Normat. Nordisk matematisk tidskrift **61**:2–4, 111–132 Published in March 2019

Language choice in scientific writing: The case of mathematics at Uppsala University and a Nordic journal

Christer Oscar Kiselman

Abstract. For several centuries following its founding in 1477, all lectures and dissertations at Uppsala University were in Latin. Then, during one century, from 1852 to 1953, several languages came into use: there was a transition from Latin to Swedish, and then to French, German, and English. In the paper this transition is illustrated by language choice in doctoral theses in mathematics and in a Nordic journal.

1. Introduction

The purpose of this note is to show how language choice in mathematical dissertations presented at Uppsala University changed during one century, from 1852 to 1953—a rapid change in comparison with the more stable situation during the centuries 1477–1852. We shall also take a look at languages chosen by mathematicians in Sweden in the journal *Acta Mathematica* from its start in 1882 and up to 1958.

This study was presented at the Nitobe Symposium in Reykjavík (2013 July 18–20) entitled *Languages and Internationalization in Higher Education: Ideologies, Practices, Alternatives*, organized by the Center for Research and Documentation on World Language Problems (CED).

2. A beginning in the vernacular of the learned

In a bull dated 1477 February 27, Pope Sixtus IV granted permission to the Archbishop of Uppsala, Jakob Ulvsson, to establish a university there.[1] The Archbishop was appointed Chancellor of the new university, which was the first in northern Europe and remained the northernmost for 163 years, until the founding in 1640 of Sweden's third university in Åbo (now Turku in Finland). The university, with its four faculties—Theology, Law, Medicine, and Philosophy—had the right to confer the degrees of Bachelor, Master, Licentiate, and Doctor. (Lindroth 1975a:129–131, 1976:6.) However, the doctor degree was limited to the Faculties of Law and Medicine (Carl Frängsmyr, personal communication 2014 March 03). In the Faculty of Philosophy, to which mathematics belonged, the degree was not sanctioned by the state until 1870.

[1] Sixtus lived 1414–1484 and was pope 1471–1484. Jakob Ulvsson was born in the 1430s, died in 1521, and was archbishop 1469–1515.

There was no activity at Uppsala University during most of the sixteenth century:

> The close connection between University and Church afforded a false security, a total dependence on the Archbishop's personal benevolence. Thus when Archbishop Jakob Ulvsson retired in 1515, the University stood without patronage. Teaching soon went into decline and the few lecturers and students dispersed. Sweden entered the epoch of the Reformation, a time of revolutionary crises in religion and politics, which resulted in the suppression of Catholicism in the country. And with that, the medieval university also ceased to function. (Johannisson 1989:12)

> In Uppsala the University was fast asleep and, for the time being, nothing was being done to awaken it. This was something of a national scandal and was also regarded as such in some quarters. (Lindroth 1976:16)

The university was "re-born" in 1593 and formally "resurrected" by an act of government dated 1595 March 15. "In 1599, 32 students were enrolled, making 150 altogether." (Lindroth 1976:25).

There was, however, no change of language: also after the resurrection all lectures in all subjects were held in Latin. This was so obvious that it did not need to be mentioned in the regulations (Tengström 1973:42). Dissertations were also in Latin.

Ernst Mauritz Dahlin (1843–1929) published a detailed account of mathematical activity in Sweden before 1679 (Dahlin 1875). Actually very little is known about mathematics in Uppsala before the resurrection in 1595. Anyhow, no other language than Latin appears in the texts written by the mathematicians mentioned in his article.

Also during the time of the so-called Swedish Empire, 1611–1718, Latin had a dominating place in the education (Tengström 1973:62). At Lund University, all lectures at the end of the seventeenth century were in Latin, and the deliberations of the university board were held in Latin, although the minutes were written in Swedish (Johannesson 1982:217).

3. A transition to Swedish

An autopsy performed by Olof Rudbeck (1630–1703) in 1677 was conducted in Swedish. His choice of language was an exceptional and most shocking event, and was heavily criticized (Annerstedt 1908:172–173, Tengström 1973:63, Teleman 2003:16).

During the eighteenth century there was a gradual transition of the lectures from Latin to Swedish, first at Lund (Annerstedt 1914:151) and later at Uppsala, but a part of the scientific publications was still in Latin (Tengström 1973:81–84). Latin started to disappear as a language of instruction from the 1720s, but in the catalogues, lectures were still announced in Latin up to 1852 (Lindberg 1994:78). Dissertations were usually presented in Latin up to the reform of 1852 (Tengström 1973:90).

It is noteworthy that mathematical education existed also outside the universities: Anders Gabriel Duhre (1680–1739) gave lectures in mathematics during the period 1717–1723 at the *Fortifikationskontoret*, the National Fortifications Agency, in Stockholm. His lectures were held in Swedish since his audience there knew little

or no Latin. Later, he also lectured in Swedish on mathematics in central Uppsala, quite close to the university, a fact which was considered by the university as a kind of hostile competition. (Nordisk Familjebok, volume 6, 1907; Staffan Rodhe, personal communication 2015 April 24.)

The first professor of economics in Sweden was Anders Berch (1711–1774), nominated by the king on 1741 September 16 to be *Professor jurisprudentiae, oeconomiae et commerciorum* (Liedman & Persson 1992:262). In several respects, this professorship represents a rare exception in the university politics of Sweden. Parliament decided not only to create the chair, but also who should be its first incumbent. Moreover, His Majesty the King, i.e., the government, decided, in accordance with the wishes expressed by Parliament, that the new professor should lecture in Swedish, and that all thesis presentations in this field should be held in Swedish (Segerstedt 1971:58, 97; cf. Lindroth 1976:124–125). The reason was clear:

> Sweden had been drained of manpower and capital, been reduced from a great power to an insignificant minor state on the edge of Europe. The situation called for quick remedies. In the economic field, mercantilism was making a vigorous breakthrough [. . .] (Johannisson 1989:42)

> Swedish gradually came into use in lectures and publications during the 18th century. There was a pressure from the outside, prompted by the spirit of bourgeois public utility. (Lindroth 1976:124)

However, this was the only official exemption from the use of Latin during lectures that was granted during this period (Annerstedt 1914:149).

That the situation for this economics professor really was an exception is clear also from the fact that the commission which had to oversee academic and school matters requested on 1746 November 12 His Majesty the King to allow dissertations in certain subjects, including mathematics, to be held in Swedish. The King denied this right in a decision of 1746 December 06, and decided that theses must be written and defended in Latin—and to be translated into Swedish and published after the defense (Annerstedt 1908:260–261, 1912:393–395).

The holders of the Skyttean Professorship in Eloquence and Politics, established in 1622 by Johan Skytte (1577–1645), all lectured in Latin. The incumbents up to 1697 we called in from Germany and probably could not speak sufficiently good Swedish; the students probably did not know German well enough. This was not important: Latin rhetoric was the foremost concern; sometimes Greek appeared (Lindroth 1975b:188). A full-fledged scholar should also speak Hebrew, be a *homo trilinguis* (Lindroth 1975a:269). Johan Ihre (1707–1780; holder of the Skyttean Professorship 1738–1780) defended in a speech in 1754 the use of Latin as an international language and expressed worries about the increasing use of other languages: that could lead to one's whole lifetime being wasted, and the republic of academia to be divided (Gren-Eklund 2011:57–58; cf. Lindroth 1976:125). For other aspects of languages used in scientific writing in the eighteenth century, see Gunnarsson (Ed., 2011).

Dissertations could be defended either *pro exercitio* 'as an exercise', or *pro gradu* 'to obtain a degree' (Lindroth 1976:139, 1978:32; Bohlin 2015:9). A successful defense *pro exercitio* gave the defendant the right to present a dissertation *pro gradu* (Bohlin 2015:9).

