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ORIGINAL ARTICLE

# Scientific language trends among Swedish urologists and surgeons 1900–1955

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## Abstract

**Purpose** Before English took the lead as the prime scientific language among northern European urologists and surgeons, German was widely regarded as the "lingua franca". This shift has to date not been systematically reconstructed. This article provides insights into the question how political and social factors influence how physicians communicate with each other, what they read, and how the constellations of international scientific communities in medicine change over time.

**Methods** Through a language analysis of more than 2000 articles, including their references, in major Swedish medical journals as well as surgical doctoral dissertations defended at Swedish universities, this paper explores scientific language trends during the first half of the twentieth century among Swedish physicians for the first time on a large scale.

**Results and conclusions** The study shows that Swedish urologists and surgeons generally did not switch to English during the years immediately after the First World War, as has been documented in other countries. After a decrease during the first 10 years after the First World War, the German language dominated among Swedish urologists and surgeons from the 1930s until the early 1940s, when English first dominated at large. The rapidity of this process shows that almost all surgical researchers had changed from German to English within just a few years.

**Keywords** History of medicine · History of urology · Scientific languages · German · English · Sweden

## Introduction

Historians agree that Germany was a "Mecca of Medicine" at the turn of the twentieth century that attracted physicians from around the world [1], including Scandinavian physicians [2]. German textbooks were an integral part of the medical curriculum in northern Europe, and Germany as well as Austria–Hungary were among the most popular countries for study trips during the first half of the twentieth century [3]. Scandinavian researchers in urology and surgery published papers in German, not only in German journals, but also in Scandinavian journals to reach an international audience [4, 5].

The leading position of German science is reflected in the fact that most Nobel Prizes in the categories physics, chemistry, and physiology or medicine were awarded to German researchers during the first three decades of the twentieth century [6, 7]. Thus, it comes as no surprise that German was widely regarded the "lingua franca" in science and medicine before the shift to English took place as an effect of the First World War, as, for example, historian Michael Gordin has demonstrated [8]. The change from German to English occurred among Scandinavian physicians as well, but the trends have not yet been systematically reconstructed. As for Sweden, which will be our focus in this paper, commentators suggest that there was a break regarding the use of the German language after the Second World War, when English became the first foreign language taught in Swedish schools [9]. Others have argued that the first steps in this direction in the field of medicine were taken decades earlier [10]. The German philologist Roswitha Reinbothe has shown that there were strong protests by Scandinavian, Swiss and Dutch surgeons when the International Society

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of Surgery (ISS/SIC) tried to downplay German as one of the official scientific languages at its congresses during the 1920s [11, 12]. The discussion about the German influence within the ISS/SIC had by then been going on at least since the beginning of the First World War, when the board excluded German members [13]. In the AIU/SIU (International Urological Association), the Germans and Austrians were excluded for the first time after the First World War [14]. Similarly, the organizers of the International Congress of Ophthalmology in Washington DC in 1922 had because of political reasons blocked both German and Austrian colleagues and the German language from the meeting. One of the strongest critics against this decision was the Swedish ophthalmologist and Nobel laureate (1911) Allvar Gullstrand (1862–1930). He suggested that scholars from Germany and Austria should be invited to the next congress in London in 1925 and that German then also, as in earlier years, should be one of the official languages (his proposal was at first accepted; however, complications arouse later) [13]. If these examples touch upon reactions by international physicians in an international setting, Swedish pharmacologist Göran Liljestrand (1886–1968) took a national and empirical standpoint when he reconstructed a rather smooth change from German to English titles during the 1930s by looking at doctoral dissertations in medicine at the Karolinska Institute [15]. Apart from these contributions, it is surprising that an in-depth study of the historical trends of German as scientific language among Swedish physicians has remained a desideratum. Analyzing more than 2000 articles in major Swedish medical journals and surgical dissertations, this paper explores scientific language trends during the first half of the twentieth century among Swedish surgeons for the first time on a large scale. At a more general level, the article raises questions about how political and social factors influence how physicians communicate with each other, what they read, and how the constellations of international scientific communities in medicine change over time. The study is part of an ongoing project on the circulation of knowledge in medicine across the Baltic Sea during the twentieth century.

## Materials and methods

For our analysis, we have completed language studies of two major Swedish journals, *Acta Chirurgica Scandinavica* and *Hygiea*, as well as an overview of surgical dissertations defended at Lund University in southern Sweden and at the Karolinska Institute in Stockholm.

