ELSEVIER

Journal of English for Academic Purposes 7 (2008) 121–132

Journal of ENGLISH for ACADEMIC PURPOSES

www.elsevier.com/locate/jeap

Scientific publishing in developing countries: Challenges for the future

Françoise Salager-Meyer*

Universidad de Los Andes, Mérida, Venezuela

"*It is science alone that can solve the problems of hunger, poverty, insanitation and illiteracy. The future belongs to science and those who make friends with science*" Jawaharla Nehru, free India's First Prime Minister (Allahabad University, 1946)

Abstract

In this paper, I first refer to the center-periphery dichotomy in terms of scientific output, placing emphasis upon the relation that exists between science and technology development, on the one hand, and social and economic development, on the other. I then analyze the main problems faced by most peripheral journals and the role nation states play in scientific activities in developing countries. I then address issues such as the world power structures, the social organization of developing countries, growing North/South disparities and the question of collaborative research. The discursive (i.e., language related) and non-discursive problems faced by researchers in periphery countries and the main initiatives that have recently been taken to try to solve the stark disparities that exist in the world of scholarly publishing are also discussed. I finally present a proposal, the aim of which is to suggest ways that could help scientists in periphery countries become fully integrated members of the worldwide network of science and would also contribute to the promotion of scientific multilingualism, a means for science to be truly universal, as it should be. I conclude by arguing that science, technology and publication form a triad which is essential for the survival of developing nations, and that, although the complete elimination of inequities in the world of scholarship is unlikely, progress could be achieved if there were a **universal** will (i.e., a worldwide will at the institutional, governmental and intergovernmental levels) to redress the current North/South imbalance.

Keywords: Linguistic imperialism; Scientific multilingualism; Periphery; NNES scientists; Research; Local/small journals

1. Introduction

When talking about scientific research and publishing, one must refer to a number of different concepts, including: 1) science itself, 2) publishers, 3) the role of nation states, 4) the world power structures, and 5) the researchers themselves. In this paper, I wish to draw attention to the stark disparities and inequities that exist in the world of scholarly publishing and also to the fact that the gulf between rich (developed or center) countries and poor

* Postal address: Apartado 715, Mérida 5101, Venezuela. Tel./fax: +58 274 266 02 89.
E-mail address: francoise.sm@gmail.com

1475-1585/$ - see front matter © 2008 Elsevier Ltd. All rights reserved.
doi:10.1016/j.jeap.2008.03.009

(developing or periphery) countries is widening.[1] Indeed, the digital divide contributes not only to the exacerbation of this gap but also to the deprivation suffered by researchers in developing countries. I therefore first of all examine the broad geopolitical context of academic/scientific publishing (numbers 1 to 4 above), and then the more specific problems faced by periphery researchers, i.e., scientists who live in developing countries whom Canagarajah (1996, p. 468) refers to as ''consumers of central scholars' knowledge'', and Ferguson (2007) as those off-networked academics who are isolated from the scholarly conversation of the discipline. I then discuss the main initiatives that have been undertaken lately to try to redress the current world imbalance regarding the world's scientific output, and I present a proposal, the aim of which is to promote scientific multilingualism and suggest ways that could help scientists in periphery countries become fully integrated members of the worldwide network of science.

2. Science: center-periphery dichotomy

A small but important part of the world's inequities manifests itself in the field of scientific publishing, where the bulk of what is published in widely read peer-reviewed scientific journals is authored by writers associated with institutions in industrialized countries.

The scientific world, divided into the 'haves' (the industrialized world) and the 'have-nots' (the developing world), is remarkably unequal in terms of volume and output.[2] But the periphery world is not a homogeneous whole; indeed, even within developing countries (and regions) there is a tremendous disparity in the distribution of science. Moreover, the gap between the 'haves' and the 'have-nots' is not only dramatically evident but also constantly widening (e.g., Arunachalam, 2002; Marusic & Marusic, 2000). In 2001, the United States of America, the European Union (then made up of 15 members only), and Japan, some of the world's wealthiest countries, collectively accounted for 78.3% of the world's published scientific research (European Commission, 2003). Taking citation analysis as an indicator of the global strength of science, King (2004) shows that 31 nations only (out of a total of 191) contribute 98% of the volume of citations to scientific research. In 2003 (when King collected his data), the US ranked first and the UK came second, but the European Union was overall second. Then followed Germany, Japan, Canada, France and Italy. The rest of the world, and this was King's key point, came as a very poor third. Of these 31 nations, only three belong to the developing world (China, India and Iran).

The existing disparity is also highlighted by the fact that 90% of important scientific research is published in 10% of journals, and while developing countries comprise 80% of the world's population, only 2% of indexed scientific publications come from these parts of the world (Abdelrahim, 2004). In a nutshell, then, all the macro bibliometric and scientometric studies, recent and past (e.g., European Commission, 2003; King, 2004; World Bank, 2006), bear out that there is a strong association between scientific research output and national wealth distribution across the world.

Understanding the reasons for the dearth of scientific productivity from developing countries is not only of academic interest, but essential for promoting the economic and social development of these marginal regions of the world for which the 'culture of science' must be one of their prime objectives if they want to have a chance to overcome hunger, poverty, poor sanitation and illiteracy and stop being the victims of exploitation (see Nehru's quote at the beginning of this paper). Indeed, the strong correlation between science and technology development, on the one hand,

[1] What used to be called the 'Third World' is now most frequently referred to as the 'developing,' 'periphery,' 'marginal,' 'non-center' or 'outskirt' world or the South. These terms stand in opposition to the 'industrialized,' or 'developed' world, the North – also called the 'center.' In this paper, I will refer to the former as the 'periphery' or 'developing' world and to the latter as the 'center' or 'industrialized' one. It should be kept in mind, however, that, within the developing world, further distinctions are today made between 'least developed' countries (LDC) or the 'Fourth World' (e.g., Niger) and 'newly industrialized' countries (NIC), such as India, Iran and China, which are nevertheless periphery in terms of international science publishing.

