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researchtrends

IN THIS ISSUE:

Welcome to issue 6 of Research Trends. This issue focuses on various aspects of the journal, one of the principal means of scholarly communication. We examine the establishment of English as the language of science after the Second World War and how the Netherlands has become a center of English-language journal publishing. At the same time, we ask scholars who have frequently cited a non-English paper why they did so.

We also look at journal analysis. Thorough journal analysis, carried out over time, can provide useful information about the performance and position of a journal relative to other journals in the same field. There is a danger, however, that the metrics produced can be used incorrectly. Professor David Colquhoun addresses the pitfalls of metrics misuse.

We welcome your **feedback** to any of the topics covered.

Kind regards,
The Research Trends Editorial Board

Did you know?

Methodological advances attract top cites

Articles describing advances or updates in experimental methodology have long been thought to attract higher numbers of citations than other research contributions, but recent research has failed to confirm this *(1)*.

Nevertheless, the 10 most cited journal articles in molecular life sciences solely comprised papers reporting some of the most important methodological advances of the last 40 years. Articles in journals in the fields 'Biochemistry, Genetics and Molecular Biology', 'Immunology and Microbiology' and 'Multidisciplinary' were sorted by citations received to date (see Table 1 – page 8).

Reference:

(1) Aksnes, D.W. (2006) "Citation rates and perceptions of scientific contribution", *Journal of the American Society for Information Science and Technology*, Vol. 57, No. 2, pp. 169–185.

Journal analysis

Journal evaluation is becoming increasingly important across academia, from scientists who have been invited to participate in the editorial processes of a journal to librarians who are considering which journals to make available to their users.

Many factors play a part in the evaluation of a journal, and these will be different for various groups of users. At the same time, evaluation usually needs to be performed in the context of other journals in a similar field. In the past, journal evaluation took a lot of time and effort. However, recognizing the growing demand for user-friendly evaluation tools, Scopus has developed the **Scopus Journal Analyzer**, which displays transparent, objective results for quick and intuitive comparison of up to 10 journals. In addition, the data are updated every two months, which means users have access to the most up-to-date information available.

A clearer picture

To evaluate a journal thoroughly, it is important to look at how it has been performing over time. It is also important to compare it with similar journals to understand the results in context.

To take an example, *Presse Médicale* is a multidisciplinary French medical review journal that commenced publication in 1893 under the title *La Presse Médicale* and continued as *Nouvelle Presse Médicale*. It receives most citations from itself, and from the other French review journals *Revue de Médecine Interne, Revue du Praticien* and *Revue de Geriatrie*.

It is relatively simple to compare the publishing trends of these four journals using the Scopus Journal Analyzer. For instance, Figure 1 shows that the annual output of three of the journals remained roughly steady over the period 1996–2007, with only *Presse Médicale* reducing the amount of content that it publishes. The low point at the right-hand side of this and the other graphs reflects the fact that the data for 2008 are as yet incomplete.

Despite this drop in output, *Presse Médicale* first increased and then maintained the level of citations that it attracts; *Revue de Médecine* Interne shows a similar increase in total annual citations despite its static content output (see Figure 2).

We can also combine these two metrics in the Trend Line, which shows trends in average journal citation per article (see Figure 3). The Trend Line is calculated by dividing the total citations received in a calendar year by the total documents published in that same year. The citations are counted regardless of when the item being cited was published.

Figure 3 clearly shows that *Presse Médicale* and *Revue de Médecine Interne* are attracting more citations while *Revue du Praticien* and *Revue de Geriatrie* have maintained a steady rate.

It is interesting to speak to the publishing editor of *Presse Médicale* to find out if any editorial changes took place during the period shown that might have impacted the citation accrual. *"Presse Médicale* used to be a weekly, then a fortnightly publication. Since 2006, it's been monthly, so naturally the number of articles decreased," says Olivier Chabot. "We also have a very exacting editorial board and the rejection rate has increased over the last four years. We now have a rejection rate of 55% for papers and 80% for clinical cases. The quality of our papers could explain why our citation rate has remained steady, even though the quantity has decreased. For the last two years, we have published more papers in English. Perhaps these articles are more highly cited. We also increased our self-citation."

