence that I want to address and that is of great concern: robustness of research and its reproducibility."

This has been highlighted to be a particular problem in the life sciences and in psychology. It is a many-headed monster – the most recent issue that we highlighted is cognitive bias in assessing evidence for claims, and ways of countering these biases (8 October 2015). It will take years to put right, and we all have a role to play. It is a critical factor, and is making those who have explored it soberly reassess their criteria for what excellence really means.

1 M. Amoretti et al, Nature 419, 456-459; 2002
2 http://www.hefce.ac.uk/pubs/rereports/Year/2015/metrictide/Title,104463,en.html
3 http://impact.ref.ac.uk/CaseStudies/
4 http://www.nature.com/news/reproducibility-1.17552



Panel 1
Defining "the Best"

"It is simply wrong to suggest that individual achievement can be considered independently from the intellectual and practical support of the surrounding environment." (Ulrike Hahn)

Richard N. Zare

Marguerite Blake Wilbur
Professor in Natural Science
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Better Practices in Scientific Publishing

It may be that less anonymity, rather than more, is the key to sustaining quality in scientific publishing. Simply acknowledging reviewers and their efforts could be just the incentive we need to attract qualified scholars and scientists to this critical task. | by Richard N. Zare

Everyone strives to do or be the best, but the state of better may be all that can be reasonably expected or hoped for.[1] Scientific publishing is extremely important to the science profession because in the scientific world, the assessment of the value of an individual's achievements depends on reputation, and wide recognition of the worth of scientific work is most effectively achieved through publications.[2] I suggest making a change to the manuscript review process that might make for better practice in the area of scientific publishing. This suggestion addresses the problem that there are too few qualified individuals willing to conduct reviews, which is an important obstacle in maintaining quality.[3]

Why do individuals accept the reviewing task? Presently, it seems to be a combination of 1) if they review others' papers, others will review theirs; 2) they learn what work their colleagues are engaged in, and this may help them in their own research; and 3) they believe that such service to the scholarly community maintains this community of scholars.[4] Clearly, these motives are not sufficient for some.

"I believe that the concept of double-blind reviews is moving in the wrong direction."

At present, referees reviewing a paper are asked to keep their anonymity. There is even a movement today to keep the author or authors of a manuscript anonymous in a double-blind review process.[5] At our 9th Forum on the Internationalization of Sciences and Humanities both the editor-in-chief of Nature (Sir Philip Campbell) and the editor-in-chief of Science (Dr. Marcia McNutt) advocated the use of double-blind reviews. The argument was made that this creates a level playing field with as much opportunity for a lesser-known author as a better-known author to get a favorable review.

Impressions

1 Kazuyuki Tatsumi, Nagoya University, and Richard Nakamura, NIH

2 Heidi Wedel, Global Young Academy

3 Gerhard Lauer, University of Göttingen, and Hans-Jürgen Lüsebrink, Saarland University

"What is needed is some mechanism to recognize the valuable service that reviewers perform in examining submitted manuscripts."

The idea is to remove all identifying materials from a manuscript. Interestingly, the Physical Review journals of the American Physical Society ran their own double-blind experiment about two decades ago. The results did not go well. From 1993 to 2001, only 0.06% of the papers submitted requested use of this option, and of these manuscripts, only about 6% were accepted for publication – an acceptance rate roughly ten times lower than for other papers submitted to the same journal. There have even been efforts (in philosophy journals) to introduce a triple-blind system in which even the editor is anonymous. While some argue that double-blind reviewing overcomes bias against women and minority groups, the results to date do not seem to support that contention.[5] Moreover, most research work builds on previous research work done by the same author. Consequently, it would not take much detective work to guess the identity of an author. Another objection is that by removing all identifiers, the reviewer is not able to judge appropriately how trustworthy or significant the claimed results are based on previous work from the same laboratory or research group.[6] Indeed, I believe that the concept of double-blind reviews is moving in the wrong direction.

Incentivizing outstanding review work

I think an important obstacle to obtaining reviews from outstanding experts is that there is insufficient incentive for the reviewer to undertake this important task. A financial reward seems to be out of the question and forgets that reputation is the real currency of the scientific realm. What is needed is some mechanism to recognize the valuable service that reviewers perform in examining submitted manuscripts. My recommendation is that each journal publish a list of its reviewers once a year. A few journals, such as the journals of the American Economic Association, explicitly acknowledge reviewers, but most journals do not. I also suggest that journals indicate the amount of reviewing done. I realize that some editors do not want it known who their workhorse reviewers are, but the number of reviews done per year could also be listed in some way, such as one, two, or many.

I think that a move to describe in more detail the contributions of reviewers would make the scientific publishing process more transparent, and it would add a more human dimension. It is my experience that anything that makes it clearer to others how science is really done benefits our field immensely.

References and Notes

1 I recommend reading the book Better by Atul Gawande (Picador, 2007), who describes a surgeon's notes on performance and what it takes to be good at something in which failure is so easy and so effortless.

2 R. N. Zare, "Editorial: Assessing Academic Researchers," Angew. Chemie Int. Ed. 51, 7338-7339 (2012).

3 From 1992-1995 I was Vice Chair of the Board of Directors of Annual Reviews, Inc., and I have been its Chair since 1995. Annual Reviews offers collections of critical reviews written by leading scientists and publishes volumes each year for 46 focused disciplines within the biomedical, life, physical, and social sciences. In the fairness of complete disclosure, it is this experience that I am borrowing from in writing this article. Let me acknowledge with gratitude discussions of this topic with Editor-in-Chief Emeritus Sam Gubins.

4 http://scholarlykitchen.sspnet.org/2015/06/17/the-problems-with-credit-for-peer-review/

5 See the article "Publishing: Is Double-Blind Review Better?" by Shannon Palus, which appeared in the July 4, 2015 issue of APS News.

6 T. E. DeCoursey, "Publishing: Double-Blind Peer Review a Double Risk," Nature 520, 623 (2015).


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Ulrike Hahn

Professor, Department of Psychological Sciences
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Selecting the Best in Psychology and Cognitive Science

Top people are products of top environments – particularly research environments characterized by diversity and complementarity – so the focus might better be placed on creating such environments than on finding the best individuals. | by Ulrike Hahn

Academic positions are a scarce resource, as are research funds, and this is unlikely to change any time soon. It is thus of utmost importance that these resources are devoted to those most likely to reward expectations. Intuitively, we want to fund, support and promote "the best". But what characterizes "the best" and how can "the best" be identified? In particular, what characterizes the best in psychology? It seems unlikely that the skills required will be exactly the same across academic disciplines, so a natural starting point for any attempt to answer this question should be to ask about the specific characteristics of the discipline in question. Again, these characteristics are likely to vary over the course of a discipline's history and are not inherently fixed, but it is readily apparent that present-day psychology is fundamentally different from, say, present-day physics.

Theoretical and empirical work in physics takes place in the context of a limited number of over-arching "theories" (or at least it seems that way to the non-physicist). Moreover, these theories are at a considerable distance from readily available data (see, for example, string theory). The contrast to psychology could not be greater: psychological theories are extremely close to the actual data they seek to describe, there are multitudes of competing "theories", and the data against which they are tested are comparatively easy to obtain. In other words, psychological theories are shallow by comparison, and often only slightly more abstract or general than the data descriptions themselves. In recent years, this has prompted critiques of psychological theorizing that have branded high-profile theoretical notions and concepts as mere re-descriptions of data. Against this backdrop, it is unsurprising that consideration of "the best" in psychology accords particular value to theory development – a premium that is manifest in the fact that the psychology's top journal in terms of citation impact and prestige, Psychological Review, is a theory journal.