[2] According to Arunachalam (2002, p. 7), in 1998, Malaysia, Philippines, Thailand, Indonesia, Pakistan, Sri Lanka, Bangladesh, Peru, Cuba, Venezuela and virtually every country in Africa (except South Africa) had published less than 1,000 papers each; in many cases, less than 500). The same source indicates that if we look at the number of papers published per unit population, the gap between the developed and the developing countries is even more striking. One should however be careful with such assertions: the Science Citation Index (from which most scientometric/bibliometric data are drawn) indeed covers less than a quarter of peer-reviewed journals worldwide and its preference for English-written journals is well-known (Cronin, 1984; Dong et al., 2005, among many others). A review of the latest Citation Index, for example, cites less than 2% of the journals published in the developing world (ISI citation index, (http://www.isinet.com, accessed October 2006).

and economic development, on the other, is very well documented (e.g., King, 2004; Man et al., 2004). Furthermore, science, technology, industrial development and power (political, military and economic) form a circle whose individual components stimulate the others.

The problem is that, while the role of technology is quite well understood by the governments of periphery countries, the importance of basic research is not. Indeed, research and its publication are not a tradition in the great majority of developing countries (exceptions include India, China and Iran). Science research is, at best, a marginal activity whose requirements in infrastructure (well-stocked libraries, laboratories and specialized equipment, complex logistical support, etc.), human resources and substantial financial resources are, as I argue below, far beyond the reach of developing countries. As Ferguson (2007, p. 21) puts it: ''The production of high-quality scientific research is quite evidently an expensive business.'' In other words, as the above figures indicate and as the macro bibliometric statistics have repeatedly shown, there is no scientific research culture/tradition in most developing nations. Among many other social, economic and even political factors, building one requires the publication and dissemination of research results, and here also developing countries experience problems, as described below.

3. Peripheral publishing

In an increasingly competitive and interdependent world, publishing journals in peripheral locations (henceforth small/local/peripheral journals) faces a number of problems in comparison with journals published in the industrialized world, often produced by editorial houses that aim at reaching the widest audience possible and making the maximum profit possible. In order to reach these objectives, the scientific quality of the journals they publish is of paramount importance. This can only be achieved through a rigorous assessment of the scientific quality of the papers published, assessment that must be performed by highly competent and reliable extramural referees, working unpaid to a set of criteria related to the perceived standard of the journal. The first problem faced by small/local/peripheral journals relates to the quality of the papers they publish, which is in general quite low. Obviously, then, these journals' impact factor (the so-called 'currency of science')[3] and citation frequency are extremely low. Furthermore, being written in local (i.e., not widely read) languages, they are seldom seen or commented on in the mainstream publishing community (cf. Pakir, 2005, regarding Asian scholarship, Habibzadeh, 2006 for Middle Eastern scientific publications, and WHO-EMRO, 2003, for the Arab World in general). They are thus invisible and fall into the lost science domain, the actors of which are denied academic promotion (e.g., Del Castillo, 2004; Marusic & Marusic, 1999; Pabón Escobar & da Costa, 2006; Phillipson, 2001; Piccoli & Procianoy, 2007; Stegemann, 2007; Tardy, 2004). Another problem of local journals is that their readership is very small and hardly ever transcends national boundaries. These journals are, as a rule, only read by those who publish in them. Fully-fledged periphery scholars indeed not only rarely publish in them (they prefer to send their best works to mainstream journals written in English), but they also hardly ever consult them because they are aware of their many editorial and technical flaws (Canagarajah, 2002; Duszak, 2006; Pabón Escobar & da Costa, 2006).

These problems are further compounded by the fact that financial restrictions affect their publication and distribution. Small journals therefore generally lack continuity and suffer from ''an unavoidable irregularity'' in the frequency of their appearance (Katic & Penava, 2005). They also publish few advertisements, which adds to their financial stress (Morcos, 1999). This makes it difficult to keep up with changing technology. All this means that periphery journals cannot be competitive in the continuously more open scientific 'market'. For all these reasons, local journals' chance of survival is minimum because visibility is a necessary condition for survival. They in fact truly perish year after year (cf. Duszak, 2006; Pabón Escobar & da Costa, 2006), further compounding the problems mentioned above of developing a culture of science research in their countries of origin.

[3] The impact factor is now a widely accepted criterion to assess the quality of scientific journals (cf. Dong et al., 2005), but it has been recently debated and criticized. Egbert (2007), for example, warns against the use of the impact factor as the sole indicator to determine the value of a given journal. Sharon Begley (2006), for her part, denounces the fact that a standard procedure of some leading journals is to send an email to all submitting authors, asking them to include recent citations from these journals to boost their impact factor! The executive director of the American Physiological Society, which publishes 14 journals, put it even more bluntly by asserting that ''We have become the whores of the impact factor'' (cited in Begley, 2006).

4. The role of nation states

The role of the state in scientific activity varies according to the level of industrialization and development of the nation concerned. In highly developed nations, about 30% of research is publicly funded. The remaining 70% comes from the private sector. By contrast, in periphery countries, the bulk of the funds for research, often more than 75%, comes from the public/university sector with very small contributions from the private sector (e.g., Nour, 2005).

According to a recent study conducted in the five highest ranked general medical journals (Man et al., 2004), developed countries devote between 2% (US, the UK, France) and almost 4% (Sweden, Finland, Japan) of their Gross Domestic Product (GDP) to scientific activities. This is between four and seven times as much as developing countries dedicate to such activities: on average, they assign less than 0.5% of their GDP to research and development. Since the GDP of center countries is much higher than that of developing ones, the investment in scientific research in highly industrialized countries is incomparably greater than that of developing countries.

The current scientific world imbalance is thus not difficult to understand. Apart from the figures presented in the preceding paragraphs, it is worth noting the results of Man et al.'s (2004) study which showed not only that research spending (percentage of GDP) and English proficiency (assessed by means of national scientists' TESOL scores) were both strongly associated with publication output, but that the English proficiency of a nation's scientists was an even stronger correlate of publication output than funding. Thus the nation state may have a role to play in terms of its policy regarding English language education for science researchers.

