

# Towards a single language in science? A Spanish view



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During the course of the last century, English has gained acceptance as the lingua franca in science. A transition from a 'national' science model to a 'transnational' model – in which English is used – has been described in Spain and other non-English-speaking countries. This new model is reinforced in Spain through science policy measures oriented to enhance international visibility. However, it can make survival of national journals difficult. National journals play an important role in the more local topics and they provide support and structure to the national science systems. Criteria followed in research evaluation should consider both national and international publications.

Science is a collective and international enterprise. The advancement of science is based on the contribution of scientists from different countries all over the world. It is also a cumulative process, since every new finding is based on the previous ones. Knowledge exchange among scientists is essential, but the diversity of languages can be an obstacle in the communication process. The need for a common medium of expression and the strong scientific power of English-speaking countries, particularly the USA after the Second World War, made English gain acceptance gradually as the lingua franca in science during the last century. Its use has allowed communication beyond frontiers and local languages.

The increasing role of English in science can be observed through the analysis of the language used in scientific journals. These journals, either in printed or electronic version, play an important role in the progress of science, since they are one of the main channels used by scientists for the dissemination of their discoveries. Looking into the Web of Science, an important multidisciplinary database produced by the Institute for Scientific

Information (ISI) of Philadelphia, USA, we observe that 96% of documents published in 2000 in the Science Citation Index Expanded were written in English (Table 1), and an increasing trend in the percentage of English-written journals and documents can be observed during the past few decades.

|                    | 1980    | 1990    | 2000    |
|--------------------|---------|---------|---------|
| English            | 84.5%   | 90.5%   | 95.9%   |
| French             | 3.8%    | 1.9%    | 1.0%    |
| German             | 5.1%    | 2.5%    | 1.1%    |
| Spanish            | 0.7%    | 0.4%    | 0.3%    |
| Japanese           | 0.7%    | 0.5%    | 0.3%    |
| Total No.Documents | 554,598 | 689,629 | 956,533 |

Table 1. Annual percentage distribution of publications by language, as covered in the Science Citation Index Expanded (Web of Science)

## National and international scope of research

The use of English makes international dissemination of knowledge easier, but does it mean that all journals need to be written in English to

adjust themselves to the international character of science?

The answer to the former question is probably not. The well-known study of Frame and Carpenter<sup>1</sup> suggests that the internationality of science varies according to the areas: English may be a requirement in some disciplines and topics, but not in others. Internationality of science may be described with regard to the scope of the research: does the research concern a local community or is it of international interest? The highest international character is that of the basic research conducted in scientific fields. This research focuses on basic aspects of knowledge which are of clear international concern. This is the case in research on the human genome, oncogenesis or particle physics. Biologists or physicists working on basic aspects of nature share the same knowledge, scientific interests and concerns all over the world. At the other end of the spectrum we find the social sciences and, especially, the humanities. Thus, the research conducted in arts and humanities is generally more locally-oriented than that in medicine or mathematics, since cultural, linguistic and historical factors play an important role in the former. In relation to clinical medicine and technical research, they are in an intermediate position, since they are usually considered as especially interesting for local communities, although this could be changing with the increasing globalization that affects all aspects of life.

The national or international scope of the research is the main factor that determines the use of national or international journals by scientists, depending on the type of audience the scientist is interested in reaching.<sup>2</sup> But what is an international journal? It is clear that the national or international nature of a journal goes far beyond the language or the publishing country, as the latter is mainly a managerial task. More important factors to consider are the international composition of the scientific committee, the variety of countries of origin among contributing authors, and, of course, having an international audience. Finally, it is not a coincidence that international journals are mostly written in English, since it is the lingua franca in science chosen to facilitate communication among scientists from different countries. That is why most scientists in basic areas such as molecular biology or immunology submit their articles to international journals,

while national journals are generally used in linguistics or in other humanities fields, or in applied disciplines such as geology. The main criterion followed in the selection of a journal for publication of recent research is supposedly to be able to reach out to the widest, but also the most appropriate, audience. At least, that is what a sample of Spanish scientists said in a recently conducted survey.<sup>3</sup>

In this context, it seems logical to consider that English should be used in international journals, mainly those covering basic research and aiming at reaching the international community, while national languages should be the most appropriate choice for those journals oriented towards the national audience, generally those focusing on more local topics.

