

GEORG NORBERT SCHNABEL AND STATISTICS*

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Abstract: In the first half of XIXth century in Bohemia, statistics had been developed in the understanding of the school of Achenwall and Schlözer. Its main exponent there was G. N. Schnabel (1791–1857), who was a professor of statistics at the university in Prague. This article is about all the main statistical publications of Schnabel, and demonstrates their gradual modernization, usage of comprehensive tables, and basic statistical analysis according to the patterns of political arithmetic and statistical graphs. Schnabel's activity was the culmination, but also the final stage, of the development of traditional university statistics in Bohemia. It also mentions the activity of Schnabel in organizing official statistics in Bohemia, his disputes with Austrian censorship and the later controversies in the matter of national statistics.

Keywords: history of statistics, Charles-Ferdinand University in Prague, Georg Norbert Schnabel, statistical graphs.

1. Introduction

Statistical theory in Bohemia in the first half of the XIXth century had been developing in the so-called German university statistics, i.e. the Achenwall and Schlözer schools. Prague University (and its Faculty of Law) was, after Vienna's, the most significant within the Austrian Empire. The subject of statistics was lectured there by Georg Norbert Schnabel from 1817. In his numerous publications from 1819-1848 we show the development and modernization of statistical science in this period, the adoption of new methods, especially from the current German university statisticians (including the so-called table statisticians), but also from political arithmetic. The 1830s and 1840s marked it's the origins of the official statistics in Bohemia in which Professor Schnabel was also engaged. The activity of Schnabel in the

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field of statistics has not yet been systematically described in the scientific literature yet. During writing this article we could only refer to one historical work by Závodský [1992].

2. The beginnings of statistics at the University of Prague

One of the historical roots of modern statistics is, in addition to official statistics and political arithmetic, the so-called university statistics, whose origins can be found at Central European universities around the mid-XVIIth century. Classics of this direction were primarily the professors of the Göttingen University: Gottfried Achenwall (1719-1772) and August Ludwig von Schlözer (1735-1809). At the University of Prague (called Charles-Ferdinand) at the Faculty of Law, lectures on statistics were introduced in 1775. Prague University thus became the third university in the Habsburg monarchy after Vienna and Innsbruck where lectures on statistics, at that time the modern and enlightenment science, were held.

Despite that the official teaching language at the university was Latin until 1784, some of the newly open sciences including statistics were also lectured in German, in the language of Central European Enlightenment. Since home-based publications did not yet exist, the prescribed textbooks were: Achenwall's *Staatsverfassung der heutigen vornehmsten Europäischen Reiche und Völker* (1768) and the two-part guidebook of Eobald Toze (1715-1789) *Der gegenwärtige Zustand von Europa* (1767). Statistics at Prague university only gained its own professor in 1779, the young graduate of the Vienna university Josef Mader (1754-1815), whose father, a famous Viennese sculptor, came from northern Bohemia.

Mader can be marked as a leading member of the first generation of the exponents of university statistics in the Czech territories. The peak of his activity was approximately the decade between 1785 and 1795. In his rather small publication *About the Term and Method of Teaching Statistics* [Mader 1793], Mader joined the ongoing discussions about the theory and methods of statistics. Briefly summarized, in the past university statistics dealt with a clear description of the various states – from the point of view of the state law, state administration, geographical conditions, population, economy, as well as foreign political interests. Mader, besides the usual description of individual states, emphasizes the general statistics of Europe, including the comparison of individual states in terms of

size, natural resources, population, economic conditions, but also the state establishment, etc.

In 1787-1795 altogether 15 volumes of proceedings called *Materialien zur alten und neuen Statistik von Böhmen Archiv der Geschichte und Statistik, insbesondere von Böhmen* were published dealing with a variety of topics from geography, economy, statistics, history, natural sciences, etc., and as far as Bohemia were concerned, they belonged to the Bohemian tradition of statistics. Mader also contributed to the publishing of collections devoted to the statistics of Bohemia, edited by J.A. Riegger (1742-1795), who was later called the “father of statistics in Bohemia”. Riegger and his colleagues were probably inspired by similar periodicals written by their famous contemporary Schlözer (*Briefwechsel, Staatsanzeigen*).