*Acta Chirurgica Scandinavica* was a surgical journal published 1920–1990. It contained articles in all fields of surgery, including urology, orthopaedics, neurosurgery and thoracic surgery, usually written by Scandinavian authors. Acta accepted articles in German, English and French. We have registered the language of articles published by Swedish authors from 1920 to 1950 and for each year counted the papers published in these three languages. A total of 973 articles are included.

Furthermore, we also examined the language of the references used in the articles to see if there was any preference depending on the language of the article. We chose to study the years 1934 (531 references in both English and German articles), 1945–1946 (165 references in English-speaking articles), and 1954 (228 references in English-speaking articles). This 20-year period was chosen to evaluate if the Second World War had any impact on the choice. In 1945–1946 and in 1954, the number of German-speaking articles was too low to make an evaluation possible. Our second text corpus consists of doctoral dissertations. In Sweden, the monograph produced in conjunction with a dissertation can still today be written in Swedish, Norwegian, Danish, English, German or French. We studied surgical/urological dissertations during the period from 1901 to 1956. In that period, a dissertation monograph usually contained 100–200 pages. Often it was published as a supplement to the *Acta Chirurgica Scandinavica*, or extracts of it was published as separate articles, again predominantly in the "Acta". The number of surgical monographs in Swedish, German, English or French during this period was registered. University departments of Surgery included at that time all fields of surgery and urology. We chose two Departments of Surgery, Lund University and the Karolinska Institute in Stockholm, and to present them separately to elucidate if there were any local preferences. All surgical/urological dissertation monographs, 32 from Lund and 62 from Stockholm, were included.

*Hygiea* was a medical and pharmaceutical journal, published in Swedish by the Swedish Society of Medicine (*Svenska Läkaresällskapet*) between 1839 and 1938. It was succeeded in 1939 by the journal Nordic Medicine *(Nordisk Medicin)*, with contributions from all Scandinavian countries. One section of *Hygiea* was devoted to "Reviews of books and articles". We have counted all reviews of books and articles from 1900 to 1938. The reviewed publications were then, for each year, divided into the language categories German, English and French. The reviews where the reviewed book or article was published in a Scandinavian language were omitted. Further, what mattered was the language, not the country of origin. For example, an article by a Scandinavian author written in German was included in the "German" group. A total number of 1272 reviews of articles and books in German, English or French were included in the present study.

Statistical comparisons were made using $Chi^2$ or unpaired Student's *t* test (two-tailed) when appropriate.

## Results

### Article language in *Acta Chirurgica Scandinavica* 1920–1950

Figure 1a summarizes the relative proportion between the three languages in articles written by Swedish authors. From 1920 to 1923, the proportion between articles in German and in English was roughly equal. From 1924 to 1927, there were considerably more articles in English than in German. Then the situation reversed; between 1928 and 1943, the number of articles in German dominated throughout the period, except for 1 year (1939). In 1944 and in the following years, a rapid relative decline in articles written in German, and a corresponding increase in English articles occurred. The relative proportion of articles in French was low throughout the examined time-period. In 1950, 100% of the articles were in English. We have not been able to trace any instructions to authors with regard to language. However, we found one German-speaking article from Denmark, written in 1951, and a

