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The Impact Factor in non-English-speaking countries

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Abstract The representativeness of the *ISI-Thomson* Impact Factor rankings and the existing relationship between countries' national languages and the diffusion of scientific publications is analyzed. We discuss literature on the Impact Factor related to language use, publication strategies for authors and editors from non-English-speaking countries, the effects of the inclusion of a new journal in the *ISI-Thomson* databases and the scientific policies articulated in some non-English-speaking countries. The adoption of the Impact Factor as the valuation criterion for scientific activities has favoured the consolidation of English language journals in the diffusion of scientific knowledge. The vernacular languages only conserve part of their importance in certain disciplines, such as Clinical Medicine or Social Sciences and Humanities. The Impact Factor, invented over 50 years ago now, could be a limitation for non-English authors and scientific journals, and does not consider some widely used practices among the scientific community concerning the development of Internet as a means for the diffusion of knowledge.

Keywords Journal Impact Factor · Language · Scientific literature · Publishing

Introduction

The representativeness of the *ISI-Thomson* Impact Factor rankings, mainly dominated by publications in English, is a subject that has attracted special interest in Central and South

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American countries, as well as in many European countries, whose populations speak mainly Spanish or Portuguese or who share a language with an outstanding scientific tradition, such as French or German. This question, that of the existing relationship between countries' national languages and the diffusion of scientific publications, has also been examined in South-East Asia, by such emerging powers as China or India, as well as in other highly developed countries, scientifically and technologically speaking, such as Japan or Korea.

In such a situation, it is of the greatest interest to carry out a bibliographic review and to analyse the existing evidence in relation to such aspects as: What are the implications of the language used with respect to the degree of citation? What publication strategies have authors and editors of scientific journals adopted with respect to the language of publication and the diffusion of papers? What position do journals not publishing in English occupy in the *ISI-Thomson* Impact Factor rankings? What is the evolution of the Impact Factors of the journals that do not publish in English? What effect do scientific policies have on the Impact Factor of papers? Or, what alternative indicators and valuation platforms to the *ISI-Thomson* Impact Factor have been developed?

The English language has become the *lingua franca* for the diffusion of scientific knowledge. It has also become the dominant language in such areas as Natural Sciences or Biomedical Sciences. Thus, for instance, in the case of Spain, the percentage of documents published in Spanish in these areas has been below 20% since 1989 and below 10% since 2002, showing a decreasing tendency in the relative weight of the Spanish language, which can be observed from the start of the 1980s and which has continued to the present day (Fig. 1).

Spanish has only conserved a certain weight in particular areas of knowledge, such as Clinical Medicine (González Alcaide et al. 2010; González Alcaide et al. 2012), or in the Social Sciences and Humanities (Fig. 2).

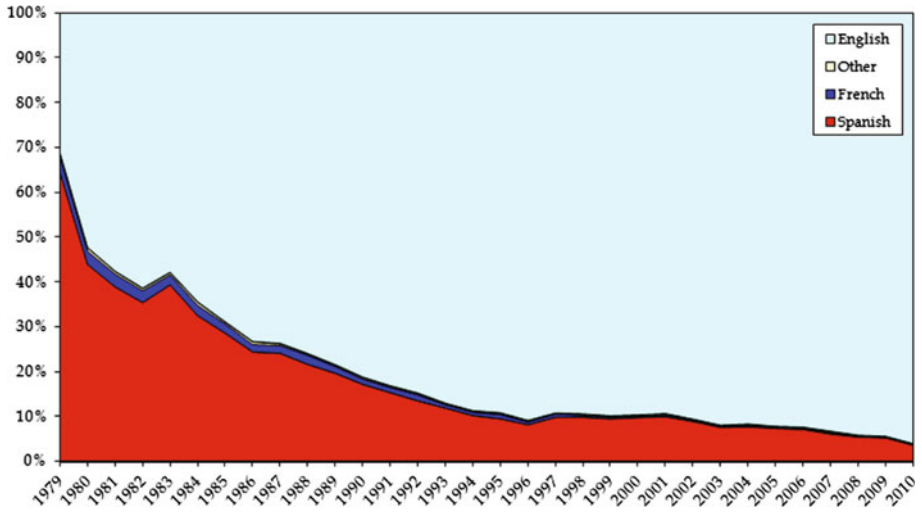

Fig. 1 Diachronic evolution of the language of Spanish publications collected in *Science Citation Index-Expanded* database (% of documents by language)