Of lesser importance for the development of statistical theory was the cultivation of this field at the university in Olomouc from 1783 (in 1782-1827 the local university was temporarily degraded to a mere academic lyceum). The lectures statistics were commissioned from the professors of political and economic sciences.

3. Georg Norbert Schnabel – life and work

Georg Norbert (Jiří Norbert) Schnabel was born in a family of tax collector in Bezručice (in Western Bohemia) on 31st March 1791. After graduation from grammar school in Pilsen he studied at the Philosophy (at that time preparatory) faculty and then the Faculty of Law at Prague University. After graduating from Prague, he obtained a doctorate at the Faculty of Law from the University of Vienna in 1816 and then he worked as Assistant Professor at the Chair of Political Sciences and Statistics. In September 1817, he was appointed Professor at the Statistical Chair of the Law Faculty at Prague University.

If Mader and his generation of statisticians started their work in the relatively liberal period of the reign of Joseph II. and Leopold II., Schnabel’s activity at the university in pre-March time (up to 1848) was under the absolutist reign of Franz I. and his chancellor Metternich. For the universities, this meant significant limitations of autonomy, the censorship of all the publications, lectures according to obligatory textbooks, control of teaching, etc. Despite that Schnabel wrote a long line of quality statistical publications he had prescribed to his lecture according to the same (and getting outdated) teaching texts of the Viennese professors Johann N. Zizius and Joseph C. Bisinger.