Erik Bohlin (2015) translated and commented the dissertation *De Cicerone Mathematico* 'On Cicero as a Mathematician' presented on 1759 June 13 by Anders (Andreas) Piscator (1736–1804). This was *pro exercitio*, and Piscator could later present a thesis *pro gradu* in 1761. The president of the session in 1759 was Petrus Ekerman (1697–1783), *eloquentiae professor*, and Bohlin discusses who the author of the text could have been. He concludes that, in this case, no definite answer can be given (2015:11). Clearly, the main point was not the actual content of the printed text but the eloquence (in Latin, of course) displayed by the candidate during the session. In those days it was common for the president to write the text to be defended; Carl Linnaeus (1707–1778), for instance, was responsible for every line in the many dissertations he chaired (Lindroth 1978:32). Sometimes the candidate had to pay for this service. Ekerman presided during his long life over a total of 516 disputations (Lindroth 1976:110), and he amassed a considerable fortune from this industry (Lindroth 1978:21; Bohlin 2015:7). Lindroth (1976:124) even calls it "his unashamed industry in connection with disputations."

In spite of all this Latin, there were some remarkable exceptions: Gustav III (who lived 1746–1792 and was king of Sweden 1771–1792) spent six weeks in Uppsala during the fall of 1786 and ordered a thesis to be defended; to please the monarch the language was Swedish (Lindroth 1981:13). The king strongly supported Swedish: he founded the Swedish Academy in the very same year.

Later, on 1788 March 22, the king and his entourage listened, with applause and laughter, to Thomas Thorild (1759–1808) vehemently attacking the ideas of Montesquieu (1689–1755), this time probably also in Swedish (Lindroth 1981:13–14).

In mathematics there were hardly any theses in Swedish before 1845; after that, both Latin and Swedish were used (Tengström 1973:90–91). In mathematics knowledge of Latin was required of all students for entering the universities up to 1905 (Tengström 1973:92). In doctoral theses it was allowed until 1964.

4. The *Nova acta* offers a way to reach out

The Royal Society of Sciences of Uppsala, founded in 1710 as the first academy in Sweden, started to publish its proceedings in 1720; from 1773 the series had the title *Nova acta Regiæ Societatis Scientiarum Upsaliensis*. To reach an international audience, several Uppsala mathematicians published articles in other languages than Swedish in these *Nova acta*.

Adolf Ferdinand Svanberg (1806–1857), who got his Master Degree in 1827, published two papers in Latin (1832, 1839) and three in French (1847, 1854, 1855) in the *Nova acta*. He was appointed professor of physics and mechanics at Uppsala in 1841.

Christian Fredrik Lindman (1816–1901) got his Master Degree in 1842 and published one article in Latin (1854) and two in French (1874, 1888) in the *Nova acta*.

Evald Viktor Ehrenhold von Zeipel (1823–1893), who presented his thesis in 1851 (which was known as a doctoral thesis; for an explanation see Section 6, page 6), published one paper in French in the *Nova acta* (1862).

5. A new statute for Sweden's universities, 1852

On 1852 April 02, Oscar I, King of Sweden 1844–1859, promulgated an ordinance (1852:20) with a new statute for the two universities in Sweden, which were located in Uppsala and Lund. In the Faculty of Philosophy, the academic degrees were *Candidat* 'Candidate' and *Magister* 'Master' (§ 128). A student for the Master Degree in the Faculty of Philosophy had to write a thesis in Latin (§ 129).

Dissertations were allowed to be published in Latin or Swedish, and had to be defended in the chosen language (§ 73, § 144). Theses could be presented and defended not only for the Master Degree, but also as a step in the procedure of applying for a university teaching position.

Four well-known mathematicians in Uppsala presented their theses in the 1860s. These were all in Swedish—Latin was the only alternative. However, as already mentioned in Section 4, several of them published articles in other languages in the *Nova acta Regiæ Societatis Scientiarum Upsaliensis*.

Göran Dillner (1832–1906) got his degree in 1861; his thesis, in Swedish, was entitled *Geometrisk kalkyl eller geometriska qvantiteters räknelagar*, and an article with that title appeared in the Annual Report of Uppsala University of 1861. He published six papers, all in French, in the *Nova acta* (1873, 1877, 1883, 1884, 1892, 1893). The first of them has a title related to that of his thesis: "Traité de calcul géométrique supérieur" (1873). Later he published two reports in Swedish from his visit to German universities and from his visit to Italian and French universities. They are entitled, respectively, "Om matematikens studium vid några af de tyska universiteten" (37 pp.) and "Om matematikens studium i Italien och Frankrike. Reseberättelse" (28 pp.), and appeared in the Annual Report of Uppsala University, 1876 and 1883, respectively.

Carl Fabian Emanuel Björling (1839–1910) presented his thesis in 1863, and later published an article in French entitled "Sur quelques transformations d'intégrales définies" (12 pp.) in the Annual Report of Uppsala University, 1865. He published one article in French (1870) and one in German (1879) in the *Nova acta Regiæ Societatis Scientiarum Upsaliensis*.

Carl Erik Lundström (1840–1869) presented his thesis in 1969 and published one article in French in the *Nova acta* (1869). Gösta Mittag-Leffler described him as "the keenest mind in Uppsala" (Stubhaug 2010:113).

Matths Falk (1841–1926) got his degree in 1869. He published an article in Swedish entitled "Om partiela differentialeqvationer af högre ordning än första" (40 pp.) in the Annual Report of Uppsala University, 1875. This is an account summarizing two earlier publications: "On the integration of partial differential equations of the N^{th} order with one dependent and two independent variables" in *Nova acta Regiæ Societatis Scientiarum Upsaliensis* (1872), which is a remarkably early publication in English by any Swedish mathematician, and another in *Tidskrift för Matematik och Fysik*. He published one more article in English in the *Nova acta* (1878), three in French (1877, 1879, 1883), and four in German (1892, 1906, 1907, 1913)—a notable language switch from French to German.

During the years 1861–1897, Uppsala University published 22 articles on mathematics in its Annual Reports. All except one are in Swedish; the exception being the one in French by Björling mentioned above.

6. The Doctoral Degree, 1870

On 1870 April 16, Charles XV, King of Sweden 1859–1872, promulgated an ordinance (1870:32) with amendments to the ordinance of 1852 relating to the academic degrees of several faculties. The degrees in the Faculties of Philosophy, Medicine, and Law were now Candidate, Licentiate, and Doctor (§ 128). A student for the doctor degree had to pass a translation test in Latin (§ 129). The permitted languages in dissertations were, as in the statute of 1852, Latin and Swedish, but in the field of New European Linguistics now also French, German, English, and Italian were allowed (§ 73, § 144).

However, the title of *Doctor* was used already in the 1850s, long before it was formally sanctioned in the statute: at the conferment ceremony, an elaborate diploma with a text in Latin was given to each successful Master candidate, who obtained the title PHILOSOPHIAE DOCTOREM ET ARTIUM LIBERALIUM MAGISTRUM (in the accusative case; the diploma reproduced in Lindroth (1976:171) is from 1857). In the nominative case the title was *Philosophiae Doctor et Artium Liberalium Magister*. Therefore, justifiably, "recipients unblushingly used the title of doctor" (Lindroth 1976:170). The amendment of 1870 can be viewed as a confirmation by the state of this fact. As already mentioned, von Zeipel, Dillner, Björling, Lundström, and Falk presented their theses before 1870; they are examples of such doctors.

On 1876 January 10, Oscar II, King of Sweden 1872–1907, promulgated an ordinance (1876:5) with a new statute for the two universities. The permitted languages were the same as in the statute of 1870 (§ 73, § 143). Every candidate for the doctoral degree in the Faculty of Philosophy had to pass a Latin translation test prior to being admitted to defend his thesis (§ 129).

Ernst Pfannenstiel (1849–1912), who got his PhD in 1877, published three papers in German (1883, 1889, 1891) in the *Nova acta Regiæ Societatis Scientiarum Upsaliensis*.

Anders Leonard Axel Söderblom (1847–1912), doctor 1879, published one article in German (1883) and three articles in French (1884, 1889, 1898) in the *Nova acta*.

During the first 38 years of the official existence of the doctoral degree in the sciences, i.e., during the perod 1870–1908, only Latin and Swedish were allowed. It is not remarkable that the mathematicians chose Swedish rather than Latin, which did not have a sufficiently developed terminology for contemporary mathematics. Maybe this could be said also of Swedish, but at least there the students had more freedom in creating new terms, and could borrow from French or German.

