

Sajnovics's *Demonstratio* (1770) A linguistic treatise based on methods of natural sciences

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Abstract

Sajnovics János (1733–1785) was the author of the basic work of comparative linguistics (*Demonstratio* 1770), which is considered the first scientific demonstration of the affinity of Hungarian and a Finno-Ugric language, Saami. This work was created on the occasion of the 1769 astronomical expedition in Denmark as unplanned side research. After the expedition the leader, Maximilian Hell reported on the transition of Venus (*Transitio Veneris*) and his assistant, János Sajnovics on the Hungarian–Lappish linguistic identity (*Demonstratio*).¹ This paper will deal with the scientific research methodology of *Demonstratio* comparing it with the methodology applied in Hell's astronomical treatise. We also consider some contemporary critics of the methodology of *Demonstratio*.

1. Introduction and hypotheses

The *Demonstratio* is a basic work of comparative linguistics, the first scientific demonstration of the affinity of Hungarian and a Finno-Ugric language. This work was created on the occasion of the 1769 astronomical expedition in Denmark as a side research (Cf. Aspaas 2012).

Maximilian Hell, royal astronomer of Habsburg Empress Maria Theresia was invited by the Danish court with the task of the observation of the 1769 Venus transit on an island called Vardø near the North Pole. Although the invitation was only for astronomical observation, the Jesuit father Hell had many other plans; he wanted to carry out a complex scientific investigation of the little-known North region; observe the animals, herbs and the origins, language and different dialects of the Lappish people. His assistant and companion János Sajnovics was also a member of the Jesuit order and also an astronomer, and Hell entrusted him with the task of Hungarian – Lappish linguistic comparison.

Sajnovics completed the mission and performed the fieldwork. After the expedition, once they returned to Copenhagen, they worked in parallel and finished their work, Hell on the astronomical topic and Sajnovics on the linguistic one. Both works were presented before the Danish Academy of Copenhagen in the winter of 1769 (naturally in Latin) and were printed soon afterwards.

As astronomers, both of them were familiar with the methodology of natural sciences, but they never made any research in the field of humanities. The humanities in general lacked a developed and generally accepted research methodology at the time. Much has been written

¹ In this paper I will use the term *Lappish* instead of politically correct *Saami*, according to the 18th-century terminology.

regarding the *Demonstratio* (cf. Hadobás 2008), but there is no research concerning its methodology.

Now, that will be the topic of this article. According to the hypothesis, the obvious choice was for Sajnovics to apply the well-known natural scientific methodology in his linguistic work as well. It will also be argued that both men applied a modern organizational structure of scientific writings: the so-called IMRD model. To verify these hypotheses, the structure, definitions and method of data collection and processing used in the work of Hell and Sajnovics were examined.

First of all, it is necessary to clarify the meaning of scientific research methodology according to Hell and Sajnovics and in their age (Section 2). Then, the manner in which it was used in Hell's astronomical treatise, the *Transitus Veneris* will be looked at (Section 3). There will then be a comparison of the methodology applied in the linguistic treatise *Demonstratio* with that of the astronomical treatise *Transitus Veneris*, to see if they were similar (Section 4). Also, some contemporary critics of the methodology of *Demonstratio* will be considered (Section 5). Finally, the paper concludes with a summary (Section 6).

2. Scientific research methodology at the time

It's important to clarify the meaning of scientific methodology in Hell's and Sajnovics's age. Hell, who was himself a mathematician and astronomer, considered natural sciences more valuable than humanities. He believed that the progress of society depends on discoveries and innovations. A good illustration of Hell's approach is his proposal for establishing an academy in 1774. His proposal contained only the sciences like mathematics, physics, astronomy, chemistry, geometry and so forth. He wanted to deal separately with philology, the arts and the humanities (if these humanities needed an academy at all).

