

ACTIVITIES

Europe and scientific publications: the exception

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Research feeding off of research, its distribution and transfer of knowledge are crucial elements in the progress of science. The communication of science is certainly not lacking technical means. Distribution by internet is spreading, especially in developing countries where it is becoming a major driving force for evolution. One could argue that an unchecked avalanche in the internet could produce uncertified and unstructured results, in brief, we yearn for information which will help instead of waste precious time.

Scientific information is in crisis: it is leaning more and more towards a monopoly from American publications. The origin of this crisis is not the emergence of the internet, nor that certain are tempted to oppose it to traditional printing on paper, but that a pernicious drift exists and is particularly harmful for all European countries, and even more so for developing countries. Comparing the impact of European versus American publications has inspired us to write this article. Let us keep in mind, however, that the United States are the biggest partners with European researchers, and that this association, which is beneficial for both parties, is to be preserved and furthermore, encouraged. The problem presented in this article is of a different nature all together.

The important role played by the United States in the control and distribution of scientific information is not a new phenomenon. By the end of the 19th century, the physical society of America (the American Physical Society, APS) had already started publishing the famous Physical Review, in a format which has hardly changed across the centuries, not to mention the colour of its cover.

European scholars, who have contributed so much scientific progress in the first half of the 20th century, published in national journals originating from academic or learned societies. They did not ignore US journals in which they also submitted their works, which contributed approximately 4% of the articles published by the APS (during the first 90 years of Physical Review and Physical Review Letters – 1893/1983 (1) – for condensed matter and optics).

This balance has now been broken. If we consider publications in letter format which have important implications and are a prelude to more general full length reports; the partition between editors in the US (APS, AIP and OSA) and editors from the EU (national or European scholars plus an editor from the private sector) is established on the basis of a ratio of 2.70 in favour of American editors (2).

The imbalance is even more poignant if we look at citations originating from the same journals, since the ratio is a factor of 4 in favour of US journals. Has Europe become a dwarf compared to the United States, as far as publications go? Fortunately, this is far from the reality. If we look at the ratio of production (measured by the number of articles published) of EU/US, we find that

it is 0.85 in 1990, while it is over 1.13 in 2000 (according to the Institute of Science and Techniques in France). Out the 90,000 articles published in the world annually in physics alone, the European continent contributes over 39%. It has become the geographical centre of science.

But then, where do all these publications go to? In 2002, the number of articles submitted by European authors represented 35% of the total submissions to APS, while those from American authors are only 25%. These numbers confirm the trend over the past ten years towards an American dominance in publications (in physics at least). A crucial situation has arisen, in which all must weigh the consequences. While Europe is the leading continent for scientific publications, there is a considerably latent vein in the activity of European publications.

We also insist that pluralism is necessary not only from the commercial point of view, but also from the ethics point of view. Peer review evaluation implies some subjectivity. It is a fact that it does not occur in the dark. A referee knows the authors and the laboratories behind the publications for which he/she must give an opinion. The author's recognition can influence the referee's judgment. In a more subtle manner, the writing of the article (particularly the choice of citations) can be influenced by the editorial policies of the journal chosen by the authors. This system is not perfect, but no alternative has been proposed yet to replace it, except for absolutely no assessment as in the case of electronic preprints. It is therefore essential to come up with the most objective evaluation process possible. A variety of equally important journals must be available for authors.

We cannot say that science is declining in Europe, however, there does exist a definite drift in the manner in which publications are handled, which is very damaging for the recognition of excellence in European science. American publications are more often than not considered more credible than European ones. What is the cause of this huge distortion between the scientific production and the distribution of information?