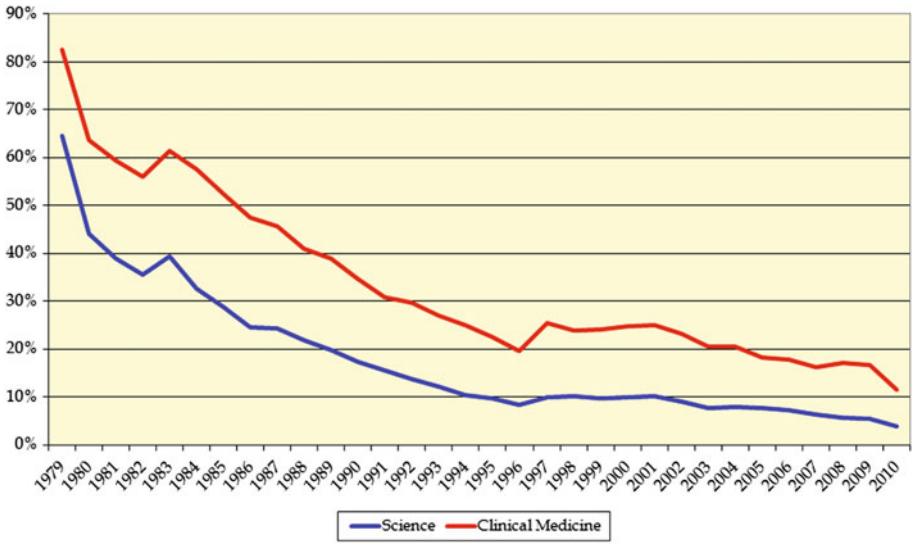

Fig. 2 Diachronic evolution of Spanish publications in *Science Citation Index-Expanded* database (% of Spanish language documents)

The Impact Factor and the strategy of bilingual publication in journals from non-English-speaking countries

Nowadays, English is considered to be the international language of Science and most articles in the international databases are published in English. Only a minority are published in other languages such as German, French or Spanish, and logically only a certain number of researchers can read such articles. Thus, many editors of scientific journals, as well as authors, believe that the publication of an article in any language other than English will decrease the accessibility to the results of the research and its diffusion among more numerous collectives (Bakewell 1992). Such is the belief in this fact that some authors wonder whether it is worth the effort of publishing in any language other than English, since it may well be "Lost Science" (Stolerman and Stenius 2008).

Faced with this situation, some editors from non-English-speaking countries have chosen to adopt English as the standard language for their publications (mainly in the case of the Sciences), or they have adopted the strategic decision to make bilingual editions (a widely used solution in such areas as Clinical Medicine in Europe and Latin America), publishing the articles in both the native language of their country and English. They thus hope to maintain their national audience, while also increasing the international diffusion of their papers (Bordons and Gómez 2004). On the other hand, countries such as Japan and China have taken the decision to select their best articles and translate them to English (Meneghini and Packer 2007). For some editors, this strategy is essential to attract authors who send their articles in English and they should take special care over the editions in this language. However, another necessary action is the publication of editorials and letters signed by reputed professionals, which means that the journals will be known by the leaders of opinion in each field and that they will consider the journal as a candidate for sending their highest quality research articles (Heras et al. 2010).

Numerous studies that have analysed the relation between the language of publication and the degree of citation have demonstrated that works published in journals edited in English show a higher degree of citation. Thus, Mueller and cols. (2006) investigated the association between the Impact Factor and the language of publication for a series of medical journals. They found that the Impact Factor of the journals is more closely associated with the language (English vs. non-English) than with the journal's country of origin, since the mean Impact Factor of the medical journals published in English-language journals originating in the USA, did not differ significantly from that of the journals in English originating in other countries. In some areas, such as *dental literature*, *Epidemiology* (Filion and Pless 2008) or *Ecology* (Leimu and Koricheva 2005), a direct relation has been observed between the language articles are published in and the number of citations they receive. Thus, in *dental literature*, it was found that papers published in English were cited five times more than those published in other languages (Poomkottayil et al. 2011). This association, which indicates that publication in English favours the citation frequency and the Impact Factor, has also been found by other authors such as Winkmann and cols. (2002).