Impressions

1 Marcia McNutt, Science
2 Martin Quack, ETH Zürich
3 Cathleen Fisher, American Friends of the Alexander von Humboldt Foundation, and Wolfgang Rohe, Stiftung Mercator

> "Environments are crucial: not only is science a collective endeavor, but collectives matter even for individual achievement."

Diversity is key

At the same time, the theoretical landscape of psychology is unusually diverse in another respect. The range of phenomena studied within psychology is considerable: from trying to understand the workings of the human eye to understanding how social groups function, alongside trying to understand mental illness, or attention, language and thought.

This diversity is reflected in the interdisciplinary links that are integral to psychology. As a discipline, psychology has close links to neuroscience, physiology, pharmacology, medicine, acoustics, computer science, economics, philosophy, and sociology. Psychological research is impossible to imagine without the input of those disciplines and much of the theory development found in psychology is dependent on those links.

What then follows with respect to characterizing "the best" from this picture of psychology as a discipline? The importance of theory development, the breadth of psychology and its interdisciplinarity combine to form particular intellectual demands: psychology requires the ability to master great intellectual diversity and integrate it into one's own research material.

Collective intelligence

At the same time, psychology, unlike physics, has no separation between "theoreticians" and "experimentalists". Any psychologist is involved in theory development, experimental design, data collection and data evaluation, with variations only in the relative emphasis given to these different tasks.

A single individual is unlikely to excel equally at all of these aspects of psychological research. From here it is readily apparent that well structured teams are the way to maximize research success. This holds at the level of research groups, at the level of academic departments and at the level of the field itself.

The way to build a top-performing department is not to stack that department with many copies of the same individual, however brilliant that individual may be. Academics probably understand far better how to build a great department than how to select a "best" individual, so it may be illuminating to approach the challenge of "identifying the best" from that (better understood) perspective. In particular, consideration of how one builds great departments suggests that it is unlikely that there will be single sets of criteria that define "the best". Diversity and complementarity are integral to building a successful research environment. And environments are crucial: not only is science a collective endeavor, but collectives matter even for individual achievement.

Nurturing the best

While it is always tempting to attribute an individual's success to his or her own intrinsic qualities (particular for those individuals!), it is simply wrong to suggest that individual achievement can be considered independently from the intellectual and practical support of the surrounding environment. Science is no different here from economies more generally: productivity depends not just on the individuals, but on the knowledge, infrastructure and equipment that determines how individuals work. Thus it seems more appropriate to think of the "selecting the best" project as one of "creating the best".


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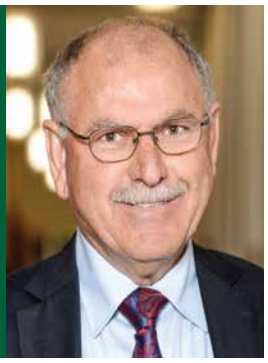
Sultan Abu-Orabi

Secretary General
Association
of Arab Universities
Amman
Jordan



Scientific Research and Higher Education in the Arab World

A brief look at why the Arab world lags so far behind in research and innovation – and what can be done about it. | by Sultan Abu-Orabi

Any worthwhile research must necessarily be based on the following pillars: vision, strategy, logistics, human resources that include well-qualified researchers, and meaningful research priorities directed towards problem-solving rather than just publishing. The Arab world today faces a host of hurdles when it comes to higher education and scientific research, including a lack of focus in research priorities and strategies, insufficient time and funding to meet research goals, low awareness of the importance and impact of good scientific research, inadequate networking opportunities and databases, limited international collaborative efforts, and of course, brain drain.

Too little support for top talent

According to statistical data in the 2009 Arab Knowledge Report, the total investment of the entire Arab world in research and development is a meager 0.2 - 0.5% of GDP, compared to 2.0 – 4.9% in the UK, Germany, Sweden, Israel, Japan, and the USA. Also, as opposed to other parts of the world where the private sector plays a significant role, most Arab countries depend on government funding for scientific research. The 2003 UNESCO report indicated that the Arab world contributes only 0.01 – 0.3% to global scientific publishing, compared to Israel at 1.1%, Japan at 8.2% and the USA at 30.8%. Such figures are self-explanatory and serve to reinforce the view that severely low levels of investment in research are directly responsible for the deplorable lack of innovation in Arab countries.

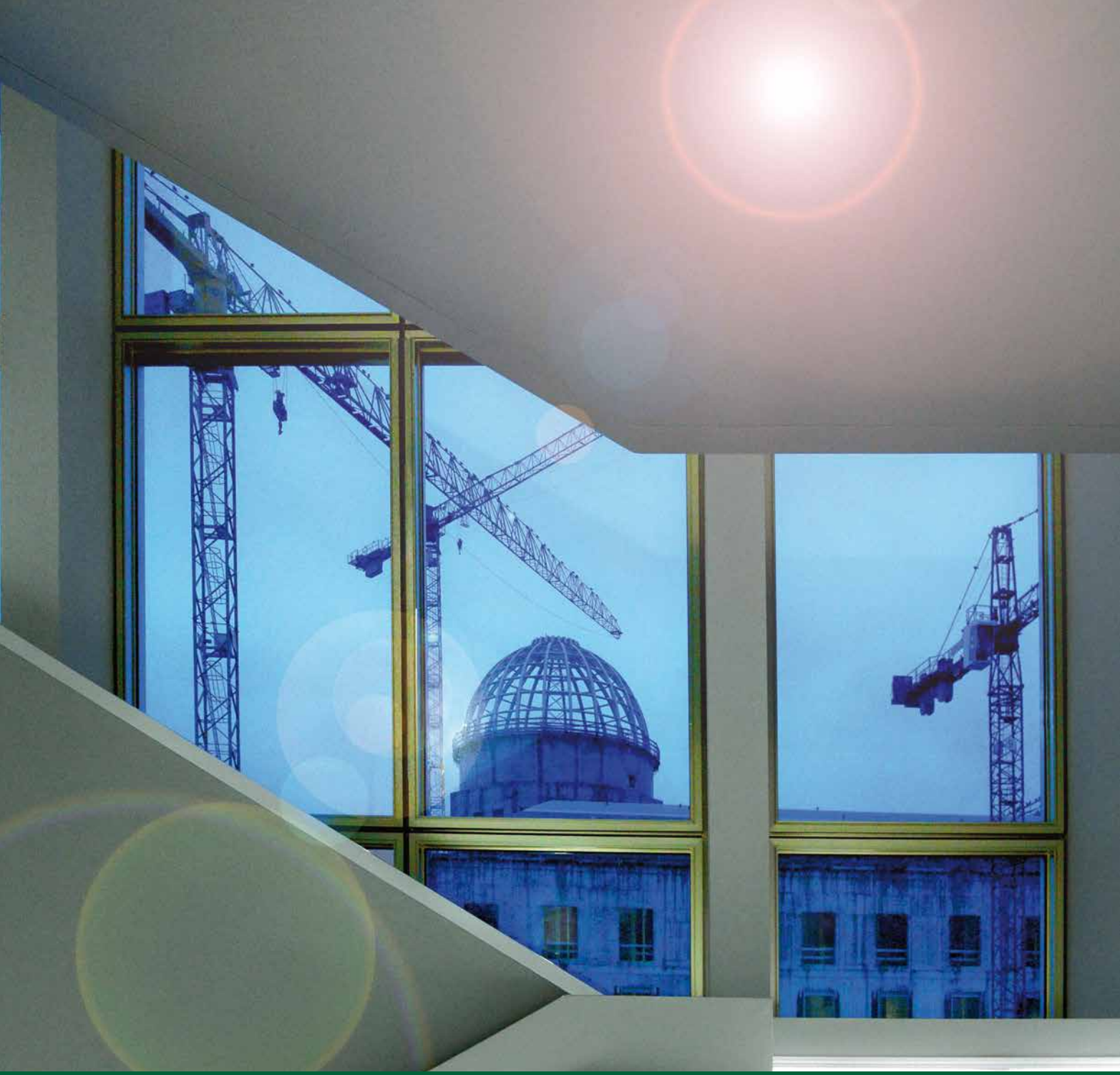
Another negative aspect is the emigration of intellectuals that accounts for about one-third of the total brain drain from Arab countries to primarily the West. Studies have shown that 50% of newly qualified scientists are lost each year, with almost three-quarters of them moving to the UK, USA or Canada. Also, almost 54% of Arab students studying abroad do not return to their home countries after graduation, thus making the West a beneficiary, by default, of highly qualified Arab scientists each year.

