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Book review

Ulrich Ammon, Ist Deutsch noch internationale Wissenschaftssprache? Englisch auch für die Lehre an den deutschsprachigen Hochschulen. Berlin: Walter de Gruyter, 1998. xvi + 339 pp. US$38.

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When this reviewer began his academic career in the early forties at Laval University, their bachelor's degree in science included compulsory courses in scientific German. For someone educated at a time when a reading knowledge of German was a requirement for any sort of specialized degree, the title of this book comes as a bit of a shock. It is like being told that a colleague who one thought was still around had passed away some time ago. When, how and why are the questions that spring to mind. This well-documented study goes a long way in answering these questions. It provides not only a thorough review of the literature on the international status of German as a language of science but also an analysis of the past and present use of German by scientists in different parts of the world. It is based on abundant data covering the past century. These include citation indexes for the natural and social sciences and the humanities, annual national bibliographies and abstracting journals for each science in the United States, Britain, Germany, Russia and other countries, from their first number to the present day. In addition to this, there are the data from the author's rich compilation of references and citations coupled with his extensive survey of the language practices and preferences of contemporary scientists. These data are presented in some 75 tables, ten figures, an appendix and some 400 references. They document, in abundant detail, the century-long decline in the relative importance of German and the other languages of science before the global and inexorable rise in the use of English in scientific discourse. This study also delineates the consequences faced by scholars and scientists forced to publish in a language which is not their own.

All this is presented in five chapters which include, after a glance at the past, a good review of the literature, a citation analysis, a survey of usage, a bibliometric study and an assessment of options and alternatives in training the future German scientists.

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The opening chapter begins with a brief retrospect of the status of scientific German during the first part of the past century. Most of us seem to have forgotten how much the development of each of our sciences depended upon those massive and thorough-going German reference works, especially those devoted to such specialities as industrial and physical chemistry which originated in Germany. So much so, that during the First World War which cut off all contact with Germany, the American scientific establishment became obliged to create its own abstracting services. For example, the unavailability of the *Botanisches Zentralblatt* prompted the Botanical Society of America to launch its own *Botanical Abstracts*. During this period, we also see the appearance of American abstracting journals for bacteriology and other specialties. It is true, as the author takes pains to point out, that most scientifically advanced countries like Britain, France and the United States already had substantial reference periodicals for some of the established sciences. In the United States, for example, the *Zoological Record* had appeared annually since 1864. Yet, if one examines for example, its 1910 issue, on the three sample pages reproduced by the author, out of a total of 30 titles, one can count one in Swedish, two in Russian, 3 in French, 5 in English and 20 in German (of which 3 are bilingual).

It is not only the amount of German science that was important, but also its quality. It seems that most of the Nobel laureates before 1940, if not German, had done graduate work under German scientists, as two pages of examples will attest.

The second section of the chapter is a brief review of the literature on German as an international language of science, most of it based on bibliometric and citation studies. There is also a review of some of the literature on the use of English in non-English science publications and an analysis of current American perceptions of European science.

The final section is devoted to the research objectives of this work and to an assessment of the problems in determining the status of German as an international language of science. This would have to include not only measures of the proportion of science publications in German, but also a measure of the language behaviour of non-English scientists, their working languages, their language of reference, reporting and publication. And finally, the problem of acquiring such data from citation banks and survey research to which the succeeding two chapters are devoted.

The second chapter therefore is the result of the author's citation analysis of national science journals outside Germany and Austria. The method is to select one key discipline in each of the areas of science (natural, social and human), namely, chemistry, economics and history. For each of these disciplines, he selects the leading reference journals in a sample of six non-German-speaking countries: the United States, Russia (USSR), France, the Netherlands, Poland and Hungary. From each of these journals, there follows a compilation by language of the number of citations per decade, where available, for the period between 1920 and 1990. The results appear in a long series of tables. To get some idea of these revealing statistics, let us simply take a look at the figures for German in the leading journal at both ends of the time scale. For chemistry, the number of citations in German in one of the leading American journals falls from 46% in 1920 to zero in 1990; in the USSR, from 37% (in 1930) to 4% in 1990; in France, from 54% to 9%; in the Netherlands, from

58% to 9%; in Poland, from 69% to 15%; in Hungary, from 55% (in 1950) to 44% in 1990.

For economics in the leading economics journal: in the United States, from 1% in 1920 to 3% in 1990; in the USSR, from 7% (in 1950) to 1% (in 1980); in France, from 7% to zero; in the Netherlands, from 29% to 1%; in Poland, from 25% (in 1930) to 1%; in Hungary, from 17% (in 1980) to 10% in 1990.