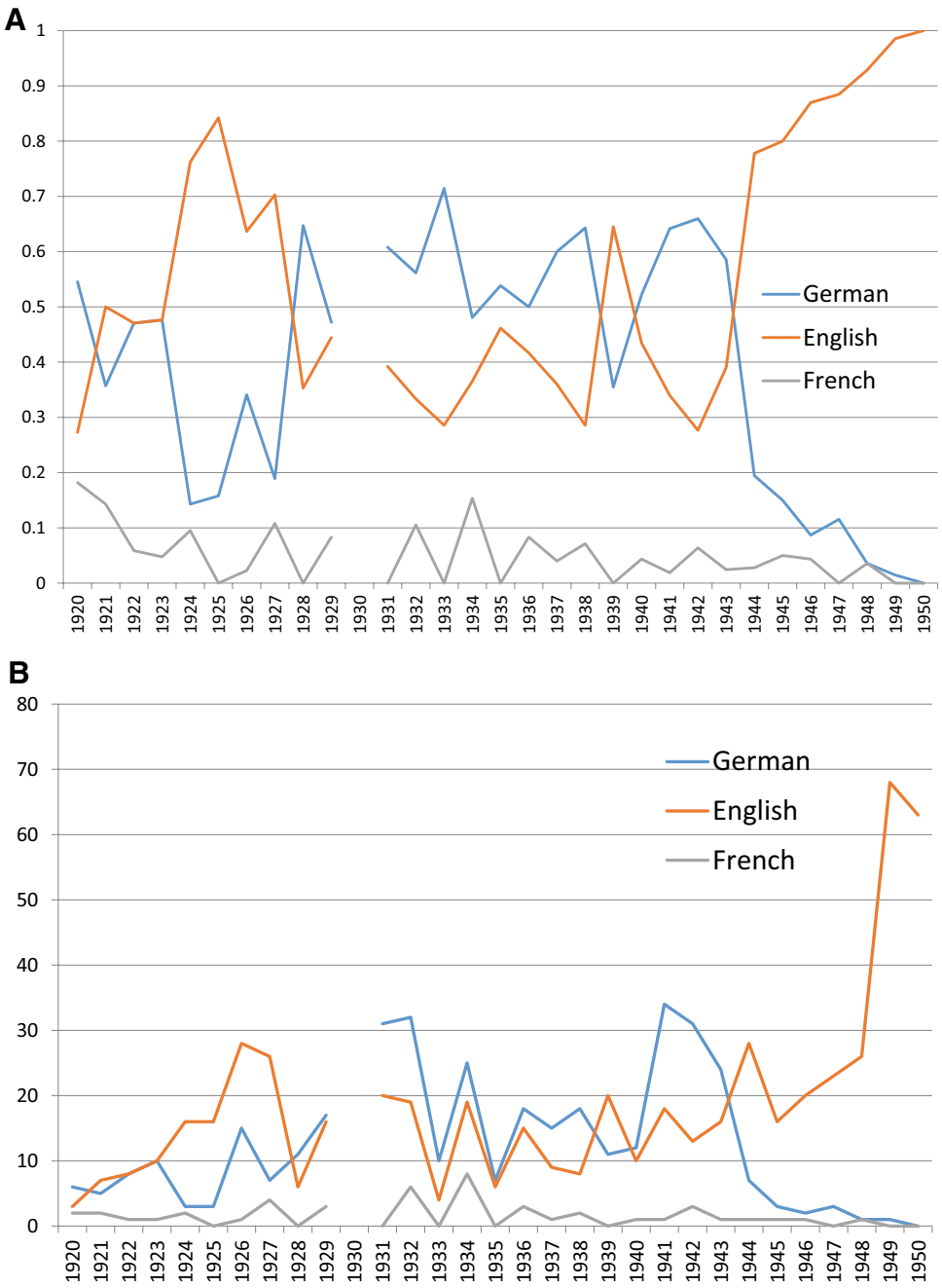


**Fig. 1** **a** the relative distribution between German, English and French as the publications by Swedish authors in *Acta Chirurgica Scandinavica* between 1920 and 1950. **b** the corresponding number of articles. There were no date of publication in the individual articles and when the volume number was transformed to year of publication this created an apparent lack of publications from 1930 which is artefactual

French-speaking from Switzerland in 1954. This speaks against a formal prohibition of German and French, as was the case with some other journals. The editors of the Swedish scientific journal *Geografiska Annaler*, for instance, explicitly stated in 1925 that non-German authors were no longer encouraged to submit papers in German [11].

There was in *Acta Chirurgica Scandinavica* a remarkable increase in the number of articles per year after the Second World War. This makes the impact of the shift to English as the language of the publications by Swedish authors even more impressive when expressed in absolute number of articles (Fig. 1b).

The relative number of articles in German 1944–1950 is (unpaired Student's *t* test, two-tailed) significantly ($p < 0.0001$) lower than 1938–1943 (6 years each).

What about the references in the articles? The hypothesis to be tested was that there is a correlation between the language of an article and the language of the references in the article. The reason for this was the assumption that an author chose a foreign language with which he or she was most fluent. There might, thus, have been a bias in the choice of references. It could also be possible that an author out of political reasons abstained from referring to papers written in a specific language (see, e.g., the ISS/SIC and AIU/SIU discussion above).

