A snapshot of research papers in non-English languages

Globally, the use of English language has been continuously increasing and English is reported to be the most widely learned second language[1]. In scholarly communication too, English has become the preferred language although it is well known that many scientific terminologies and words are derived from Latin and Greek. It has been reported that 'science reached the end of its Latin when in 2012 International Code of Botanical Nomenclature declared as no longer obligatory that the Linnaean binomial classification, but also the description of candidates for new species, be in Latin'[2].

With the increasing use of English as a means of communication, a researcher may more likely want to publish his work in English so that it gets a wider readership. But what has been the trend? We have attempted to study the publication trend in various languages based on data from the *Web of Science* (*WoS*) Core Collection database.

Figure 1 shows that there has been a gradual decline in the number of papers published in non-English languages since 2011. Maximum number of non-English papers (91,434) was published in 1987, after which there was a decline till 2003. The non-English papers increased again between 2004 and 2010, after which the output started declining again. Figure 1 also shows the trend in yearly percentage of non-English papers to the total number of published papers. Since 1977, there has been a continuous decline in the share of non-English papers except for a slight increase in the period 2005–2010.

We selected the top languages based on the number of papers published from 1945 to 2014 indexed in the *WoS* Core Collection database (Table 1). In English language, approximately 48 million papers have been published during the period 1945–2014.

The non-English languages have been analysed for the period 2005–2014. Only articles and reviews have been selected for analysis. From Table 1, it can be seen that maximum number of papers has been published in German. However, those in Chinese have the highest citations per paper (2.86) and *h*-index (52). Portuguese has the second highest average citation rate (2.67) with an *h*-index of 50. For the same period, the *h*-index of papers in English is 1204, much higher than for any other language.

Figure 2 shows that during the period 2005–2014, in addition to German being the top non-English language, there has

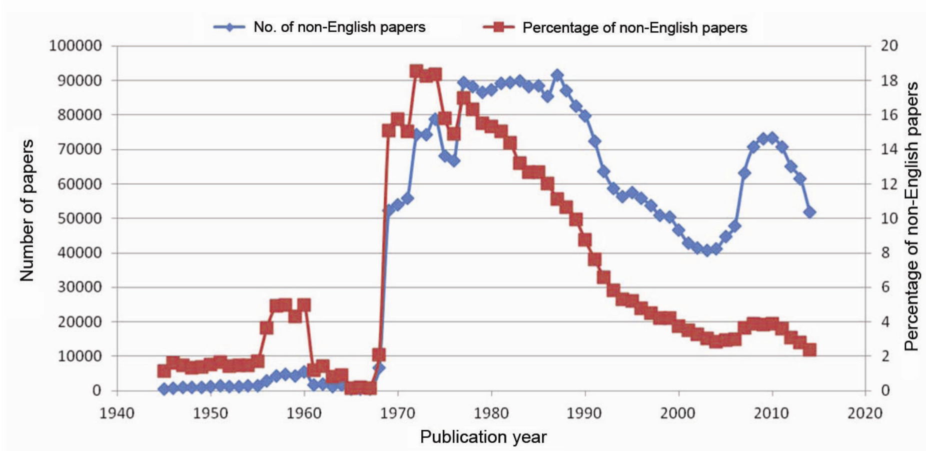

Figure 1. Percentage of non-English papers and year-wise percentage of non-English papers to the total number of published papers.

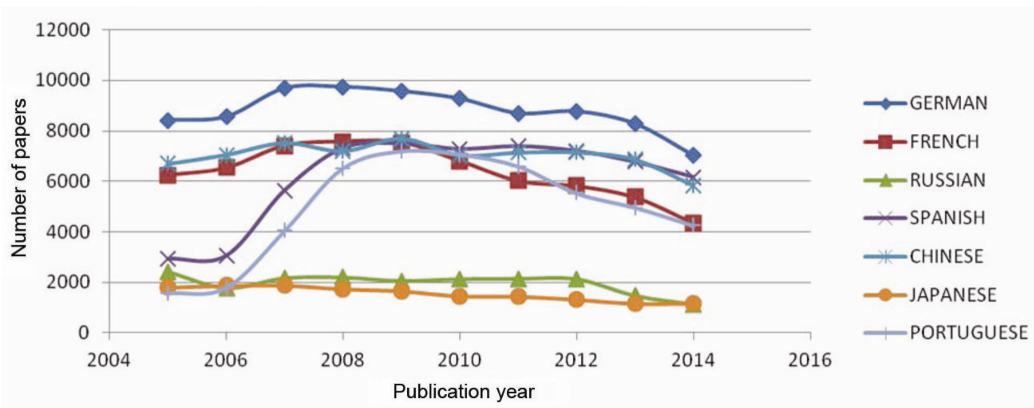

Figure 2. Year-wise publication trend in non-English papers between 2005 and 2014.