However, other works have shown that there is no clear connection between an increase in the degree of citation for papers published initially in other languages and which are translated to English as a strategy of the journals' editors (bilingual journals) (Bracho-Riquelme et al. 1997; Bracho-Riquelme et al. 1999). Téllez-Zenteno and cols. (2007) demonstrated that there were no statistically significant differences among papers published in Latin American medical journals between those papers published in journals in English, bilingual journals and journals written in the native language, Spanish or Portuguese; in spite of the fact that the average is a little higher in favour of English. In addition to the question, which is not clear, of whether the bilingual edition directly increases the impact of a paper, there is also the problem that the translation to English of all or some of the articles is a costly system, perhaps too costly; maybe even unattainable for developing countries.

Publication strategies for authors and editors from non-English-speaking countries

The greater citation for works published in English, and therefore the possibility of reaching a higher impact, is a well-known fact for researchers from non-English-speaking countries. Consequently, they try to publish their papers in English language journals of an international nature, or at least to publish their best articles in this language. These journals are usually those which have the greatest Impact Factors and, at the same time, get the high quality articles; which in turn allows them to maintain and even increase their pre-eminence in the impact rankings.

The quality of a paper, and thereby its Impact Factor, cannot be dependent on the fact that it is in English, since excellent works may be published in any language. However, with the current system of scientific recognition, this fact is unavoidable, in spite of its inconsistency. Researchers must look for strategies through which they can publish in journals with a recognised Impact Factor. The possibility of publishing in journals with a high Impact Factor is an important subject on which to reflect for countries which are not English-speaking, as many of the Science valuation systems and their finance are based on this type of publication. Nevertheless, what is also certain is that numerous journals of a regional nature play an important role in the diffusion of particular types of knowledge among certain collectives.

On the other hand, some editors generally reject articles from countries which are not part of the scientific élite, as they "suspect" a priori that they will not be cited very much and that they will therefore have a negative effect on the journal's Impact Factor. In order to try to mitigate this, some authors adopt the strategy of citing the research produced in the *leading scientific nations*, in the hope that their colleagues will recognise their work and thus improve their own success (Meneghini et al. 2008). In this sense, articles written by researchers from English-speaking countries have a greater probability of being accepted for publication than those of authors from non-English-speaking countries (Borsuk et al. 2009). What is the solution to this problem? There is no easy solution, though two possible strategies are usually proposed: (a) authors tend to publish their best articles in international English language journals and articles of local interest in national journals; (b) editors try to adopt bilingual publication strategies in their native language and English or only in English. There are also strategies aimed at increasing the citation and impact degree of their publications.

As for the authors, the fact that many non-English-speaking authors publish in both English language journals and native language journals is a direct consequence of the adoption of the Impact Factor as the valuation criterion and this shows that many researchers discriminate between works published with respect to the language, sending those they consider to be of a greater quality or international diffusion to journals in English, and generally with higher Impact Factors, while other papers are sent to national, native language journals (Hasse and Fischer 2010). As an example, it has been shown that 88.9% of Spanish authors in the area of Cardiology, who have published more than nine documents, have published in both Spanish language and English language journals (Bolaños Pizarro 2012) (Fig. 3).

Another interesting aspect with respect to non-English-speaking countries is the question of duplicated, or redundant, publications. In this sense, Tucker and cols. (2011) determined that 19% of the papers published in English by Chinese institutions in medical journals had a considerable element of content overlap with respect to papers published in Chinese. More detailed empirical studies should be developed to allow the degree of overlap between publications in English and other languages to be determined. This is

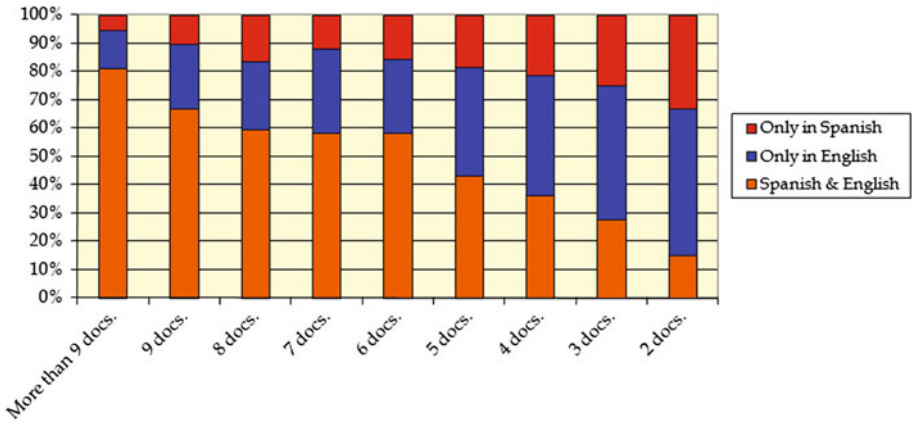

Fig. 3 Distribution of the participation of Spanish authors in the area of Cardiology by language of edition of the journals (% of authors, 1999–2008 period, *Science Citation Index-Expanded* and *Índice Médico Español* [Spanish Biomedical Database])