To take another example, *Nuclear Physics B*, which commenced publishing in 1967, focuses on original research in high-energy physics and quantum field theory. It is read by particle physicists, field theoreticians and statistical and mathematical physicists. Most of its citations come from *Physical Review D, Journal of High Energy Physics, Nuclear Physics B and Physics Letters B*.

Again, these journals can be compared in the Scopus Journal Analyzer. *Physical Review D* is registering an annual increase in citations (see Figure 4). *Nuclear Physics B* has the highest average journal citation per article, 77.15 in 2007 (see Trend Line in Table 1). This upward trend can also be seen for *Physics Letters B* (see Figure 5).

"Nuclear Physics B has consistently maintained its high standards despite the reduction in the number of papers being published in particle physics," says Publishing Director David Clark of his journal.

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The value of bibliometric measures

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Figure 1 – The annual output of the four journals under review remained relatively stable over the period 1996–2007, with only *Presse Médicale* reducing the amount of content that it publishes.

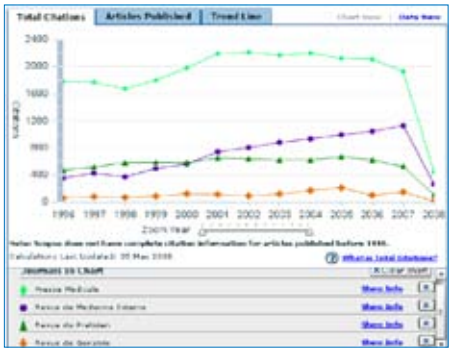


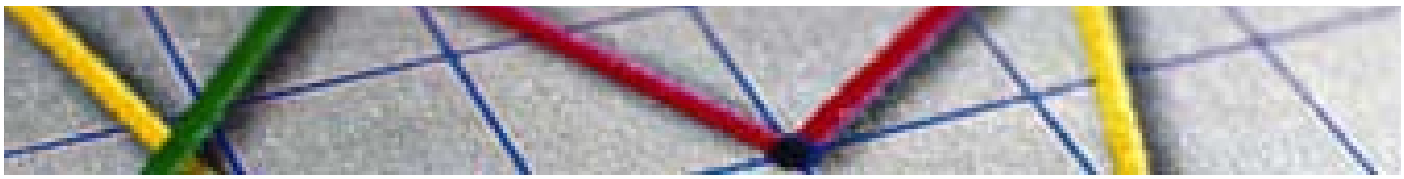
Figure 2 – Despite reducing its output, *Presse Médicale* has first increased and then maintained the level of citations that it attracts. *Revue de Médecine Interne* has also experienced a steady increase in citations.

Figure 3 – The Trend Line, which shows average journal citation per article, clearly reveals that *Presse Médicale* and *Revue de Médecine Interne* are attracting more citations while *Revue du Praticien* and *Revue de Geriatrie* have maintained a steady rate.

Figure 4 – Of the journals under review, only *Physical Review D* is registering an annual increase in citations.

Figure 5 – *Physics Letters B* has registered a steady increase in average journal citation per article.

Table 1 – *Nuclear Physics B* has the highest average journal citation per article: 77.15 in 2007.



Journal publication: why the Netherlands is so prolific

It is generally known that the share of world articles is dominated by the countries with the most researchers. This is unsurprising and has been the case for many years. However, the geographical distribution of the journals' publication country does not follow the same pattern, as Table 1 reveals.

Table 1 - Publishing location of journals in 2007. Source: Scopus.

Country	Number of journals published from that country	% of all journals
United States	7,589	33.2%
United Kingdom	4,536	19.8%
Netherlands	2,085	9.1%
Germany	1,729	7.6%
China, People's Republic of	633	2.8%
Japan	630	2.8%
France	611	2.7%
Switzerland	460	2.0%
Italy	454	2.0%
Canada	404	1.8%
Russian Federation	342	1.5%
Poland	284	1.2%
Spain	276	1.2%
India	270	1.2%
Australia	256	1.1%
Brazil	215	0.9%
Czech Republic	123	0.5%
Turkey	112	0.5%
Hungary	107	0.5%

The Netherlands is a particularly notable example of this differential, especially when one considers the size of the country's population, ranking third on the list behind the United States and the United Kingdom.