5. World power structures

Industrialized countries, in spite of eloquent political speeches and promises, are much more willing to provide economic aid to causes such as the fight against famines in Africa and drug-trafficking in Latin America than to effectively promote authentic scientific research in developing countries or contribute to their technological development. Indeed, industrialized countries have been accused of preferring to keep their 'know how' to themselves rather than to teach it to developing countries. At the Global Research Village Conference held in Denmark in 1996, Rudolph Scholten, the then Austrian Minister of Research, Science and Arts, avowed that:

> [d]eveloped countries are less interested in giving than in selling to developing countries… There is a big gap between what developed countries profess and what they are actually doing in matter of development. (cited in Arunachalam, 2002, p. 3)

Four years later, in 2000, the Amsterdam Global Research Conference emphasized the need for industrialized countries to give priority to building a research culture and adequate research capacities in the developing world (Arunachalam, 2002). Unfortunately, the transfer of basic knowledge and the development of opportunities for knowledge generation in developing countries continue to be neglected. The rhetoric of such conferences is rarely put into action. Moreover, the social organization of developing and periphery countries also contributes to the ineffectiveness of research efforts in these regions of the world. It is indeed often characterized by small dominant elites, strong central governments, oppressive bureaucracies, weak economies, high inflation rates, fragile institutions, and unstable political systems.

The scientific inequities across the world offer a further advantage for the industrialized world: they permit intellectual migration from the poor to the rich countries. The Arab states, for example, have produced a number of outstanding Nobel Prize winners in recent years, but all these scientists have moved to either Britain or the US (King, 2004). Regarding the African continent, the latest figures indicate that it is losing net 100,000 scientists in science, technology, medicine and nursing to the North every year (King, 2004). This is a net loss for Africa, a very negative capacity building, indeed. Along the same lines, Mullan (2005) reports that the brain drain from developing countries produces over a quarter of the medical workforce in the UK, Australia, Canada and the US.

As far as collaborative research is concerned, here too the situation is unsurprisingly unequal. Several studies (e.g., Kachru, 1996; Lee & Mills, 2000; Mendieta et al., 2006; Raina & Habib, 1994; Zaki, 1993) have denounced the inappropriateness of governance of collaborative research, i.e., the fact that funding bodies from the first world tend to favor commissioning research themselves rather than supporting research initiated by investigators in periphery countriess. Very few papers indeed have resulted from international collaboration involving African or Latin American countries (Arunachalam, 2000). It is interesting to note that Braine's (2005b) study about Hong Kong's applied

linguistics publishing corroborates these findings. This situation is therefore not the ''privilege'' of the hard sciences. Thus, not only is science dominated by the few industrialized countries (King, 2004), but scientific collaboration is dominated by them as well.

6. NNES researchers

It has been argued that the native/non native dichotomy has become quite problematical, and its utility, relevance and coherence are currently being questioned (Davies, 2003; Ferguson, 2005, 2007; Hwee, 2006; Swales, 2004). The argument is that the degree of experience/expertise in academic publication and proficiency in certain genres of academic discourse (i.e., the novice vs. expert dichotomy) are more important than the NES/NNES status (cf. Hyland, 2000, 2006). However, for want of a better short expression, I will here use the NES/NNES one.

6.1. The discursive (language-related) perspective

A caveat is in order here: just as periphery countries do not form a homogeneous group, NNES do not either. There are NNES in the center as well as in the periphery. And if we want to be even more exact, a further distinction should be made between those ''privileged'' NNES who have spent time in an English-speaking country (the ''exiled from paradise'', in Geertz' (1973) parlance) and/or those who are members of prestigious, internationally known research groups and/or laboratories in their home country, on the one hand, and on the other, those who have never left their home country and/or do not have the chance to conduct research under the supervision and mentoring of renowned NNES scholars or NES expatriates. For the former, obviously, writing up a scientific/academic paper in English will be less difficult and less time-consuming than for the latter, who cannot rely on their peers' expertise and L2 linguistic assistance.

As far as scientific communication is concerned, the disadvantage of being an (English) additional language user may be on the wane, as scholars such as Canagarajah (2006), Ferguson (2005, 2007), Flowerdew (2000), and Swales (2004), among others, have recently pointed out. One's status as a NES or as a NNES may thus be becoming a less critical determinant of success in academic/scientific publication than other non-linguistic factors, such as location (center vs. periphery), level of expertise (junior vs. senior researchers) and network access. This is undeniable. However, the importance of linguistic skills should not be underestimated (cf. Benfield, 2007; Benfield & Feak, 2006; Coates et al., 2002; Hewings, 2006; Langdon-Neuner, 2006; Man et al., 2004). Ferguson (2007) himself asserts that for some multilingual scholars, linguistic factors do constitute an additional obstacle to negotiate on the path to academic publication (e.g., the NNES scholars I referred to above who have never left their home country). The problem is, firstly, that non-discursive factors very frequently go hand in hand with poor linguistic skills (at least in non-English speaking periphery countries) and, secondly, that poor linguistic skills frequently go hand in hand with paper rejection. Coates et al. (2002), for instance, clearly show that badly written articles correlate with a high rejection rate and that, although many factors could influence the rejection of an article, on equal scientific merit, a poorly written article will have less chance of being accepted. This situation will worsen because of the decreasing editorial tolerance for less-than-perfect language and writing clearly referred to in the instructions for manuscript preparation across major science, technical and medical publishers (Shashok, 2008). This represents a vicious circle that leads us to the following so frequently asked question: Are NNES scientists discriminated against?

Several recent studies from a variety of disciplines provide clear evidence of bias favoring authors from the US, English-speaking countries outside the United States, and prestigious academic institutions (Altbach, 1997; Canagarajah, 1996; Coates et al., 2002; Flowerdew, 2000; García Landa, 2006; Garfunkel et al., 1994; Gibbs, 1995; Link, 1998; Swales, 1998; Wood, 1997; inter alia), the most recent ones in our field being Braine's (2005a) report and Li's (2006) sociopolitical case study. By contrast, John Flowerdew's (2001) research in ELT and applied linguistics suggests that there is no evidence of discrimination against non-native English submissions, although his Cantonese-speaking informant in mass communication (Flowerdew, 2000, p. 135) certainly holds the view that discrimination exists.