important as, should the extent of this practice be confirmed, it could suppose an important change to the Impact Factor of scientific journals and, in general, to all the bibliometric indicators which establish a relationship between the number of documents published and the degree of citation. Similarly, there needs to be a more detailed analysis of the influence, with respect to citations, of other ethically reproachable practices such as "fragmentation" of articles or "ghost authorship", as their contribution does not justify their inclusion as co-authors.

The editors of scientific journals, on the other hand, apart from the strategy of bilingual publication mentioned above, have also adopted another series of practices. As an example, we could mention here their use of open systems, such as the *Public Library of Science* (PLOS), which allow authors of non-English-speaking countries to send, together with the English version, a version in their native language as complementary material (*supporting material*). Thus, authors can attract both national and international readers, as well as their citations. The electronic edition of the English version is another strategy which is recommended to increase the impact, as it allows universal diffusion while also providing numerous advantages to readers, as it facilitates searching and reading. This version allows online publication with a *Digital Object Identifier* (doi) that minimizes delays and permits early citation before the printed version appears. Another strategy of some editors, which is ethically more questionable, is to ask for their readers' co-operation in various ways; not only to cite articles published in their journal, but also to do so when they publish in other, international journals, as this increases the number of external citations and reduces self-citations (Fernández and Plasencia 2002). However, self-citation, in spite of being an indicator of an author's own belief in his/her work and in the journal in which the work has been published, is not well considered and is even punished by the editors of the *ISI-Thomson* (Smith 1997). In addition, the abuse of self-citation is considered an indicator of a journal suffering from scientific isolation, since it is enclosed within consultations of its own publications and does not cite external publications (De Granda Orive et al. 2005). In this sense, some authors have noticed a decrease in the percentage of national citations throughout the twentieth century in favour of journals published in English and included in the *ISI-Thomson* databases (Navarro 1996). Some authors use the term *incest* to refer to the abuse of self-citation. Such is the case of the study by Schloegl and Stock (2004), who found a positive correlation between the percentage of self-citations in German journals and the Impact Factor.

The editorial committees of journals from non-English-speaking countries should clearly define the type of professionals they wish their journal to be read by. The journals that form the mouthpiece of a nation's scientific society, or those that deal with problems of a national, regional or local nature, should normally have a readership among the professionals concerned; so, in these cases, publication in English only would not achieve this goal. In this sense, some editors defend publication in the native language, arguing that an important percentage of the citations they receive will be from journals published in this field, in addition to the fact that they are publications which serve a community of readers who use the native language (Aleixandre Benavent et al. 2007a; González Alcaide et al. 2010). The solution may sometimes be for societies to have two journals, one with an international projection published in English and another national one published in the native language (Aleixandre Benavent et al. 2007a). The version in English should be electronic, which would greatly reduce the costs and allow universal diffusion. As for its commercial distribution, journals should be edited by publishers who guarantee their neutrality and independence with respect to extra-scientific commercial interests.

Once English has been adopted as the language of publication, one of the problems researchers from non-English-speaking countries find is that of the grammatical and linguistic correction of the manuscripts, as these aspects have a direct influence on the editorial decision, since it influences the correct communication of the results (Hines 2001). Some of the linguistic barriers non-English-speaking researchers have to overcome have been described by Gannon (2008), of which we could point out the difficulties of expressing exactly what they want to say, proposing future research guidelines and sharing their best ideas with their competitors. A study by Vasconcelos et al. (2008) concluded that Latin American research works with a good knowledge of written English received more citations and had a higher *h-index* than those with a lower level of English. They concluded that the language is an important factor in the quality of the scientific production and that scientific policies should put more emphasis on improving the linguistic competence of researchers. Countries such as Brazil, which have systems to promote quality improvement in journals through an improvement of the language of the articles, have managed to increase, in a sustained manner, the Impact Factor of their journals over recent years (Meneghini and Packer 2007).