One of the biggest causes is the role played by scientific publications in 2004. Publications inform, and publications evaluate. First of all, as it has always been, scientific publications convey information and also place dates on discoveries. However, traditional journals are in close competition with servers which allow free and instant distribution of new but unchecked information across the world (3). Even if certain researchers are reluctant to use this mode of distribution, which does not guarantee the same discovery rights as does a journal, it is rather successful. We do not believe that there exist any obstacles for complementarity between both systems, each fulfilling a different function. In effect, if servers allow a large and immediate distribution, scientific journals (whether in the form of paper or internet) bring, with their committee and professional intervention by editors (4), significant added value (evaluation, layout, electronic links to citations, and reverse citations). It is in fact this editorial value which justifies the cost of the journal.

Another aspect with the information given by journals is that of archiving the information. Computers facilitate immediate access to articles dating back to the creation of the journal. One of the biggest merits of publications from APS, in this domain is to offer online access to all publications dating back to the creation of the journal in 1893, for a small fee! The APS has thus successfully created a scientific world in which research is quickly being taken over.

The other essential role of publications is the scientific evaluation. The scientific community is no longer (fortunately) comprised of a few scholars as before. It is organised in universi-

ties, big organisations, industrial laboratories, and is spread out across the world. The evaluation process has become essential. Naturally, publications provide a support for the decisions on allocation of positions or research funding for instance. For the referee, who more often than not acts within a scientific group, nothing can replace a thorough reading of the manuscript but the existence of an indicator of judgment by the peers cannot be totally ignored. It consists of the impact factor (IF), which is attributed annually by ISI at each scientific review (5). It is certainly not the existence of the IF which causes a problem, but rather its influence on the behaviour of a large number of scientists, namely the search for greater recognition.

It particularly reinforces the power of attraction towards certain magazines such as *Science* and *Nature*, who enjoy great recognition among scientists, and often creates links between the scientific community and the world of political decisions in science. These magazines publish commentaries, with strong values added from the editors, on articles appearing in other more specialised journals. Furthermore, they publish important specialised results and are therefore in growing competition with specialised journals. It benefits from the implicit complicity with the authors, and thereby an article accepted in *Science* or *Nature* becomes a "status symbol".

Based on the IF of the journals, the authors believe that they should try anything to publish their results, guaranteed with a large distribution and a large recognition that would improve their reputation for landing positions, for promotion, or for research contracts. In fact, they put a lot of importance on the IF of the journal, which in general has little to do with the importance of the published articles. For example, a recent study of the individual citations received from published articles in magazines with a huge IF (P.O. Seglen in the *British Medical Journal*, 314, 498-502, 1997), shows that half of them are cited on average 10 times more often than the other half. Only 10% of the articles contribute 90% of the citations of the journal! In other words, the distribution in the rate of citations is sharply peaked around a very small number of articles. In the case where a researcher attributes an IF of this or that prestigious journal, there is in most cases an encroachment of recognition.

Does the visibility of European research really benefit from this attraction towards American journals, or to strong IF's? Alas, it does not seem to be the case. Although the IF (calculated over a 2 years delay) for publications from European laboratories is very slightly increasing within the time frame of 1990-2000, it still remains about 43% below the IF of publications coming from American laboratories. The European therefore do not benefit from sending their works to American publishers (could anyone seriously claim that their works are of lesser scientific quality than their American colleagues!).

How can we react to a situation in which the European contribution to scientific development is not properly recognised? One must come up with several courses of action; with an increased attractiveness of European publications for the scientific community, for improved publication tools given to researchers in Europe and for changes in the scientists' behaviour.

Regarding the first point, which concerns the editors, a critical mass and a threshold of credibility must be reached. Europe must be united, putting together what each of the national constituents can offer best. Notwithstanding the noticeable progress, including the fusion of various national publications within the European continent in the last ten years, European publications would not carry any weight without participations from our British colleagues (who also suffer from American competition).

A reasonable coexistence in the future would involve the three axes: America, Europe and Asia, where each is guaranteed global coverage, as much for the authors as for the readers.