Such divergent findings could be attributed to different disciplinary contexts, to the inherent competitiveness of the field, to the size of the discourse communities, to whether the NNES authors are from the center or the periphery, etc. The fact remains that empirical evidence for discrimination or non-discrimination claims is mixed and somewhat inconclusive (Ferguson, 2005, 2007). Nevertheless, there is a widespread, though not universal, sense that NNES

scientists are disadvantaged when it comes to publishing their works in mainstream journals that overwhelmingly publish in English and whose gate-keeping practices boost the dominance of Anglo-American discursive norms, styles and conceptions, to the disadvantage of scholars in periphery countries, in particular.

It should be pointed out, though, that the feeling of disadvantage is expressed differently by center NNES. The surveys conducted in the European Union by Ammon (2001b), Murray and Dingwall (2001) and Truchot (2001), for example, clearly indicate that the Swiss and German scholars dot not feel that the dominance of English represents an impediment to their careers, whereas – as could be expected for political and historical reasons– the French do! (See also Ferguson, 2007).

Be that as it may, this state of affairs contributes to 'linguistic imperialism,' a phenomenon that has been harshly criticized and condemned (e.g., De Swaan, 2001; Pennycook, 1998; Phillipson, 1992, 2003), although so far, as Jenkins (2006) remarks, no noticeable change has occurred in ELT or teacher education policy.

For authors in periphery countries who are far from elite academic institutions, the disincentives, disadvantages and obstacles to publication in high-status journals are indeed multifarious. I list just a few of them:

a) lack of academic L1 (and obviously L2) scientific writing training policies at the undergraduate and/or graduate level
b) universities' lack of budget for specialized editorial staff;
c) lack of expert help from authors' editors, ghostwriting services, professional writers and/or professional translators to edit their research papers (Shashok, 2008) – they are far too expensive.

It thus takes much more time and is much more expensive to learn how to read, write and/or speak English to a high level in the periphery than in the center (Benfield & Howard, 2000; Ferguson, 2007; Vasconcelos, 2006). But, as we all know, more than writing skills are required to publish internationally.

6.2. The non-discursive (not-language related) perspective

In 1996, Canagarajah mentioned a series of *non-discursive requirements* many scientists in the periphery could not possibly satisfy, due to factors such as poor paper quality, unreliable mailing services, and under-resourced, absent or unreliable communication means. For example, there were more phone lines in Manhattan than in the whole of Sub-Saharan Africa, and in 1997, internet host penetration rates in North America were 267 times greater than rates in Africa. By October 2000, the gap had grown to a multiple of 540 (National Science Board, Science and Engineering Indicators, 2002). This explains why, ten years later, new electronic manuscript submission requirements imposed by leading scientific journals make it even more difficult for periphery academics to contribute their share to international science. It is indeed in the nature of new technology to exacerbate the divide between the rich and the poor. In short, most of the dilemmas faced by scholars in periphery countries can be summed up in three words, as Roman Tetil, a professional translator from Kraków, cogently put it: ENGLISH or €NG£I$H? (Sykes, 2006).

7. Recent initiatives

Is it then at all possible for the developing countries to get integrated into the 'Global (rich persons') Research Village' or is it an illusion, a utopia? Let us be realistic. Full integration is at best a long way off if it can ever happen, but this does not mean that we should abandon all hope and refrain from doing something about the situation I have described above. It could be argued that without utopia, there would be no history, and that, without utopia, we would still be living in the Stone Age! In fact, a few initiatives have been taken lately to try to redress the current world imbalance in matters of scientific publication. It is to these that I now turn briefly.

First, scientific writing courses in English have recently been implemented in several regions of the developing world: for example, in India (Basrur, 2006), China (Cargill & O'Connor, 2006)), Iran (Habibzadeh, 2006), Croatia (Marusic & Marusic, 2000), Brazil (Vasconcelos, 2006), Iran (Handjani, 2007) and Venezuela (Salager-Meyer, 2007).

Second, a few scientific journal editors, reviewers, and/or applied linguists are currently calling for a greater tolerance towards deviation from native standards (Benfield & Howard, 2000), i.e., for the NNES right to 'linguistic peculiarities' (Ammon, 2001a). In this respect, Dr J. R. Benfield (President of the European Association of Thoracic Surgeons) goes a step further and argues that since it is a privilege for NES that the language of science is currently

English, and because with privilege comes responsibility, each journal should consider developing a mentoring service wherein NES are made available to non-native speakers when they ask for editorial assistance (Benfield & Howard, 2000, p. 648), an idea also recently put forward by Braine (2005a) regarding *TESOL Quarterly*. Benfield and Feak (2006) also argue that the review of EIL (English as an International Language) manuscripts by a qualified language professional should precede review by a qualified peer. This leads us to the concept of 'solidarity and cooperation' a few examples of which I will now present:

1. Ana Marusic, editor of the *Croatian Medical Journal*, a journal published in US English only, suggests that journal editors should function as educators, a move that would empower would-be contributors, through specific training, to become qualified producers of research articles written in English (see also Marusic & Marusic, 2000, 2001).
2. An *AuthorAID* program[4] has been set up by a Canadian consortium, providing developmental editing assistance for inexperienced and 'would be' authors, principally from developing countries, who want to publish their health-related research in widely read (English-medium) journals (Robbins & Freeman, 2007). Development editing is the process of turning preliminary findings or ideas into publishable manuscripts. Those who advertise this program contend that, for would-be contributors from developing countries, such editorial assistance could make the difference between rejection and acceptance by a peer-reviewed journal.
3. Commercial organizations offer professional proofreading and editing for researchers wishing to publish in English language journals (e.g., *American Journal Experts,* http://www.journalexperts.com/) This, of course, has a price, and, although it is said to be a 'modest' and 'competitive' one, it is still very high for the average researcher in the periphery.
4. A recent initiative taken by some well- established center scientific journals involves 'twinning' with local journals (Heseltine, 2006). This is the case with the *BMJ*, the *Lancet* and *JAMA* twinning project in Mali, the aim of which is to improve the quality (and international dissemination) of African medical journals.