Looking ahead

It must be noted, however, that the brain drain is not happening in a vacuum, but rather as a result of several causes, just three of which are low salaries by international standards, a dismal lack of research opportunities and the political instability in the region. It seems that the only clear solution would be to increase the budget for scientific research, select meaningful priority areas for research, lay down workable strategic goals and action plans, establish adequate databases and networking capabilities, and robustly encourage private sector input and participation.

Impressions

Sultan Abu-Orabi and IAB member
Katharina Boele-Woelki, Bucerius Law School



Panel 2
Methods of Selecting the Best

"Future-focus is especially important for early career researchers, but missing in many assessment frameworks that measure excellence retrospectively." (Majella Franzmann)

Daya Reddy
President
National Academy of Science
of South Africa
Pretoria
South Africa

Identifying the Best in an Unevenly Diverse Global Community

The "best" young researchers in developing countries are likely working in sub-optimal local environments and proceeding along unconventional career paths. To find these gems of talent, reviewers may need to broaden their perspective and even engage with the young scholars themselves. | by Daya Reddy

The world of research today resembles a complex, noisy system. For example, in the life, health and physical sciences alone, in excess of one million journal articles are published annually. The challenge we face, then, is one of identifying high quality among individuals in a world of scholarship that is global, though quite unevenly so.

Peer review, the use of quantitative measures, or bibliometrics, and sometimes personal interviews, are the most prevalent approaches to assessment. The dangers of the uncritical use of bibliometrics have been highlighted by many: a key document in this regard is the 2012 San Francisco Declaration on Research Assessment.[1] The relative ease of numerical approaches is seductive, but one cannot expect such blunt instruments on their own to do justice to the complexity of scholarly work. Worse, since they shape incentives, their adoption distorts behaviour and leads to aberrant practices. With selective use, bibliometric measures can nevertheless support rather than replace expert judgement, and can assist in enlightening multi-pronged assessments.

The blind dependence on bibliometrics can push researchers to the edge, if not over it, of what constitutes ethical behaviour and practices, as highlighted in a recent article,[2] in which the authors make the case for reviewing incentive structures so as, inter alia, to reward scholars for "publishing well rather than often".

Identifying outstanding individuals in the context of collaborative research presents special challenges. Multidisciplinary research is a special kind of collaboration that has grown to an unprecedented degree, with membership of research groups often crossing several disciplinary boundaries. How then to tease out the contributions of an individual in such work? Whatever the methods of assessment, these methods should not implicitly or otherwise act as a disincentive to collaborative work, which is often characterized by exceptional creative synergies.

Impressions

1 Laura Na Liu, MPI for Intelligent Systems, and Katja Dörschner-Boyaci, Gießen University
2 Hans-Ulrich Reissig, Freie Universität Berlin
3 Peter Greisler, Federal Ministry of Education and Research


1

> "In seeking out top scholars, peer review continues to be a valuable tool, but it is important to be aware of local or regional circumstances."

Finding excellence in sub-optimal environments

Scholarship is a global enterprise, but its global reach is unevenly spread, with substantial differences in relation to resourcing, the existence of critical mass, of an established research tradition, and the ability to link into cutting-edge networks.

As an example, research productivity in sub-Saharan Africa has experienced rapid growth, albeit off a low base. Further insights may be gained by examining the nature of international collaboration in sub-Saharan Africa. For example, 79% of all research in East Africa was produced through international collaboration, according to a study by the World Bank and Elsevier,[3] with a minuscule proportion of these collaborations being intra-African. This situation signals a lack of critical mass in the region to produce international quality research on its own – not the sort of environment in which young researchers can flourish. The situation is exacerbated by a large number of transitory researchers, who stay for two years or less.

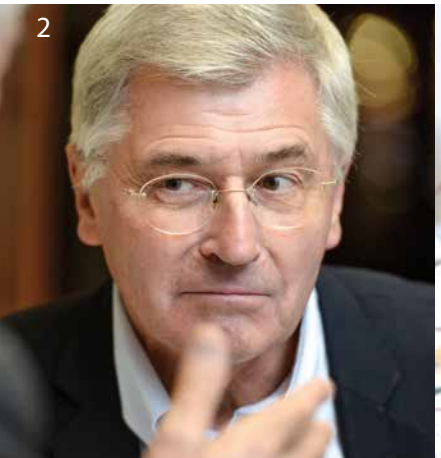
The challenge in such an environment is to identify hidden gems who have worked in isolation from the mainstream, and whose career trajectories have not followed a path such as those encountered in the developed world.

In seeking out top scholars, peer review continues to be a valuable tool, but it is important to be aware of local or regional circumstances. In some instances excessively laudatory reports, possibly a traditional approach, are of minimal use. Multiple reviewers with a range of perspectives may assist in this regard. Direct engagement with young scholars and the development of a first-hand feel for local conditions are of enormous value in efforts to identify the best.

Whatever the context, the task is one of weighing up an individual against a composite set of criteria that include superior creativity, intellectual depth, tenacity, the ability to take the right sorts of risks, and, importantly, the ability to take brilliant insights beyond conception and through to realization.

1 http://www.ascb.org/files/SFDeclarationFINAL.pdf
2 http://www.sciencemag.org/content/348/6242/1420.summary
3 http://www.elsevier.com/research-intelligence/research-initiatives/world-bank-2014

> "The blind dependence on bibliometrics can push researchers to the edge, if not over it, of what constitutes ethical behaviour and practices."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Carlos F. O. Graeff
Departamento de Física
UNESP, Bauru, Brazil
CAPES Ministério da
Educação, Brasilia, Brazil
and Livio Amaral
Instituto de Física, UFRGS
Porto Alegre, Brazil

Selecting the Best, a Brazilian Perspective

Highly centralized and highly structured, Brazil's system of assessing academic excellence ensures a multidisciplinary approach. | by Carlos F. O. Graeff

Measuring science is a vast, complex subject with multiple actors that depends on models, ideology, as well as understanding of social, economic and territorial realities. In this context we shall discuss the Brazilian experience on evaluating Masters and PhD programs. Brazil's science system and research universities were recently restructured.

Strict quality controls

In the 1950s, two federal scientific funding agencies were created: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) within the Ministry of Education, and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) under the Ministry of Science and Technology. Research in Brazil is mainly carried out at universities funded by agencies such as CAPES and CNPq. CAPES is quite unique. Its main mission is to evaluate and fund stricto sensu postgraduate programs (Masters and PhDs); it analyzes new proposals each year and awards federal permission to start. The postgraduate programs (PGP) in Brazil are given a score on a scale from 1 to 7; any program scoring below 2 must be closed. This is quite particular to Brazil, where a PhD or Master degree can only be given by programs that have scores higher than 3. PGPs are evaluated on their basic objective of training human resources and their overall quality based on multi-dimensional indicators. The periodicity is four years; the next evaluations will take place in 2017 (2013-2016).