For history in the leading historical journal: in the United States, from 15% to 13%; in USSR from 2% (in 1940) to zero (in 1980); in France, from 21% (in 1930) to 3%; in the Netherlands, from 45% to 16%; in Poland, from 9% (in 1930) to 39%; in Hungary, from 54% (in 1950) to 8% in 1990.

This remarkable citation analysis is bolstered in the next chapter by an equally well-designed survey of the use of German by scientists in seven non-German countries: the United States, Russia, France, the Netherlands, Poland, Hungary and Japan. The questionnaire (which appears as an appendix) was developed and pretested in the author's home university (Duisburg) and its English and French versions collated and re-tested. Copies were sent out in 1991 and 1992 to sample scientific centres and universities in each of the seven countries. Out of 1520 sent, 835 were returned – a good 55% response rate.

On the basis of these returns, the author was able to complete numerous tables showing the relative knowledge and use of foreign languages by the scientists in each of these countries. For reading knowledge, if we add the 'good' and 'very good' self-ratings, we get 82% for English, 61% for German, 50% for French and 44% for Russian, reflecting in part languages taught in school. Frequent use of documents in these languages was somewhat lower at 57% for English, 18% for German, 9% for French and 4% for Russian.

Publishing ('often' + 'sometimes') in these languages was still lower: 27% in English, 12% in German, 5% in French and 4% in Russian.

The survey also showed that knowledge and use of German varied between disciplines, countries and generations. For history it was 74%, chemistry, 63% and economics 59%. Country-wise, the Netherlands led with 97%, followed by Hungary with 69%, and France 46%. The younger generation (under 45) felt more secure in the language than did their older colleagues.

The survey also attempted to measure the language attitudes of the scientists. Whether it was a matter of preference, importance or motivation, the rank-order was always the same: English, German, French. So was the belief in the language preferences of science journals – 75% believing that journals publish in English only. However, in belief in the traditional importance of the different languages and cultures for the development of science, the proportion was somewhat different: German (50%), English (45%), French (23%).

Data from the survey coupled with the author's foregoing citation analysis are greatly enriched in the fourth chapter by the addition of statistics from the extensive compilation of Large, Ellen and especially of those of Tsunoda (1983) of the languages of articles cited in such authoritative abstracting journals as for example, the *Chemisches Zentralblatt* with its 150 years of continuous publication. These statistical studies have revealed a continual use in the proportion of natural science articles

in German from 1880 to 1920, surpassing (at 42%) the percentage attributed to English. From that point on, one notes a steady decline to a nadir of 9% in 1970.

Since the period covered by these studies ends in 1980, it was important to see the extent to which the trends they reveal extend to the end of the century. For the period beyond 1980, the author draws his data from the most complete abstracting journals available in the natural and social sciences. From 1980 to 1996, he finds that the numbers of references to articles in German continues to decrease in the natural sciences: percentage-wise, in biology (3 to 1), chemistry (12 to 2), physics (4 to 1), mathematics (4 to 1), and in medicine (6 to 2). There is a corresponding increase in English in these sciences to 85%, 83%, 96%, 94% and 88% respectively.

All this at the expense not only of German but also of French, Russian and the other languages of learning including Italian, Spanish, Dutch, the Scandinavian languages and more, which all together have accounted for less than 10% of the journal references in the natural sciences. Within this minority, one notes a slow but steady rise in Japanese to beyond the 2%-level. One also notes that some of the most demographically powerful languages with speakers numbering in the hundreds of millions, just do not figure.

In the social sciences and humanities, the picture (from 1975 to 1995) is somewhat different; but most trends remain. References to German articles have declined in philosophy (12% to 6%) and history (9% to 5%) while in sociology there is a slight upturn (3% to 4%).

One must constantly keep in mind, however, that all this refers to language use: not to science, but to its documentation. A citation index is not the measure of scientific creation or production. In 1975, for example, on data provided by the *Science Citation Index* one can deduce that although the United States accounts for 22% of the world's scientific production, it takes up 65% of the citations. Nor are these citations a measure of quality. Although the citation impact rate for the U.S. was a respectable 8.8, that for Switzerland was 11.1 – but only for articles published in English. In the field of chemistry, although 83% of the references were in English, the U.S. took out only 8% of the patents, as against 57% for Japan with about 2% of the references in Japanese. It would seem that one would have to skim off much of the hype and halo effects to get at the hard data on scientific innovation.

In sum, contemporary citation data, most of which is American, are measures of the impact of English on the language behaviour of scientists, but also to some extent of the level of language competence and behaviour in the United States, attributable perhaps to the backwardness in foreign languages in the general education of its citizens.