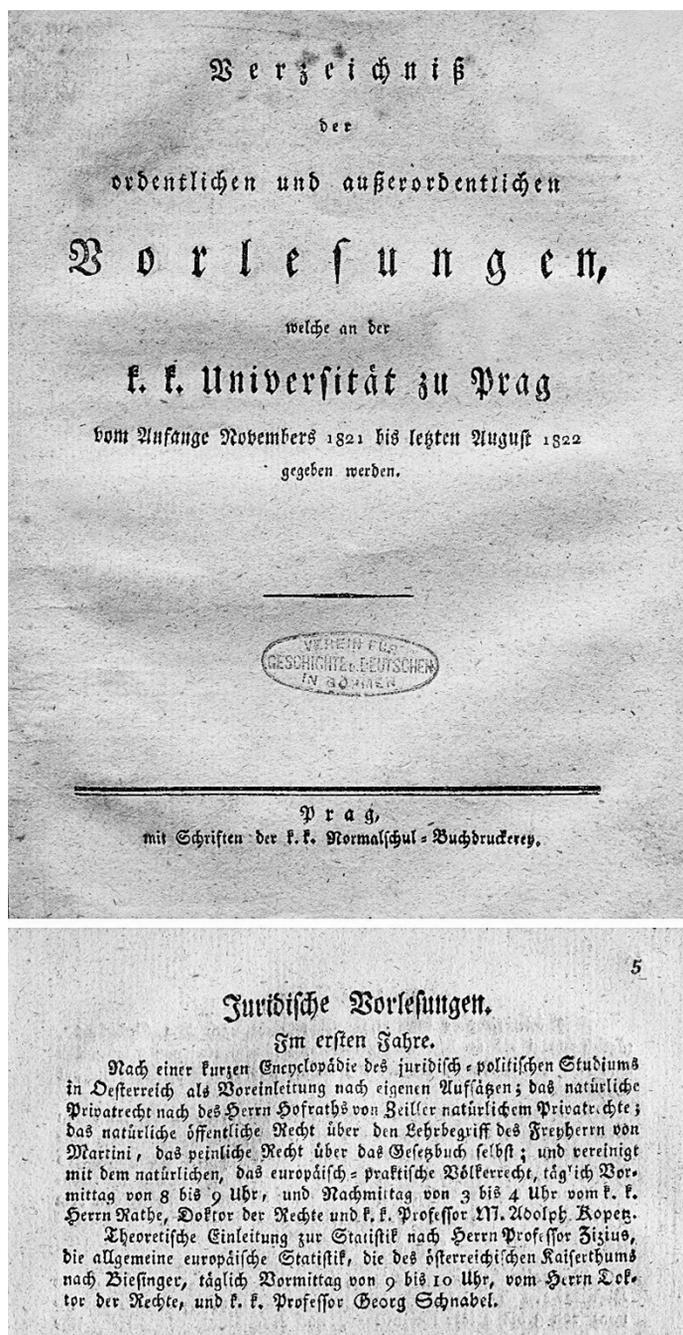


Fig. 1. Lectures by Professor Schnabel in the official study program of Prague University

Source: photo by authors.

In 1835 Schnabel took the opportunity to move from the statistics department to the better paid department of law theory and criminal law. In addition to the publications in his new specialization, Schnabel issued several important statistical works until 1848 (see next paragraph). Already in 1827, he had also published a three-part history of the Faculty of Law of Prague University.

In 1849-1850 Schnabel witnessed significant liberalization of the conditions at the university Thun's reform), which among others, eliminated the direct state supervision of education and compulsory textbooks. Schnabel also used the newly availed options and held his lectures in Czech. In 1850, and again in 1854, he was elected Dean of the Faculty of Law (the term of office was annual), in the academic year 1852/53 Professor Schnabel was the rector of the university (the following year he became the vice-rector in accordance with the rules). He died on 22nd October 1857 (the often mentioned 1856 is incorrect).

4. Georg Norbert Schnabel and statistics

In addition to the works from other disciplines, Schnabel published a long series of statistical publications, of which all the most important are chronologically listed in the section References. Shortly after his appointment as a professor, he wrote an extensive (nearly 600 pages) overview of Europe's organization after the Vienna Congress *Die europäische Staatenwelt* [Schnabel 1819]. By its unusual title, the author wanted to emphasize that there is a system of states on the European continent that should not be described by statistics alone (by the so-called ethnographic method), but as a unified system – the comparative method of which Schnabel had always been a proponent.

The first part of the book is devoted to the theory of statistics and “historical preparation” (essentially to the political history of the European states and their constitutions.) Part II contains a description of Europe as a system of states, mutually influencing each other and related by alliances and treaties. The division of the content into three chapters is quite standard: the geographical description of the European states (territory, population), the state establishment and the administration of the states (where there is also the treatise on the economy). The interpretation is illustrated in numerical figures only in some parts, but it includes general considerations, explaining contexts and historical excursions in the spirit of “comparative and evaluation methods” (*vergleichend-räsonierende Methode* in the publication title).

Precisely this comparison and evaluation of the government and administration systems in the European states, their judiciary, etc. attracted the attention of the police authorities. Although the publication had been properly censored, Schnabel was investigated, his lectures were checked (by checking notes in students' books!) and Schnabel was given a strict reprimand with the warning that he might lose his professorship [Bělina, Hlavačka, Tinková 2013, pp. 255-260].

Schnabel's Statistical description of Bohemia [Schnabel 1826b] is after Riegger's unfinished *Skizze einer statistischen Landeskunde Böhmens* (1795) and several partial attempts by other authors, the first exhaustive description of Bohemia in the spirit of traditional university statistics. The text of this small publication is logically and clearly arranged, with the available figures being illustrated mainly by the interpretation of the population and state of the economy in the country. The curriculum is structured according to the outline:

I. Potential of the country.

A. Country (geographical relations).

B. Inhabitants (including economic relations).

II. Government

A. Terrestrial system (basic laws, ruler, states, etc.).

B. Country administration (political administration, education, health, finance, justice, military management).

Schnabel also wrote three smaller works inspired by the works of current table statistics. The first [Schnabel 1826c] is concerned with the Austrian monarchy, only from the point of view of the territory and inhabitants in particular countries. The slender brochure contains a number of numerical data, from which various proportional numbers are calculated, in particular, to compare the population density in each country of the Empire. The other two brochures [Schnabel 1826a] and [Schnabel 1828] contain mainly tables, with mainly numerical data, and only brief textual information (e. g. the names of the provinces in particular states).

