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Who is Michael D. Gordin?

Michael D. Gordin, the author of the monograph *Scientific Babel* (2015), is Rosengarten Professor of Modern and Contemporary History at Princeton University. This monograph is not the first one by this Princeton-based historian. During his approximately 15-year-long career, Michael D. Gordin has become a prolific author having written five books, having co-edited seven volumes and special issues, and having published a plethora of articles and book reviews, all mainly dealing with the history of modern science.[1] This current monograph of his addresses a centuries-long problem of the scientific language barrier.

Scientific Babel

Scientific Babel: How Science Was Done Before and After Global English (415 pages) consists of the introduction, eleven chapters, and the conclusion, and serves as an interesting interdisciplinary treatment of various languages of science with a special emphasis on the history of science. In other words, this monograph deals with the scientific language barrier not only from a usual linguistic, but also from a historical point of view. Starting with Latin, the author undertakes an intriguing historical journey through a variety of languages and language projects in the last 300 years which resulted in the contemporary virtually monoglot science.

[1] His impressive CV can be found on his own web page at: www.michaelgordin.com.

Talking Science

In *Talking Science* (p. 1–22), an extensive introduction to the monograph, Gordin instantly explains that, although written in the contemporary global scientific language, this book "is not fundamentally a book about English. It is a history of scientific languages, the set of languages by means of which scientific knowledge has been produced and communicated" (p. 1). However, as the author admits, this history of scientific languages does end "with the most resolutely monoglot international community the world has ever seen – we call them *scientists* – and the exclusive language they use to communicate today to their international peers is English" (p. 2) (author's italics). Monolingualism is therefore quite a strange outcome, since the humanity has been multilingual for most of its history. As Gordin points out, "[t]he goals of this book are not only to show how we came to this point, but also to illustrate how deeply anomalous our current state of affairs would have seemed in the past" (p. 2).

The author then enumerates in alphabetical order the languages in which a significant scientific production has been done so far (p. 4): these are Arabic, Chinese (classical), Danish, Dutch, English, French, German, Greek (ancient), Italian, Japanese, Latin, Persian, Russian, Sanskrit, Swedish, Syriac, and Turkish (Ottoman). As it can be seen, in comparison to other cultural activities, science has always been done in a limited set of languages. According to Gordin, this book is about "how scientists managed to work among this (limited) profusion of tongues, how they hoped to conquer it, and how it came about that the Babel was no more" (p. 4).

In this introduction, the author further distinguishes a native language from a vehicular language, the first one being, according to him, the language of identity, and the other one the language of communication. As he explains: "You want your interlocutor to understand what you say, and this is easiest to achieve by using the language your listener (or reader) understands best, or at least the strongest language you have in common–that is, using what is called by linguists a *vehicular language*" (p. 5) (his emphasis). As Gordin concludes, "[t]oday's overwhelming dominance of one vehicular language may give the impression that science naturally trends toward communication and away from identity" (p. 5). However, only a couple of centuries earlier, Latin was a single scientific language, a language of communication, but it was joined by many other languages, mainly languages of identity. This is, according to Gordin, "an omnipresent feature of all interchange," where identity and communication "interact within the spheres of language and language choice" (p. 5), sometimes resulting in scientific asymmetry: "If you are a

native speaker of English, your language of identity equals your language of communication" (p. 5). As the author later explains, "[t]oday's situation raises obvious issues of fairness, whereby non-Anglophones have to study English intensively and deploy it with some high level of fluency, while native speakers of English can conduct their science without that educational burden" (p. 13).

Apart from English, the author gives a short graphical portrayal of other dominant vehicular languages (French, German, Japanese, and Russian) since the late 19th century which served as serious rivals to English. For instance, from 1880 to 1910 there was an almost equal partition of publications in English, French, and German, which the author calls the "triumvirate" (p. 7). Since 1910, only German succeeded in playing the leading role of the scientific lingua franca, but only between 1910 and 1930, which is, according to the author, due to the aftermath of World War I which "was central in cementing both the collapse of scientific German and the ballistic ascent of English" (p. 7). Due to this incredible ascent of English since the 1930s, all other languages were used less and less. For example, French showed a gradual decline throughout the 20th century (since the 1920s), and Japanese never posed a serious "threat" to any scientific language represented in the graph. Of all the mentioned languages, only the usage of Russian started to grow exponentially after the 1930s (at its peak in the 1970s), but it, as all other languages apart from English, never came close to German (at its peak in the 1920s). As Gordin pointed out, "[b]ehind the graph lie a million stories, and it is history's task to uncover them" (p. 8), in which his book largely succeeded.