According to these data, the Netherlands publishes over 9.0% of all journals in the world. An initial explanation for this is that several of the world's largest scientific, technical and medical publishers, including Elsevier, Springer and Taylor & Francis, all have offices in the Netherlands. This skews the figures somewhat since the country of publication is linked to the publishers' head office location and not necessarily to where the journal is physically published. However, this does not explain why these companies chose the Netherlands as their publishing location.

Location, location, location

A look back at the history of Elsevier in the Netherlands goes some way to answering the second anomaly. For centuries, the Netherlands was a haven for scholars escaping religious or creative persecution in their own countries. Between the 17th and 19th centuries, famous scholars such as Erasmus, John Locke, John Milton, Descartes and Galileo published their work in the Netherlands rather than in their home countries because it had a liberal publishing infrastructure. One of the first publishers in the Netherlands, founded in 1580, was Elzevir. Its name was adopted in 1880 by one of the largest science and technology publishers, Elsevier.

By the 19th century, the German language had become the standard scientific language. In many disciplines, knowledge of German was a basic requirement internationally until well into the 20th century. German publishers were well established in the market and at a commercial peak. However, with the rise of Hitler's Nazi regime in the 1930s, many of Germany's best scientists fled to neighboring countries as well as the United States.

Moving west

This emigration of scientists led the Noord Hollandsche Uitgevers Maatschappij, which later became a part of Elsevier, to believe that the language of science would shift from German to English, a prediction that proved to be true. Elsevier started to publish the work of European scientists in English, one of the first of which was Paul Karrer's *Organic Chemistry* in 1937.

After the Second World War, the German publishing industry was in tatters and what remained of it, mainly located in Leipzig and Berlin, found itself within the Soviet occupation zone and later in

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Research trends

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the GDR. As a consequence, there was a movement westwards: the German National Library moved from Leipzig to Frankfurt and Springer from Berlin to Heidelberg.

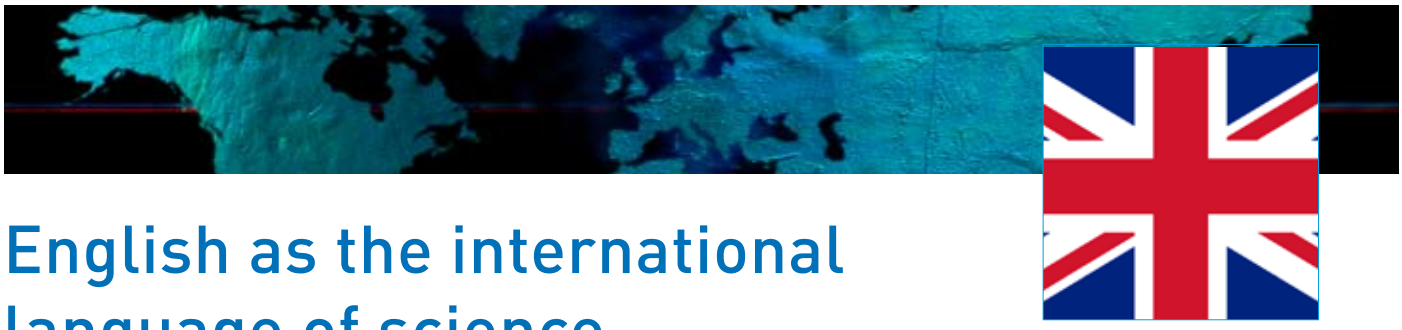
Dutch publishers took advantage of the situation and the Netherlands' location between Western Europe and the English-speaking UK and US, which made it the perfect center of the new international science-publishing world that emerged after the war. Other international publishing houses also saw the opportunities the Netherlands offered and established offices there. This has resulted in a high concentration of publishing companies relative to the size of the country and number of researchers, and thus a high number of published journals attributed to it.