The use of English, an imperative for scientists working in basic science, implies an additional effort for those scientists whose native language is different from English. The transition from a 'national' science model, in which the national language is used for publications and other communications, to a 'transnational' model, in which a single international language (English) is used, is happening gradually in most non-English countries. Scientists try to improve their visibility in mainstream science through a series of consecutive strategies, as described by Zitt.<sup>4</sup> The first step is for scientists to choose to publish their papers in international journals, specifically in journals covered by the Science Citation Index (SCI). The second step is to publish in English, rather than non-English, language journals, again ones included in the SCI. Finally, scientists submit articles to high prestige journals, such as high impact SCI-covered journals. This trend can be reinforced through science policy measures, as we will show below.

### **Influence of research assessment practices**

Scientists are motivated to undertake research for different reasons: curiosity, the welfare of humanity, to solve specific problems, and so on. But in all cases, their activity is also reward oriented. Scientists are rewarded for their discoveries and contributions to scientific progress in different ways: personal satisfaction, prestige, prizes, citations and promotion are some of them.

Research evaluation is a basic feature in the process of science, and it is the key factor in the distribution of rewards. The quality and relevance of scientists' contributions are assessed by their peers, who will first determine whether they will be published in a scientific journal or not, and then acknowledge them through citations in their own work. Later on, the entire professional career of the scientists may be evaluated by panels and committees composed of other well-known scientists who are in charge of the distribution of resources, scholarship awards or positions. These experts' decisions are based on their knowledge of the field and are supported by objective and indirect criteria of scientific quality, such as bibliometric indicators. Thus, having numerous publications, a high number of citations, and publishing in high quality journals are all considered criteria of scientific excellence. Scientists are well aware of it and try to 'play by the rules of the game' of the research evaluation process.

During the last two decades, research evaluation procedures have been increasingly established in most of the advanced countries. The activity of institutions and even individuals is assessed with a wide array of purposes, such as fostering good quality research, identifying the best performers and supporting science policy decisions regarding distribution of what are always limited resources. Criteria for research evaluation are increasingly explicit and publicly available.

In Spain, scientists working at universities and at the Spanish Council for Scientific Research (CSIC) are assessed by the National Commission for the Evaluation of Research Activity (CNEAI) every six years. This system, first set out in 1989, is one of the instruments established by the Science Act – the legal framework of Spanish publicly-funded scientific activity since 1986 – with the aim of fostering high quality, visible Spanish research. Tenured scientists at research centres are required to submit their curriculum vitae along with what they consider to be their five 'best' publications from the period under evaluation. Submissions are evaluated by experts in 11 scientific fields. Scientists are requested to justify the quality of their publications according to different criteria, such as relevance and originality of content, number of citations, and quality of the journals in which they have published. The criteria accepted as quality indicators of the publication journals

differ by research areas, but being covered by the Science Citation Index or Social Sciences Citation Index (ISI databases) or having a high impact factor within the appropriate category are examples of what is accepted in Natural Sciences, Exact and Experimental Sciences, and Social Sciences. It should be noted that very few Spanish journals are covered by these databases, so publications in international journals are clearly encouraged with this approach. Criteria for evaluation are reassessed periodically, in order to reflect the changing habits and features of the different areas adequately. Since these criteria have been in practice for more than ten years, they have influenced the behaviour of our scientists, who now try to submit their articles to ISI journals with the purpose of obtaining a positive evaluation in the research assessment process. A positive evaluation leads to an increase in researchers' salaries, but the economic motivation is not the most important one, since the raise is very small. The main incentives are the recognition and prestige gained, and the possibilities for professional promotion that these entail, as the positive evaluation is considered to be proof of scientific excellence by the CNEAI. The fact is that the Spanish contribution to the ISI database has increased from 1.3% of the world output in 1990 to 2.5% in 2003. A trend towards ISI-covered journals has been observed in different areas, specifically in Exact and Experimental Sciences, for which the criteria were initially designed. According to a recent study<sup>5</sup> the policies used by the CNEAI were highly efficient in stimulating scientific production and the internationalization of research.