We can conclude that the *Nova acta Regiæ Societatis Scientiarum Upsaliensis* served during a long time as a channel for Uppsala mathematicians to reach out internationally. We see that this started before the official introduction of the doctorate in 1870. Also, as mentioned above, Björling published an article in French in the Annual Report of Uppsala University in 1865.

On 1891 April 17, Oscar II, promulgated an ordinance (1891:13) with amendments to the statute of 1876. The languages permitted in theses were not changed (§ 143). However, the Latin translation test in the statute of 1876 was repealed (§ 129).

7. German, English, and French allowed from 1908

On 1908 November 27, Gustaf V, King of Sweden 1907–1950, promulgated an ordinance (1908:135) with a statute replacing that of 1876. The permitted languages were Swedish, Latin, German, English, and French (§ 117).

Thus for the first time German, English, and French were allowed in the sciences. However, even before 1908, there were five doctoral dissertations in mathematics presented at Uppsala University in French (in 1892, 1898, 1899, 1903 and 1905), during the time when the statute of 1891, which permitted only Latin and Swedish in theses in mathematics, was in force. I do not know how this was possible—maybe an exemption was granted in each individual case.

On 1916 January 28, Gustaf V promulgated an ordinance (1916:66) with some amendments to the statute of 1908. The languages permitted were not changed compared to the ones in 1908 (§ 117).

8. Swedish, French, German, and English

Yngve Domar compiled a list (1982a) of all doctoral theses in mathematics which were approved at Uppsala University during the period 1870–1982. From this I have listed the languages of the theses (using the language of their titles); see Table 1. I have also checked Josephson (1891) for theses from the period 1855–1890, where, however, it is difficult to separate doctoral dissertations from those presented as part of an application procedure.

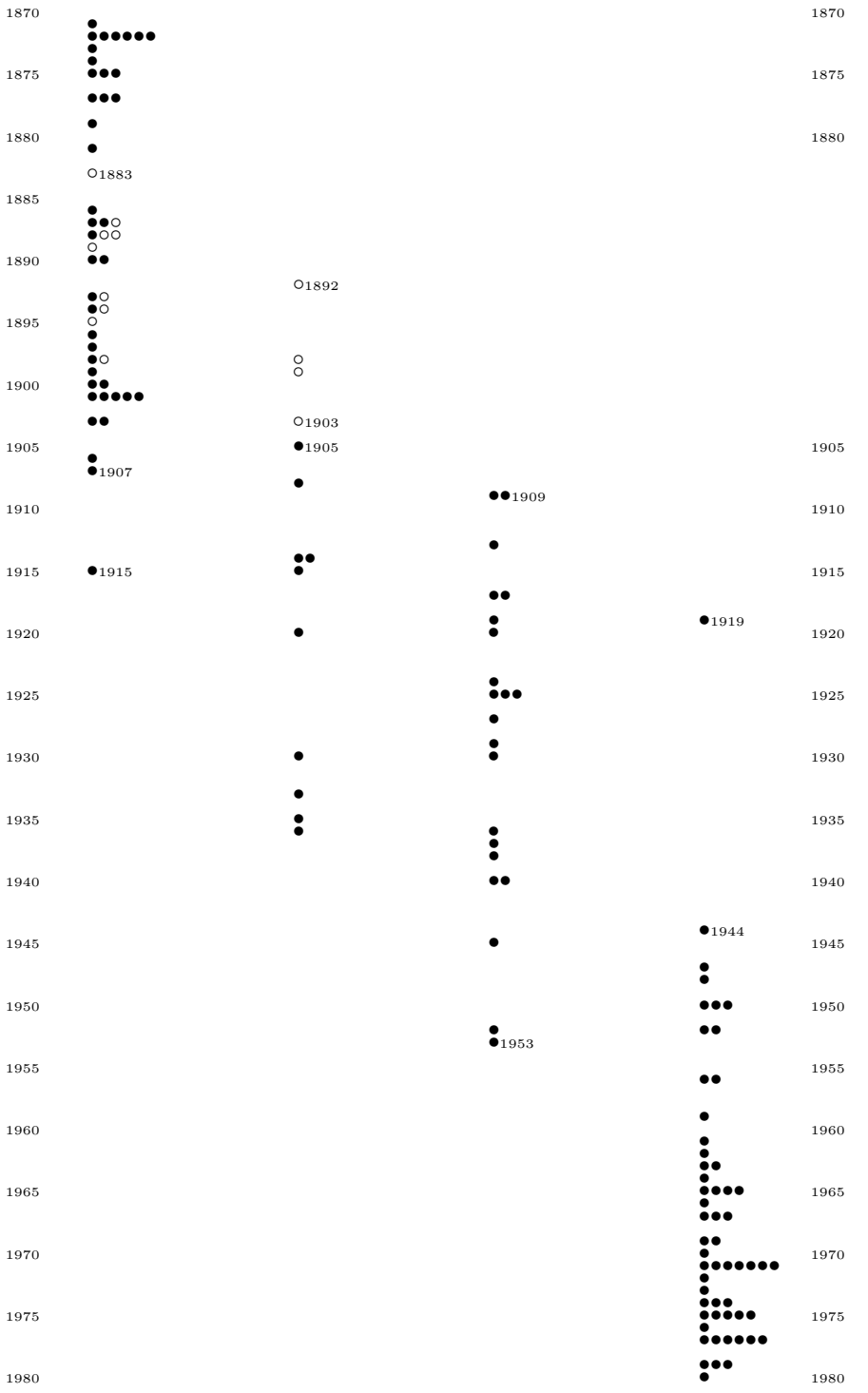
The list does not contain only persons who had obtained their education in Uppsala. During the years 1883–1903 no less than thirteen theses were presented at Uppsala University by persons who had studied at *Stockholms högskola*, Stockholm University College. This establishment, founded in 1878, obtained the right to confer doctoral degrees only in 1904. Until then, those who wanted to get the degree had to defend their theses at a university, i.e., at Uppsala or Lund—or abroad. Of these thirteen theses, there were nine in Swedish (during the period 1883–1898) and four in French (during the years 1892–1903).

In Table 1, theses defended by somebody with education from Uppsala University are marked with a bullet, •, while theses presented at Uppsala by men who got their education at Stockholm University College are marked with a circle, ∘.

In the beginning of the period, there are only theses in Swedish. The first thesis written in another language came in 1892—or 1905 if we count only theses by those who had studied at Uppsala University. This means that the students from Stockholm started the trend thirteen years before those from Uppsala.

With the sole exception of one thesis on the history of mathematics in 2002, the last thesis in Swedish was presented in 1915. But also this one was an outlier; the next to last in Swedish came already in 1907. The 1915 thesis was written by Karl Mattias Essén, known as Matts Essén (1881–1972). While he was writing his dissertation on a subject proposed by Anders Wiman, he worked full time as a teacher at Uppsala High School (*Schola Cathedralis Upsaliensis*). His ambition was to become a lecturer at the Normal School in Uppsala, and he achieved that goal. It is not impossible that his plans for this teaching position made him write only for readers who knew Swedish—he needed to impress the decision makers at

Table 1. Languages in mathematical theses at Uppsala University 1870–1980.



the Normal School. In any case, his school service prevented him from continuing to do research after his thesis. (Matts Essén, son of the above-mentioned Matts Essén, in an interview on 1998 January 15.)

When doctoral candidates left Swedish and started to write in another language, French was the first to be used. A total of fourteen theses in French were presented during the 45 years 1892–1936.[2] Alternatively, if we include only respondents who had studied in Uppsala, there were ten theses in French during the 32 years 1905–1936.

When the theses were no longer in Swedish, doctoral candidates did not write only in French—there followed a period of both French and German. The first dissertation in German came 1909, and the last 1953. The list contains 22 theses in German during these 45 years.