*Many thanks to Professor **Hans Roosendaal** for his help with the historical aspects of this article.*


DISCORSI
E
DIMOSTRAZIONI
MATEMATICHE,
IN LEIDA,

Galileo's last and greatest work, published in 1638 by Elzevir, *Discorsi e Dimostrazioni Matematiche* is considered the first important discussion of modern physics.

Country trends



English as the international language of science

Since the end of the Second World War, English has become the established language of scholarly communication, but not without controversy. In this article we examine some of the reasons for the rise of English and its consequences in the context of national trends in English and local-language publishing.

The underlying reason for the rise of English as the language of science remains a topic of debate, but most frequently it is acknowledged as an accident of 20th century political and economic history *(1)*. The British Empire, which spanned the globe from the late 16th to the early 20th century, was the largest empire in history and made English a truly international language. Today it is the first language of about 400 million people in 53 countries, and the second language of as many as 1.4 billion more. English was therefore well positioned to become the default language of science in the wake of the disruptive wars of the first half of the 20th century.

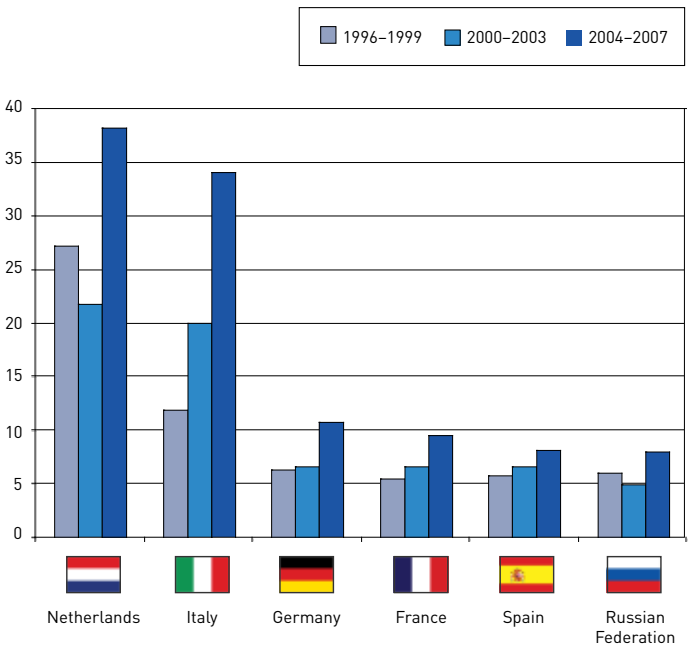


Figure 1 – Ratio of the number of journal articles published by researchers in English to those in the official language in six European countries, 1996–2007. Source: Scopus.

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Country trends

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Shifting language preferences

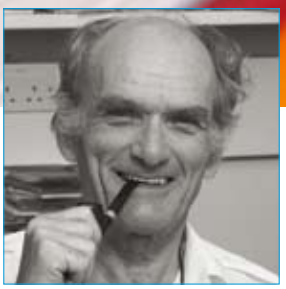
Whatever the reason, the use of English as the scholarly *lingua franca* has become self-reinforcing, with academic reward schemes in many countries placing great emphasis on publication in international (mostly English-language) journals. Figure 1 shows the ratio of the number of journal articles published by selected nations' researchers in English to those published in that nation's official language in three consecutive four-year periods.

The Netherlands has always had a strong tradition of publishing in English, and so the ratio of English to Dutch journal articles is quite high and shows no clear trend in this analysis. Conversely, Italy's ratio has risen dramatically over the period of analysis, suggesting a very strong impetus by Italian authors to publish in English. More modest, but equally important, trends away from local-language authorship are repeated in Gemany, France, Spain and the Russian Federation.

Reference:

(1) Tardy, C. (2004) "The role of English in scientific communication: *lingua franca or Tyrannousaurus rex?" Journal of English for Academic Purposes*, Vol. 3, No. 3, pp. 247–269.

Expert opinion



The misuse of metrics can harm science

Professor David Colquhoun

When Eugene Garfield devised the Impact Factor (IF) in 1955 to help select journals for the Science Citation Index, he had no idea that 'impact' would become so controversial.