As the author admitted, his study is mainly a focus on Europe and North America, portraying only the history of languages which he uses and understands: English, Esperanto, French, German, Latin, and Russian. As he explains, "[t]he comprehensive story is obviously bigger than that and could include all of the world over all of recorded history. I restrict myself to this narrower swath for two reasons: one intellectual and one practical" (p. 9). The intellectual reason behind his focus on only these languages is that the phenomenon of global English started on those very continents. The practical reason why the author wrote a history of primarily European scientific languages is because of his ability to read and understand them: "I cannot write a history from sources I cannot read and understand. That is a frank admission of ignorance, and you don't come across such things very often in books like this one" (p. 9), with which one could not agree more.

Before dealing with the mentioned scientific languages, the author also touched upon "the seemingly universal phenomenon of linguistic citation bias", coming eventually to conclusion that "[s]cholars disproportionately cite literature in the

languages they feel most comfortable with, which are often their native languages" (p. 10). However, this does not mean that the quantity of citations equals quality. Quite the opposite: the scholarship "is always biased by the linguistic capacities of the scholar. It's only honest to admit it" (p. 10). Gordin honestly states that he is no exception to this rule.

The Perfect Past That Almost Was

In this monograph each chapter focuses on one scientific language, but not exclusively, "because we cannot understand the history of any individual language without seeing how its users deploy it in dialogue with its competitors" (p. 21). Thus, the first chapter (p. 23–29) starts with "the most persistent archetype of a scientific language: Latin" (p. 24).

Latin was not a dominant language of science until the high Middle Ages and the Renaissance, being subordinate to Greek and Arabic in the continental and Mediterranean regions for over a millennium. From the high Middle Ages, Latin perfectly functioned as a universal scientific language, all up to 1850, when it was largely abandoned in the scientific community (except in botanical nomenclature). As a result, since the early modern period, Latin has been primarily perceived in two ways: "as a Paradise lost, a moment of universal comity before the descent of Babel, or as an artificial straightjacket that Europe is better off without" (p. 24). In other words, as the author adds, "[t]he contemporary status of English changes the way we view Latin. If you think that one language for science improves efficiency and understanding, the rejection of Latin appears as a monument to human folly; if you lament the loss of individuality and heterogeneity, then we are back to Paradise lost, but this time our Eden is polyglot" (p. 24).

The author poses an important question why Latin was eventually abandoned as a universal language of science and gives several answers to it, some being more credible than others. The first one says that it was difficult to adapt Latin for modern challenges of science. However, how is it possible for English to adapt so quickly and coin new terms, mostly from the Latin lexical stock? Another, more persuasive, answer for the abandonment of Latin is the decline of power in the Catholic Church and consequently the absence of classical learning. However, for us the most credible consequence is the increased usage of vernaculars, especially in the 19th century when it came to the rise of powerful nation-states with their official languages. This last consequence ultimately led to the abandonment of Latin and the transition to Scientific Babel or, as the author also calls it, the triumvirate –

"a fitting Latin name!" (p. 49) – of English, French, and German, which was fully established by the end of the 19th century.

The Table and the Word and Hydrogen Oxygenovich

Before dealing with the languages of the triumvirate, the author deals with one other important language of science – Russian. In two chapters entitled *The Table and the Word* (p. 51–77) and *Hydrogen Oxygenovich* (p. 79–103), Gordin chronicles quite extensively the well-known priority dispute between Dmitrii Mendeleev (a Russian chemist) and Lothar Meyer (a German chemist) because of the mistranslation of the word *periodic*, and gives a brief description of Russian linguistic features. On the basis of the Mendeleev-Meyer dispute, the author tries to show how it is actually impossible to ascertain the priority disputes of discovery in a multitude of languages and their (bad) translations. However, these chapters are "not fundamentally *about* that dispute" (p. 54) (his emphasis). They are more about the introduction of Russian as a scientific language and its clash with German, a language of the triumvirate.