However, as we can see, these initiatives, however praiseworthy they may be (and they certainly are), all support and strengthen linguistic imperialism in the sense that the growing linguistic and rhetorical monopoly and monoculture Swales referred to some years ago (Swales, 2000) will be even more strongly felt through the standardization of (Anglo-American) academic rhetorical practices (see also Mauranen, 1993; Phillipson, 1992) to the detriment of other cultural norms and thought patterns.

8. Challenges for the future

I believe that further progress could be made if there were a *universal* will to undertake certain steps. By *universal* I mean a will that would involve not only scientists worldwide (those from developed as well as those from developing countries) but also governments, international associations, organizations, aid agencies, etc. Let us now consider some short-term challenges.

8.1. Short-term challenges

A greater number of internationally recognized periphery scientists could be appointed to the editorial advisory boards of international journals. The absence of periphery NNES scientists as members of editorial advisory boards is indeed noteworthy. By way of example, Richard Smith (cited in Lown & Banerjee, 2006), former Chief-Editor of *The British Medical Journal,* found only two participants from low-income countries among 111 editorial board members in the 'big 5' medical journals. Such a move could result in a more careful monitoring of the proportion of submissions from scientists in periphery countries accepted for publication, having, for example, a fixed quota for the publications of works from the developing world.

Journals in the developed world could broaden the practice of soliciting specific articles from periphery researchers or publishing special issues on scholarship in non-Western contexts. This would result in the dissemination of

[4] See http://www.jphp.umb.edu/documents/Authoraid.pdf.

peripheral research and an increase in competition. The original and unique knowledge of a local environment will spread, and scientific communication will be enhanced.

Steps could also be undertaken to diminish the cost of scientific publications. Journal prices jumped between 84% (UK) and 155% (US) from 1996 to 2002, increases that exceeded the UK and US inflation rates (Arunachalam, 2002; Fortney & Basile, 1998; Schlimgen & Kronenfeld, 2004). These figures are of course intimately related to the large profit margins made by society and commercial publishers for whom subscription to their journals is their only source of income. Scientists from all over the world should do all they can to persuade publishers and scientific organizations not to sacrifice the interest of 'public good' on the altar of commercial interest.

Efforts should be made too to make Open (free) Access (OA) to information and self and/or institutional archiving a reality. Indeed, in spite of many efforts, OA is far from being a reality. A report commissioned by the Wellcome Trust (2003), *Economic Analysis of Scientific Research Publishing*, indicates that the publishing industry produced about 164,000 journals and periodicals worldwide (in science, technology and medicine, 1.2 million papers were produced in 24,000 journals every year), but only 2,816 titles (half of them peer-reviewed) are listed in the *Directory of Open Access Journals* (http://www.doaj.org). Few of these on-line periodicals are core, English-medium journals (United Kingdom Parliament).

More and more academic voices (e.g., Chan et al., 2005; Lenzer, 2008; Stegemann, 2007) claim that the OA initiative has prompted some significant and welcome steps by many scientific publishers, but in general these steps have fallen short of expectations of the proponents of this idea. It is true that some journal publishers have recently made their journals freely available to clients in developing countries, but the majority of these publishers also require university libraries to subscribe to, and obviously pay for, the paper versions of their journals. What is more, subscription prices are the same for developed as well as for developing countries, which should not be the case. According to statistics provided by Bioline International, in countries with a GDP capita/year below US$1,000, 56% of medical institutes surveyed had been unable to purchase any subscriptions to journals over the past five years.

With real access to information, scientists in the periphery would be able to cite key (for the time being, written in English) references, and the ironical situation, so vividly put forward by Canagarajah (2002), where scholars in periphery countries are marginalized when writing about their own local communities while their center scholar counterparts achieve recognition when writing about the same topic, might no longer hold true if OA becomes a 'real reality.' The problem is that governments can only influence publishers indirectly. Mandating of the OA provision policy itself is needed if the desired goals are to be reached. It is worthwhile mentioning here that the US Congress and the European Research Council have recently (December, 2007) announced mandatory OA policies that direct researchers to deposit their manuscripts with PubMedCentral or other specified online medical databases that are freely available to the public. The US mandate follows nearly four years of contentious debate between consumer groups and researchers, on the one hand, and the Association of American Publishers, on the other (Lenzer, 2008). This mandate is, undoubtedly, an exemplary step in the right direction. Finding ways to reconcile the desire for universal and immediate OA to peer-reviewed scientific journal articles with the need to ensure the economic sustainability of these journals is thus of prime importance (Shashok, 2007, offers a few suggestions).

To promote self and institutional archiving of research publications on free-to-air websites, awareness raising exercises could be held, followed by regional technical workshops to train key individuals in creating and maintaining institutional archives. This would be a further step towards achieving a global, interoperable, free-of-charge network of published refereed literature. It would also provide appropriate recognition for the entities within the publishing industry in the industrialized world that are supporting this option by creating workable options for authors to use in archiving their work in this way.

When addressing such issues, we should always bear in mind that not only do information-deprived researchers need useful information to be available free on the web, but they also need the technology in place to take advantage of that information. Important investments in wireless and satellite connections could thus be made. International aid agencies (e.g., the United Nations and its agencies such as the World Health Organization and UNESCO) have a leading role to play in this venture.

8.2. Longer term challenge: regional (peripheral) editorial bodies and scientific multilingualism

The following long-term proposal requires the collective effort of charitable foundations, commercial and private publishers, nation states, national research councils, science academies, government research agencies from around

the world and international agencies such as those mentioned above in order to raise the funding necessary to put it into practice. The idea is to create, at *regional* scales (i.e., not individual, departmental, institutional or national scales) private *editorial* bodies that would start up new regional high-quality referred journals (online and/or paper-based) that would:

a) be based in developing countries (as Diane Belcher, co-editor of *English for Specific Purposes* [JEAP's sister journal] convincingly posits: "Certainly having more refereed publication opportunities available beyond a limited number of prestigious center journals will be a welcome development" [2006, p. 150]);
b) publish papers written in the major (local) languages spoken by the scientists of a given periphery region (e.g., for Latin America: Spanish and Portuguese, apart from English);
c) be especially appreciative of local perspectives;
d) transcend national borders;
e) be extramurally peer-reviewed;
f) be accompanied by bilingual or, better still, trilingual (translated into other 'lesser' languages) abstracts, titles and keywords;
g) be swapped at no cost from one region of the developing world to another, but sold at a reasonable price to center libraries/universities/research centers;
h) adhere at no cost to manuscript authors to the open access/institutional archive initiatives; and
i) be included into the mainstream of world scientific communication in non-English-dominated international databases so as to be able to compete on the international market.