The final part of this chapter is an attempt to explain this deep decline in the status of German. The author points to such factors as the economic devastation which ravaged Germany after the First World War, the treatment of scientists under the Nazis, and the post-war brain drain. He also points out the faster rate of progress in the English-speaking world, its soaring GNP, its growing market share of publications, the shift of the centres of learning away from Europe, the globalisation of American computer content and the quasi-monopoly of Internet providers in addition to the attraction of well-funded American prestige centres. There is also the inherent

intolerance of code diversity in communication systems and the momentum of usage: the more a language is used for a certain purpose, the more it will continue to be used.

Yet the author does not demonstrate how all these intervening factors are interrelated and mutually re-enforcing. For example, how the counter-productive European system of interlocking bi-lateral treaties led to the First World War, and coupled with its vengeful aftermath (including the systematic blackballing of German science) incited a more conciliatory American administration eventually to turn its back on Europe with its unending squabbles. This double isolation led to an inward-looking Germany which envisaged its redemption in the ideology of ethnic nationalism leading to a second war and second devastation within a century. It was within this socio-political European and American context that Germany and Austria lost their great thinkers to America and Britain – including those of the Frankfurt School and the Vienna Circle – never to return. During their most productive years they could only witness from afar the subversion of their science to the service of the cruel and mindless ideology that had imprisoned their homeland. In other words, an explanation of the role of Germany within the socio-political ecology of the century would have helped us understand the change in the status of its language.

All the foregoing has led to two conclusions: that English is indeed the leading language of contemporary scientific discourse and that most of the world's scientists can and do get by without benefit of German. The author has also concluded that these trends show no signs of changing any time soon and that the probability of German regaining its pre-eminent position as the language of science is slight. Having established this, the author devotes the final chapter to its implications for the future of German science and the training of scientists.

As a language of science, he presents English as a giant among pigmies (specifically one with a height of 170 cm among creatures no more that 10 cm tall. Neither German nor French, nor Russian, which have had their day, is likely to replace it. It is significant that leading and semi-official-scientific journals in nation-states like France should decide to publish in English. So is the frequent appearance of articles with titles like 'Le français scientifique en chute libre' (Scientific French in Free Fall) and 'Von Deutsch keine Rede' (No question of German) and 'Englisch als deutsche Wissenschaftssprache' (English as a German Science language).

In this predicament, two options are posited: 1. German as the exclusive teaching medium and research language. 2. The use of English in both research and teaching. In other words, should German be the only scientific language of German-speaking countries?

Before answering this question, the author invites us to distinguish between the cognitive and communicative aspects of research. Cognition-wise, the German language is as well equipped as any to deal with any scientific concept. Its *Ausbau* rating (Kloss) is as high as that of English and it has the advantage of being the first language of the population.

Intercommunication of scientific research is another matter. Here one must further distinguish between access and diffusion. To obtain access to the fruits of scientific

research in the world, a knowledge of German is insufficient – as the foregoing chapters have amply demonstrated.

There remains the question of diffusion – specifically the language of publication of the German scientist who has to consider the following: (a) the contribution that could be made to the advancement of science for theoretical or practical purposes, (b) the critical feedback obtainable from the world of specialists, (c) the increased prestige of a wider readership including possible long-term material rewards.

It is true that German countries are well-served in German in all fields of basic science. Yet for the rapidly expanding leading edge of international science, English is indispensable ("die Spitzenforschung spricht englisch"). That is, unless the altruistic scientific pioneer is content to remain unheralded and unknown. And it is indeed well-known that European science is largely ignored by American science journalists.

This means that the place of English in German education has to be re-evaluated for each type and level of schooling. Since the results of school English have proven to be grossly inadequate, including English for special purposes, one should examine new types of schooling and educational experiments that have succeeded. The author points to the binational and international schools, the language achievement of student exchanges, study terms abroad, and the possibility of generalised bilingual or trilingual schooling in German, English and a third language. It would be therefore important to regard academic English as the neutral lingua franca of science, as was Latin until the 17th century in all German universities.

To these proposals, the author anticipates a host of objections. So he takes pains to give each of them its fair share of the final chapter. They include: all the usual arguments against reforming education, the dissolution of the German speech community and its nation-states, loss of alternative ways of looking at knowledge, decline of German as a foreign language, and the creolization of German, widening of the gap between the specialist and the lay people, wastage of school time which could better be devoted to science, the stigma of non-native English and the subversion of culture in education.

These questions also apply to the education of scientists in all countries outside the English-speaking world. So that the scope of this book becomes much wider than its title would suggest. Its contents should be of interest to both educators and scientists in most countries.

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