



## Fame on Sale: Pitfalls of the Ranking Game

Once upon a time, Science shared ranks with the Arts in being considered something almost sacred and truly worthy of human dignity. In those good days, Science was pure and so were those devoting their lives to it, at least in the eyes of their contemporaries. Even though most people did not fully understand, what Science was about, they would concede that we as humans have as much of a need for beauty in the Arts as for answers to the mysteries of Nature. Scientists were valued for their knowledge and shared their findings in learned publications, where they competed against each other for the most astonishing new insights.

Over the centuries, acquired knowledge started transforming everyday life. Science gave rise to Technology that spurred progress, and with it additional demand for technological improvements. Soon it became clear that countries with the most advanced technology will play the decisive role in an increasingly global world. Governments started investing in new technologies, for peaceful and not so peaceful purposes. Especially since World War II, Technology and related Sciences in Far East countries including Japan, Korea and China have made unprecedented progress. The ever increasing amount of information, which had to be accommodated in an equally rapidly increasing number of journals, became very hard to overlook and separate into new insight or mere replicas. The fairy tale ends about here, since it is not clear, if most scientists have lived happily ever after.

For one, the public perception of the role of research has changed. Science turned into a commodity to be invested in and changed its primarily mission from nurturing knowledge to supporting technological progress. In an increasingly success-oriented world, even the Nobel prize, designed to reward the most important achievements, acquired a quality of prestige not only for individuals, but also for institutions and countries. Since prestige started to count more than knowledge, the need emerged to rank individuals along with their institutions and countries according to their relative fame. The Ranking Game was born.

In a climate of declining funding and public interest in Pure Science, academic institutions started to compete for external funding and good students. Their relative success was being quantified on a relative scale. Determining

the ranking of academic institutions has evolved into a periodic project for many popular journals and magazines. The Universities have taken the bait to a large degree and started conforming to the rules of the Ranking Game established by journalists with often only second-hand knowledge of Science.

Since one of the key criteria used in the Ranking Game is the amount of external research funding, institutions started increasing the pressure on scientists to attract the highest amount of funding possible. Needless to say, the necessity to submit many research proposals per year is very time consuming and taxing on the creativity of individuals. University administrations have started convincing talented young faculty to give up their lofty goals in favor of other research directions that should attract much more external funding, digging effectively a grave to academic freedom.

Science funding agencies, most of which have initially been installed to promote knowledge, now more than ever have become subjected to the scrutiny of political powers with their particular agendas. Since very few politicians appreciate the fact that the most beneficial discoveries have resulted from scientific curiosity, research funding worldwide has been directed to highly-ranked institutions engaging in specific research areas with planned objectives. Few realize the similarity between planned science and planned economy, which had caused the glorious collapse of the communist empire.

Everything has become subject to the Ranking Game, including the scholarly activity of individual scientists. Intricate schemes, such as the h-index, have been designed to reduce individuals to a single number. Most of such schemes focus on the number of times a particular publication has been cited. In the flood of scientific journals, a select few have acquired a high average number of citations per publication, the so-called impact factor. The publishers have recognized the market value of this insight and have turned the Ranking Game to their competitive advantage, publishing their impact factors with two decimal points precision. The commercial journals *Nature* and *Science* have been very successful in this respect, and many Scientists started to believe that an article published in these journals is intrinsically more valuable than when

it is published elsewhere. The truth is somewhat different: the Editors select among many quality submissions those, which most likely will be cited many times. I doubt that Einstein's Theory of Relativity would qualify, since it lacks popular appeal and impressive graphics.

Yet if a publication in Nature or Science magazine is what distinguishes the extraordinary from the average, then ranking is as easy as enumerating publications in these two journals. If improving their ranking is the utmost objective of academic institutions, then they ought to encourage their employees to publish there. This encouragement can be as explicit as providing a high financial incentive to the corresponding author. Current rates range from US\$60,000 at Kyung Hee University in Korea to amounts up to US\$100,000 in China. Please do not take me wrong: I do not criticize a university administration for rewarding excellent research; I criticize it for ignoring the same research results when published elsewhere. It appears that Korea and China have succeeded best in corrupting young scientists into believing that anything not published in these elite journals is not worth much. Two tangible consequences of this attitude are a substantial temptation to scientific dishonesty and substitution of original research ideas by replicas of fashionable research trends, defined by the editorial boards of these highly regarded journals.

I give my full respect to the colleague Scientist, who refuses to give in to the temptation to modify his or her research data, making them more convincing to these journals and consequently being able to buy a new car. Not so strong was the Korean Scientist Hwang Woo-suk of Seoul National University, who published two articles on stem cell cloning in the journal Science in 2004 and 2005, and who was subsequently convicted of fabricating his results.

The German scientist Jan Hendrik Schön of AT&T Bell Labs acquired fame while publishing 15 manuscripts in Nature and 19 manuscripts in Science between 2000–2003 in the field of organic electronics. He was subsequently offered the Director position at the Max-Planck Institute in Stuttgart, Germany, and rumor has it that he was close to a Nobel Prize. Unfortunately, most of his findings were a fraud. His results were cited at a rate of over 1000 times per year before he was exposed. So much for the value of publishing in a particular journal. I feel sorry for colleague Scientists at institutions that reward financially publishing in select journals, since the authors now have to endure much more scrutiny of their results.

It is tempting for an individual, an institution, a funding agency and a country to take short-cuts to achieve fame. Eventually, everything boils down to each individual scientist taking a free decision to either accept or reject the lure of cheap fame. As history has shown, extraordinary results grow in an environment of academic freedom. Subjecting promising individuals to plans and restrictions, even if provided in absolute luxury, has mostly turned counter-productive. As the decision-makers of the elite Korean institution KAIST had to find out after a series of student suicides in 2011, quality among the best can not be improved any more by requiring each student to out-perform the peer average. A Nobel Prize can not be attracted in this way. It is dangerous to attempt buying fame.



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**David Tománek** studied Physics in Switzerland and received his Ph.D. from the Free University in Berlin. While holding a position as Assistant Professor of Physics in Berlin, he got engaged in theoretical research in Nanostructures at the AT&T Bell Laboratories and the University of California at Berkeley. He established the field of Computational Nanotechnology at Michigan State University, where he holds a position as Full Professor of Physics. His scientific expertise lies in the development and application of numerical techniques for structural, electronic and optical properties of surfaces, low-dimensional systems and nanostructures. Since he was working on his Ph.D. Thesis, he promoted the use of computer simulations to understand atomic-level processes at surfaces and in atomic clusters. Witnessed in several hundred publications and invited talks are his results on the electronic structure, mechanical, thermal, and optical properties, as well as quantum conductance of nanostructures. His contributions to Computational Nanotechnology, in particular in the field of fullerenes and nanotubes, have been rewarded by a Fellowship of the American Physical Society, the Alexander-von-Humboldt Foundation Distinguished Senior Scientist Award and the Japan Carbon Award for Life-Time Achievement.