The IF ranks journals based on how many citations they receive over a particular period. However, in recent years, certain misuses of the IF have been brought to light, including its emergence as a performance-measurement tool. Garfield himself has noted that the IF was never intended to assess individuals *(1)*.

Accessing individuals

In a letter to *Nature*, Professor David Colquhoun of the Department of Pharmacology, University College London, voiced his concerns about the way IFs are being misused to assess people *(2)*. According to him, it is all part of a worrying trend to manage universities like businesses, measuring scientists against key performance indicators. "IFs are of interest only to journal editors. They are a real problem when used to assess people," he says.

This becomes clear when one looks behind the figures. Bert Sakmann may have won a Nobel Prize in 1991, but under some current assessment criteria, he would have been unemployed long before that happened. From 1976 to 1985, he published between zero and six papers per year (average: 2.6). Yet, despite this low output, during these years he produced scientifically important papers.

> "People believe Impact Factors are being used to assess people, and work towards getting papers into good journals rather than writing good papers."

Problem of perception

The real problem may be one of perception. Colquhoun says, "No one knows how far IFs are being used to assess people, but young scientists are obsessed with them. Whether departments look at IFs or not is irrelevant; the reality is that people perceive this to be the case and work towards getting papers into good journals rather than writing good papers. This distorts science itself: it is a recipe for short-termism and exaggeration."

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Expert opinion

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He continues, "Good departments don't measure applicants or staff by arbitrary calculations at all. All universities should select by references and assessment of papers, and those that already do so should publicly declare this to ease the fears of applicants."

In an essay by Eugene Garfield published on its website, Thomson Scientific itself addresses the scope of the IF and the potential for misuse. "Thomson Scientific does not depend on the Impact Factor alone in assessing the usefulness of a journal, and neither should anyone else," it says *(4)*. It recognizes that while the IF has in recent years been increasingly used in the process of academic evaluation, the metric continues to provide an approximation of the prestige of the journals in which individuals have been published and is not an assessment tool for the individuals themselves.

Metrics will never be able to provide a holistic picture of an individual scientist or journal and should certainly not determine science. However, they can function as an initial indicator, thereby providing a starting point for further discussion or assessment.

References:

(1) Garfield, E. (2005) "The agony and the ecstasy: the history and meaning of the Journal Impact Factor", *International Congress on Peer Review and Biomedical Publication*, Chicago, September 16, 2005.

(2) Colquhoun, D. (2003) "Challenging the tyranny of impact factors", *Nature*, Correspondence, 423, 479.

(3) Colquhoun, D. (2007) "How should universities be run to get the best out of people?", *Physiology News*, Vol. 69, pp. 12–14.

(4) Garfield, E., "The Thomson Scientific Impact Factor"

Photograph of David Colquhoun © Mark Thomas

Why did you cite...?

Why did you cite...?

More than 913,700 French articles are referenced in Scopus. Of these, *"Note preliminaire sur le traitement des angiomes vertebraux par vertebroplastie acrylique percutanée" (1)* is ranked as the most cited article, with more than 500 citations to date.

To gain some insight into what makes a successful non-English paper, we asked the authors and those who have cited the paper frequently why they thought this paper had such an impact. The unanimous response was that the main reason for citing the article so frequently was because it represented a landmark in the field and was the first to describe a technique that was adopted internationally in the years thereafter.

One of the authors, Professor Deramond from CHU Amiens, says: "It is the first article describing the original vertebroplasty technique [...]. A considerable number of articles [...] focus on this minimally invasive therapeutic method [...] [hence the article] is cited systematically."

Frequent citers agree with this. Dr. Pflugmacher, from the University of Berlin, says that "the article is cited several times because it is the origin of vertebroplasty." Dr. Liebermann of the Cleveland Clinic, Dr. Burton from the University of Texas and Dr. Jensen from the University of Virginia expressed very similar views.