Non-English-speaking scientific journals in the ISI-Thomson databases, author recognition and peripheral science in the developing world

Most publications included in the *ISI-Thomson* databases are journals edited in English, while the presence of other languages is small. Also, with respect to the degree of citation, the rankings are headed by English language journals (González de Dios et al. 2011). The defence of German against English has been the subject of numerous articles of opinion published in German, Austrian and Swiss scientific journals. Some authors comment on the difficulty of journals written in German reaching higher Impact Factors than one due to the fact that this indicator is fundamentally given to journals published in English (Edouard 2009); while others, even in the 1990s, were calling attention to the fact that the Impact Factor was eliminating the German language (Haller et al. 1997; Rempen and Rempen 1998). This aspect can also be extended to other languages such as Spanish or French (Aldrete 2010; González Alcaide et al. 2010).

It has been observed that the inclusion of a new journal in the *ISI-Thomson* database, and the fact that it has an Impact Factor in the *Journal Citation Reports*, leads to an initial increase in its Impact Factor of the years subsequent to its inclusion, as has occurred in the case of the Spanish journals in the field of Clinical Medicine (Fig. 4). However, with a few exceptions, this does not correspond to an increase in its relative position in the rankings with respect to the rest of the publications in the field. In fact, stagnation or even a decrease in the Impact Factor and the position in the rankings occupied by these journals has been observed, in spite of the many strategies used by editors of these journals to translate the contents to English (Table 1).

This same phenomenon has been observed by Wang and cols. (2007) with respect to ten journals edited in China and published in English. This was attributed to their reduced internationalization and to the fact that they are not attractive publications for the authors to send their best quality work to, because of their localized nature, scarce circulation and reduced Impact Factors. This same phenomenon has been noted by Yamazaki and Zhang (1997) with respect to Japanese journals published in English.

At this point, we should also mention the fact that authors from some non-English-speaking countries of Europe and from such geographical areas as Latin America and

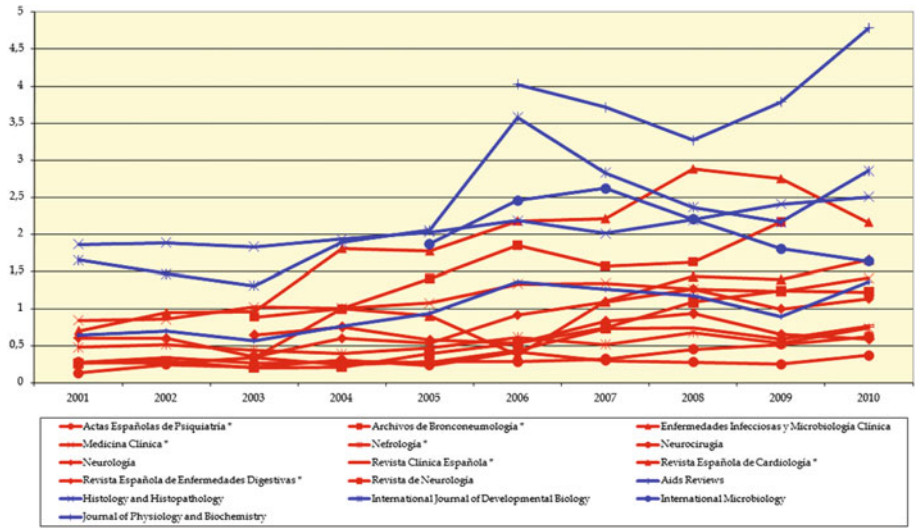

Fig. 4 Evolution of the Impact Factors of Spanish journals in the field of Clinical Medicine included in *Science Citation Index-Expanded* database for over 10 years (*black*/*blue* English language journals; *grey*/*red* Spanish language journals). Asterisks indicates Bilingual journals (Spanish and English). (Color figure online)

South-East Asia have a lower degree of citation than authors from the USA, in spite of publishing in international journals in English. Concerning this aspect, Aldrete (2010) presents a list of innovations and outstanding scientific contributions in the field of Medicine and Anaesthesiology, published by Latin American authors in journals with an international circulation, which were undervalued and even avoided in later reviews. Other works also point to a lower recognition of the scientific merits of Latin American authors, measured by a lower degree of citation, in spite of the fact that, in many cases, the work was published in prestigious scientific journals and in English (Meneghini et al. 2008). This would suggest that, independently of the language and journal of publication, greater recognition is given to the contributions of researchers from countries with a higher scientific development, situated in the *mainstream* of Science; as opposed to those researchers and the scientific contributions from less advanced countries, in spite of the fact that their discoveries had been made first, before those from the researchers of the more developed countries. In this sense, it is significant that many reviews, with no methodological justification, avoid publications that are not in English, in spite of the fact that these works have abstracts and key words in English.