The editorial processes of these journals would include specialized linguistic assistance, i.e., translators who would translate, upon request, the papers published. This implies that translators, terminologists, documentalists, applied linguists and language teachers will become more and more necessary in scholarly communication. Such a move would promote scientific multilingualism, which is a means for science to be truly universal, as it should be. Several renowned voices recognize the future need to be multilingual and, in humanity's interest, to protect and enhance linguistic diversity (e.g., Ammon, 2006; Canagarajah, 2006; Mendieta et al., 2006). Hooman Momen (2005), editor of the WHO bulletin, argues that local languages will become more and more important for the dissemination of knowledge and that improvements in machine translations, coupled with on-line publication, could provide non-English authors with opportunities to publish in their own language.

Lastly, and as a consequence of the above, the reward system for scientists working in periphery locations should change. Indeed, these researchers are today being pressured to increase their output in English and to submit it to journals published in Anglo-American countries (Braine, 2005a; Bunout & Reyes, 1998; Ferguson, 2007; Loria & Arroyo, 2005). This is what Altbach (1997, pp. 10–11) calls a "*slavish obeisance*" to both Western ideas and institutions, and "*an unfortunate straightjacket*" for scholars. Non-English medium refereed regional journals should be accepted in any researcher's academic promotion assessment on exactly the same footing as their Anglo-American counterparts are.

9. Conclusion

All this is easier said than done and mere idealism cannot win. Without concerted institutional and political backing, the ideas and proposal put forward in this essay stand on weak ground. In truth, the complete elimination of inequalities in the world of scholarship is unlikely, but progress could be achieved if there were a universal will (at institutional, *governmental* and *intergovernmental* levels) to redress the current world North/South imbalance, not only in the academic/scientific domain but also in all aspects of human life. To 'universalize science' indeed means not only to cooperate actively in its creation but also to extend the fruit of its applications to the whole of humankind so that not only Europeans, North Americans, Japanese or the well-off classes of developing countries, i.e., a privileged few, but humankind as a whole, will be able to enjoy the benefits that science and technology can provide and the opportunities these benefits bring. Everyone is entitled to live in dignity. No doubt, science is fundamental for the industrialized world, but it is much more than fundamental for the periphery world. For the periphery world, science is a question of survival. Science, technology and publication form the triad that spur industrialization, wealth production, real independence and the interdependences and equilibrium that should characterize the relations of all the countries and peoples in today's world.

Acknowledgments

I gratefully acknowledge the three anonymous reviewers and Margaret Cargill for their helpful suggestions for tightening the paper.

References

Abdelrahim, E. (2004). The language of scientific research. Available from. <http://www.islamonline.net/English/Science/2004/11/article06.shtml>.

Altbach, P. (10 January, 1997). Straightjacket scholars. *South China Morning Post* 11.

Ammon, U. (2001a). *The dominance of English as a language of science*. Berlin: Mouton de Gruyter.

Ammon, U. (2001b). English as a future language of science at German universities. A question of difficult consequences posed by the decline of German as a language of science. In U. Ammon (Ed.), *The dominance of English as a language of science* (pp. 343–361). Berlin: Mouton de Gruyter.

Ammon, U. (2006). The status and function of English in Germany. *Revista Canaria de Estudios Ingleses, 53*, 27–33.

Arunachalam, S. (2000). International collaboration in science: the case of India and China. In B. Cronin, & H. B. Atkins (Eds.), *The web of knowledge: A festschrift in honor of Eugene Garfield* (pp. 215–231). Medford: Information Today Inc.

Arunachalam, S. (2002). The global research village: a view from the periphery. *Digital Library of Information Science and Technology*. Available from: <http://dlist.sir.arizona.edu/843/01/Article%5F11.pdf>.

Basrur, R. (2006). Medical writing in India. *The Write Stuff, 15*(2), 50–51.

Begley, S. (2006). Scientific journals artfully try to boost their ratings. *The Wall Street Journal.* <http://online.wsj.com/public/article/SB114946859930671119-eB_FW_Satwxeah21loJ7Dmcp4Rk_20070604.html> Accessed 05.06.06.

Belcher, D. (2006). English for specific purposes: teaching the perceived needs and imaged futures in worlds of work, study and everyday life. *TESOL Quarterly, 40*(1), 133–156.

Benfield, J. R. (2007). Cardiothoracic surgeons divided by a common language. *Annals of Thoracic Surgery, 84*, 363–364.

Benfield, J. R., & Feak, C. (2006). How can authors cope with the burden of English as an international language? *Chest, 129*, 1728–1730.

Benfield, J. R., & Howard, K. M. (2000). The Language of science. *European Journal of Cardio-Thoracic Surgery, 18*(6), 642–648.

Bioline International. <http://blogs.openaccesscentral.com/blogs/bmcblog/entry/berlin_5_and_developing_countries> Accessed 14.05.07.

Braine, G. (2005a). The challenge of academic publishing: a Hong Kong perspective. *TESOL Quarterly, 39*(4), 707–716.

Braine, G. (2005b). Publishing in applied linguistics from the Chinese mainland. *Review of Applied Linguistics in China., 1*, 48–60.

Bunout, D., & Reyes, H. (1998). Manuscritos biomédicos escritos por autores chilenos y publicados en revistas internacionales en 1997. *Revista Médica Chilena, 126*(6), 677–688.

Canagarajah, A. S. (1996). Non discursive requirements in academic publishing, material resources of periphery scholars, and the politics of knowledge production. *Written Communication, 13*(4), 435–472.