After ten years (1829) Schnabel returned to the issue of general statistics of Europe in the work of the same name [Schnabel 1829a], that was published four years later in a slightly reworked edition in Vienna [Schnabel 1833]. The extensive two-part work contains mainly a survey of the European states, written using the comparative method; unlike the similar older one [Schnabel 1819] it is significantly more modern and more extensive numerical data and also simple statistical analysis (see below). These are primarily treatises on the population,

agriculture and partly on industry. There is even a ‘compulsory’ national character for different European ethnic groups. The Slavs – especially the Czechs – came out well here, better than the Poles, who “prefer hunting and illicit trade before agriculture”¹. Also, in the case of this publication, the Viennese censor required a number of adjustments [Roubík 1940, p. 114].

Let us have a closer look at the simple statistical methods that are used by Schnabel especially in publications: [Schnabel 1826c] and [Schnabel 1833]. In the first of them, spatial and material indexes are commonly used, as well as other proportional numbers. For example, when analyzing population figures in the Habsburg monarchy, Schnabel is not satisfied with the publication of density data per square mile in individual countries. He compares those densities according to the indexes (he takes the highest value as the basis – from the Lombard-Venetian Kingdom), he also calculates the reverse values of the density (the size of the area per thousand inhabitants) and also compares the values of this indicator with the indices.

In *General Statistics* there are other analysis of population relations by the methods of political arithmetic. Sometimes we have the possibility to observe Schnabel’s thinking and find him not only fairly daring in his estimates but also in numerical errors, such as in Schnabel [1833, I, p. 166]. In the quotations of the analyzes of foreign authors, Schnabel, for example, copies of the abbreviated mortality tables from the French and Swedish sources [1833, I, pp. 176-178]. To a lesser extent, Schnabel compares European countries with proportional numbers in other areas – especially in agriculture (the share of arable land in agricultural land, the share of vineyards in agricultural land, arable land per capita, grain harvest per capita, etc.), military matters (the ratio between the usual size of troops and the number of inhabitants, the ratio between the infantry and the cavalry) etc.

Thanks to Schnabel there is the first use of graphs in statistical literature in Bohemia. Already in a brief publication [Schnabel 1826c] appendixes with graphs are attached. The first graph compares the size of particular countries of the Habsburg monarchy using multicolor squares that correspond to the area of the country (the squares are drawn to one another and “hung” on one straight line – see Figure 2).

¹ „Die nördlicher wohnenden Slaven insbesondere lieben starke Getränke und volle Tafeln, sind abgehärtet und arbeitsam; dagegen aber mehr der Jagd und dem Handel (Schacher), als dem Ackerbaue zugethan.“ [Schnabel 1833, I, p. 189].