Table 1. Comparison of top languages using bibliometric indicators

Language	Papers 1945–2014	Papers 2005	Papers 2014	Papers (*P*) (2005–2014)	Citations (*C*) (2005–2015)	Average citation *C*/*P*	*h*-index
German	968,450	8420	7030	88,107	166,230	1.89	51
French	691,264	6248	4361	63,684	110,800	1.74	41
Russian	685,860	2417	1124	19,624	12,028	0.61	13
Spanish	206,062	2937	6171	61,301	113,679	1.85	44
Chinese	136,956	6702	5850	70,240	201,028	2.86	52
Japanese	129,220	1797	1164	15,466	18,929	1.22	20
Portuguese	73,009	1567	4246	49,551	132,329	2.67	50

also been an increase in the number of Spanish and Portuguese papers. Japanese and Russian language papers have maintained a nearly constant rate of publication. However, there is a gradual decline in the number of papers published in all these languages since 2009.

With increasing preference for English, it is unlikely that the output of non-English research papers may increase in future. According to Gordin[2], 'It is not that one language is more scientific than others but this decline of non-English languages and the rise of English is due to complex historical factors.'

1. https://en.wikipedia.org/w/index.php?title=English_language&oldid=700675769 (accessed on 22 January 2016).
2. Gordin, M. D., *Scientific Babel*, The University of Chicago Press, Chicago, 2015.

NITIN KUMAR
YATISH PANWAR*
G. MAHESH

National Science Library, CSIR-National Institute of Science Communication and Information Resources, 14, Satsang Vihar Marg, New Delhi 110 067, India
**e-mail: yatish@niscair.res.in*

Plate tectonics at the blink of an eye

Tectonic processes on the Earth operate over a scale of millions of years. Today, we only see their cumulative outcome in terms of topographic build-up, evolution of landscape, emergence of island belts, reorganization of tectonic plates, etc. These processes cause crustal deformation through distinct phases of the earthquake cycle. An earthquake cycle operates over tens to hundreds of years. The process of strain accumulation in an earthquake cycle is slow, varying from less than a couple of millimetre per year in the plate interior (e.g. Indian peninsula) regions to less than a couple of centimetre per year in the plate boundary (e.g., Himalayan arc) regions. We do not notice these changes until we use high-precision measurements, e.g. space-based global positioning system or interferometry synthetic aperture radar measurements. However, occurrence of an earthquake, the most prominent phase of an earthquake cycle, in which accumulated strain is released in a few seconds to minutes, makes us realize that the strain which just got released during the earthquake, must have accumulated in the preceding years, which could range from a few tens to hundreds or even thousands of years. Thus an earthquake is testimony to a process which operates over several decades to centuries. In other words, the process of earthquake occurrence actually provides a big window through which we can observe how plate tectonics operates on Earth. Such windows may be few and far separated in time and space, and therefore difficult to experience during one's lifetime. We know that the Indian plate that got detached from the African continent about 95 million years ago, had embarked on its northward journey until it collided with the Eurasian plate, ~40 million years ago, giving rise to the Himalaya. The entire process must have largely been accomplished through the occurrence of several hundreds or thousands of great earthquakes. The direct evidence for all of these has obviously been modified by the subsequent geological processes, but the underlying mechanism is plate tectonics.

What we see today are the two continents, Africa and India, separated by an ocean; we can only infer its past. However, we are currently witnessing a similar process which is underway in the Indian Ocean. The plate motion and earthquake occurrence in the region suggest that the notion of traditionally considered Indo-Australian plate being single and rigid is wrong and the plate boundaries between the India and Australia plates in the region are found to split the Indo-Australian plate, hitherto considered single, into India, Australia, and Capricorn plates. The region of the diffused plate boundaries extends from the central Indian ridge near Chagos bank, eastward past the 90°E ridge to the Sumatra trench, southward along the 90°E ridge, and southeastward throughout the Wharton basin, covering an area of about 6 million km^2. The southwestern part of the plate appears to have already fragmented to produce the Capricorn plate which has a diffuse boundary with the Australian plate along the southern 90°E ridge. Although the process of plate breaking and fracturing in this region is slow, in a span of less than two decades, it witnessed two great and two major