Canagarajah, A. S. (2002). *The geopolitics of academic writing*. Pittsburg, PA: University of Pittsburg.

Canagarajah, A. S. (2006). TESOL at 40: what are the issues? *TESOL Quarterly, 40*(1), 9–34.

Cargill, M., & O'Connor, P. (2006). Developing Chinese scientists' skills for publishing in English: evaluating collaborating-colleague workshops based on genre analysis. *Journal of English for Academic Purposes, 5*(3), 207–221.

Chan, L., Kirsop, B., Costa, S., & Arunachalam, S. Improving access to research literature in developing countries: challenges and opportunities provided by Open Access. Paper presented at the World Library and Information Congress, August 2005, Oslo.

Coates, R. B., Sturgeon, B., Bohannan, J., & Pasini, E. (2002). Language and publication in cardiovascular research articles. *Cardiovascular Research, 53*(2), 279–285.

Cronin, B. (1984). *The citation process. The role and significance of citations in scientific communication*. London: Taylor Graham.

Davies, A. (2003). *The native speaker: Myth and reality*. Clevedon: Multilingual Matters.

De Swaan, A. (2001). English in the social sciences. In U. Ammon (Ed.), *The dominance of English as a language of science* (pp. 71–83). Berlin: Mouton de Gruyter.

Del Castillo, D. (3 March, 2004). The Arab world's scientific desert. *Chronicle of Higher Education.*

Dong, P., Loh, M., & Mondry, A. (2005). The impact factor revisited. *Biomedical Digital Libraries, 2*, 7, Available from: <http://www.bio-diglib.com/content/2/1/7>.

Duszak, A. (2006). Looking globally, seeing locally: exploring some myths of globalization in academia. *Revista Canaria de Estudios Ingleses, 53*, 35–45.

Egbert, J. (2007). Quality analysis of journals in TESOL and applied linguistics. *TESOL Quarterly, 1*(41), 157–171.

European Commission. (2003). *Third European report on science and technology indicators*. Brussels: European Commission Directorate-General for Research.

Ferguson, G. (2005). Is English really a Tyrannosaurus rex? scientific communication and the global spread of English. In P. Duran Escríbano, G. Aguado de Cea, & A. M. Roldán Riejos (Eds.), *Reflections on language use in the academic context* (pp. 73–93). Madrid: Universidad Politécnica de Madrid.

Ferguson, G. (2007). The global spread of English, scientific communication and ESP: questions of equity, access and domain loss. *IBÉRICA, 13*, 7–38.

Flowerdew, J. (2000). Discourse community, legitimate peripheral participation and the non-native English-speaking scholar. *TESOL Quarterly, 34*(1), 127–150.

Flowerdew, J. (2001). Attitudes of journal editors to non-native speakers' contributions. *TESOL Quarterly, 35*(1), 121–150.
Fortney, L. M., & Basile, V. A. (1998). Index medicus price study: publishing trends between 1994–1998. *Serials Review, 198.24*(3–4), 49–73.
García Landa, L. G. (2006). Academic language barriers and language freedom. *Current Issues in Language Planning, 7*(1), 61.
Garfunkel, J. M., Hamrick, H. J., & Lawson, E. E. (1994). Effect of institutional prestige on reviewers' recommendations and editorial decisions. *Journal of the American Medical Association, 272*, 137–138.
Geertz, C. (1973). *The interpretation of cultures*. New York: Basic Books.
Gibbs, W. W. (1995). Lost science in the third world. *Scientific American, 273*, 76–83.
Habibzadeh, F. (2006). A bird's eye view of science publishing and editing in Iran. *European Science Editing, 32*(4), 98–100.
Handjani, F. (2007). Around the world: teaching medical writing to doctors and scientists. *The Write Stuff, 16*(1), 14.
Heseltine, E. (2006). Workshop in Africa on peer-review. *European Science Editing, 32*(3), 74–76.
Hewings, M. (2006). English language standards in academic articles. *Revista Canaria de Estudios Ingleses, 53*, 47–62.
Hwee, L. S. (2006). What is the definition of a native speaker of English? *The Write Stuff, 15*(2), 47.
Hyland, K. (2000). *Disciplinary discourses: Social interactions in academic writing*. London: Longman.
Hyland, K. (2006). The 'other' English: thoughts on EAP and academic writing. *The European English Messenger, 15*, 34–38.
Jenkins, J. (2006). Current perspectives on teaching world Englishes and English as a Lingua franca. *TESOL Quarterly, 40*(1), 157–182.
Kachru, B. B. (1996). A microsociolinguistic analysis of language vitality: geolinguistic profiles and scenarios of language contacts in India. *Language in Society, 25*(1), 137–140.
Katic, T., & Penava, Z. Inclusion of nationally oriented journals into the journal elite of international significance or what can scientific outskirts offer to the metropolis? Paper presented at the World Library and Information Congress: 71st IFLA General Conference and Council, August 2005, Oslo, Norway.
King, D. (2004). The scientific impact of nations. *Nature, 430*, 311–316, Available from. http://www.itdg.org/?id=publicgood_king.
Langdon-Neuner, E. (2006). EASE forum digest. *European Science Editing, 32*(3), 77–78.
Lee, K., & Mills, A. (2000). Strengthening governance of global health research. *British Medical Journal, 321*, 775–776.
Lenzer, J. (2008). US Congress and European Research Council insist on open access to research results. *British Medical Journal, 336*, 176–177.
Li, Y. (2006). A doctoral student of physics writing for publication: a sociopolitically- oriented case study. *English for Specific Purposes, 25*(4), 456–479.
Link, A. M. (1998). US and non-US submissions: an analysis of reviewers' bias. *Journal of the American Medical Association, 280*, 46–47.
Loria, A., & Arroyo, P. (2005). Language and country preponderance trends in MEDLINE and its causes. *Journal of Medical Library Association, 93*(3), 381–385.
Lown, B., & Banerjee, A. (2006). The developing world in the New England Journal of Medicine. *Globalization and Health, 2*(3). Available from: http://www.globalizationandhealth.com/content/2/1/3.
Man, J. P., Weinkauf, J. G., Tsang, M., & Sin, D. D. (2004). Why do some countries publish more than others? An international comparison of research funding, English proficiency and publication output in highly ranked general medical journals. *European Journal of Epidemiology, 19*, 811–817.
Marusic, A., & Marusic, M. (1999). Small scientific journals from small countries: breaking from a vicious circle of inadequacy. *Croatian Medical Journal, 40*, 508–514.
Marusic, M., & Marusic, A. (2000). How to help small journals become part of the mainstream literature. *Science Editor, 23*, 81–83.
Marusic, M., & Marusic, A. (2001). Good editorial practice: editors as educators. *Croatian Medical Journal, 42*, 113–120.
Mauranen, A. (1993). *Cultural differences in academic writing*. Berlin: Peter Lang.
Mendieta, E., Phillipson, R., & Skutnabb-Kangas, T. (2006). English in the geopolitics of knowledge. *Revista Canaria de Estudios Ingleses, 53*, 15–26.
Momen, H. Language barriers and translation. Implications for open access journals. Paper presented at the International Seminar on Open Access for Developing Countries, Salvador, September 2005, Bahia, Brazil.
Morcos, A. (1999). Publishing in developing countries: problems and solutions. *CBE News, 22*(6), 198.
Mullan, F. (2005). The metrics of the physician brain drain. *New England Journal of Medicine, 353*, 1850–1852.
Murray, H., & Dingwall, S. (2001). The dominance of English at European universities: Switzerland and Sweden compared. In U. Ammon (Ed.), *The dominance of English as a language of science* (pp. 85–112). Berlin: Mouton de Gruyter.
National Science Board. (2002). *Science and engineering indicators*. Arlington, VA: National Science Foundation.
Nour, S. S. (2005). Science and technology development indicators in the Arab region: a comparative study of Arab Gulf and Mediterranean countries. *Science, Technology and Society, 10*(2), 249–274.
Pabón Escobar, S. C., & da Costa, M. C. (2006). Visibility of latin american scientific publications: the example of Bolivia. *Journal of Science Communication, 5*(2), 1–8.
Pakir, A. (2005). Applied linguistics proper? Relocation, reorientation, and realignment. *TESOL Quarterly, 39*(4), 720–723.
Pennycook, A. (1998). *English and the discourses of colonialism*. London: Routledge.
Phillipson, R. (1992). *Linguistic imperialism*. Oxford, England: Oxford University Press.
Phillipson, R. (2001). Global English and local language policies: what Denmark needs. *Language Problems and Language Planning, 25*(1), 1–24.
Phillipson, R. (2003). *English-only Europe: Challenging language policy*. London: Routledge.
Piccoli, N. B., & Procianoy, S. (2007). Brazilian scientific journals: an overview. *European Science Editing, 33*(3), 73–74.
Raina, D., & Habib, S. Patronage, competition and rivalry: the structure of scientific exchanges in the age of colonialism. Paper presented at the Orstom/Unesco Conference on 20th Century Science: Beyond the Metropolis, 1994, Paris.
Robbins, A., & Freeman, P. (2007). AuthorAID: developmental editing assistance for researchers in developing countries. *European Science Editing, 33*(1), 9–10.