The evaluation procedure established by the CNEAI appears to have been most suitable for research in Exact and Experimental Sciences, in which high success rates are obtained, that is, around 90% of the evaluations were positive in 1999. However, the evaluation process seems to be less adequate for researchers in Economics and Social Sciences, in which the positively-evaluated applications are around 60%. The local nature of research in these areas and the lack of international contacts are some of the reasons suggested for the low success rate. Moreover, the lack of cognitive consensus that frequently exists in these disciplines might make the peer review process more complex, more subjective, and less reliable. Finally, scientists from other locally-oriented disciplines,

such as geology, also consider that the evaluation criteria set by the CNEAI are not adequate for them, since they give priority to internationally-oriented topics and underestimate the relevance of others, just because of their local interest.<sup>6</sup>

### National journals in danger

An internationally-oriented trend in a scientific community is clearly positive for the general advancement of science. Spanish research is now more international than it was ten years ago, and Spanish scientists are better known beyond our borders. But in many fields, national journals have been neglected in favour of international ones. Scientists try to publish in international journals, since they want to obtain a wide audience and to be rewarded by research assessment procedures. As a consequence, several national journals have disappeared, as they received fewer and fewer original manuscripts over time. A decreasing trend in the percentage of journals in languages other than English is observed in several databases, including the Web of Science. Specifically, the percentage of SCI-covered journals written in English grew in this database from 89.2% in 1982 to 94.4% in 1993, while the percentage of journals written in Spanish fell from 0.2% to 0.1%.<sup>7</sup> It should be noted that during this period the presence of documents published by Spanish researchers showed a dramatic increase in the SCI database, while the production in national databases, such

as ICYT, showed the opposite trend. As an example, we show in Figure 1 the evolution over time of the scientific output of the region of Madrid, which accounts for almost one third of the entire Spanish production.<sup>8</sup> During the eight years analysed, publications from the Madrid region in the international SCI database increased by 54%, whereas production in the national database ICYT showed a decreasing trend (–15%). In fact, Spanish scientists themselves confirm they try to publish in English to broaden the dissemination of their research, to gain international visibility and to include internationally-oriented publications in their curricula vitae complying with the criteria set by Spanish authorities, in order to obtain a positive evaluation of their research activity.<sup>9</sup>

This trend towards a more frequent use of English has been observed in other countries, as shown in Table 2, with data obtained from the Science Citation Index Expanded. In 1985, France, Austria, Germany and Spain published more than 25% of their publications in languages other than English, but this percentage fell to 10% or even lower by 2002. The French data is particularly remarkable, because France used to be the least English-oriented country within the European Union: non-English publications in this country decreased from 41% in 1985 to 10% in 2002. The move of French scientists to journals written in English has been previously discussed in different studies. It seems that science policy measures were the underlying reason, as in the Spanish case. As stated by Butler,<sup>10</sup> a decisive factor in this tendency