The first doctoral thesis in English was defended already in 1919.[3] However, it was to be the only one for a long time: the second appeared 25 years later, in 1944. This second thesis in English was presented by Carl-Gustav Esseen. When asked why he wrote in English, he give me two reasons (Carl-Gustav Esseen, personal communication 1998 January 13). The first was that he could write in English more easily than in German, although he had studied more German than English in high school. French he did not know sufficiently well. The second and more important reason was that in his field, mathematical statistics and probability, British researchers, for example Ronald Fisher (1890–1962) and Karl Pearson (1857–1936), and some Americans, were the leaders. Important journals were *Journal of the Royal Statistical Society*, published in London, and the American *Annals of Mathematical Statistics* (1930–1972; after that divided into two). In probability, Russians like Andreĭ Kolmogorov (1903–1987) and Aleksandr Khinchin (1894–1959) were leading, while the Germans were not that outstanding in Carl-Gustav's opinion, neither in probability, nor in mathematical statistics, and did not publish any very important journal in the area. Reinhard Siegmund-Schultze writes:

> In probability theory, the French and Russian schools were much stronger than the German one, Richard von Mises being essentially the only contributor on the German side during the 1920s. (Siegmund-Schultze 2014:1236)

As an early example of Swedes being oriented towards British science, Carl-Gustav mentioned Harald Cramér (1893–1985), whose book *Random variables and probability distributions* appeared in 1937 in the series Cambridge Tracts. Cramér's students, Herman Wold (1938), Carl-Otto Segerdahl (1939), and Ove Lundberg (1940), all presented their theses in English at Stockholm University College. Esseen himself published two papers in English, in 1942 and 1943, before he presented his thesis in 1944. The choice of language in these early dissertations was thus clearly motivated by the strong presence of certain researchers in the field.

[2] A later, isolated example is a thesis from 1980 consisting of one article in English and one in French. The title and the abstract were in English. Conceivably, this could be the case also in other theses, since in general only the title has been used for classification.

[3] This thesis was written by Ragnar Nyhlén (1892–1949). He determined the groups of order $16p^2$ and $8p^3$. There is no acknowledgment or mentioning of any advisor in the text. A clue to why it was written in English might be that the theory of finite groups depended a lot on the work of William Burnside (1852–1927). His book *Theory of Groups of Finite Order* from 1897 as well as its later edition from 1911 were very important, and both are quoted by Nyhlén. He also quoted several journal articles in English.

Arne Beurling[4] (1905–1986) wrote his thesis in French in 1933 after having spent some time in Paris. Esseen was the first of Beurling's students who got a PhD; the second, Göran Borg (1913–1997), wrote his thesis, which was not in mathematical statistics but on Sturm–Liouville theory, in German in 1945, and Beurling's other students all in English.

The transition in Uppsala from Swedish to French and then to German is actually easy to explain. Anders Wiman (1865–1959) became an extra-ordinary professor in 1901 and an ordinary professor in 1907. Erik Holmgren (1872–1943) became an extra-ordinary professor in 1907. With them research at Uppsala were raised to an international level, and it became natural to direct doctoral theses to researchers in other countries. It can also be mentioned that Wiman wrote mostly in German, while Holmgren wrote mostly in French: Wiman's mathematical bibliography comprises 72 papers during the period 1892–1954, of which 6 are in Swedish, 3 in French, and 63 in German, while Holmgren wrote 31 papers during 1898–1927, of which 3 are in Swedish, 23 in French and 5 in German.

The first four theses in French (1892–1903) were presented by candidates from Stockholm University College, and this had a reason: a rise to an international level had occurred earlier there. It had been achieved by Gösta Mittag-Leffler (1846–1927), professor from 1881, and Sonja Kovalevsky[5] (1850–1891), professor 1884–1891. For more on Gösta, his life and work, and how he succeded in bringing Sonja to Stockholm, see Stubhaug (2010; 2015).

After 1953 and up to 1980, there are only theses in English—with half of an exception from 1980 as mentioned in footnote 2.

There are three women who presented their theses (all in English) during the period 1870–1980: Sonja Lyttkens (1919–2014) in 1956, Kersti Haliste in 1965, and Anna-Lisa Arrhenius-Wold (1914–1994) in 1971.

There was one thesis in pedagogy with specialization in the didactics of mathematics during the period: Matts Håstad 1978, in Swedish (not listed in Table 1 since it was not in mathematics). Later, during the years 2002–2009, four theses in mathematics on the history or pedagogy of mathematics were presented at Uppsala University. One was in Swedish; three in English: Staffan Rodhe, *Matematikens utveckling i Sverige fram till 1731* (2002); Johan Prytz, *Speaking of Geometry* (2007); Johanna Pejlare, *On Axioms and Images in the History of Mathematics* (2008); Kajsa Bråting, *Studies in the Conceptual Development of Mathematical Analysis* (2009).

It should be emphasized that the transition from Swedish to French and German in no part depended on any foreigners presenting their theses. The first non-Swede in the whole list is O. Gruder, who wrote in German and got his PhD in 1952. In the 1970s and 1980s there were many PhD students in Uppsala from other

[4]There is a *Arne Beurlings torg* 'Arne Beurling's square' in Kista, north of Stockholm. This is in recognition of his deciphering in 1940 of the code of the *Geheimfernschreiber* used by Nazi Germany for messages to and from occupied Norway and on the Eastern front.

[5]Her Russian name was Софья Васильевна Ковалевская. In her publications she used the male form of her family name: her inaugural dissertation was published in Crelle's journal in 1875 under the name Sophie von Kowalevsky; her articles in German and French in *Acta Mathematica* were written under the name Sophie Kowalevski. In Sweden she was known as Sonja Kovalevsky; a portrait that hung in the office of her successor Lars Hörmander she had signed as Sophie Kovalevsky; this is also the form of her name that Mittag-Leffler used in the French-language obituary, dated 1892 October.

countries—but they do not influence the statistics, since by then everything was in English anyway. This situation prevails until now.

9. Science in France and Germany

As we can see, French and German coexisted for some time (1909–1936) in theses at Uppsala. This is due to contacts during several decades between advisors at Uppsala and mathematicians in the two leading countries.

In mathematics during the latter part of the nineteenth century, French research flourished, with Henri Poincaré (1854–1912) as a world leader. To illustrate his influence, one example may suffice. Poincaré published in 1886 in the *Bulletin de la Société mathématique de France* a paper on infinite determinants. Mittag-Leffler advised Helge von Koch (1870–1924) to work in this field, and von Koch published two papers in *Acta Mathematica* in 1891 and 1892. His PhD thesis, presented at Uppsala University in 1892 when he was 22, was based on these two papers. (He is now best remembered for the von Koch snow flake, an early fractal.)

However, except for this brilliant example, the strong position for French mathematics is only weakly reflected in the French-language dissertations written during the nineteenth century in Uppsala.

Of the sixty men who got their degree during the period 1870–1915, probably six can be said to have been internationally well-known mathematicians: Gösta Mittag-Leffler (1872; Swedish), Helge von Koch (1892; French), Erik Axel Holmgren (1898; Swedish), Ivar Fredholm (1898; French), H. T. Grönwall (1898; Swedish), and Fritz Carlson (1914; French). None of them wrote in German, and the proportion of theses in French among them, one half, is larger than in the whole list.

The situation in physics was remarkably different:

Table 2. Language choice in theses in physics during forty years, 1890–1929 (Kaiserfeld 1997:245–258).

	Swedish	*German*	*French*	*English*	*Sum*
Uppsala University	38	23	2	1	64
Lund University	6	15	1	0	22
Stockholm University College	3	7	0	2	12
Sum	47	45	3	3	98

Referring to the first half of the twentieth century, Thomas Kaiserfeld (1997:29–30) writes that, since the end of the nineteenth century, Göttingen and Berlin were the most important centers for physics and mathematics. Many Swedish physicists visited Göttingen: travelling PhD students served as the eyes and ears in the world for the physics departments in Sweden.

It may be that the comparatively strong position of French among mathematicians was unique within the sciences.

Bo Sandelin made a similar study of language choice in doctoral theses in economics in Sweden. In his table (2001:523) of theses from the period 1895–1969, the last thesis in German was published in 1935, and French does not appear at all.