Multidisciplinary by design

CAPES is divided into 48 divisions grouped in the College of Humanities, the College of Life Science and the College of Natural Science, Engineering and Multidisciplinary Research. The evaluation operates with structured questionnaires, multi-step peer review and collegiate decisions. First a specialist committee from a given division produces a structured report and recommendation, which is then analyzed by the Technical Scientific Council (CTC). CTC is composed of 18 representatives of all divisions. To make the analyses and decisions of CTC possible, each division of CAPES generates structured documents available online. For example, if the head of the history division is asked to report on a particular postgraduate school from civil engineering, a detailed description on how the indicators are evaluated is given in the "Documento de Área" and "Relatório de Avaliação". Many indicators are quantitative and use common bibliometric parameters such as the Journal Impact Factor. However, normally a qualitative assessment is involved in giving its grade. Many other are purely qualitative, especially in the humanities. Grades are awarded according to a

Impressions

1 IAB Member Liqiu Meng, TU München
2 Christiane Fellbaum, Princeton University
3 Richard N. Zare, Stanford University

"The CAPES model of independent and periodic evaluation and funding is certainly a main contributor to this success story in Latin America."

five-step scale (very good, good, etc.) after ranking the performance of each PGP in the division. The PGP score (1-7) is reached after analyzing the weighted sum of all grades, and ranking the PGP. It is important to stress that each division produces its own set of indicators. In many cases the decision of CTC does not agree with the one from the division. 3,337 PGPs were analyzed in 2013 in a two-week CTC meeting. Some programs date back to the 1970s, while others are quite new; the number of PGPs has grown steadily over the last 20 years at a rate of approximately 20%. Notably, the number of PhD theses per year is strongly correlated to the remarkable growth of Brazil's scientific output over the last 30 years.

The CAPES model of independent and periodic evaluation and funding is certainly a main contributor to this success story in Latin America. The CAPES assessment is conducted, to a large extent, according to "The Leiden Manifesto for research metrics"[1](LM) and is characterized by two basic principles: it is democratic and transparent. There is clear diversity across the humanities, the natural sciences, or the various regions across Brazil in their different stages of development, but the logic remains the same, and is fair.

1 D. Hicks, P. Wouters, L. Waltman, S. de Rijcke, and I. Rafols, Nature 520, 429 (2015).

Majella Franzmann

Independent Consultant in Higher Education
Honorary Professor
Department of Studies in Religion
The University of Sydney
Australia

Flexibility and Future-focus in Assessing the Quality of Research

Standardized quality-assessment frameworks should be flexible enough to account for the many different types of work involved in research projects. And the search for "the best" among early career researchers should focus on the future rather than the past. | by Majella Franzmann

The current growing international call for new ways of assessing research excellence beyond the blunt use of metrics[1] appears to be driving a convergence of views about the use of qualitative expert assessment (peer review) supported by some form of quantitative measures (metrics) to assess research quality. However, prior to finding the right mix of these measures two further aspects of assessment frameworks in general need to be addressed: the various activities undertaken within the timeframe of research projects that have an impact on the quality of the final outputs of those projects; and the particular circumstances of early career researchers and the assessment of their capability for excellent research, usually without the benefit of a long list of quality outputs or achievements.

As is the case with similar national research assessment frameworks, such as the REF in the United Kingdom and the PBRF in New Zealand, the ERA in Australia currently assesses research outputs within a limited timeframe, in this case over a five-year period. While the REF has gone some way to consider significant activities or aspects of a quality research profile by currently setting assessment criteria at 15% for research environment, 20% for impact, and 65% for research excellence, this does not account for different types of research work at different times within a project or within the "lifespan" of research by a team or by an individual.

Acknowledging the many phases of research

For any research team or individual researcher there will be times of intense laboratory work or field work; there will be times of intense interaction with industry, problem-solving or integrating new ideas for commercialization of research; there will be times when new projects are initiated with new teams, including doctoral students and postdoctoral researchers who require intense mentoring until they are ready for the next steps in collaborating either with other academics in different research fields or with external stakeholders. None of these activities are mutually exclusive, but the reality is that one aspect may require more energy and time than others in these particular phases. If we are trying to measure research quality realistically, then we need to consider beforehand how to be flexible enough in our approach to treat the various phases of the lifespan of research and give particular weightings to aspects of the research journey.

Accounting for youth

Some ten years ago, as Australia was planning for the Research Quality Framework (RQF), its first (but subsequently cancelled) national research assessment exercise, the Australian Council for Humanities, Arts and Social Science (CHASS) produced a seminal paper entitled "Measures of quality and impact of publicly funded research in the humanities, arts and social sciences".[2] The report proposed three areas for assessment, with research teams free to choose a particular percentage from a sliding scale to best identify their current profile at the time of assessment: Quality, 40-70%; Impact, 20-50%; Capability, 10-30%. Such an innovative model is both flexible and fair, and could be used for assessing research in any field or discipline, not just in the HASS sector. Most importantly, apart from its flexibility, it introduces the area of capability, defined as reflecting "the capacity of a research unit to contribute to future goals of research and research training, ensuring the vitality and diversity of Australian research" (CHASS p. 11). The model thus brings a future-focus to the assessment exercise that is especially important for early career researchers, but is missing in many national assessment frameworks that measure excellence retrospectively. Measuring capability acknowledges the reality that a great deal of excellent research is already being done by doctoral students and early career staff. Emerging postgraduate/postdoctoral research should be measured and be acknowledged to play a part in the final assessment of quality within a research team or institute.

In summary, there needs to be a much greater discussion about flexibility and future-focus prior to attempting to set the method by which peer review and metrics could be used for national assessment frameworks, as well as for assessment processes used by funding bodies to judge research quality.

1 See, for example, Hicks. D., et al. (2015). 'The Leiden Manifesto for research metrics', Nature 520: 429-431; and Wilsdon, J., et al. (2015). The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management. HEFCE 2015. DOI: 10.13140/RG.2.1.4929.1363

2 Measures of quality and impact of publicly funded research in the humanities, arts and social sciences, Occasional Paper 2, Council for Humanities, Arts and Social Sciences/Australian Government Department of Education, Science and Training, November 2005. My thanks to Professor Malcolm Gillies for making me aware of this paper.

Impressions

Daya Reddy, Academy of Science of South Africa,
Martin Grötschel, BBAW

Panel 3
Identifying the Best - In Practice

"Good intuition is far better than journal-based metrics or other numerical measures for identifying cutting-edge ideas and creative researchers with high potential for breakthroughs." (Kazuyuki Tatsumi)

Maciej Żylicz

President
Foundation for
Polish Science
Warsaw
Poland

Supporting the Best, so That They Can Become Even Better

The advantages of peer review are clear, but one drawback seems to emerge: the very human tendency to avoid uncertainty and risk in favor of that which is considered correct. The Foundation for Polish Science wants to adjust the review process and improve its ability to home in on potentially transformative research. | by Maciej Żylicz

The Foundation for Polish Science has been in operation since 1991. It is a non-profit NGO which pursues the mission of supporting science in Poland, yet most of its activities are open to applicants regardless of their nationality. In the past 25 years, the Foundation has awarded more than 8,000 prizes, fellowships and grants to beneficiaries from every branch of science in keeping with its main motto: "Supporting the best, so that they can become even better". All FNP grants, prizes and scholarships are awarded competitively. Peer-review constitutes a central part of selecting the best people to receive funding based on their scientific excellence – the most important criterion.

As a signatory of the San Francisco Declaration on Research Assessment, the Foundation makes limited use of bibliometrics in its assessment procedures. When assessing individual research output, we focus on the content of published papers, rather than the impact factor of the journal in which they were published. We often ask applicants to select only a limited number of papers and to provide a brief description regarding the originality of their scientific achievements.

We believe strongly that only peers can adequately assess one's originality, whether it concerns previous research output or a research proposal. Therefore, in addition to standard evaluations by external reviewers, selected applicants are invited to pitching sessions, where they are interviewed with respect to their research proposal. Unlike other funding organizations, we do not narrow down such interviews to specific domains of science; the panel is fully interdisciplinary. We see it as an added value that individual applications – at this final stage of the peer-review process – are assessed by representatives of various disciplines. As a result, we aim to support people that may have broad influence and impact on modern science.