Speaking Utopian

The subsequent chapter entitled *Speaking Utopian* (p. 105–130) depicts at its beginning the clash of all the languages of the scientific triumvirate, which made the scientific communication somewhat more difficult. As the author asks himself: "How had communication been possible in the early nineteenth century? Through English, French, and German. These tongues were indeed associated with powerful nation-states, but they were also something more. Nonnative speakers had learned these languages en masse in order to communicate with others. They were, each of them, *auxiliaries*, and thus facilitated communication across the crazy-quilt of European speech" (his italics) (p. 108). In addition, science was done more and more in other languages as well, which led to a plethora of potential languages of science, no scientist was actually able to master equally. As Gordin pointed out, "to keep themselves acquainted with the special scientific work and studies which interested them, all savants would have to be polyglots; but to become polyglots they would have to abandon every other study, and therefore they would be almost destitute of knowledge of their special subjects" (p. 107). The solution to this problem was to find another common language of science. However, among the multitude of languages, it was impossible to find one for the following reasons: "[t]he French would never tolerate German; the Germans would never tolerate English; the English would tolerate nothing at all; and none of the rising nationalist movements

would submit to any of these three" (p. 110–111). As the author acknowledges, Latin was then a far better solution for the international communication than the triumvirate for two simple reasons: it was singular (one needed to learn only one language) and it was no one's native language. However, by the late 19th century, Latin was virtually discarded (or better said dead) as the common language of science.

At that time, a prospect of another common language of science, a neutral scientific auxiliary, could only be found in a mélange of competing "artificial languages" (such as Volapük, Esperanto, Ido etc.) which became extremely popular in the fin-de-siècle Babel. The author does not use the term "artificial languages" to a great measure because he is well aware that even the so-called natural languages are "artificial" to an extent, but gives precedence to the term "constructed language" instead, even though this term has largely become obsolete in the interlinguistic literature. The current and widespread term for constructed languages is "planned languages", but the author is either not aware of this fact or does not want to confuse or burden the readers with the right terminology. At any event, Gordin does differentiate *a priori* planned languages (those languages whose vocabulary is not based on existing languages) from *a posteriori* planned languages (those languages whose vocabulary is to a great extent based on existing languages). Concerning *a priori* languages, Gordin mentions Solresol as the first and last *a priori* language to be relatively successful, and concerning *a posteriori* languages, he pays most attention to the best known ones: Volapük, Esperanto, and Ido. While dealing with *a posteriori* languages, the author comes to a conclusion with which we very much agree: "If a constructed universal auxiliary was to be had, it was going to have to be *a posteriori*: built upon ethnic languages but stripping them of the exceptions and complexities that bogged down students of traditional tongues" (p. 113).

In order to show how complex a planned language can be, the author provides the reader with a brief outlook of Volapük, the first *a posteriori* planned language invented in around 1880 by Johann Martin Schleyer, a German Roman Catholic priest, which obtained global attention, but whose language community largely broke apart due to many reform requests and the unyielding persona of its creator, who did not allow tinkering with his language and made it his personal property. For Schleyer, his language was perfect, although it was extremely difficult to learn due to its grammatical and lexical intricacies. Schleyer, namely, borrowed words from existing languages, but adapted them to his language beyond recognition. For instance, the word *Volapük* itself (meaning "language of the world") consists of English words "language" and "world", which are not easily discernible to an aver-

age language user. Being a complex language with a complex background, its language community fell apart already by 1890. As Gordin concludes, "[s]ure, it died, but perhaps the important lesson was that it had lived" (p. 118).

However, the greatest merit of Volapük lies in the fact that it succeeded in preparing the ground for a more successful planned language – Esperanto. Esperanto (meaning "the one who hopes") is the invention of Polish physician L.L. Zamenhof in 1887 whose goal was to provide a universal second language. Not consisting of highly unrecognisable words, four cases, the umlauted forms of *a*, *o*, *u* etc., as it was the case with Volapük, but being a fairly easy-to-learn language, Esperanto almost succeeded in becoming an official international auxiliary language, even though this is not a widely known fact. As the author states correctly: "[t]oday most people who are not Esperantists consider it, frankly, borderline ridiculous. Then again, people who are not Esperantists typically do not know much about it" (p. 119).