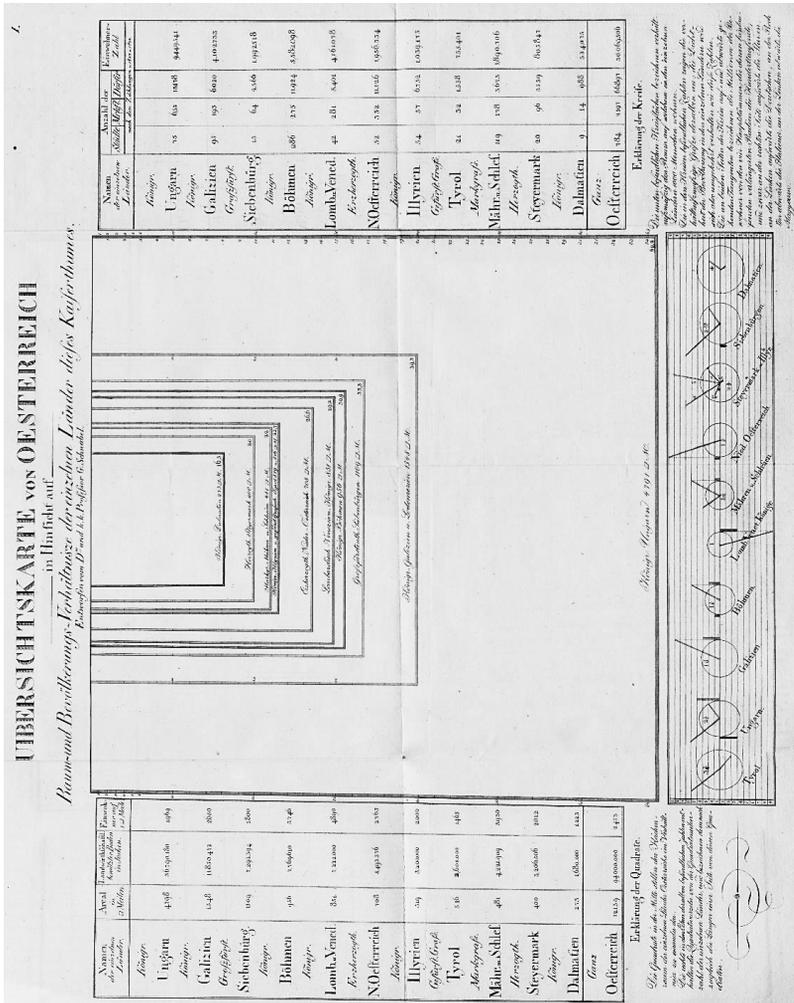


Fig. 2. Comparison of individual countries of the Austrian Empire
Source: photo by authors.

The second graph illustrates the combination of the number of inhabitants, its density and national composition in each country. The basis of the graph is the size of the area per 1000 inhabitants (the reversed population density), represented for each country by a circle (the magnitude of this indicator, the centers of the circles lie on one horizontal line). The numerical data in the circle expresses an index comparison with the value of the indicator in the most densely populated country of the monarchy (for Bohemia this index was $1\frac{1}{3}$). The varied vertical half-tangents express the population in millions (left up Germans; down Hungarians; upper right Slavs, down Italians), the elongated oblique radials show the remaining hundreds of thousands of inhabitants (the nationality is again expressed in color and direction, support lines allow reading of values). This graph, especially in terms of population representation, is not very clear – see Figure 2².

Similar statistical graphs in a combined set of geographic schemes and statistical tables are two large annexes to *General Statistics* [Schnabel 1829a] – in the 1st and the 2nd print, they were also published separately as [Schnabel 1829b]. While in the case of the tables it is possible to appreciate their clarity and the choice of interesting data, the statistical graphs here barely point to progress against the previous publication. The size and population of European states this time, Schnabel shows in a coordinate graph in which the number of inhabitants is recorded for each state on the vertical axis, on the horizontal axis is its area, and on the line connecting these two points, it records the population density. Due to the large number of European countries compared, the graph is generally unclear, all the more so that the author does not respect (on any axis) the scale and, in some cases, the order of the states.

The second of the above stated graphs is modified so that the circles are replaced with squares and instead of the tangent and radials different sequence numbers are added. The representation of the length and size of the river basins of the eight most important European rivers is simple and clear, the pictogram's predecessor can be seen in the altitude graphs of both Austrian and other European mountains (two variants of the graph). Some clarity cannot be denied to another historical rather than a statistic, somewhat monstrous graph, presenting the territorial development of the Habsburg monarchy and the succession of sovereigns in the individual countries (forming at the time of the book

² These graphs were probably also published as a separate map publication [Schnabel 1825].

the Austrian Empire). The graph has the form of huge a flow (coordinates at the shore indicate the flow of time), coming down from several rivers over the centuries (Bohemia, Moravia, Austria, Hungarian, etc.). Small influxes show later territorial gains. The chronology is from the first legendary princes to the present.