An editorial fusion would also have the great merit of allowing the creation of an archive covering all the previous centuries, along with all the major discoveries. Let us not forget that the international year for physics in 2005 celebrates the publications by Einstein and others in European journals. We can say just as much about articles from European Nobel price winners such as Néel, Kastler, de Gennes, Bednorz and Mueller. This centralised archive would then become a serious competitor against the reputed PROLA and APS archives. This competition would not exclude cooperation between the US and EU archives of course. Our British colleagues have already started working on it, and the French are in the process. Let us hope that German and Italian can do the same.

With a larger distribution favouring visibility and IF's, the editors must seriously consider subscriptions from institutions, replacing individual subscriptions for each laboratory library. Better yet, let us imagine free online access with, on the other hand global contracts between editors and research organisations.

There exists a just balance to be reached regarding publications between centralisation, where excesses lead towards a dangerous monopolisation of the edition, or an abundance of journals resulting in financial charges which no library could undertake. It seems just as clear for researchers and contributors that we are, that the distribution of fundamental scientific knowledge cannot bring undue commercial value. This does not exclude the existence of commercial editing, but it should be realised that researchers no longer have the means of paying twice upon submission of their works, and for accessing the journal.

In any case, the scientific leaders, the members of the evaluation committee, must all recognise the gravity of the situation, and give opinions on the equality of American and European publications. The very same people, since they are also co-authors, should no longer use the common excuse when choosing an American editor of: "it was preferable for my students who will soon be looking for a new position".

Instead of judging the value of a work by the IF of the journal in which it is published, which unfortunately many evaluators do time and time again, it is essential to have a more substantial approach, taking into account the number of citations directly attributed to the concerned article. These data are available online through the ISI (not free of charge, this is true, but which the referee should have access to).

These considerations are essentially based on an examination of the situation in physics (although the conclusions would not differ for other disciplines), and uncovers a paradox. Europe has a brilliant past in fundamental discoveries and scientific publications. It continues to play a leading role with its excellent researchers, as indicated by their scientific publications. But the control and the distribution of their knowledge has escaped them. Is it normal that Europe cannot master the distribution of acquired knowledge from its own researchers, when a huge fraction of the cost of fundamental research in this continent is taken care of by the governments? The situation can be modified if the European editors accept a common effort which drives researchers to satisfy their desires for recognition, which are justified from their publications. Hanna Arendt once said "a global government inevitably results in tyranny"; we doubt that this is what researchers wish for. In this case action is necessary and a radical change is urgently needed from the authors as well as from the referees.

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Footnotes

- (1) This statistic is determined from the best articles published by the APS in the first 90 years.
- (2) Data is provided by the ISI in Philadelphia which gives information from over 3000 scientific journals.
- (3) The most popular server is based on arXiv in Cornell which now has European access controlled by the CNRS at the Centre of calculations in Lyon at IN2P3.
- (4) At this point, it is worth noting that European journals resulting from a fusion of several national publications, put into question later in this article, the function of scientific editors at the top of a referee committee are guaranteed by the researchers in full activity, and therefore are particularly competent in controlling the evaluation of submitted articles.
- (5) The IF of a journal for a given year is obtained by adding up the number of citations of this journal in the previous two years as found on the ISI web, and then by dividing by the number of articles published by this journal within the same time period.

First EPS Liquid Matter Prize

Professor Jean-Pierre Hansen FRS of the University of Cambridge will be the first recipient of the new Liquid Matter Prize of the European Physical Society. This prize was created in 2002 by the EPS to honour outstanding achievements in this field of research. The prize will be awarded to Professor Hansen on the occasion of the 6th Liquid Matter Conference, to be held in Utrecht, July 1-6, 2005 (<http://www.liquids2005.nl/>).

For more than one reason, it is fitting that Jean-Pierre Hansen should be the first recipient of this prize. During the past 40 years, a large and vibrant community of researchers in liquid-state physics has grown in Europe and the development of both this field and this community is closely linked to the career of Jean-Pierre Hansen.