We compared the language distribution of the references in papers in German, English and French in *Acta Chirurgica Scandinavica* by Swedish authors for the year 1934. The results are shown in the two diagrams given to the left in Fig. 2. The distribution of references was roughly the same irrespective of whether the article was in German or English (in fact, a $Chi^2$ test did not show any significant difference). Thus, around 60 per cent of the references this year were to German-speaking articles, irrespective of whether the article was written in German or English. In English articles from 1945 to 1946, the distribution of reference languages had changed compared with the situation in 1934, with a decrease in German- and an increase in English-speaking references. This change was significant compared with the distribution in English-speaking articles in 1934 ($Chi^2$, $p < 0.001$). In 1954, these changes had become even more pronounced with about 80% of the references now being in English. For the years 1945–1946 and 1954, there were not enough German articles to make a similar analysis possible.

## Language of doctoral dissertations in surgery at Lund University and at the Karolinska Institute

Upper panel in Fig. 3 shows the language of the dissertation monographs at the Department of Surgery at Lund University from 1901 to 1956. Except for one German monograph in 1901, all were in Swedish until 1927. From 1930 to 1942, all were in German. The last in German is shown in Fig. 4, left panel. The first time a monograph was written in English was in 1944 (see Fig. 4, right panel). From 1944 to date,

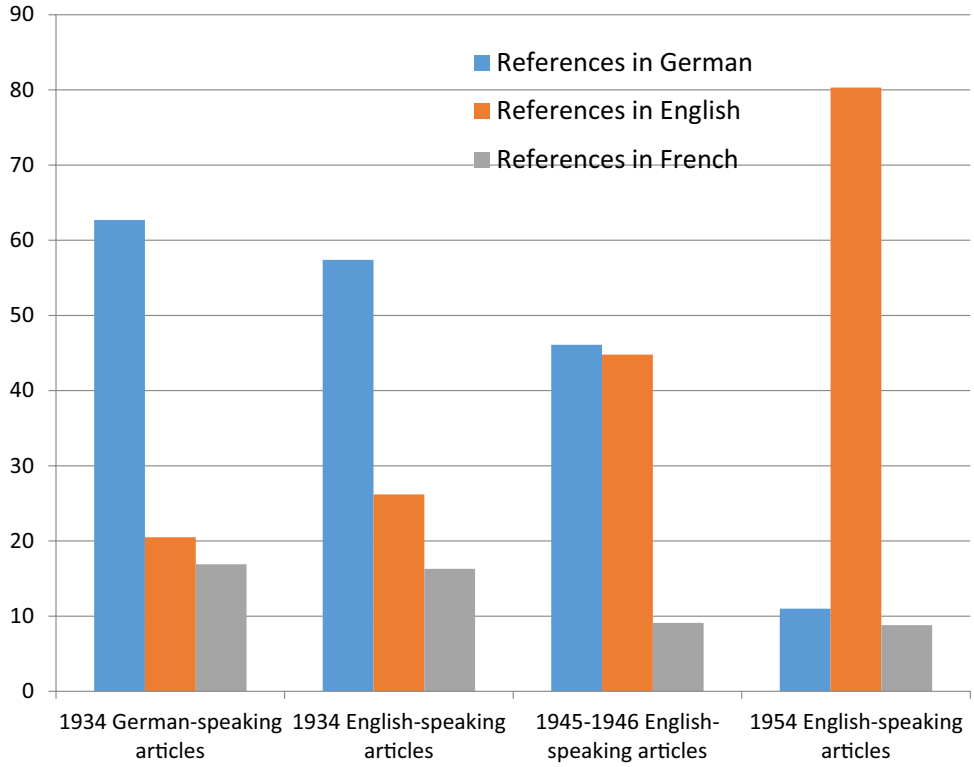


**Fig. 2** The language of the references referred to in the *Acta Chirurgica Scandinavica* are shown. The two left diagrams compare the relative language proportions of the references in German-speaking and English-speaking articles by Swedish authors 1934. The two diagrams to the right show the corresponding distribution in English-speaking articles 1945–1946 and 1954