The Wizards of Ido

In the subsequent chapter entitled *The Wizards of Ido* (p. 131–158), Gordin goes on to show how successful the promotion and usage of Esperanto became and how seriously the language was considered to play the role of the international planned language in the early years of the 20th century. In particular, *The Delegation for the Adoption of an International Auxiliary Language*, a committee of renowned academics, was founded in 1901 by French academics Louis Couturat and Léopold Leau, but convened only as late as 1907 with the sole goal to choose the best planned language or planned language project among many.[2] During that year, Esperanto figured prominently among other proposed languages and language projects, but *The Delegation* eventually suggested that it be taken into consideration only after certain reforms. Some of the linguistic features of Esperanto which needed to be changed were its circumflexed letters (*ĉ*, *ĝ*, *ĥ*, *ĵ*, *ŝ*, and *ŭ*), the definite (and only) article *la*, the marked accusative, the plural with a *–j* ending etc., to which the Esperanto community became largely accustomed. Zamenhof, represented by de Beaufront, a fervent advocate of Esperanto, before the committee, strongly rejected *The Delegation*'s terms since he was well aware that even minor language reforms would make the language and its community unstable. In the meantime, another

[2] It should be pointed out that in the interlinguistic literature "planned language" and "planned language project" are in no way synonymous. "Planned language projects" refer to planned languages which have never had a practical application, that is, a significant community of speakers, whereas "planned languages" succeeded in establishing a sizable and balanced language community.

language project cropped up called *Ido* (meaning "offspring" in Esperanto) by an anonymous author which largely drew from Esperanto, but offered revised linguistic features as *The Delegation* had required. As it later turned out, the author of this language project was de Beaufront himself, working on it behind Zamenhof's back. This made Esperanto drop out of race for the common scientific language, but also provoked a schism in the language community, since a significant number of Esperantists defected to the Ido community, mainly those who advocated reforms in Esperanto. However, in spite of "improved" linguistic features, Ido did not succeed in creating a sizable and stable language community largely due to the fact that its reform-prone adherents constantly requested changes to its structure. As a result, it was never in later years considered a serious scientific language. What is more, its community largely declined, leaving now at the beginning of the 21st century approximately only a couple of hundred speakers of the language.

Volapük and Ido are namely textbook examples of how a scientific language (as any other language) should not be devised. In order to have a balanced language and language community, one should not strive for constant reforms, but cultivate the language and maintain a stable language community. This is what Esperanto managed to do, having enabled a significant literary production and a strong language community all over the world and to this very day owing to a steady and standardised language. It should be pointed out that Gordin, in contrast to other authors, takes planned languages seriously, incorporating their form and function in the context of strenuous endeavours to establish a universal language of science.

The Linguistic Shadow of the Great War and Unspeakable

The next chapter called *The Linguistic Shadow of the Great War* (p. 159–185) clearly depicts the necessity of a neutral common language of science. In particular, following World War I, German (being the language of a defeated enemy) and its speakers exprienced a boycott in international organisations, conferences, and education systems of Entante nations. What is more, by the end of the war, 16 US states banned the use of German, and on the streets of Findlay, Ohio, one could even be fined $25 by the city council if one spoke the language. To this boycott German scientists responded with a counter-boycott, descriminating against languages and the speakers of Entante nations, making the state of science even more complicated. Even though the linguistic boycott of German and German scholars was lifted in 1926, the exclusion of German on the global scientific scene during the boycott years had serious consequences for the usage of German outside of Germany, making it an even lesser used language of science. Following Hitler's