For an appraisal of German mathematics in the nineteenth century, let me mention what Mittag-Leffler reported from his meeting in 1873 with Charles Hermite (1822–1901). Hermite is quoted as saying:

> "My heart bleeds, but I must speak the truth, also in the field of mathematics, the Germans are currently far superior to us." [...] "*Vous avez fait erreur, Monsieur, me dit-il: vous auriez dû suivre les cours de Weierstrass à Berlin, c'est notre maître à tous.*" (Stubhaug 2010:156)

Similarly, in a recent article by Arild Stubhaug:

> Hermite considered that, for the moment, German mathematics was superior to that of the French and he spoke with the greatest admiration about Bernhard Riemann, Karl Weierstrass and other German mathematicians, and recommended that Mittag-Leffler make a longer sojourn in Germany. Hermite regretted that he himself was unable to journey there due to the antagonism that still existed between the two countries after the French-German War of 1870–71. (Stubhaug 2015:23)

Also later, during the 1920s, mathematics flourished in Germany. Laurent Schwartz (1915–2002) writes in his memoirs about this:

> À côté d'une science française, sinon médiocre, du moins très moyenne, l'Allemagne connut un développement scientifique prodigieux. Durant la Première Guerre, elle protégea, à l'arrière, ses savants travaillant pour les militaires ; après la défaite, elle fit preuve d'un dynamisme généralement plus grand que la France. Entre 1930 et 1932, la science allemande était à son zénith. Les plus grands savants du monde se trouvaient à Göttingen. (Schwartz 1997:79)

Reinhard Siegmund-Schultze concurs:

> Arguably, by the late 1920s and early 1930s, mathematics in Germany, particularly in Göttingen, had become the most 'internationalized' of all national mathematical cultures of the world. (Siegmund-Schultze 2014:1236)

For more on the development in Germany, see Gordin (2015, Chapter 7, Unspeakable) and my paper on Werner Fenchel (2018).

10. Language choice in *Acta Mathematica*

To complement the survey of language choice in doctoral dissertations, let us take a look at the languages used by mathematicians in Sweden who published in the journal *Acta Mathematica*; see Table 3. This journal was founded in 1882 by Gösta Mittag-Leffler; see Domar (1982b). The Franco-Prussian War of 1870–1871 was then still close in time, and Mittag-Leffler wanted his journal to be a neutral scientific arena between the two great powers—who were still hostile to each other.

Concerning the origin of the journal, let us note that Sophus Lie (1842–1899) and Mittag-Leffler met in June 1881, and it was then that the idea for the new journal was born (Stubhaug 2010:272). "The two men also agreed that the editors of the journal ought to be leading Nordic mathematicians, and that the treatises, of the highest professional caliber, should be published in German or French, or occasionally in English or Latin" (Stubhaug 2010:265). Only German and French were used in the beginning. Latin and English should be allowed exceptionally (Domar 1982b:3). The first article in English was published in 1887 (volume 11), by Sir William Thomson in Glasgow, Lord Kelvin; the second in 1890–1891 (volume 14); and the third in 1901 (volume 24). No article ever appeared in Latin.

Table 3. Languages in articles by mathematicians in Sweden in *Acta Mathematica*, volumes 1–100, years 1882–1958.

• = Research article authored by a mathematician working in Sweden.
◦ = A shorter note or an obituary written by a mathematician working in Sweden.

Year	*Volume*	*French*	*German*	*English*	*Year*
1882	1		••		1882
	2, 3	•			
	4, 5	•••	••		
1885	6, 7	•	••••		1885
	8				
	9, 10, 11	••••	•••		
	—				
	12	•			
1890	13, 14	•••			1890
	15	•••••••			
	16	••◦			
	17	••			
	18	••			
1895	19		•		1895
	—				
	20, 21		◦		
	—				
	22				
1900	23	••			1900
	24	•••••◦			
	25, 26	••	•		
	27	•••	•		
	28	••			
1905	29	••	••••		1905
	30	•			
	—				
	31	••			
	32				
1910	33	••			1910
	34	•			
	35	••	◦		
	36	••			
	37	•	•		
1915	—				1915
	40	•◦	••◦		
	—				
	41	•	••		
	—				
1920	42	•			1920
	38	•			
	43	•			
	39, 44	◦	◦		
	—				
1925	45, 46	•			1925
	48	••	◦		
	47, 48, 49		•		
	51				
	52, 53				
1930	54, 55	◦	•		1930
	56, 57		•		
	58, 59	•	•		
	60, 61	•			
	62, 63				
1935	64, 65	◦	•		1935
	66, 67		•		
	68	•	•		
	69	◦			
	70, 71				
1940	72	•			1940
	73, 74	••••			
	75				
	—				
	76		••		
1945	77	•	•	•	1945
	78	•	•		
	79			•	
	80		•		
	81	•		••••	
1950	82, 83, 84	◦		•	1950
	85, 86			•	
	87, 88	◦	•	•	
	89, 90	◦		•	
	91, 92			•	
1955	93, 94			•	1955
	95, 96			••	
	97, 98				
1958	99, 100	•		•	

The front page of the journal showed an equilibrium between German and French—and still does.

The founder succeeded brilliantly in his ambition in that outstanding mathematicians from the two leading countries published their articles in his journal. It became a great success, and is still one of the world's leading journals, at least in certain subfields of mathematics.

While a doctoral thesis is a once-in-a-lifetime event for almost everybody, the same person can publish several articles in a journal over an extended period. Therefore we cannot expect the same short periods of transition when looking at journals.

10.1. The first 35 volumes of *Acta Mathematica*, 1882–1912

In 1913, an index covering the first 35 volumes of *Acta Mathematica* was published, with years of publication during the period 1882–1912. The index was prepared by Marcel Riesz (1886–1969, my mathematical grandfather). In these 35 volumes, 24 mathematicians working in Sweden published 18 research articles in German and 49 in French. There is a clear tendency that German dominates among the older authors, French among the younger ones.

Most writers during this initial period chose one language, either German or French, and stuck to it. But four of them switched language, from German to French, and one in the other direction, with a total of nine articles in German and eleven articles in French:

Table 4. Four scientists changing from German to French in *Acta Mathematica* and one changing in the other direction, volumes 1–35, years 1882–1912.

A: Number of articles in German; *B:* Last article in German;
C: First article in French; *D:* Number of articles in French.

	Born	*A*	*B*	*C*	*D*	*Died*
Carl Johan Malmsten	1814	1	1882	1884	1	1886
Hugo Gyldén	1841	3	1887	1891	2	1896
Sonja Kovalevsky	1850	2	1885	1889	3	1891
Torsten Brodén	1857	1	1905	1904	1	1931
Edvard Phragmén	1863	2	1885	1885	4	1937

All others wrote in one language, with the exception of Mittag-Leffler himself, who wrote ten articles in French and two in German during this time. The latter are, however, an obituary of the great German mathematician Karl Weierstraß (1815–1897; the mathematical grandfather of my mathematical great-grandfather, i.e., my mathematical (father)[5]) and a short commentary on his letters and unpublished manuscripts—it was only natural that these two were written in German. So, as far as publications in *Acta Mathematica* are concerned, Mittag-Leffler cannot be considered to be a language switcher.

In addition to the five persons mentioned in Table 4, six authors wrote a total of nine articles in German, to wit (with year of birth followed by the number of publications): Matths Falk (1841; 1), Victor Bäcklund (1845; 1), Anders Lindstedt

(1854; 1), Karl Bohlin (1860; 1), Allvar Gullstrand (1862; 1), and Anders Wiman (1865; 4).

And in addition to the persons mentioned in Table 4, thirteen wrote a total of 38 articles in French: Alexander Berger (1844; 2), Gösta Mittag-Leffler (1846; 10), Jakob Söderberg (1856; 1), Ivar Bendixson (1861; 5), Gustaf Kobb (1863; 3), Henrik Petrini (1863; 1), Gustaf Cassel (1866; 1), Ivar Fredholm (1866; 2), Helge von Koch (1870; 8), Erik Stridsberg (1871; 1), Wilhelm Oseen (1879; 2), Johannes Malmquist (1882; 1), and Marcel Riesz (1886; 1). The years of birth indicate that the younger generation preferred French.