Overcoming risk aversion

Yet, we are fully aware that the rules we adopt may not be an ideal solution. Some applications may be overlooked, especially those of particular novelty and originality: projects that cross boundaries or try to push the status quo. At times, assessors seem not to be entirely

Impressions

1 IAB Member Guinevere Kauffmann, Max Planck Institute for Astrophysics

2 IAB Member Verica Trstenjak, University of Vienna

3 Hans-Jürgen Lüsebrink, Saarland University

"The peer-review method seems to promote applications that are scientifically correct, but have no ground-breaking potential."

Kazuyuki Tatsumi
Designated Professor
Research Center for Materials Sciences
Nagoya University
Japan

comfortable with such proposals, especially when expected results are not easily foreseen. Unfortunately, the peer-review method seems to promote applications that are scientifically correct, but have no ground-breaking potential. In the near future, we would like to adopt within FNP's assessment schemes such solutions that would enable us to identify transformative, high-risk/high-gain projects, and pay adequate attention to their assessment.

We plan to ask our experts the following questions:
Is it possible to predict the outcome of this proposal?
If this proposal is successful, what kind of impact will it have on science and society?
In the case of interdisciplinary projects: Will the outcome of the project have an impact on different fields of science, or does it only involve methodology from one field being applied to another field?

We also plan to inform applicants that we tolerate failure in research work and that it is possible to modify a project's goals during implementation of the grant proposal.

Intuition-Based Decisions in Selecting the Best

Among the least "scientific" of our human abilities, intuition can be a powerful tool for identifying researchers with true breakthrough potential.
| by Kazuyuki Tatsumi

I am not directly linked to any funding agents in Japan, so that my role is to comment from the perspective of a pure scientist.

Scientists always look for 'breakthroughs', because the development of science relies very much on them. Scientific breakthroughs consist of outstanding discoveries, inventions, and new methodologies that could change the scientific paradigm, and often entail entering unknown territory beyond existing disciplines.

Long-term investment is critically important for bringing about scientific breakthroughs, and this depends on access to stable and diverse sources of funding. It is also imperative to reaffirm autonomy in making funding decisions, along with responsible research conduct, which is at the essence of the scientific enterprise. We should ensure the freedom of researchers, particularly young researchers, in proposing their research topics and methodologies, and we should provide them with intellectual room to allow for serendipity. Covering the whole spectrum of research for the purpose of evaluation requires complex procedures, as renewing knowledge and cultivating the best talent are processes that span all scientific disciplines. Certainly, identifying "the best" in this regard cannot be attained by a single measure.

It takes talent to identify talent

A key to successfully selecting "the best" is to acquire excellent personnel for evaluation. Reviewers must have the appropriate knowledge and expertise, if not entirely supreme, in order to assess the proposal both broadly and in the specific context of the research field. It goes without saying that the basic principles of research integrity are fairness and accountability, among others, based on rigorous and transparent scientific merit review at a global level. So how can we attain "research integrity at a global level" in evaluating processes to find "the best"?

Journal-based metrics, such as journal impact factors, have increasingly been used as a convenient numerical measure of scientists' works and even scientists' abilities despite many well-documented flaws and doubts regarding such metrics. I wish to point out here that the intuition of established scientists based on their rich experience, knowledge and scientific expertise is essential in assessing quality of research and researchers. Review processes based on intuition may sound subjective and not very precise. However, I sense that good intuition is far better than journal-based metrics or other numerical measures for identifying cutting-edge ideas and creative researchers with high potential for breakthroughs.

"A key to successfully selecting "the best" is to acquire excellent personnel for evaluation. "

There is an old-saying in China:
千里馬常有　伯楽不常有

Translated into English, it means something like:
Plentiful are excellent steeds running 1000 miles.
Scarce are excellent horse experts, "Hakuraku",
who find excellent steeds.

While it is not really very hard to find excellent steeds, which may run 1000 miles with ease, it is extremely difficult to find highly talented horse masters, who can discover a steed's ability, size it up, and develop it.

The same goes for the world of science, and perhaps the humanities as well. Therefore, in order to select "the best", it is critically important to start with finding able evaluators! Established scientists with keen intuition in their disciplines are encouraged to assist in identifying "the best", even though their intuition-guided judgments may not be perfect, and even though they may make mistakes from time to time.

Here is a message, a sort of radical but rational message:
In science, "the good old Best finds the future Best".

It is the responsibility of scientists to convey this message to metrics-loving politicians, policy-makers and administrators whose understanding of the sciences may be thin.

Impressions

1 Birgit Wetterauer, Federal Ministry of Education and Research
2 Robert E. Norton, University of Notre Dame
3 Sultan Abu-Orabi, Katharina Boele-Woelki, Ulrike Hahn


1

Richard Nakamura
Director
Center for Scientific Review
National Institutes of Health
Bethesda, MD
United States

Identifying the Best Research for Awards by the US National Institutes of Health

As the NIH looks to further improve its system of peer review, the first priority is to attract "the best" reviewers. Other optimization measures include more nuanced assessments of performance and a closer look at best practices around the world. | by Richard Nakamura

NIH has a grant award process that emphasizes project support and training/career support to individual scientists within academic institutions. To evaluate applications, NIH has a two-stage review process powered by the input of multiple external experts and other stakeholders: (1) Evaluation for Scientific Merit by external scientific experts from academia and industry (Peer Review). (2) Evaluation for Relevance to Research Priorities by the relevant NIH Institute or Center, which consults more senior scientific experts, patients and patient advocates on its Advisory Council. The NIH Institute or Center Directors make the final funding decision based on the advice from their councils and program staff.

The NIH Center for Scientific Review (CSR) centrally manages the review of more than 70% of NIH grant applications, over 60,000 in 2015, via 173 standing review committees and nearly 300 federal scientists. CSR engages approximately 16,000 unique reviewers per year. Strong performance depends on a culture of unselfish and independent judgment of scientific merit by expert reviewers. Twenty-four institutes take the review scores and written summaries and make funding decisions that incorporate the relevance of the applications to their institute missions. This is a highly decentralized decision-making process significantly removed from the US political process.

Peer-review the key to past and future success

The two-stage process, which was developed after WWII, along with very high levels of funding has enabled scientific dominance in biomedical research and led to significant advances in US and global health. How important is peer review to these advances? Researchers from Harvard and Boston Universities recently reported in Science magazine[1] that better peer review scores were consistently associated with better research outcomes as measured by citations, publications, and patents. They noted that reviewers appear to be able to make fairly fine distinctions at the best score levels that cannot otherwise be explained by the investigator's publication history, grant history, institutional affiliations, career stage, and degree types.

A personal comment on bibliometrics: Bibliometrics should be used as a threshold, not as a competition. A metric can be manipulated and favors older, well-networked scientists. When used for promotion and resources, the struggle for citations has corrupted national science. Our best institutions eschew use of citation measures in evaluating scientists.

Challenges today

Keeping science progress going in the US, however, is challenging. The flattening of US budgetary support for NIH since 2003 has led to a severe drop in grant application success rates, causing great stress among research scientists and criticism of the peer review system since it is the proximate cause of funding failure. However, improvements are always desirable, so CSR has responded by looking for new ways to assess and advance NIH peer review. It has greatly strengthened its analytic capacity to study its own performance and conduct studies to:

1) determine optimum ranking systems,

2) examine fairness of review across sectors,

3) measure subjective impressions of performance by applicants, reviewers and institute program staff,

4) measure review outcomes.