rise to power and emigration of many German scientists, the status of German, as described in the chapter called *Unspeakable* (p. 187–212), diminished even more. As a result, emigrant scientists of German descent had to learn another language to teach and publish in it, which was not very easy to achieve. Gordin gives many examples of such scientists who put a lot of effort in order to function in a different scientific community, the most vivid example being perhaps the one of physicist Lise Meitner who found herself in Sweden learning Swedish concluding in turn that outside one's linguistic homeland, "[o]ne never enjoys equal rights and is always internally alone" (p. 210). As the author will show in the following chapters, the German Research Council estimated that between 1950 and 1967 about 1,400 scientists emigrated from West Germany: the majority of them fled to the United States and decided to learn English and publish in it. As a matter of fact, these scientists had no other option but to conform to the anglophone population in the USA since the Americans refused to learn foreign languages. Thus, the emigration of German intelligentsia which switched to English had major consequences for the status of German, which could have been rehabilitated as a scientific language after the Second World War: "hopes for the rehabilitation of the language to its former international dominance rested with science, for this was an area (unlike politics or economics) where German dominance was not resented in the contemporary world, and in which the achievements of the past retained value" (p. 291). Quoting Ulrich Ammon, Gordin concludes that "the ground lost by German has been gained virtually exclusively by English." However, before becoming an incontestable global (scientific) language, English had to deal with the rise of Russian.

The Dostoevsky Machine, All the Russian That's Fit to Print, and The Fe Curtain

The following three chapters called *The Dostoevsky Machine* (p. 213–240), *All The Russian That's Fit to Print* (p. 241–266), and *The Fe Curtain* (p. 267–291) largely concentrate on the role of Russian as a scientific language and the development of MT, or machine translation, since the early 1950s. In particuar, due to the Cold War and the arms race between the USA and the Soviet Union, a scientific race also occurred between these two countries. Since the Americans wanted to know what the Soviets were doing, and the Soviets were also highly interested in the affairs of the Americans, a method had to be discovered how to translate as many publications from one language to another in a short amount of time. The method of MT seemed plausible at that time and was propagated very much, especially by Léon Dostert, an American polyglot interpreter of French extraction. Although not very popular in the scientific community, Dostert was so influential while promot-

ing MT that by 1960 various institutions, such as NSF, CIA, the Army, Navy, and Air Force, were all funding research on this translation method. However, since MT was highly expensive and the price did not match expected results, by the late 1960s the interest in MT waned to a great extent. At any rate, this race in MT enabled Russian to become a serious scientific language. For instance, by the 1970s, the Soviet Union was as productive as the US concerning literature in chemistry. However, with the decline in MT, the interest in the Russian language also declined, preparing uncontested ground for the global dominance of English.

Anglophonia

The chapter entitled *Anglophonia* (p. 293–315) starts with the mention of the 2012 abolishment of the obligatory official record of plant species in Latin, which has been a common practice for centuries. This abolishment clearly shows the last obstacle which had to be removed for the English language to become a universally undisputable scientific language. Also, since the triumvirate of English, French, and German was destabilased by other national languages such as Russian, there was no other language which would prevent or at least contest scientific "compression to a single language" (p. 306). This had serious consequences for the non-English-speaking scientific world which realised that it is better for the reception of their journals to change their names and the language of scientific articles they wanted to publish into English. As Gordin exemplifies, "German scientists, to take a prominent example, have to make the difficult choice between identity and communication, between supporting journals and educational institutions in their native language or disseminating cutting-edge research to the broadest-possible readership. Anglophones don't" (p. 312). In short, the global dominance of English made foreign journals and scientific articles and works not written in English highly irrelevant, which in turn contributed to the exponential growth rate of scientific literature written in English. Therefore, as the author concludes, if you are a prospective Nobel laureate and "if you aim for the Prize, aim in English" (p. 305).

Here, the author once again turns to the unavoidable issue of the neutrality of English. As he notes, "[p]erhaps it was not so much that English was seen as neutral and therefore appropriate for scientific interchange, but rather that the association with science, long famed for objectivity and impartiality, endowed Anglophony with neutrality" (p. 310). Somewhat similarly he concludes that "English has attained its current position owing to a series of historical transformations that it also in turn shaped, exploiting a perception of neutrality that it gained through being distinctly non-neutral in either its British or American guise" (p. 315). However,

we find highly debatable that all feel equally this vague notion of neutrality that scientific English is supposedly associated with, especially the non-English-speaking world. As Gordin points out correctly, "evidence that English is not neutral is remarkably easy to find. The most obvious asymmetry is that a certain segment of the community learns the language effortlessly as children; the rest – the majority – struggle through years of education" (p. 310). Here, the author poses a relevant question: is the current system bad for science or for English? As he concludes, it is better to have one scientific language, in this case English, than a multitude of scientific languages, but that, as he further suggests, is not good for English because it makes its usage slowly depart from standard English due to the predominant usage of non-native speakers: it becomes "simplified, reduced, stereotyped to highlight communication and minimize stylistic nuance" (str. 314). In particular, the author remarks that this scientific English starts to resemble Basic English, a simplified variant of English created by linguist and philosopher Charles Kay Ogden in 1930 and aimed for teaching English as a second language.