We see that, during the journal's first 30 years, 1882–1912, mathematicians in Sweden published both in German and French in *Acta Mathematica*. The articles in French were in the majority, comprising 73 per cent of the total. The younger authors during the time up to 1912 preferred French. It appears that the choice of language was a personal matter and depended primarily on the advisors' earlier visits to France or Germany.

10.2. Volumes 36–100 of *Acta Mathematica*, 1913–1958

Later, during the years 1913–1947, the languages French and German were roughly equally frequent in *Acta Mathematica* among articles authored by mathematicians in Sweden. However, the total number of authors from Sweden is now very small. Wiman alone published sixteen papers in *Acta Mathematica*, all in German, during the years 1895–1952. From 1945, English appears as a language used by Swedish mathematicians, starting with an article based on Esseen's thesis of 1944, and it becomes the only language in articles written by mathematicians in Sweden from 1953, with very few exceptions—one being an obituary in French in 1953 and another a joint article in French by Arne Beurling and Jacques Deny in 1958.

11. *Bibliotheca mathematica*

Gustaf Hjalmar Eneström (1852–1923) was a Swedish mathematician, statistician and bibliographer. During the years 1884–1914 he edited a journal on the history of mathematics called *Bibliotheca mathematica*. It was published in three series: the first, during the three years 1884–1886, came out as a kind of appendix to *Acta Mathematica*; the second, during the years 1887–1899, was an independent journal published in Stockholm; and the third series, during 1900–1914, was published by Teubner in Leipzig—at a more ambitious level. The journal was really international, which in this context means European. In the beginning it published mostly bibliographical references. Later, and increasingly so, notices, reviews of publications as well as full articles appeared. The languages used were French, German, English, and Italian (never Swedish); later, during the Leipzig years, German dominated. The publications mentioned or reviewed were written in the same languages, with the addition in some cases of Russian.

Eneström's work with *Bibliotheca mathematica* is really extraordinary and indicates that he followed European research on the history of mathematics quite closely, and by his efforts enabled many others to do so. I see his journal as an extremely valuable source.

12. Languages in higher education in Sweden more recently

In the Royal Statute of 1956 (1956:117) for the universities in Uppsala, Lund, and Gothenburg, replacing the ordinance of 1916, the permitted languages in doctoral theses are the same as in 1908 and 1916, except for the order in which they are listed, which is now Swedish, Latin, English, French and German (113 §).

In the Royal Statute of 1964 (1964:461) for the universities and certain university colleges, Swedish, English, French, and German are the permitted languages in doctoral theses (99 §). Latin is not permitted after 1964 June 30.

The last doctoral dissertation to be written in Latin was that of Alf Önnerfors, *Pliniana. In Plinii Maioris Naturalem Historiam studia grammatica semantica critica*, published in 1956 (Erik Bohlin, personal communication 2014 April 04).

According to the ordinance for education at the Faculties of Philosophy (1969: 327), the languages permitted in theses are Swedish, Danish, Norwegian, English, French, and German (63 §). This is the first time that the two other Scandinavian languages are allowed.

In the Higher Education Ordinance of 1977 (1977:263, 8 kap. 30 §), the languages permitted in theses are the same as in the ordinance of 1969.

As a unique exception, Mohammad Zuhayr (now Zouhair) Al-Adhami, of Stockholm University, applied to the government for an exemption from the ordinance: he wanted to defend a thesis in Arabic entitled *Sayyid Zutb. Litteraturkritikern som vi ser honom i "Fi Zilal Al-zur'an". En litteraturkritisk forskning i "Fi-Zilál al-Qur'an"* (1986). The university recommended that this should not be permitted: a thesis in Arabic could not be satisfyingly judged by scholars in Sweden. *Universitets- och högskoleämbetet* (UHÄ) 'the Swedish Higher Education Authority' was of the same opinion. But the Swedish government nevertheless decided in August 1985 to permit this. The thesis was defended in 1988.

Nothing is said about languages in doctoral theses in the Higher Education Ordinance of 1993 (1993:100)—this is true of the original ordinance as well as of the version which is currently in force in 2016. In an effort towards decentralization, the Swedish government intended such decisions to be made locally at each institute of higher learning. However, now, in 2016, no local decision at Uppsala University concerning languages can be found. We have returned to the beginning more than half a millennium ago, when language choice was so obvious that it did not have to be regulated.

As a rule of thumb we can say that teaching today at the Faculty of Science and Technology of Uppsala University is in Swedish up to the Bachelor level, and in English after that, at the Master and PhD level. A majority of the PhD students at this faculty cannot speak Swedish, and this is also true for several of the professors. Concerning the language situation in higher education in Sweden during recent years, see, e.g., Kiselman (2001a, 2001b); a report to the Swedish Government called *Mål i mun* 'Speech' (Kommittén för svenska språket 2002); and Gunnarsson (2004).

13. Is the choice of language important?

It is time to ask about the real importance of language choice in mathematics and other sciences. Maybe the question should have been asked already at the start of this paper—but if so at the risk of the whole subject being immediately abandoned. For a wider discussion, see Gordin (2015), for example about Mendelev's periodic system, and the review of Gordin's book by Ammon (2015).

A language can serve to reach out to others, but also to exclude some—maybe in a clever combination. Richard von Krafft-Ebing (1840–1902) published in 1886 a book, *Psychopathia Sexualis*, with an unusual choice of language for the epoch:

> Although first published in Latin—to reach a medical audience while at the same time discouraging adolescents looking for sensational literature—the textbook nonetheless attracted a flock of readers, presumably artists and scientists who were willing to put the Latin they had learned in gymnasium to use for the first time. (Kandel 2012:41–42)

In mathematics, language is clearly less important than in the humanities: terms have a precise denotation given by an explicit definition and usually have no or few connotations and nuances. Moreover, formulas form a kind of scaffolding providing support to the words.

Nevertheless, let me illustrate the importance of language choice by two examples, although not pointing in the same direction.

That choice of language can have consequences is manifestly illustrated by the fate of the treatise presented on 1797 March 10 by Caspar Wessel (1745–1818) at the Royal Danish Academy of Sciences. The title is, in Danish: *Om Directionens analytiske Betegning, et Forsøg anvendt fornemmelig til plane och sphæriske Polygoners Opløsning*. It was later published in Danish in 1798, 1799 and 1896. The first publication in any other language appeared in 1897, in French: *Essai sur la représentation analytique de la direction*. A publication in English followed: Wessel (1999), accompanied by analyses by Bodil Branner, Nils Voje Johansen and Kirsti Andersen.

In his treatise Wessel described, for the first time ever, the complex plane, but we do not call this plane the *Wesselian plane*—we call it the *Gaussian plane*, since Johann Carl Friedrich Gauß (1777–1855) is generally known for this invention/discovery. Another name is the *Argand diagram* or the *Argand plane*, named for Jean-Robert Argand (1768–1822).

After two centuries, Wessel has received full credit, but had he published in Latin or German, he would certainly have received it earlier.

Another case is that of distribution theory, a most important tool in the theory of partial differential equations and also a brilliant theory in its own right. Laurent Schwartz (1915–2002) is known as the creator of this extremely successful theory. However, the first to define and use distributions was Sergeĭ L′vovič Sobolev (1908–1989), who did so in an article in 1936. His definition and the results based on this received only a minuscule mention in a footnote in Schwartz's famous book (1966:3, footnote 4). Similarly, Lars Hörmander (1931–2012), in his influential books, did not give proper credit to Sobolev's definition, nor to his results (Hörmander 1963:1, 1983:53, 1990:53). For further comments see my article (2007).

Sobolev's 1936 article was published in French.

14. Conclusion

In the doctoral dissertations we have considered, French and German coexisted during 28 years, 1909–1936. The periods of transition from Swedish to French, and from German to English were quite short.