As for the developing countries, due to diverse factors, including the low impact and diffusion levels of their scientific journals, the Science they produce has received the qualification of "peripheral science" or "science lost in the developing world" (Stolerman and Stenius 2008), where scientists take much longer to achieve international recognition and society does not benefit from their achievements until much later. In order to solve this problem, initiatives encouraging the creation of information systems and databases specialised in journals from these countries have been started. This idea is based, fundamentally, on the creation of virtual systems attached to the *Open Access* movement. The citation of works deposited in open repositories has been analysed by Moed (2008).

Table 1 Ranking of the Spanish language journals in the field of Clinical Medicine included in *Journal Citation Reports* database

Journal	Ranking in *Journal Citation Reports* (position 1–4 determined from the quartiles distribution 25, 50 and 75% of journals)									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Actas Españolas de Psiquiatría	75 of 81 (4)	80 of 88 (4)	82 of 87 (4)	88 of 90 (4)	88 of 94 (4)	91 of 94 (4)	90 of 94 (4)	91 of 101 (4)	101 of 117 (4)	103 of 128 (4)
Archivos de Bronconeumología	–	–	27 of 31 (4)	27 of 34 (4)	23 of 33 (3)	22 of 34 (3)	26 of 34 (4)	27 of 40 (3)	23 of 43 (3)	–
Enfermedades Infecciosas y Microbiología Clínica	–	–	37 of 41 (4)	37 of 41 (4)	39 of 43 (4)	41 of 47 (4)	46 of 50 (4)	43 of 51 (4)	47 of 57 (4)	46 of 58 (4)
Medicina Clínica	41 of 112 (2)	44 of 107 (2)	41 of 102 (2)	48 of 103 (2)	49 of 105 (2)	44 of 103 (2)	50 of 100 (2)	62 of 107 (3)	68 of 133 (3)	64 of 153 (2)
Nefrología	39 of 44 (4)	36 of 47 (4)	42 of 49 (4)	45 of 52 (4)	47 of 51 (4)	48 of 55 (4)	49 of 55 (4)	51 of 57 (4)	54 of 63 (4)	60 of 69 (4)
Neurocirugía	135 of 139 (4)	133 of 141 (4)	134 of 141 (4)	128 of 139 (4)	132 of 139 (4)	122 of 137 (4)	131 of 139 (4)	142 of 148 (4)	155 of 167 (4)	171 of 188 (4)
Neurología	–	–	115 of 135 (4)	120 of 140 (4)	128 of 148 (4)	131 of 147 (4)	121 of 146 (4)	132 of 156 (4)	148 of 167 (4)	164 of 185 (4)
Revista Clínica Española	93 of 112 (4)	86 of 107 (4)	93 of 102 (4)	91 of 103 (4)	93 of 105 (4)	83 of 103 (4)	72 of 100 (3)	81 of 107 (4)	98 of 133 (3)	90 of 153 (3)
Revista Española de Cardiología	50 of 65 (4)	45 of 66 (3)	48 of 70 (3)	28 of 71 (2)	31 of 72 (2)	26 of 74 (2)	28 of 74 (2)	27 of 79 (2)	34 of 95 (2)	52 of 114 (3)
Revista Española de Enfermedades Digestivas	41 of 47 (4)	44 of 45 (4)	45 of 47 (4)	43 of 46 (4)	45 of 46 (4)	44 of 48 (4)	45 of 50 (4)	45 of 55 (4)	56 of 66 (4)	58 of 72 (4)
Revista de Neurología	124 of 136 (4)	124 of 138 (4)	132 of 135 (4)	133 of 140 (4)	135 of 148 (4)	132 of 147 (4)	126 of 146 (4)	126 of 156 (4)	119 of 167 (3)	135 of 185 (3)