Here, we would add that it is indeed more efficient to have one common scientific language. However, we should point out that the author exaggerates when it comes to the perceived neutrality of English. A plethora of scientific literature on the imperialism of the English language in the last 30 years, which the author does not mention at all, clearly shows the extent of the encroachment of the English language on all other languages. What is more, we must also disagree with his view that English has started to deviate from standard English primarily owing to non-native speakers. Even though there are differences in the usage of native and non-native speakers of (scientific) English, the norm of standard English will always approve or disapprove a certain usage and in that way control scientific publications, as any other publication in English.

Babel Beyond

In the concluding chapter called *Babel eyond* (p. 317–325) the author takes a short look at the future of scientific languages. As he concludes, we can only guess what might happen with the current language of science, "because there is no historical precedent for today's Anglophonia" (p. 320). However, he adds, there are three possibilities: the first says that the status quo will continue (with the uncontested status of English), the other one that scientific English will be replaced by another language, the third is the possibility of several languages becoming languages of science (with English still having an important role). It is highly unfortunate that the author makes no further elaboration on these three scenarios. His meticulous re-

search of the post-Latin Scientific Babel could have enabled him to provide us with certain possible outcomes in the international scientific landscape, regardless of the fact that the present scientific state is to a great extent unprecedented. What is more, part of the title of his book is "how science was done before and after global English", but Gordin does not venture to make many speculations on science "after global English", that is, on science in a possible post-English scientific world. He does not even take into serious consideration Arabic, Chinese, Hindi, Spanish etc. as possible contenders for a universal scientific lingua franca, which are virtually unavoidable when one is predicting the linguistic future of the world.

All in all, there are many things which can be found absent in this very chapter, but also in the monograph as a whole. The most conspicuous omission is the book's lack of discussion of language situations extrinsic to science and geopolitical changes, such as language contact, entertainment, technology, the rise of the Internet and other media etc., which also largely contributed to the global dominance of English. Although the monograph would then turn out somewhat longer, its framework would surely offer a complete picture for a general reader. Having been restricted to science just because, as Gordin himself claims, science has been anglophone longer and more completely than any other domain, the book loses its pacing in certain places, especially in consecutive chapters dealing with the same language.

The book ends with a host of acknowledgments (p. 327–329), a list of visited archives (p. 331–332), notes (p. 333–402), and an index (p. 403–415).It comprises approximately 300 pages, which are not very difficult to read, primarily thanks to Gordin's thoroughly amusing and enjoyable narrative of the linguistic history of science, as well as his linguistic playfulness which is most vividly presented in his witty chapter titles (without a condescending attitude to the subject, as this attitude sometimes occurs in contemporary "science"). Although Gordin's story is not entirely a linguistic one, it can be of great interest to a linguist as well as to a historian. At any rate, the book shows the author's impressive command of a variety of languages, literature in those languages, and a special skill of incorporating and presenting interesting pieces of information (linguistic or not) in an extremely delightful way.

In short, this book is, as the author himself concluded, very much "a history of Western science" (p. 24) or Western science's search for its lingua franca: an interesting historical and linguistic journey describing the decline of Latin, a profusion of languages which failed to dominate science, and, as an outcome, the rise of global English as we know it. Gordin's treatment of the world of Scientific Babel

manages to show that science had always got a global impact, but the language of science has not. However, although Gordin managed to present "the cacophony" of European languages, it is necessary, or more likely an imperative, to write comparative histories of other scientific languages which were neglected in this account, especially Asian languages, which would then fill the centuries-long holes of scientific endeavours in other parts of the world. Of course, in order to be noticed by the predominately monoglot scientific community, these extensive histories should in any case strive to be written in English, just like this short review managed to do.