If we disregard only one exceptionally late doctoral thesis in Swedish and only one exceptionally early thesis in English, the theses presented since 1870 are grouped with quite small overlaps, except for French and German as already mentioned. The first thesis in French presented by someone who had got his education in Uppsala came in 1905, while the next to last in Swedish was defended in 1907, resulting in a transition period of just three years, 1905–1907. The years 1944–1953 constitute a short transition period from German to English. One could argue that the last two theses written in German were special, and if so, we have an even shorter period of transition, 1944–1945, from the second thesis in English in 1944 to the third to last thesis in German in 1945.

Diplomas had been issued with the title *Doctor* already in the 1850s, but the Swedish state officially established the Doctor Degree in the sciences only in 1870.

The state allowed theses outside the field of New European Linguistics to be written in German, English or French in 1908; neverthelss five theses in French were accepted during the years 1892–1905.

When only Latin and Swedish were allowed in theses, Uppsala mathematicians could during many years reach audiences in other countries by publishing in the *Nova acta Regiæ Societatis Scientiarum Upsaliensis* of the Royal Society of Sciences of Uppsala.

In *Acta Mathematica* Swedish mathematicians published both in French and German during the period 1882–1947. Four Swedish authors in *Acta Mathematica* switch from German to French during the 1880s. Since 1953, Swedish mathematicians publish almost exclusively in English in *Acta Mathematica*.

Acknowledgments

Carl-Gustav Esseen (1918–2001) and Matts Essén (1932–2003) kindly granted me interviews. Matts also commented on the manuscript, as did Yngve Domar (1928–2014). Britt-Louise Gunnarsson encouraged the project. More recently, Carl Frängsmyr has helped me with the history of Uppsala University. Erik Bohlin informed me on theses in Latin and sent me his booklet (2015). Reinhard Siegmund-Schultze, Seidon Alsaody, and Arild Stubhaug sent important comments to earlier versions, and Staffan Rodhe informed me about Duhre and Eneström. An anonymous referee provided several suggestions, which made me broaden the presentation. Marie Mosshammar and Frida de Verdier were most helpful in digging up documents in Uppsala University Library. Finally, Michael D. Gordin sent me constructive criticism and important comments, which led to several clarifications.

For all this help I am most grateful.

Higher education ordinances 1852–2015

1852. *Kongl. Maj:ts Nådiga Statuter för Universiteterna i Upsala och Lund.* Gifna Stockholms Slott den 2 april 1852 [*Royal Statute for the Universities in Uppsala and Lund.* Promulgated at Stockholm Palace on 1852 April 02]. Swensk Författnings-Samling 1852:20.

1870. *Kongl. Maj:ts Nådiga Skrifwelse till Cancellers-Embetet för Universiteten i Upsala och Lund, angående förändrade föreskrifter i afseende på den Philosophiska graden m.m.* Stockholms Slott den 16 April 1870 [*Royal Writ to the Office of the Chancellor for the Universities in Uppsala and Lund, concerning changed instructions relating to the Philosophical degree etc.* Stockholm Palace on 1870 April 16]. Swensk Författnings-Samling 1870:32.

1876. *Kongl. Maj:ts förnyade nådiga statuter för universiteten i Upsala och Lund.* Stockholms slott den 10 Januari 1876 [*Renewed Royal Statute for the Universities in Uppsala and Lund.* Stockholm Palace on 1876 January 10]. Svensk Författnings-samling 1876:5.

1891. *Kongl. Maj:ts nådiga kungörelse angående ändringar i vissa paragrafer af universitetsstatuterna.* Stockholms slott den 17 april 1891 [*Royal Writ concerning amendments to some articles of the University Statute.* Stockholm Palace 1891 April 17]. Svensk Författnings-samling 1891:13.

1908. *Kongl. Maj:ts nådiga statuter för universiteten i Uppsala och Lund.* Stockholms slott den 27 november 1908 [*Royal Statute for the Universities in Uppsala and Lund.* Stockholm Palace on 1908 November 27]. Svensk författnings-samling 1908:135.

1916. *Kongl. Maj:ts nådiga statuter för universiteten i Uppsala och Lund.* Stockholms slott den 28 januari 1916 [*Royal Statute for the Universities in Uppsala and Lund.* Stockholm Palace on 1916 January 28]. Svensk författnings-samling 1916:66.

1956. *Kungl. Maj:ts universitetsstatuter.* Stockholms Slott den 6 april 1956 [*Royal Statute for the universities.* Stockholm Palace on 1956 April 06]. Svensk författningssamling 1956:117.

1964. *Kungl. Maj:ts stadga för universiteten och vissa högskolor (universitetsstadgan).* Stockholms slott den 4 juni 1964 [*Royal Statute for the Universities and Certain University Colleges (The University Statute)*]. Stockholm Palace on 1964 June 04. Svensk författningssamling 1964:461.

1969. *Kungl. Maj:ts kungörelse om ändring i kungörelsen den 28 mars 1969 (nr 50) om utbildning vid de filosofiska fakulteterna.* Stockholms slott den 23 maj 1969 [*Royal Ordinance on Changes in the Ordinance of 1969 March 28 on Education at the Faculties of Philosophy.* Stockholm Palace on 1969 May 23]. Svensk författningssamling 1969:327.

1977. *Högskoleförordning* [*Higher Education Ordinance*]. Svensk författningssamling 1977:263.

1993. *Högskoleförordning* [*Higher Education Ordinance*]. Svensk författningssamling 1993:100. (This ordinance was amended 109 times up to 2016 March 28; the latest amendments up to 2018 May 09 are in *Svensk författningssamling* 2017:1326.)

Other references

Al-Adhami, Mohammad Zuhayr. 1986. *Sayyid Zutb. Litteraturkritikern som vi ser honom i "Fi Zilal Al-zur'an". En litteraturkritisk forskning i "Fi-Zilál al-Qur'an".* PhD Thesis defended at Stockholm University in 1988.

Ammon, Ulrich. 2015. Review of Gordin (2015). *Language Problems & Language Planning* **39**, No. 3, 312–318.

Annerstedt, Claes. 1908. *Upsala universitets historia* [*History of Uppsala University*], II:1, 1655–1718. Uppsala: A.-B. Akademiska Bokförlaget.

Annerstedt, Claes. 1912. *Upsala universitets historia. Bihang* [*History of Uppsala University. Supplement*]. III. Handlingar [Transactions] 1695–1749. Uppsala; Stockholm: Almqvist & Wiksells Boktryckeri-A.-B.

Annerstedt, Claes. 1914. *Upsala universitets historia* [*History of Uppsala University*], III:2, 1719–1792. Uppsala; Stockholm: Almqvist & Wiksells Boktryckeri-A.-B.

Bibliotheca mathematica. Zeitschrift für Geschichte der Mathematik. Journal d'Histoire des Mathématiques. First series (1884–1886); second series (1887–1899); third series, volumes 1–14 (1900–1913/1914). Edited by Gustaf Eneström.

Bohlin, Erik. 2015. *Om Cicero som matematiker. En 1700-talsdisseration under presidium av Petrus Ekerman* [*On Cicero as a Mathematician. An Eighteenth-Century Dissertation chaired by Petrus Ekerman*]. Introduction, translation, and explanatory notes by Erik Bohlin. Uppsala: Bibliotheca Neolatina Upsaliensis II.

Dahlin, Ernst Mauritz. 1875. *Bidrag till de matematiska vetenskapernas historia i Sverige före 1679* . IV + 148 pp. **In:** Uppsala universitets årsskrift.

Domar, Yngve. 1982a. Doktorsdisputationer under perioden 1870–1982 [PhD presentations during the period 1870–1982]. Manuscript, Uppsala University, Department of Mathematics.

Domar, Yngve. 1982b. On the foundation of Acta Mathematica. *Acta Math.* **148,** 3–8.

Gordin, Michael D. 2015. *Scientific Babel: How Science Was Done Before and After Global English.* Chicago; London: The University of Chicago Press.

Gren-Eklund, Gunilla. 2011. Philology in the eighteenth century: Europe and Sweden. **In:** Gunnarsson (Ed., 2011:45–61).