Scientific policies

The scientific policies articulated in some non-English-speaking countries such as Spain have had a decisive impact on the increase in scientific productivity, since their valuation agencies have taken productivity and citation parameters of journals indexed in the ISI-*Thomson* databases as their reference. The adoption of these valuation criteria have marked a fundamental milestone, in that they have stimulated the need for the scientific community to publish in international journals. Nevertheless, this policy has had several negative effects with respect to the national scientific publications, principally the undervaluation of the Spanish journals. It has also had an influence on the adoption by researchers of publication strategies guided, in many cases, by criteria concerning academic profitability; or other ethically reproachable forms of behaviour, such as unjustified authorships, fragmentation, making duplicate or redundant publications, the alteration of the traditional citation criteria, introducing unjustified self-citations, making directed citations or purposely omitting relevant citations, all of which are factors that, together with other much more damaging fraudulent scientific conduct, such as inventing, copying or falsifying the published information, are not exclusive to Spanish scientific activity, but which are linked to the pressure to publish as a competitive process in which publications constitute one of the main reference points in the processes of scientific valuation and credit. The adoption of the *Journal Citation Reports* as a reference on the valuation level marked the beginning of an active debate among the Spanish research community concerning the suitability of the Impact Factor as a valuation criterion, having stressed the need to consider other criteria and the development of alternative or complementary projects (González Alcaide et al. 2008), since, in other countries, such strict valuation criteria, in which the publications have such weight with respect to evaluating scientists' activity, have not been adopted (Clapham 2005; Delgado López-Cózar et al. 2007). Finally, it should be pointed out that the adoption of publications included in the *ISI-Thomson* as a reference, although it has had a positive influence that favoured the increase in productivity in journals of international diffusion, has had a more moderate influence in the case of citations. In this sense, new policies, such as the encouragement of transnational collaboration, have attempted to mitigate such an effect (González Alcaide et al. 2012).

Frustrations concerning the Impact Factor

The literature on the Impact Factor is full of linguistic metaphors which are a faithful reflection of the expressions of discouragement and the feelings of frustration of many scientists concerning this indicator. The frustration appears when authors perceive an imbalance between the value they give to their work and the scarce repercussions their work attains in terms of impact and citations (Porcel and Aleixandre 2000; Pérez 2000). The scarce citation of national articles has been defined by some authors as an attitude of "scientific auto-boycott" and of "submission to the North American power" (Ortega Serrano et al. 1992). Some authors even wonder: "If the articles published in *non-English-speaking journals* are neither known, read or cited, why do we write them?" (Porcel and Aleixandre 2000; Aleixandre Benavent et al. 2007a).

On the other hand, some authors point out that the term "Impact Factor" is deceptive, since it is a measure of the importance of a journal with respect to the set of articles that have been published in it, and that it is used to measure the relative importance of the researchers, the research programmes, and even the scientific institutions. Thus, they

recommend that this indicator's name should be changed in accordance with its real function, which is simply that of a "citation index" of a journal and nothing more (Hecht et al. 1998; Williams 1998; Gensini and Conti 1999).

The valuation of publications and alternative indicators to the Impact Factor

The problems and limitations of the ISI-Thomson Impact Factor, and in particular the over-representation of English language journals, have made the development of both alternative indicators and valuation instruments necessary.

Among the numerous alternative or complementary indicators that have been described in the scientific literature, we could mention here the *Adjusted Impact Factor*, *Cited Half-life Impact Factor*, *Eurofactor*, *Disciplinary Impact Factor*, *Journal to Field Impact Score*, *Journal International Index*, *H-index*, *Eigenfactor* and *G-index*, among others (Aleixandre et al. 2007b). These indicators have been described and analysed in comparative studies which have generated an ample bibliography and debate concerning their suitability among the research community (Matthew et al. 2008). Also, some large communications enterprises, such as Elsevier, Google and Microsoft, have launched their own indicators based on the information available in their databases or in the web.

Among the new initiatives that bring together the development of an indicator and a valuation platform for scientific journals, we can mention the *SCImago Journal Rank Indicator* (SJR), accessible through the portal *SCImago Journal and Country Rank* (http://www.scimagojr.com/). The SCImago group, dependent on the Spanish Research Center-CSIC and various Spanish universities, dedicates the portal *SCImago Journal and Country Rank* to the publication of several indicators using the information contained in the *Scopus* database. The *SCImago Journal Rank* (SJR) is based on the *PageRank* of Google and aims to become an alternative to the Impact Factor of *ISI-Thomson*. However, this indicator is not completely satisfactory either, especially in certain disciplines (Schöpfel and Prost 2008).