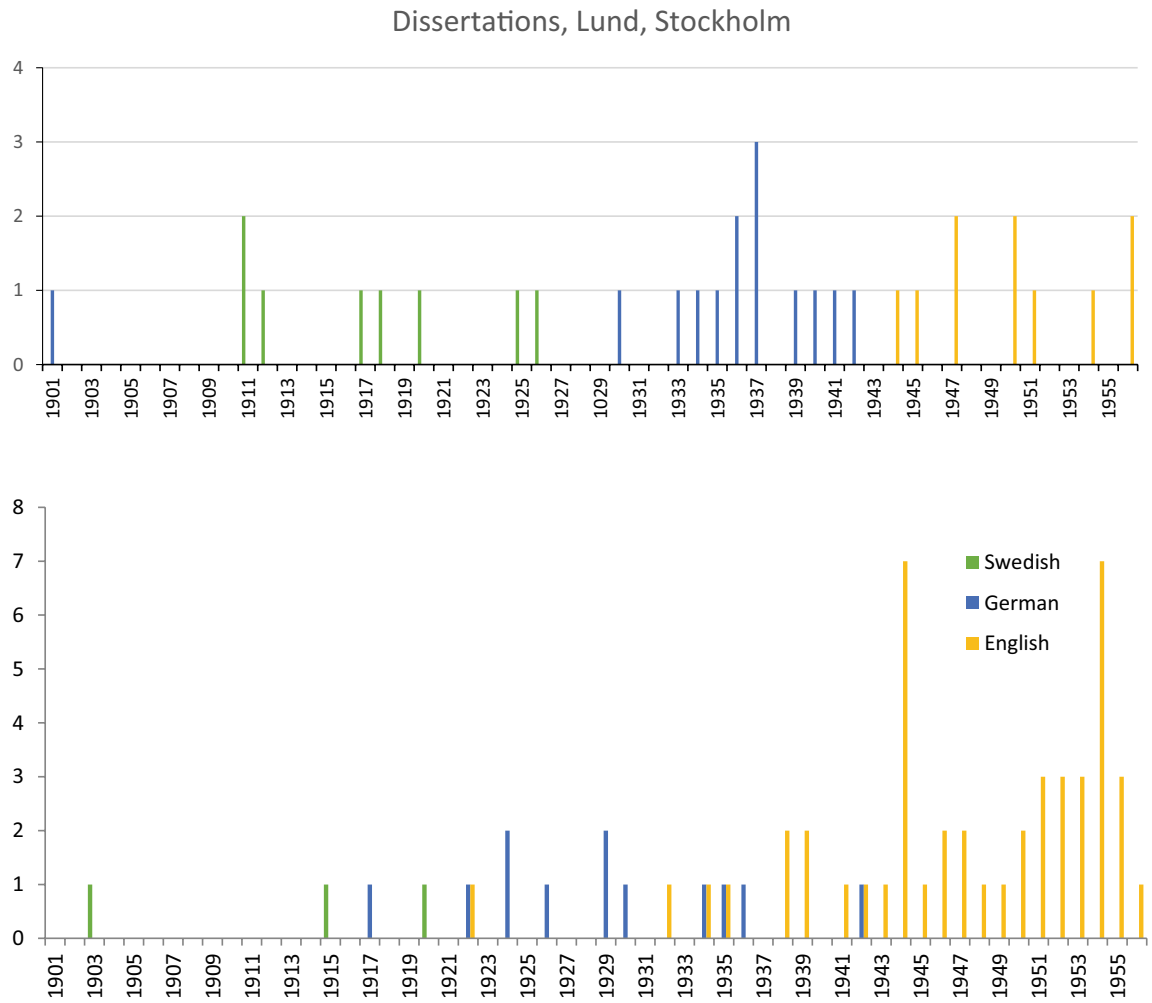


**Fig. 3** This figure shows the language of doctoral dissertations in surgery between 1901 and 1956 in Lund (upper panel) and in Stockholm (lower panel)

there has not been a single monograph in German, and only one in Swedish.

The situation was more complex at the Karolinska Institute. Initially Swedish dominated, and from 1923 to 1942 there were monographs written in either German or English. During this time-period, English became more and more common. The last monograph in German was from 1942. Since then, English has been the only language used.

### Book and article reviews in *Hygiea* 1900–1938

This is an attempt to evaluate in quantitative terms the language of books and articles in medicine in general that attracted the interest of the *Hygiea* readers which were Swedish physicians of all disciplines. Figure 5 summarizes the results. Throughout the period from 1900 to 1938 (the last year *Hygiea* was published), German articles and books were in majority. There is, however, over time, an almost linear slowly decreasing relative number of publications in German, and an increase in publications in English. The relative proportion of German-speaking publications 1938 is still almost twice as high as for those written in English. The number of reviewed publications in French is considerably lower and the relative number does not change over time.