Gunnarsson, Britt-Louise. 2004. Svenska, English eller Deutsch. Om språksituationen vid svenska universitet och högskolor [Swedish, English, or German. On the language situation at Swedish universitites and university colleges]. **In:** *Engelskan i Sverige. Språkval i utbildning, arbete och kulturliv* [*English in Sweden. Language Choice in Education, Work, and Cultural Life*], pp. 108–129. Stockholm: Svenska språknämnden.

Gunnarsson, Britt-Louise. Ed. 2011. *Languages of Science in the Eighteenth Century.* Berlin; Boston: De Gruyter Mouton.

Hörmander, Lars. 1963. *Linear Partial Differential Operators.* Berlin et al.: Springer-Verlag.

Hörmander, Lars. 1983. *The Analysis of Linear Partial Differential Operators.* Volume I: *Distribution Theory and Fourier Analysis.* Second Edition 1990. Berlin et al.: Springer-Verlag.

Institut Mittag-Leffler. 1958. *Acta Mathematica.* Table des tomes 1–100.

Johannesson, Gösta. 1982. *Lunds universitets historia* [History of Lund University]. II. 1710–1789. Lund: LiberFörlag.

Johannisson, Karin. 1989. *A Life of Learning: Uppsala University During Five Centuries.* Translated by Max Brandt. Uppsala: Uppsala University.

Josephson, Aksel G. S. 1891. *Avhandlingar ock program utgivna vid svenska ock finska akademier ock skolor under åren 1855–1890* [*Dissertations and programs published at Swedish and Finnish academies and schools during the years 1855–1890*]. Uppsala: Lundequistska Bokhandeln.

Kaiserfeld, Thomas. 1997. *Vetenskap och karriär. Svenska fysiker som lektorer, akademiker och industriforskare under 1900-talets första hälft* [*Science and Career. Swedish Physicists as Lecturers, Academics, and Industrial Researchers During the First Half of the Twentieth Century*]. Lund: Arkiv.

Kandel, Eric R. 2012. *The Age of Insight: The Quest to Understand the Unconscious in Art, Mind, and Brain, from Vienna 1900 to the Present.* New York, NY: Random House.

Kiselman, Christer. 2001a. La sveda faklingvo en tekniko, matematiko kaj natursciencoj. **In:** Fiedler, Sabine; Liu Haitao (Eds.): *Studoj pri interlingvistiko. Festlibro omaĝe al la 60-jariĝo de Detlev Blanke. Studien zur Interlinguistik. Festschrift für Detlev Blanke zum 60. Geburtstag*, pp. 40–56. Dobřichovice (Prague): Kava-Pech.

Kiselman, Christer. 2001b. Svenskt fackspråk inom teknik, matematik och naturvetenskap [The situation of Swedish in the fields of technology, mathematics, and the natural sciences]. **In:** *Libens Merito. Festskrift till Stig Strömholm*, pp. 225–243. Acta Academiæ Regiæ Scientiarum Upsaliensis **21**.

Kiselman, Christer. 2007. Enkonduko al distribucioj. *Acta Sanmarinensia*, Volume VI, No. 4, pp. 105–132. (Formal year of publication 2004.) Academiae Internationalis Scientiarum (AIS). Göttingen: Leins Verlag.

Kiselman, Christer O. 2018. Werner Fenchel, a pioneer in convexity theory and a migrant scientist. *Normat. Nordisk matematisk tidskrift*, **61**, No. 2, 133–152.

Kommittén för svenska språket. 2002. *Mål i mun. Förslag till handlingsprogram för svenska språket* [*Speech. Draft action programme for the Swedish language*]. Statens Offentliga Utredningar 2002:27. Stockholm: Fritzes offentliga publikationer.

Liedman, Sven-Eric; Persson, Mats. 1992. The Visible Hand: Anders Berch and the University of Uppsala Chair in Economics. *The Scandinavian Journal of Economics* **94**, Supplement, 259–269. Proceedings of a Symposium on Productivity Concepts and Measurement Problems: Welfare, Quality and Productivity in the Service Industries.

Lindberg, Bo. 1994. *Europa och latinet* [*Europe and Latin*]. Stockholm: Natur och Kultur.

Lindroth, Sten. 1975a. *Svensk lärdomshistoria. Medeltiden; Reformationstiden* [*Swedish History of Ideas. The Middle Ages; The Time of Protestant Reformation*]. New printing 1997. Stockholm: Norstedts Förlag AB.

Lindroth, Sten. 1975b. *Svensk lärdomshistoria. Stormaktstiden* [*Swedish History of Ideas. The Time of the Swedish Empire*]. New printing 1997. Stockholm: Norstedts Förlag AB.

Lindroth, Sten. 1976. *A History of Uppsala University 1477–1977.* Translated by Neil Tomkinson with the assistance of Jean Gray. Uppsala: Uppsala University.

Lindroth, Sten. 1978. *Svensk lärdomshistoria. Frihetstiden* [*Swedish History of Ideas. The Age of Liberty*]. New printing 1997. Stockholm: Norstedts Förlag AB.

Lindroth, Sten. 1981. *Svensk lärdomshistoria. Gustavianska tiden* [*Swedish History of Ideas. The Gustavian Time*]. Edited and published by Gunnar Eriksson. New printing 1997. Stockholm: Norstedts Förlag AB.

Nordisk Familjebok. Konversationslexikom och realencyklopedi. 1905, volume 3 (Bibliotheca mathematica); 1907, volume 6 (Duhre); 1907, volume 7 (Eneström). Stockholm: Nordisk Familjeboks Förlags Aktiebolag.

Sandelin, Bo. 2001. The De-Germanization of Swedish Economics. *History of Political Economy* **33**, Issue 3, 517–539.

Schwartz, Laurent. 1966. *Théorie des distributions.* Paris: Hermann.

Segerstedt, Torgny. 1992. *Den akademiska friheten under frihetstiden* [Academic Freedom during the Age of Liberty]. Acta Universitatis Upsaliensis. Skrifter rörande Uppsala universitet. C. Organisation och historia, 22. Uppsala: Uppsala University.

Siegmund-Schultze, Reinhard. 2014. One hundred years after the Great War (1914–2014): A century of breakdowns, resumptions and fundamental changes in international mathematical communication. **In:** *Proceedings of the International Congress of Mathematicians, Seoul, 2014*, volume 4, pp. 1231–1253. Seoul: Kyung Moon SA.

Sobolev, S. L. 1936. Méthode nouvelle à résoudre le problème de Cauchy pour les équations linéaires hyperboliqies. *Mat. Sb.* **1** (43), 39–71.

Stubhaug, Arild. 2010. *Gösta Mittag-Leffler: A Man of Conviction.* Translated from the Norwegian and Swedish editions by Tiina Nunnally. Berlin; London: Springer.

Stubhaug, Arild. 2015. Gösta Mittag-Leffler (1846–1927). *Newsletter of the European Mathematical Society*, No. 96, 2015 June, 22–25.

Teleman, Ulf. 2003. *Ära, rikedom och reda. Svensk språkvård och språkpolitik under äldre nyare tid* [*Glory, Wealth, and Order. Swedish Language Cultivation and Politics in Early Modern Times*]. Stockholm: Norstedts ordbok.

Tengström, Emin. 1973. *Latinet i Sverige. Om bruket av latin bland klerker och scholares, diplomater och poeter, lärdomsfolk och vältalare* [*Latin in Sweden. On the Use of Latin Among Clerics and Scholars, Diplomats and Poets, Learned and Rhetoricians*]. Stockholm: Bonniers.

Wessel, Caspar. 1999. *On the Analytical Representation of Direction. An Attempt Applied Chiefly to Solving Plane and Sherical Polygons.* Originally presented in 1797; translated by Flemming Damhus. Introductory chapters by Bodil Branner, Nils Voje Johansen and Kirsti Andersen. Edited by Bodil Branner and Jesper Lützen. Copenhagen: The Royal Danish Academy of Sciences and Letters.

Uppsala University, Department of Information Technology
Paper address: P. O. Box 337, SE-751 05 Uppsala
Amber addresses: `kiselman@it.uu.se`, `christer@kiselman.eu`
URL: `www.cb.uu.se/~kiselman`

Submitted on 2016 March 28.
Accepted for publication in 2016. Published in March 2019.