Hell's priority for the methodology of sciences was based upon the belief that it was the only right way of research and cognition. He was convinced that its methods could be more successful in the field of humanities as well. This distinction between science and humanities was very common and accepted from the age of ancient Greek philosophy. Systems of statements logically deducible from axioms (e. g. those of logic, and mathematics) were referred to as *scientia*. By contrast, skills to be mastered in practice on an inductive basis were called *artes*, e. g. history and the study of grammar. In contrast to the sciences, the human arts did not have a logical system and were therefore considered inferior. Hell referred to this contrast several times, for example in a dispute with George Pray, who was a historian (C. Vladár 2017). Hell suggested that mathematics used strict and exact definitions, and logical demonstrations, giving provable and controllable results, while the humanities used fuzzy terminology, was inductive and therefore had incomplete demonstrations.

3. The perfect example for the scientific methodology: Hell's *Transitus Veneris*

A brilliant example of Hell's methodology can be seen in his *Transitus Veneris*. It was the written version of his lecture held in the Danish Academy in 1769. The work contained a preface and eight chapters, in total 82 pages.

Hell's preface "To The Astronomers" [1]-7
"Test of the Quadrant from Copenhagen" 7-15
"Errors of the Quadrant Defined by Observations" 16-17

“On the Latitude, or Pole Height of the Vardøhus Observatory”17-29
“On the Longitude, or Difference of Meridian of Vardøhus”30-50
“On the Method of Observing the Optic contacts 51-61
“Observations of 2nd, 3rd, and 4th June Pertaining to the State of the clock” 61-69
“Observation ...on 3rd June” 69-80
“Observation of the Eclipse of the Sun on 4th June ...81-82
(English translation by Aspaas 2012)

Figure 1. The structure of the *Transitus Veneris*

Hell devoted 60 of the 82 pages to a description of the research methods, and the observation data while the results were presented on the last twenty pages. Hell described in detail the method used for the location of the observation point, the procedures followed in the testing of the clocks, listed the instruments of the observation, the method used for the observation. He urged terminological standardization and exact definitions, for example for the term *contactus opticus*.

The organizational structure of the *Transitus* is very similar to the modern so-called IMRD model of scientific writing:

Introduction – What is the purpose of the research? What is the research question?

Methods – When, where, and how was the study done?

Results –What did the study find?

Discussion – What might the answer imply and why is it important? How does it fit in what other researchers have found?

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(English translation by Aspaas 2012)

Figure 2. The structure of the *Transitus Veneris* according to the IMRD model (marked with different colours)

The preface corresponds to the **Introduction** (with light blue), the chapters I-VI. correspond to the **Methods** (with red), and the last chapter includes the **Results** and the **Discussion** in one (with green).

There is one strange thing worth mentioning. While Hell himself later did human research (linguistics and history). Surprisingly, in this work, he did not follow his own strict methodological principles applied in the astronomical field. His notes and letters testify that he did not deal with his linguistic data critically: did not care about the change of the languages, the variants, the problems of spelling and so on. As we will see later, Sajnovics argued that one should never rely only on written evidence but must find a native speaker to check the pronunciation. In contrast to Sajnovics, Hell did not make any attempt to find out the real sound of the words, and names. He merely judged from the spelling used in the various written sources, seeking a complete match to modern Hungarian words. When it was needed, he had widened the definitions as well. This can be seen in the second edition of the *Demonstratio* where he forced Sajnovics to add new sections to the work. For example the etymology of the name of the province *Carjelia* originating from the Hungarian elements: *Kar-jel-ia*, [Land of brave arms], based on a picture of a scutum found in a geographical atlas. Another example of Hell's method was positing the origin of the Hungarian language from Chinese. (For more details see C. Vladár 2017.)