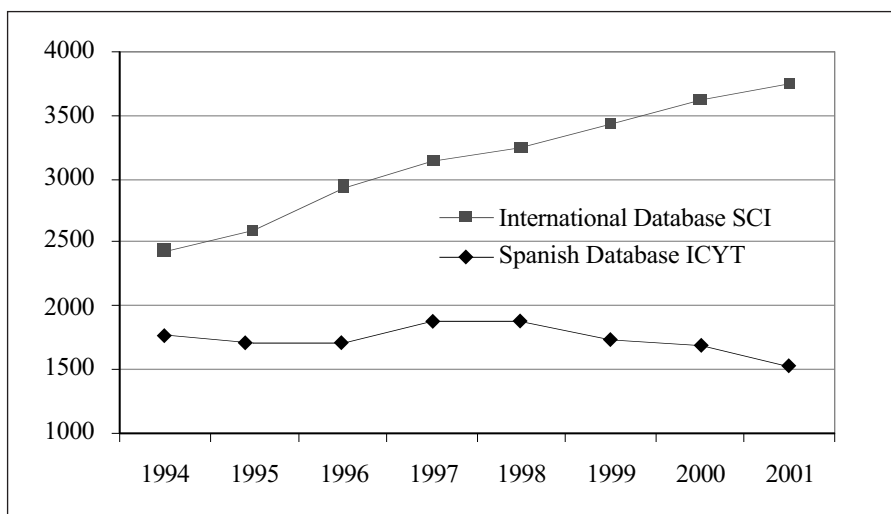


Figure 1. Number of publications from the Spanish region of Madrid in national and international databases

| Country     | 1985          |           | 2002          |           |
|-------------|---------------|-----------|---------------|-----------|
|             | All languages | % English | All languages | % English |
| France      | 34,191        | 58.80     | 52,142        | 89.08     |
| Austria     | 4,011         | 61.88     | 8,596         | 94.03     |
| Germany     | 49,046        | 62.21     | 74,551        | 90.37     |
| Spain       | 7,017         | 72.08     | 26,939        | 92.08     |
| Belgium     | 6,434         | 86.04     | 11,686        | 97.96     |
| Italy       | 17,175        | 87.50     | 38,064        | 98.94     |
| Portugal    | 449           | 94.65     | 4,168         | 98.99     |
| Greece      | 1,591         | 96.61     | 6,193         | 99.73     |
| Netherlands | 12,077        | 97.60     | 21,457        | 99.40     |
| Sweden      | 11,130        | 98.63     | 16,770        | 99.84     |
| Finland     | 4,119         | 99.15     | 8,006         | 99.76     |
| Denmark     | 5,345         | 99.35     | 8,999         | 99.82     |
| UK          | 61,768        | 99.71     | 83,604        | 99.86     |
| Ireland     | 2,489         | 99.76     | 4,989         | 99.90     |

Table 2. Percentage of documents written in English by European Union countries as covered by the Science Citation Index Expanded (Web of Science)

Note: The data for Germany in 1985 includes the production of both the Federal and Democratic Republics of Germany.

was a court intervention which prevented the enactment of a law requiring nearly all publicly-funded research to be published in French, arguing that this law was contrary to the “freedom of communication and expression in teaching and research”.

### Strategies of national journals to compete in the international market

Scientific journal editors have reacted promptly, trying different strategies to increase the diffusion and attractiveness of their journals. Inclusion in high prestige databases, such as SCI, has become an important objective. Writing in English is considered by the editors to be a way of gaining readership and increasing the possibility of inclusion in international databases. Therefore, different decisions have been made such as the addition of English abstracts, increasing the proportion of papers in English, or even changing their publication's language and title into English. In the case of Spain, only two out of the eleven journals covered by restricted SCI in 1981 were English-written, while five out of the six journals covered in 2001 were in English (see Table 3). According to a recent study by Zitt et al.,<sup>4</sup> Spain, together with Italy and Japan were the countries with the highest rates of change into English in the period 1982–1991.

Sometimes, in very basic fields, the change into English is the first step in a process of internationalization that can lead national journals to merge into supra-regional ones, within a specialized discipline. That is the case of the *European Journal of Organic Chemistry* and the *European Journal of Inorganic Chemistry*, created in 1998 by the merger of national journals of chemistry from different European countries, such as the Spanish *Anales de Química – Edición Internacional*. The resulting journals are large supra-regional journals with high international visibility.<sup>11</sup>