Google Scholar Citations (http://scholar.google.com/intl/en/scholar/citations.html) was launched in July of 2011. It brings together the scientific production of researchers and shows the number of citations for each item on a personal page. It presents three bibliometric indicators: the total number of citations, the H-index and the i10 index (number of papers with over ten citations). The information on the citations received and the production is automatically updated as it is indexed by Google (Cabezas Clavijo and Torres-Salinas 2012). Kousha and Thelwall (2006) have carried out an exploratory study of *Google Scholar Citations* and *Google Web/URL Citations* in several disciplines.

Microsoft Academic Search (http://academic.research.microsoft.com/), available from September of 2011, allows the creation of personal profiles based on the information gathered by the search engine, providing more indicators and functions than those offered by Google Scholar Citations, such as the possibility of seeing the context in which a paper has been cited, following the scientific production of an institution, or exploring the collaborative network of a researcher and the relations via the citations (Cabezas Clavijo and Torres-Salinas 2012).

In Latin America and the Caribbean we should mention the *SciELO-Scientific Electronic Library Online* (http://www.scielo.org/php/index.php), a system for the co-operative electronic publication of scientific journals in Internet which aims to serve the scientific communication needs of those countries, to ensure the visibility of and universal access to its scientific literature, and to contribute to overcoming the abovementioned phenomenon

of "lost science". SciELO offers, in addition, indicators on the use and impact of the scientific journals integrated in this system.

The *Web of Knowledge*'s bias in the coverage of national journals has, in some countries, encouraged national initiatives to cover these lagoons, particularly in the field of Social Sciences and Humanities. They analyse citations using their own country's journals in order to obtain complementary indicators to those provided by *ISI-Thomson*. Several citation analysis platforms have arisen in Spain, normally financed by public competitions, such as the *Índice de Impacto de las Revistas Españolas de Ciencias Sociales* [*Spanish Social Science Journals Impact Index*] (IN-RECS) (http://ec3.ugr.es/in-recs), which was later extended to humanities journals (INRECH) and legal sciences (INRECJ) (http://ec3.ugr.es/in-recj) (Aleixandre et al. 2007b).

Conclusions

The Impact Factor of the *ISI-Thomson* is closely related to the journals of Anglo-American origin, since they are the majority and they occupy the top places in the rankings of all disciplines or fields of knowledge. The adoption of the Impact Factor as the valuation criterion for scientific activities has favoured the consolidation of these publications and of the English language in the diffusion of scientific knowledge. The vernacular languages only conserve part of their importance in certain disciplines, such as Clinical Medicine or Social Sciences and Humanities. The Impact Factor, and especially the use that is made of it in many cases, constitutes a limitation or a condition for authors and scientific journals, in which both are obliged to adopt decisions guided, in many cases, more by the rankings than by objective, scientific criteria based, for example, on the contents of the journals or on its potential readers, especially in non-English-speaking countries and in the said disciplines. In addition, the Impact Factor, invented over 50 years ago now, does not consider some widely used practices among the scientific community concerning the development of Internet as a means for the diffusion of knowledge. Thus, it would be plausible to look for alternatives that can include the development of alternative indicators which take into account the relative weight of citations due to language or country, or the development of specific rankings with respect to the language of publication or to take into account such factors as the visibility of the papers.

With a view to a better visibility of Science in both the national and international fields, all the sectors involved should adopt measures. The editors of national, scientific non-English-speaking journals could consider the possibility of publishing different journals, in English and in their native language; the journal coverage of databases could be widened, as well as introducing modifications in relation to the appropriate calculation of the bibliometric indicators they offer; and the national research and valuation agencies, for their part, should encourage policies that contribute to overcoming the linguistic barriers of scientific communication and increase the impact of their national journals, and in short, of the Science generated in their countries. They should also adequately evaluate the scope and implications of the use that is made of the bibliometric indicators instead of simply applying them indiscriminately.

It would also be advisable to develop or improve citation databases in the European Union and in geographical areas that are not included in the scientific élite, databases that would have a wide coverage of quality journals and which would allow an Impact Factor, independent of the *ISI-Thomson*, to be created, one which could facilitate access to the scientific literature of those countries. Such initiatives as the *Google Scholar Citations*,

Microsoft Academic Search and *Scientific Electronic Library Online-SCIelo*, are only the tip of the iceberg of the new scenario generated by the development of Internet as a means for the diffusion of knowledge and they should be used as instruments to assist in a more objective and precise valuation of the results of scientific activities and researchers.

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