## Discussion

Scholars have suggested that the USA already around 1910 had surpassed Germany in terms of research infrastructure and research in the natural sciences and in medicine [16, 17]. Similar statements have also been proposed in recent contributions within the history of surgery [18]. How did these developments affect Swedish physicians and their choice of scientific languages? Our results suggest a complex relation among Swedish surgeons with regard to their

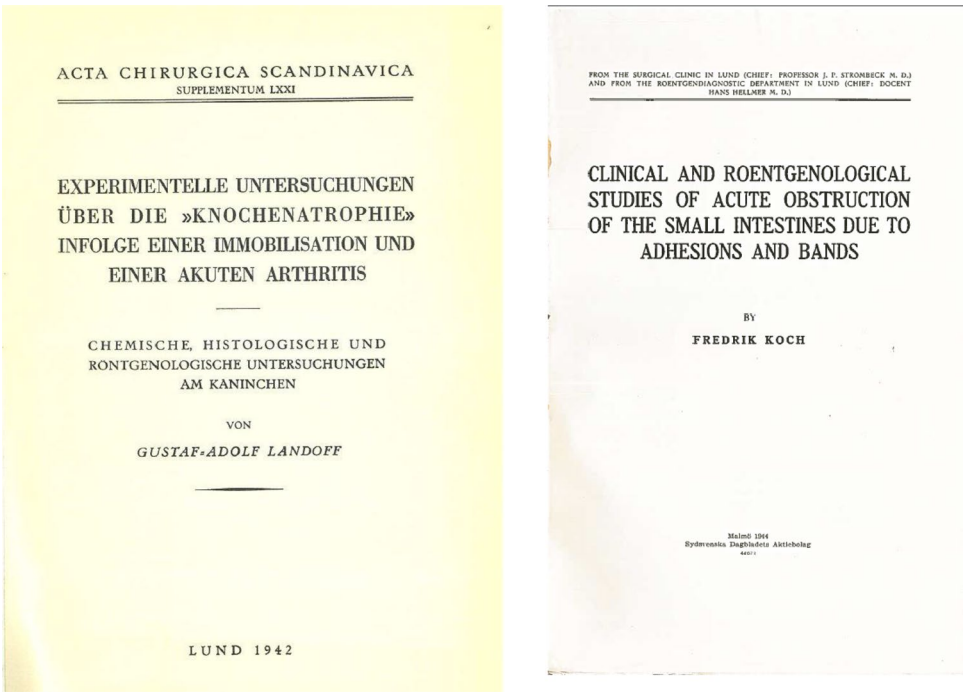


**Fig. 4** The last thesis in German (left) and the first in English (right) at the Department of Surgery, Lund University

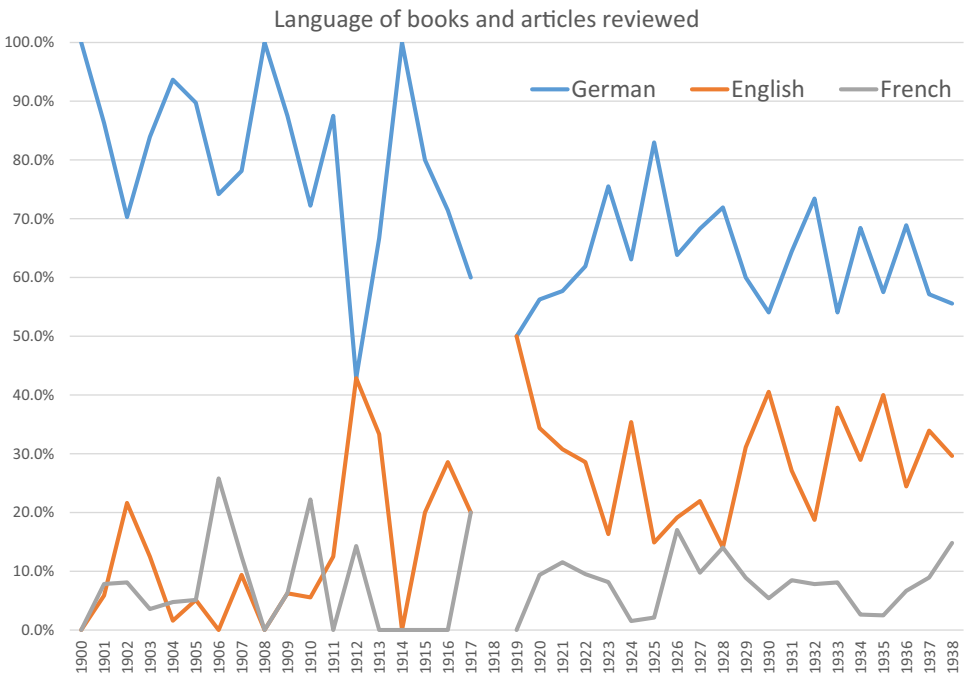


**Fig. 5** The language of articles and books that were reviewed in the journal *Hygiea* between 1900 and 1938. Reviews of publications in other languages than German, English or French are omitted. There were no reviews published during 1917