Effect of language on diffusion

It seems, however, that the fact that the article was written in French was rather an obstacle to its early diffusion. Professor Deramond notes that "it wasn't until 1997 and the publication of an article in the *American Journal of Neuroradiology* that vertebroplasty became really recognized and spread worldwide." One of the other authors, Professor Le Gars from CHU Amiens, stresses: "This article is often cited because it is the first to describe the vertebroplasty technique, devised in our hospital and now used worldwide. This is what explains the high number of cites, the usage of the French language in an Anglo-Saxon world being rather a penalizing factor."

Professor Belkoff, a frequent citer from the John Hopkins Medical Center, adds: "Vertebroplasty would have become the mainstream practice that it is perhaps 10 years earlier, had the article been written in English. If it were not for Jacques Dion, a French Canadian, hearing about vertebroplasty presented in French at a meeting of radiologists, the introduction of vertebroplasty to the US may have taken even longer. Jacques brought back what he learned to UVA, where he and colleagues Mary Jensen, John Mathis and Avery Evans used it and started spreading the word."

Reference:

(1) Galibert, P., Deramond, H., Rosat, P., Le Gars, D. (1987) *"Note preliminaire sur le traitement des angiomes vertebraux par vertebroplastie acrylique percutanée"*, *Neurochirurgie*, Vol. 33, No. 2, pp. 166–168.

Did you know?

Methodological advances attract top cites

Articles describing advances or updates in experimental methodology have long been thought to attract higher numbers of citations than other research contributions, but recent research has failed to confirm this *(1)*.

Nevertheless, the 10 most cited journal articles in molecular life sciences solely comprised papers reporting some of the most important methodological advances of the last 40 years.

Articles in journals in the fields 'Biochemistry, Genetics and Molecular Biology', 'Immunology and Microbiology' and 'Multidisciplinary' were sorted by citations received to date (see Table 1).

Reference:

(1) Aksnes, D.W. (2006) "Citation rates and perceptions of scientific contribution", *Journal of the American Society for Information Science and Technology*, Vol. 57, No. 2, pp. 169-185.

Author(s)	Article title	Year	Journal	Cites to June 2008	Methodological advance
Laemmli U.K.	Cleavage of structural proteins during the assembly of the head of bacteriophage T4	1970	*Nature*	78810	Gel electrophoresis of proteins
Bradford M.M.	A rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein dye binding	1976	*Analytical Biochemistry*	70237	Concentration determination of proteins
Chomczynski P., Sacchi N.	Single-step method of RNA isolation by acid guanidinium thiocyanate-phenol-chloroform extraction	1987	*Analytical Biochemistry*	40031	Isolation of RNA
Thompson J.D., Higgins D.G., Gibson T.J.	CLUSTAL W: Improving the sensitivity of progressive multiple sequence alignment through sequence weighting, position-specific gap penalties and weight matrix choice	1994	*Nucleic Acids Research*	24570	Alignment of protein sequences
Altschul S.F., Gish W., Miller W., Myers E.W., Lipman D.J.	Basic local alignment search tool	1990	*Journal of Molecular Biology*	21989	Alignment of DNA sequences
Sanger F., Nicklen S., Coulson A.R.	DNA sequencing with chain-terminating inhibitors	1977	*Proceedings of the National Academy of Sciences of the United States of America*	20352	Sequencing of DNA
Towbin H., Staehelin T., Gordon J.	Electrophoretic transfer of proteins from polyacrylamide gels to nitrocellulose sheets: Procedure and some applications	1979	*Proceedings of the National Academy of Sciences of the United States of America*	18125	Transfer and detection of proteins
Saitou N., Nei M.	The neighbor-joining method: a new method for reconstructing phylogenetic trees.	1987	*Molecular biology and evolution*	15356	Construction of phylogenetic trees
Thompson J.D., Gibson T.J., Plewniak F., Jeanmougin F., Higgins D.G.	The CLUSTAL X windows interface: Flexible strategies for multiple sequence alignment aided by quality analysis tools	1997	*Nucleic Acids Research*	11840	Alignment of protein sequences
Mosmann T.	Rapid colorimetric assay for cellular growth and survival: Application to proliferation and cytotoxicity assays	1983	*Journal of Immunological Methods*	11101	Cell survival assay