For the construction of his graphs, Schnabel was inspired by foreign patterns, probably by the works of the pioneer of graphic representation in statistics A.F.W. Crome (1753-1833), Professor in German Gießen (a set of interlocking squares and a representation of the number and density of the population by means of circles with tangents and radials).

As mentioned above, Schnabel had been involved in statistics even after leaving the Chair of Statistics at the university. updated his *General Statistics* in such a way that together with the reprint of the 2nd edition [Schnabel 1841b] he published an extensive addition with the title *Europe around year 1840* [Schnabel 1841a]. From a methodological point of view, it is necessary to point out the frequent use of averages instead of the individual values of the indicators, whether they are climate indicators, population reproduction or agricultural and industrial production, etc. Fondness of table statistics at that time in averages and proportional numbers is reflected here in the calculations of such indicators as the ratio of the area of the lowlands and mountains, the length of the watercourses, averaging per square mile of the area, etc. For the population density indicator of the individual states, it is remarkable the thought of the author about the dispersion of individual values to the left and to the right of the average (pp. 38-39).

Among the modern elements of this Schnabel's work it is necessary to add also his interest in the dependence between the studied features. In several tables and in the text (especially pp. 26-27), he shows how the average temperature decreases with the increase of the altitude (excluding the latitude!), or how the decrease of the northern latitude degree increases the diversity of the plants (quantified by the number of species) etc. Statistical methodology of the examination of dependency did not develop further in Europe until the findings of Galton in the last third of the 19th century.

Official statistics was in Habsburg monarchy centered in Vienna. In the first half of the 19th century it is possible to observe the beginning of the organization of some statistical branches, also on the local level. In 1832 or the Bohemian Land Trade Commission was given the task of collecting data for Bohemian economic statistics. Its most prominent

member from 1833 was Professor Schnabel. The Land Trade Commission usually worked closely with Industrial Unity (Verein zur Ermunterung des Gewerbsgeistes in Böhmen), which started operations in 1833. In 1841 Industrial Unity established its own statistical office, the first specialized statistical workplace in Bohemia. The reorganization of Industrial Unity (at the beginning of 1844) established five permanent committees, of which the fifth and the section led by it were devoted to industrial statistics and closely cooperated with statistical office. The first elected chairman of the Fifth committee was Schnabel.

From the end of the 1830s, the Land Trade Commission had sent to the Vienna authorities comprehensive reports on the state of the economy in Bohemia. Schnabel has also used several of his journal articles, of which the most important was [Schnabel 1834] providing a vivid picture of the state of the industry in Bohemia during the industrial revolution.

The statistical work of the “new generation” is Schnabel’s sizeable book [Schnabel 1846], which gives for its time detailed and accurate overview of the state (and recent development) of agriculture in Bohemia. Schnabel used the Population Census from 1843 (according to the contemporary custom part of the Census was also the cattle count), the results of the most recent cadastral survey (the so-called stable cadastre) and a number of different surveys, organized by the Land Trade Commission, in which he actively participated. The publication is already commemorating the modern branch yearbook: a substantial part of it is made up of extensive tables, giving a detailed picture of the geographical conditions and climate in Bohemia, the agricultural land and its distribution, the amount of crops harvested, the livestock production, but also forestry, hunting, fishing, etc. The tables also include, for example, calculations of average market prices of the most important crops (for the years 1838-1843) for individual regions and for the whole country (pp. 88-91). Also, the text part contains several simple analyses, comparison with the earlier state, confronting data from various sources, etc.

While this large book appears somewhat cumbersome, then Schnabel’s last book *Tables to the statistics of Bohemia* [Schnabel 1848] gives a modern impression. The author has basically abandoned the old state-based concept of statistics and works only with numerical information (“because the numbers speak” – p. 1 of the preface). The publication consists of 62 large tables, supplemented with a brief

commentary on the source, comparison with older data, short analysis and explanations. Most of the tables contain, in addition to the totals for Bohemia, data for individual regions (16) and Prague.