use of German in scientific publications. During the 1920s, the use of German in original articles in surgery and allied sciences showed a pronounced decrease, as seen in Fig. 1a, b. This coincides with the abolition of the language in some international meetings. As indicated in the introduction, this led to an opposition by Swedish researchers, who generally considered German as their primary scientific language, but probably also to an adaptation to the prevailing conditions as a result of socioeconomic and political reasons. However, the increase of English in surgical papers in *Acta Chirurgica Scandinavica* did not last; from 1928 and onwards the number of German papers recovered remarkably, and German was in fact until 1943 used considerably more than English every year except in 1939. Our analysis also shows that, even in English-speaking articles, more than 50% of the references

were to German-speaking papers. Also, during the 1930s, monographs published in conjunction with medical dissertations were often written in German as opposed to the situation in the 1920s when the monographs were usually in Swedish. We found an interesting difference between Lund, where all surgical doctoral dissertations between 1930 and 1942 were in German, and Stockholm, where there was a more even distribution of German and English-speaking monographs, with a slow shift towards English during that time-period. We speculate that this could be due to preferences by the head of the Surgical Department or the geographical proximity between Lund and Germany. The last monograph in German in both Lund and Stockholm was published in 1942. Since then all monographs except one (which was in Swedish) have been in English. German as a scientific language in the *Acta Chirurgica Scandinavica* had a strong position until the midst of the Second World War, with a tendency to become even stronger (Fig. 1a, b). Then a dramatic change occurred: within just a few years, German virtually disappeared. In addition, the number of references to German-speaking articles decreased. In 1955, 80% of the references were in English, and only 10% in German. In 20 years, references to German-speaking papers had, thus, gone down from 60 to 10%, while English-speaking references had increased from 20 to 80%. The use of French has been very limited throughout the period, and it even decreased during and after the Second World War.

Figure 5 suggests that there was a slow but steady decline in the interest of medical books and articles in German, which would be contrary to the development in surgery described above (see, e.g. Fig. 1). We believe, however, that the decline of German in Fig. 5 is illusory. It can be explained by a relative increase in the number of publications in English, and consequently a relative decrease in publications in German worldwide.

In summary: our study shows that Swedish surgeons generally did not switch to English during the years immediately after the First World War, as has been documented in other countries [8, 12]. In contrast, we found a more complex development. After a decrease roughly during the first 10 years after the First World War, the German language dominated among Swedish surgeons from around 1930 until the early 1940s, when English took the lead. Then, the use of the German language in Swedish journals and academia imploded. The rapidity of this process shows that almost all surgical researchers had changed from German to English within just a few years.

English has become the gatekeeper to discourses in medicine. For example, to qualify for Scopus, Elsevier's abstract and citation database for peer-reviewed journals, one inclusion criterion is that there is an English abstract. As many other scholars in European countries, the Swedes followed the language transfer to English to reach a larger audience. This shift from German to English has so far been a trend towards irreversibility.

In this process, even the titles of German scientific journals have been changed to English, such as *Zeitschrift für Zellforschung* which became *Cell and Tissue Research* in 1973, *Pflügers Archiv* became *Pflügers Archiv—European Journal of Physiology* in 1975, and *Langenbecks Archiv für Chirurgie* was named *Langenbeck's Archives of Surgery* in 1998. Further research is needed to elucidate the multifactorial reasons of this language shift.

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**Author contributions** NH project development, management, data analysis, manuscript writing/editing. FM data analysis, manuscript writing/editing. TH data analysis, manuscript writing/editing. BU project development, data analysis, manuscript writing/editing.

## Compliance with ethical standards

**Informed consent** For this type of study, informed consent is not required.

**Conflict of interest** The authors declare that they have no conflict of interest.

**Research involving human participants and/or animals** This article does not contain any studies with human participants or animals performed by any of the authors.

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