Salager-Meyer, F. (2007). Around the world: teaching medical writing to doctors and scientists. *The Write Stuff, 16*(1), 15.
Schlimgen, J. B., & Kronenfled, M. R. (2004). Update on inflation of journal prices: Brandon/Hill list journals and the scientific, technical and medical publishing market. *Journal of the Medical Libraries Association, 92*(3), 307–314.
Shashok, K. (2007). How might open access become sustainable? *Learned Publishing, 20*, 223–224.
Shashok, K. (2008). Content and communication: how can peer review provide helpful feedback about the writing? *BMC Medical Research Methodology, 8*(8), 3, Available from. http://www.biomedcentral.com/bmcmedresmethodol/archive/.
Stegemann, H. (2007). Raising the visibility of "small journals": the Venezuelan Association of Biomedical Journal Editors (ASEREME). *The Write Stuff, 16*(4), 161–165.
Swales, J. (1998). Language, science and scholarship. *Asian Journal of English Language Teaching, 8*, 1–18.
Swales, J. (2000). Languages for specific purposes. *Annual Review of Applied Linguistics, 20*, 59–76.
Swales, J. (2004). *Research genres: Explorations and applications*. Cambridge: Cambridge University Press.
Sykes, J. (2006). The culture of science editing. Report of meetings. *European Science Editing, 32*(3), 71.
Tardy, C. (2004). The role of English in scientific communication: lingua franca or tyrannosaurus rex? *Journal of English for Academic Purposes, 3*(3), 247–269.
Truchot, C. (2001). The language of science in France: public debate and language policies. In U. Ammon (Ed.), *The dominance of English as a language of science* (pp. 319–328). Berlin: Mouton de Gruyter.
United Kingdom Parliament. Available from: www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/399/39909.htm.
Vasconcelos, S. (2006). Correlating English proficiency to international publication rates for Brazilian scientists. *The Write Stuff, 15*(2), 49.
Wellcome Trust. (2003). *Economic analysis of scientific research publishing*, (revised ed.). Cambridge: SQW Limited.
WHO-EMRO. Medical journals in the Eastern Mediterranean region. Paper presented at the First Regional Conference on Medical Journals in the WHO Eastern Mediterranean Region, October 2003, Cairo, Egypt.
Wood, A. (April 1997). International scientific English: some thoughts on science, language and ownership. *Science Tribune*. Available from: http://www.tribunes.com/tribune/art9/wooda.htm.
World Bank. (2006). *World bank development indicators 2006*. Washington, DC: World Bank Publications.
Zaki, A. (1993). An evaluation of language educational programs in Morocco. Unpublished doctoral dissertation, Faculté Sidi Mohammed Ben Abdellah, Morocco.

Françoise Salager-Meyer was educated at the University of Lyons, France and the University of Texas, Austin. She currently teaches ESP and Russian at the University of the Andes, Venezuela. She has authored numerous publications on written medical discourse and was awarded the Horowitz Prize in 1994 and 2004 for her works on the pragmatics of written scholarly communication.