> "Reviewers appear to be able to make fairly fine distinctions at the best score levels that cannot otherwise be explained by the investigator's publication history, grant history, institutional affiliations, career stage, and degree types."

CSR also recognizes that it and the scientific community now face many problems, such as studies that lack reproducibility and a review system that is seen as too conservative. How is the NIH planning to proceed?

1) Attract the best scientists to review

2) Develop nuanced measures of performance

3) Study alternate ranking systems

4) Compare best practices across national and international organizations

5) Test new grant mechanisms

6) Encourage review evaluation of scientific rigor

7) Change cautiously to keep our scientific communities on board

1 Li, Danielle and Agha, Leila: Big names or big ideas: Do peer-review panels select the best science proposals? Science 24 April 2015: Vol. 348 no. 6233 pp. 434-438

Impressions

1 Peter Wriggers, University of Hannover

2 Gale A. Mattox, Georgetown University

3 Eric S. Koenig, Chairman of the Board of Directors, American Friends of the Humboldt Foundation, and IAB and Board of Directors member Joseph S. Francisco, University of Nebraska

Katja Doerschner

Research Group Leader

Department of Psychology and Sports Science

Gießen University

"I do not want to do research in order to be 'the best'. I want to do my best to do outstanding science."

"No magic equation"

There seems to be no magic equation that can be used to compute "the best". In my opinion, a selection process aiming to identify outstanding early career researchers is most likely to succeed through in-depth peer review. I am aware that this is a) a lot of work, and b) not without its own pitfalls. However, peer review should – at the very least – avoid the normalization problems associated with bibliometrics, since reviewers do know, for example, the rate of publishing in the field and are thus able to take bibliometrics "with a grain of salt".

I believe that a measure of "best" should be one that emerges naturally out of one's scientific endeavor – and not one that can be achieved through specific career-advancement strategies. I do not want to do research in order to be "the best". I want to do my best to do outstanding science.

2

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Contributors

Speakers at the 9th Forum on the Internationalization of Sciences and Humanities

Sultan T. Abu-Orabi Aladwan

Professor Sultan Abu-Orabi is an organic chemist and the Secretary General of The Association of Arab Universities, which has its headquarters in Amman, Jordan. He previously served as President of Yarmouk University, Jordan's second largest public university, and as President of Irbid National University and Tafila Technical University in Jordan. He is also the President of the Jordanian Chemical Society and of the Arab Union of Chemists. He was a visiting professor at Bahrain University and at King Fahd University of Petroleum and Minerals in Saudi Arabia.

Sultan Abu-Orabi, who obtained his PhD from the University of Michigan in 1982, is Editor-in-Chief of two international chemistry journals and a member of several editorial boards. He has served as supervisor and examiner of dissertations for more than 50 MSc and PhD students in Jordan, across the Arab world, in India and in Europe, and has organized, served on advisory boards of, and presented lectures at numerous international conferences. He has also received several research fellowships and awards, including a Humboldt Research Fellowship, and published over 60 papers throughout his career spanning 30 years.

Philipp Campbell

Dr. Philip Campbell is Editor-in-Chief of Nature and of the Nature Publishing Group. His areas of responsibility include the editorial content and management of Nature, and assuring the long-term quality of all Nature publications. He is based in London.

Dr. Campbell has a BSc in aeronautical engineering, an MSc in astrophysics and a PhD and postdoctoral research in upper atmospheric physics. Following his research, he became the Physical Sciences Editor of Nature and then, in 1988, the founding editor of Physics World, the international magazine of the UK Institute of Physics. He returned to Nature to take on his current role in 1995.

He has worked with the UK government, the European Commission and the US National Institutes of Health on issues relating to science and its impacts in society. For ten years until 2012 he was a trustee of Cancer Research UK. He is a founding trustee and Chair of the research funding charity 'MQ: transforming mental health'. He is an elected Fellow of the Royal Astronomical Society and of the Institute of Physics, has honorary degrees from several universities, and was awarded an Honorary Professorship by the Peking Union Medical College. He is a Life Member of Clare Hall, Cambridge University.

Katja Dörschner-Boyaci

Katja Dörschner-Boyaci is an experimental psychologist, whose research focuses on visual perception, aiming to understand the mechanisms by which the brain is able to construct a rich perceptual experience from the inherently ambiguous retinal input. She obtained her Ph.D. from New York University in 2006 (New York City, USA), and conducted research as a postdoc at the University of Minnesota (Minneapolis, USA) before joining the Department of Psychology & the National Magnetic Resonance Research Center at Bilkent University (Ankara, Turkey) as Assistant Professor in 2008. Since 2014, she has directed a research group at the Department of Psychology at the Justus Liebig University Giessen, where she and her team investigate the neural mechanisms that underlie the visual perception of material qualities. In the same year, she was also appointed as a Visiting Scholar at the Department of Cognitive Science, University of California San Diego (USA).

Dr. Dörschner-Boyaci's research has been funded by the Scientific and Technological Research Council of Turkey, as well as FP7 and E-RARE programs. For her work she received the TUBITAK Young Scientist Encouragement Award (2012), the Turkish Academy of Sciences Outstanding Young Scientist Award (2013), and the Sofja Kovalevskaja Award granted by the Alexander von Humboldt Foundation (2014).

Majella Franzmann

Professor Franzmann is by training an expert in Religious Studies. Since 2005 she has been involved in university management, firstly as the Dean of Research for Humanities and the Chair of Academic Board at the University of New England, Australia, then as Pro Vice-Chancellor Humanities at Otago University in New Zealand, and most recently as Pro Vice-Chancellor Humanities at Curtin University in Australia. She is currently an Honorary Professor at the University of Sydney and an independent consultant in Higher Education.

While a doctoral student Professor Franzmann studied at the University of Tübingen, Germany on a DAAD scholarship. She returned to Tübingen as a Humboldt Research Fellow in 1992-1993, renewing her Fellowship in 1995 and 2007. Professor Franzmann has held four Australian Research Council Large/Discovery Grants, the last two grants with a team of national and international scholars working on the 14th century remains of Manichaeans and the Church of the East (Nestorians) in China. She is currently working on an international long-term project on Women in Manichaeism.

Professor Franzmann was elected a Fellow of the Australian Academy of the Humanities in 2001. She served on the Council of the Academy in 2007, and was Head of the Academy Section for Philosophy, Religion and the History of Ideas, 2011-2013. She was again elected to the Council for 2014-2015.

Carlos F. O. Graeff

Carlos F. O. Graeff is Professor of Materials Science at State University of São Paulo (UNESP). He received his PhD in Physics from the State University of Campinas (UNICAMP) in 1994. After a post-doctorate at

TU München as fellow of the Alexander von Humboldt Foundation, he joined the University of São Paulo (USP), Campus Ribeirão Preto, as Assistant (1996-1999) and Associate Professor (1999-2006). In 2006 he joined the State University of São Paulo (UNESP) as Full Professor. Since 2013, he has been Principal Investigator of CEPID-FAPESP "Center for the Development of Functional Materials". His research is funded by the Brazilian National Research Council (CNPq).

Professor Graeff was a visiting Professor at Ecole Polytechnique Fédérale de Lausanne, Université Claude Bernarde Lyon 1, and Huazhong University of Science and Technology. He is a former Coordinator of the Materials Science Division in CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, Brazilian Ministry of Education), Scientific Director of SBPMat (Sociedade Brasileira de Materiais), and President of Clube Humboldt do Brasil.

His field of interest is Materials Science, more specifically electronic magnetic resonance, organic semiconductors and electronic devices (solar cells and thin film transistors). He has a strong interest in nurturing scientific talent and supervises more than 35 Masters students, PhD students and postdocs. He has published more than 120 articles and holds several patents.