It is clear that English-written journals have a larger number of potential readers. An increase in the number of citations has been described in some studies for English-written documents; this may lead to higher impact factors in the long term. However, it is also true that information overload is an important problem and that the proliferation of journals makes it difficult to keep up with the literature. Scientists have to select carefully what they are going to read and generally choose the

|                                | 1981 | 2001 |
|--------------------------------|------|------|
| All documents in Spanish       | 1    | 1    |
| Documents in several languages | 9    | 1    |
| All documents in English       | 1    | 4    |
| Total                          | 11   | 6    |

Table 3. Distribution of Spanish journals covered by restricted SCI by language used in the documents

most relevant and prestigious journals, so peripheral English language journals may also be overlooked. On the other hand, English is not a solution by itself. A recent study aimed at determining the effect that the change from French into English had on the impact of a French journal did not find any increase in the impact factor or in the ranking position among publications of the same discipline.<sup>12</sup>

Moreover, English is not appropriate for national journals oriented towards a local audience. As stated by the *Medicina Clínica* editor, who rejected changing the language of the journal into English a few years ago, we cannot forget what the target of the journal is and who its readers are.<sup>13</sup> *Medicina Clínica* is the most prestigious Spanish journal in the area of clinical medicine, with a high circulation in all hospitals and medical centres. In fact, it succeeded in being covered by the SCI in 1992, in spite of its being written in Spanish, due to its large size (around 500 documents per year). As stated by Fewer,<sup>14</sup> the view that publications ought to be only in English is a mistake, since it would mean that fewer members of the wider public in non-English-speaking countries would be able to read the research published by their own scientists.

In Spain, other national journals have adopted an intermediate position: they have retained the Spanish language but have added a translation of the articles into English. Thus, they manage to preserve their usefulness to the Spanish readership community while trying to increase their international visibility. This is the case of the *Revista Española de Cardiología*, which adopted two different strategies to gain visibility: translating the Spanish text into English, as well as making the electronic version of the journal available on the Web.

National journals – especially high quality national journals – play an important role in more locally-oriented disciplines. Moreover, multi-disciplinary journals in native languages provide support and the essential structure to the national science systems.<sup>15</sup> Since journals of very different quality coexist within the national markets, those initiatives oriented at fostering and assessing the quality of national journals as the first step required for their participation in the evaluation research procedures are especially relevant. As an example, we can mention LATINDEX

(<http://www.latindex.unam.mx/>), which is a regional information system for scientific journals in all disciplines in Latin-American and Caribbean countries, together with Spain and Portugal. It was created in 1995 with the purpose of setting quality criteria to be followed by journals, conducting journal evaluation, and enabling access to high-quality journals through a specific information system. The long-term objective is to increase quality and visibility of the journals included in the system. At the European level, the European Science Foundation is promoting an initiative that aims to collect lists of high quality journals for each European country in the areas of Arts and Humanities, which are the least-covered areas in the Web of Science. In spite of the increasing internationalization of science, national journals are still important for the appropriate development of science within each country. The study of the scientific production of a given country should include both national and international publications, if a comprehensive view of the state of research in that country is desired.

## Conclusion

In summary, science is an international enterprise and English is today the lingua franca which enables communication among scientists all over the world. The use of English allows scientists to obtain a much larger dissemination, visibility and recognition of their work, and in doing so scientists from very different countries may become part of the international scientific community. However, it is sometimes still appropriate to publish in native languages and local journals. National journals play an important role in providing the essential structure for national research systems as well as in disseminating research results in those more locally-oriented disciplines. The criteria followed in the different countries for the evaluation of research may strongly influence the publication habits of scientists, who are increasingly concerned about their scientific careers. Therefore, evaluative procedures should consider both national and international publications, weighted according to their corresponding importance in the field under study. Non-English languages are still relevant vehicles for knowledge transfer. English-speaking countries hold an

advantageous position, since their native language is used for scientific communication worldwide, but they are frequently ignorant of significant results reported in foreign-language publications. As stated by Garfield two decades ago: "The cultural and political value of linguistic training is indeed vital to good science, since it will increase the kind of personal contacts that lead to better identification of important information".<sup>16</sup>

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