Schnabel used data from the latest pre-March census in 1846 and from other actions of official statistics. In estimating the values of some indicators, Schnabel was inspired by classical methods of political arithmetic: for example, the number of persons employed in agriculture was estimated to be five times the number of agricultural holdings (Table 20), similarly, the amount of harvest of some crops was estimated by means of the officially established sowing area and the average yield from the “morgen” (Table 24), total logging (Table 25) etc.

If the traditional university statistics characterized the state of the country or its parts, here Schnabel is often interested in the development of indicators in time. In some cases, it publishes a time series of indicators (e.g. Tables 6, 50, 55), in other places he compares the most recent data with older data, calculates annual year differences etc. The averages and proportional numbers are frequent again, but their choice is, as in the case of the published data, well thought out and used for various analyzes. The novelty is also the beginning of transition from the global statistics of official statistics to the analysis of the set of individual values, typical of modern statistics from the time of Quételet. A step in this direction is, for example, the table on beer production supplemented by the distribution of 1 044 breweries in Bohemia according to the (probably weekly) beer exhibition (Table 37).

Schnabel's *Tafeln* were published at the beginning of the revolutionary year 1848 and data about the national composition of the inhabitants soon became the target of a sarcastic attack by the journalist Karel Havlíček Borovský, who had already criticized Schnabel before [Havlíček Borovský 1986, pp. 131-137]. The people's nationality was not surveyed during censuses at that time and estimates of ethnic composition were usually based on information on the prevailing language in individual localities. They were often based on church lists of parishes, in linguistically mixed places the proportion was estimated, for example, by the participation in Czech and German sermons in the church etc. [Roubík 1940, p. 61]. It was only from the census of 1880 that the “contact language” appeared (Umgangssprache) in the census questionnaire, defined as the language usually used by the person in contact with the environment. This methodology was interpreted as an indirect question about nationality and was criticized mainly by the

Czechs. Schnabel already in *Tafeln* (Table 8) was approaching this concept of nationality when he estimated the numbers of native Czechs who were then commonly employed by Germans (e.g. merchants, officials, etc.) and they were counted among the Germans.

5. Conclusion

Our article introduced G.N. Schnabel as the main representatives of the second and at the same time the last generation of the Achenwall and Schlözer school of statisticians in Bohemia. If his first papers were still written according to the principles of traditional university statistics, others were already influenced by tabular statistics and partly by political arithmetic, and the last two were already completely refraining from the exhaustive verbal description of the state and devoting themselves only to numerical characteristics and its analyzes. Although in the environment of Central European universities in part even after the middle of the 19th century (of course modernized) concept of statistics in the spirit of the Achenwall school (in Prague e.g. Professor Eberhard A. Jonák), it was only the final stage of university statistics. What is more, the subject of the survey was taken from university statistics by other newly introduced disciplines – constitutional law, geography, political economy, etc. The term statistics was understood at the end of the 19th the century as something completely different than a hundred years earlier. Professor Schnabel as a proponent of liberalism, was in particular in the first period of his activity, in conflict with the absolutist regime. Later, as a supporter of the local patriotism, he was the target of criticism from the leaders of the emerging generation of language nationalists.

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GEORG NORBERT SCHNABEL I STATYSTYKA

Streszczenie: W pierwszej połowie XIX wieku w Czechach statystyka została rozwinięta zgodnie z myślą szkoły Achenwalla i Schlözera, głównie za sprawą G.N. Schnabla (1791-1857), profesora statystyki na uniwersytecie w Pradze. Artykuł prezentuje wszystkie główne prace dotyczące statystyki opublikowane przez Schnabla, ukazując ich stopniowy rozwój i modernizację. Artykuł nawiązuje również do działalności Schnabla w organizowaniu statystyki publicznej w Czechach, wspominając jego spory z austriacką cenzurą, a także kontrowersje w kwestii statystyki krajowej.

Słowa kluczowe: historia statystyki, Charles-Ferdinand Uniwersytet w Pradze, Georg Norbert Schnabel, wykresy statystyczne.