Jean-Pierre Hansen is a European scientist, *par excellence*. He was born in Luxemburg and studied physics in Belgium (Liège). For his subsequent scientific training he went to the Université de Paris-Sud (Orsay) where he obtained 'Doctorat de Troisième Cycle' under the guidance of Bernard Jancovici and Dominique Levesque. He then became a student of Loup Verlet, one of the pioneers of computer simulation in Europe. Hansen's PhD thesis ("Contribution à l'Etude des Systèmes de Lennard-Jones classiques et quantiques") and the publications that resulted from it, have made a lasting impact. Chairman of his thesis examination committee was Jacques Yvon – one of the founders of theoretical liquid-state physics. After spending a year as a postdoctoral fellow in the US (Cornell), Hansen returned to France. In 1973, he was appointed professor at the Université Pierre et Marie Curie in Paris. In 1987 he was the founder and director of the Laboratoire de Physique of the new Ecole Normale Supérieure de Lyon.

Jean-Pierre Hansen has transformed liquid-matter research in Europe. First of all, because he has made major contributions to virtually all aspects of liquid-matter physics. But possibly even

more important has been his role in shaping the field. When he started his scientific career, liquid-matter physics was lagging far behind other fields of science, mainly because of the lack of hard data that could be used to discriminate between different theories. In the 1960's, the Orsay "school" (Verlet, Hansen, Levesque and Weis) completely changed the approach to liquid-state theory by making use of computer "experiments" to test theoretical concepts. Computer experiments had been pioneered by Metropolis, Alder and Wood in the US. But, with the emergence of the "French school", the centre of gravity moved to Europe. The fact that there now exists an elegant and robust theory of liquid matter is in no small part due to the work of Hansen and collaborators.



Hansen is internationally recognized as an authority in the application of statistical mechanical methods to the prediction of the structure, phase behaviour, thermal and dynamical properties of liquid matter. He was the first to apply "exact" computer simulation methods to determine the complete phase diagram of a simple fluid. He proposed a successful and widely used freezing criterion based on the structure factor of liquids. His pioneering work on molten salts and dense plasmas has led the way to a quantitative understanding of the structure and dynamics of strongly correlated ionic liquids. But he also considered the properties quantum fluids, in particular in an astrophysical context. Later, Hansen's insightful molecular dynamics simulations of supercooled binary alloys provided the first quantitative tests of the mode-coupling theory of the kinetic glass transition. Aspects of this pioneering work are contained in the classic book that Jean-Pierre Hansen co-authored with Ian R. McDonald: "Theory of Simple Liquids" (1976). This book has already had two editions and, to this day, remains the key reference in the field.

From the early 1970's on, Orsay became the Mecca for scientists from all over the world who were interested in the combination of liquid-state physics and computer simulation. This was facilitated by the fact that, at that time, Orsay hosted the Centre Européen de Calcul Atomique et Moléculaire (CECAM) which offered hospitality (and computer time) to visiting scientists. Hansen was closely involved in CECAM activities and, in fact, not long after he moved to Lyon, CECAM followed him.

Hansen's charisma and unique international reputation were illustrated in a rather unexpected way when he organized the first EPS Liquid Matter Conference at the ENS in Lyon (1990). The number of attendants far exceeded all expectations, so much so that large tents had to be rented to host the parallel sessions. There can be little doubt that Hansen himself was the magnet that attracted this large audience. The scientific quality and unique atmosphere of this first meeting have convinced the Liquids community, both inside and outside Europe, to return to subsequent Liquid Matter conferences.

In 1997, Hansen moved to the University of Cambridge where he is at present Head of the Theory Sector of the Department of Chemistry. In his current research, he applies the concepts of "simple" liquids to colloidal suspensions, electrolytes, and (bio)polymer solutions. In view of his thesis work on Lennard-Jones models, it is only fitting that Hansen now occupies the same Chair in Cambridge that was once held by Lennard-Jones.