Ulrike Hahn

Ulrike Hahn first qualified as a lawyer, passing both her 1st and 2nd State Law Examinations in the state of Bavaria, Germany, before taking a Masters in Cognitive Science and Natural Language at the University of Edinburgh. This was followed by a DPhil in Experimental Psychology from Oxford University on the topic of rules and similarity in categorization. Upon completion of her doctorate, she joined the Department of Psychology at the University of Warwick as a lecturer, moving on after two years to the School of Psychology at Cardiff University where she remained for 14 years. Since 2012 she has been at the Department of Psychological Sciences at Birkbeck College, University of London, where she also serves as director of the Centre for Cognition, Computation and Modelling.

Ulrike Hahn's research interests are categorization, similarity, language and language acquisition, and, first and foremost, questions of human rationality. Her research examines human judgment, decision-making, and the rationality of everyday argument. She is presently particularly interested in the role of perceived source reliability for our beliefs, including our beliefs as parts of larger communicative social networks.

Ulrike Hahn is presently a member of the Senior Editorial Board of "Topics in Cognitive Science" and an Action Editor for Frontiers in Cognitive Science and for Frontiers in Social Psychology. She also served as an Action Editor for "Psychonomic Bulletin & Review" from 2008-2012, and as a consulting editor for Psychological Review from 2009-2010.

She was awarded the Cognitive Section Prize by the British Psychological Society, the Kerstin Hesselgren Professorship by the Swedish Research Council, and the Anneliese Maier Research Award by the Alexander von Humboldt Foundation.

Laura Na Liu

Laura Na Liu is a group leader at the Max Planck Institute for Intelligent Systems in Stuttgart and a professor at the Kirchhoff Institute of Physics at the University of Heidelberg. After obtaining her PhD in physics in the group of Harald Giessen at the University of Stuttgart in 2009, working on 3D complex plasmonics at optical frequencies, she joined the group of A. Paul Alivisatos at the University of California, Berkeley, as a postdoctoral fellow. From 2011 to 2012, she was a visiting professor in the group of Naomi Halas at Rice University. At the end of 2012, she received the Sofja Kovalevskaja Award from the Alexander von Humboldt Foundation and took up her position at the Max Planck Institute for Intelligent Systems in Stuttgart.

Laura Na Liu's research is multidisciplinary and located at the interface between nanoplasmonics, biology, and chemistry. Her group focuses on developing sophisticated and smart plasmonic nanostructures for answering structural biology questions as well as catalytic chemistry questions in local environments. She is an associate editor of Science Advances.

Apart from the Sofja Kovalevskaja Award, Laura Na Liu has received several other prestigious awards, including the Hertha Sponer Prize of the Deutsche Physikalische Gesellschaft, the Nanoscience Award AGENT-D, a fellowship for the Max Planck Society's Elisabeth Schiemann Kolleg, the Heinz Maier Leibnitz Prize of the German research Council DFG, an ERC Starting Grant, and the Light2015 Young Woman in Photonics Award of the European Optical Society.

Richard K. Nakamura

Dr. Richard K. Nakamura is the Director of the Center for Scientific Review. He leads the review of grant applications of the National Institutes of Health. Dr. Nakamura received his Bachelor of Arts in Psychology from Earlham College and his Ph.D. in Psychology from the State University of New York at Stony Brook. He was with the National Institute of Mental Health from 1976 to 2011. In 2001, he received the NIH-Asian/Pacific American Organization Outstanding Achievement Award for Administrative Work. In 2002, Dr. Nakamura was elected by the American Association for the Advancement of Science (AAAS) to the status of AAAS Fellow. Also in 2002, Dr. Nakamura was awarded the Presidential Rank Award for outstanding leadership. In 2004 and 2005 respectively, he received leadership awards from the Federation of Behavioral Psychological and Cognitive Sciences and from the International Society for Behavioral Neuroscience. In 2009 he was awarded the NIH Director's Award for Outstanding Administration.

Daya Reddy

Daya Reddy was born in Port Elizabeth, South Africa. He completed a degree in civil engineering at the University of Cape Town, a Ph.D. degree at Cambridge University in the UK, and a post-doctoral year at University College London. He currently holds the South African Research Chair in Computational Mechanics, in the department of mathematics and applied mathematics at the University of Cape Town. He served as executive dean of the faculty of science at UCT between 1999 and 2005.

Professor Reddy's research lies in the domain of mathematical modelling, analysis and simulation in mechanics. He has made significant contributions to the theory of plasticity and to the development of stable and convergent mixed finite element methods. He maintains an active engagement in biomechanics, including research into aspects of cardiovascular mechanics.

Professor Reddy is actively involved in strengthening the scientific enterprise and in the domain of providing science advice to policymakers. He is currently president of the Academy of Science of South Africa (ASSAf), president-elect of the International Council for Science (ICSU), and co-chair of the InterAcademy Council.

Daya Reddy is a recipient of the Award for Distinguished Service from the South African Association for Computational and Applied Mechanics, and the Order of Mapungubwe from the President of South Africa. He has held numerous visiting positions, including those of Visiting Faculty Fellow at the Institute for Computational Sciences and Engineering at the University of Texas at Austin and the Timoshenko Lecturer at Stanford University. In 2012 he received the Georg Forster Research Award from the Alexander von Humboldt Foundation.

Kazuyuki Tatsumi

Kazuyuki Tatsumi received his B. Sc. degree in 1971 from Osaka University, and completed his Ph.D. thesis on theoretical inorganic chemistry in 1976. After holding postdoctoral positions at Texas A&M and at Cornell University (with Prof. Roald Hoffmann), he returned to his home institution as a research associate. He was promoted to Associate Professor at Osaka University, and, in 1994, to Professor at Nagoya University. He served as Director of the Research Center for Materials Science at Nagoya University from 2003 to 2013 and is currently Designated Professor in the Institute.

He has received the Inoue Prize for Science, the Alexander von Humboldt Research Award, the Chemical Society of Japan Award, the DFG Eugen und Ilse Seibold Prize, the Commendation for Science and Technology by the Japanese Ministry of Education, and the Japan Academy Prize. He was also awarded an honorary doctorate from the University of Münster, Germany. He was elected a member of the Japan Academy, and a corresponding member of the Nordrhein-Westfälische Akademie der Wissenschaften und Künste.

His research interests include 1) coordination chemistry of chalcogenido complexes and clusters of transition metals, 2) organometallic chemistry of coordinatively and electronically unsaturated transition metal complexes, and 3) bioinorganic chemistry of reductases. Prof. Dr. Tatsumi was the President of the International Union of Pure and Applied Chemistry (IUPAC) in 2012-2013, and Vice-Chair of Section III of the Science Council of Japan in 2012-2014. He has been serving as a Member of the Executive Board of ICSU.

Richard N. Zare

Richard N. Zare is the Marguerite Blake Wilbur Professor in Natural Science at Stanford University. A graduate of Harvard University, Professor Zare held appointments at the Massachusetts Institute of Technology, the University of Colorado, and at Columbia University, before moving to Stanford University in 1977, where he was named Chair of the Department of Chemistry in 2005 and served in that capacity for six years. In 2006 he was also named a Howard Hughes Medical Institute Professor. Professor Zare is renowned for his research in the area of laser chemistry, resulting in a greater understanding of chemical reactions at the molecular level. He has made seminal contributions to our knowledge of molecular collision processes and contributed significantly to solving a variety of problems in chemical analysis. His development of laser induced fluorescence as a method for studying reaction dynamics has been widely adopted in other laboratories. Professor Zare has given named lectures at numerous universities, authored and co-authored over 800 publications and more than 50 patents, and published four books.

Among his extraordinary array of honors are the Priestley Medal, the National Academy of Sciences Award in Chemical Sciences, the Wolf Prize in Chemistry, the King Faisal International Prize in Science, and the Wilhelm Jost Memorial Lecture of the German Bunsen Society. He holds honorary degrees from universities across the globe and was named (honorary) fellow of – among many others – the Indian Academy of Sciences, the Academy of Sciences for the Developing World, the Royal Society, the Chinese Academy of Sciences, and the Swedish Royal Academy of Engineering Sciences.

A former chair of the National Research Council's Commission on Physical Sciences, Mathematics, and Applications, and of the National Science Board, Professor Zare also served as the Chair of the President's National Medal of Science Selection Committee. He advised the Camille and Henry Dreyfus Foundation before becoming a member of the Board of Directors in 2010, and in 2012 was appointed chair of the Committee on Science, Engineering and Public Policy of the National Academies of Sciences, Engineering, and Medicine. He also currently serves as Chairman of the Board of Directors at Annual Reviews, Inc.

Maciej Żylicz

Professor Maciej Żylicz studied experimental physics and biology at the University of Gdansk. In 1986 he was awarded the habilitation degree in molecular biology, and in 1992 he became a full professor (Head of the Department of Molecular Biology, Faculty of Biology, later Faculty of Biotechnology). He served as Vice-Rector for Science of the University of Gdansk from 1990 to 1993. In 1993/94 he was a visiting professor at the Institute of Oncology of the University of Utah. Since 1999 he has been head of the Molecular Biology Department of the International Institute of Molecular and Cell Biology in Warsaw. Maciej Zylicz is best known for his work on molecular chaperone activity of heat shock proteins. He is the author of almost 90 scientific papers (over 6000 citations), has supervised 15 doctorates in Poland, while six of his closest colleagues (doctoral and habilitation candidates) have been appointed as professors. He is a member of the Polish Academy of Sciences, the German National Academy of Sciences Leopoldina, EMBO and the Senate of the Max Planck Society. He is the recipient of the Foundation for Polish Science Prize and of the Prime Minister of the Republic of Poland's Award for Scientific Achievements, as well as honorary doctorates from the University of Wrocław, University of Gdańsk and Jagiellonian University.

The International Advisory Board

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

The International Advisory Board and Humboldt Foundation staff members at the 2015 IAB Meeting

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, world-wide 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. 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.

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An Independent Expert Group

The Members of the International Advisory Board

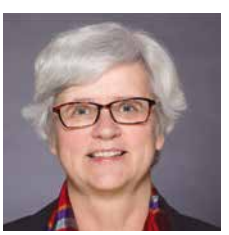
Chair

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 field work in South China, exploring rural transformations and the socialist 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 Nahum Guzik Distinguished Academic Chair 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 the President of Bucerius Law School, the first private law school in Germany, where she also serves as the Claussen Simon Foundation Professor of Comparative Law. Until September 2015, she was Professor of Private International Law, Comparative Law and Family Law at Utrecht University, the 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 member and board member of various professional associations and institutions, such as the Deutsche Gesellschaft für Völkerrecht and the Swiss Institute of Comparative Law, and serves on editorial boards for global, European and South African law journals, book series and open access platforms. In 2014, she was elected president of the International Academy of Comparative Law. She taught at the Hague Academy for International Law and was awarded honorary doctorates from Uppsala University and the University of Lausanne, as well as the Anneliese Maier-Forschungspreis from the Alexander von Humboldt Foundation.

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 also heads 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 Selcuk 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.

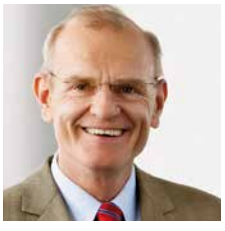
Joseph S. Francisco is the Dean of the College of Arts and Sciences and holds the Elmer H. and Ruby M. Cordes Chair in Chemistry at the University of Nebraska-Lincoln. Following undergraduate studies at the University of Texas and a PhD in Chemical Physics at the Massachusetts Institute of Technology, he spent two years at the University of Cambridge and returned to MIT as a Provost Postdoctoral Fellow. 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.

Joachim Herz is the Thomas O. and Cinda Hicks Family Distinguished Chair in Alzheimer's Disease Research at the University of Texas Southwestern Medical Center. He studied at the University of Heidelberg, where he also completed his doctoral thesis in Pharmacology. After graduating from medical school in 1983, he practiced medicine as a surgical resident in Germany and England before joining the European Molecular Biology Laboratory (EMBL) in Heidelberg. He moved on to the laboratory of Drs. Michael Brown and Joseph Goldstein at the University of Texas Southwestern Medical Center in 1989 and joined the faculty of the Department of Molecular Genetics at UTSW in 1991, where was named full professor in 1998 and the Thomas O. and Cinda Hicks Family Distinguished Chair in Alzheimer's Disease Research in 2002. He is an Established Investigator of the American Heart Association and a member of the American Society for Clinical Investigation. Among his numerous awards and honors are fellowships from the Boehringer Ingelheim Foundation and EMBL, being selected as a Syntex Scholar, the Lucille P. Markey Scholar Award, the Wolfgang Paul Award of the Alexander von Humboldt Foundation and the German Federal Ministry of Education and Research, the Heinrich-Wieland Prize for Excellence in Lipid Research, and a MERIT award from the National Institutes of Health.

Guinevere Kauffmann is a Director at the Max Planck Institute for Astrophysics in Garching, Germany. Following her undergraduate years in South Africa, she obtained her doctorate at Cambridge University. After a postdoctoral stay as a Miller Fellow at the University of California, Berkeley, Dr Kauffmann moved to Munich, where she has been a scientist at the Max Planck Institute for Astrophysics since 1995, most recently as the leader of a group studying galaxy evolution.

Dr. Kauffmann is known for her pioneering work developing theoretical models for the formation and evolution of the galaxy population as a whole. She has also played a leading role in devising analysis methods for extracting quantitative information about the physical processes driving galaxy evolution from the observational data provided by modern large-scale surveys, notably the Sloan Digital Sky Survey, but also smaller, specially designed surveys, which she and her team have carried out themselves.

Dr. Kauffmann was awarded the Heinz Maier-Leibnitz Prize and the Gottfried Wilhelm Leibniz Prize, the most prestigious prize in German research, by the German Research Foundation. She was elected to the American Academy of Arts and Sciences, the German National Academy of Sciences Leopoldina, and the US National Academy of Science. In 2010, she was awarded the Distinguished Service Cross of the Federal Republic of Germany for her service to science.



Stefan Marcinowski joined BASF's main laboratory in Ludwigshafen following his chemistry studies in Stuttgart and Freiburg and after completing his PhD 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 board of directors for 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.

Impressions

1 Enno Aufderheide, Secretary General, Helmut Schwarz, President, Humboldt Foundation

2 Kazuyuki Tatsumi, Nagoya University

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. Her published books include 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.

2

Verica Trstenjak is a professor of European law at the University of Vienna and an external scientific member of the Max Planck Institute Luxembourg for International, European and Regulatory Procedural Law. In addition, she teaches for various Master and LLM programs at universities throughout Europe. Since 2013, Professor Trstenjak has also been an interim judge (juge par intérim) of the civil service tribunal of the EU and a member of the Council of the European Law Institute (ELI). From 2004 to 2006 she served as judge on the General Court of the European Union, and from 2006 to 2012 as an Advocate General of the European Court of Justice. From 1996 to 2000 she was also State-Secretary at the Ministry of Science and Technology, Slovenia. She has published several books, more than 250 articles, and has given lectures and keynote speeches at numerous international and European conferences. She is a member of the editorial board of several renowned legal journals, such as European Law Review, a founding member of the European Law Institute (ELI), and member of associations such as the International Academy of Comparative Law and Academia Europaea.

Raimo Väyrynen, Professor Emeritus of Political Science at the University of Notre Dame, USA, and at 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 a 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 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, among others.

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
2015	Identifying the Best – Theory, Methods, Practice

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