4. A linguistic treatise based on methods of science: Sajnovics's *Demonstratio*

Hell was confident in the field of astronomy, but Sajnovics, forced into linguistic research, faced two major problems. On the one hand, the humanities in general and linguistic comparison especially lacked an accepted research methodology at the time. On the other hand, as an astronomer, he never conducted any linguistic research. He felt challenged: an astronomer dealing with linguistics. In the preface of his work, he resolved this competence issue saying, as a native speaker of Hungarian, he was able to make a judgement about linguistic affinity.

As the methodology, he followed Hell's footsteps. The first edition of *Demonstratio* was made parallel with the *Transitus Veneris*, they were presented to the same audience, printed in the same place, and both had a Danish translation from the original Latin almost immediately.

They were similar in their approach and methodology. The Latin word *demonstratio* was a technical term with the meaning of mathematical proof, the treatise used the methodology of natural sciences, and its structure was also similar to the modern IMRD model.

The chapters of the first edition of *Demonstratio* according to the IMRD model are shown in Figure 3.

Sajnovics's preface "To The Royal Society of Sciences" [1-4]
I. The language of Hungarians and Lapps can be the same even if the speakers do not understand each other 1-7
II. It is impossible to determine the identity of languages from the books 8-12
III. The similar pronunciation of the words by these people 12-16
IV. On the Lappish orthography by Leem and on the Hungarian orthography 17-22
V. Transformation of the Lappish orthography into the Hungarian orthography 22-25
VI. On the diversity of dialects in general 26-30
VII. On the different Lappish dialects of Finnmark 30-32
VIII. The common words of these people 32-53
IX. The declination of nouns, the comparison of adjectives... 54-61
X. The similar use of pronouns, affixes, suffixes and prepositions 61-66
XI. The conjugation of verbs and by the auxiliary verbs 66-73

XII. The opinion of some famous authors 73–83

Figure 3. The structure of the *Demonstratio* according to the IMRD model (marked with different colours)

The main parts according to the IMRD model are as follows. The **Introduction**: the purpose of the research in the preface (in light blue). The **Methods** in the first seven chapters (in red), the **Results** from the eighth chapter to the eleventh chapter: on the one hand the comparative vocabulary and on the other hand the grammatical comparison (in green). The **Discussion** in the last chapter (in blue).

It's worth examining the parts dealing with the method more closely. The *Demonstratio* has a straightforward, purposeful logical structure. The preface sets the main hypothesis and the first seven chapters of the work deal only with the creation of the theoretical framework: the clarification of concepts and methods. At first, Sajnovics set up the hypothesis of the identity (*idem esse*) of the Hungarian and Lappish languages then he demonstrated how identity should not be investigated and how it should be. The first two chapters are purely logical proof, with syllogisms and probabilistic reasoning. This logical proof reasons the hypothesis: it is possible the identity of languages even if the speakers do not understand each other. According to Sajnovics the language comparison has to meet three criteria:

1. unified orthography of words,
2. unified dialects
3. original vocabulary.

The following chapters dealt with (in current terms) the limitation of the research corpus, and how to make the data (that is the words) comparable. Sajnovics investigated the criteria one by one, each criterion would be investigated in two steps, one chapter dealt with the theoretical foundation of the criterion and the following chapter with the unification summarized in tables. First the unification of orthography (creating rules signed with Roman numerals) and then the unification of Lappish dialects (creating rules signed with Arabic numerals). For the verifiability of the research, he investigated only the words collected in a printed vocabulary, Leem's Lappish Nomenclator (Leem 1748). After all, the comparative vocabulary in the *Demonstratio* is not abundant as it contains one hundred fifty pairs of words accompanying the numbers of the transformation rules.

The chapters on grammatical comparison also focus on rules and the examples are just for illustration. It is interesting that the work mainly lacks comparative paradigms between the two languages. He only gives rules with few Hungarian and Lappish examples or without any examples. He discusses his topic longer only if the categories of the Lappish grammars need to be unified. For example, there was the problem of how to unify the case system of the different grammatical descriptions, what is the meaning of the term *noun case*. Sajnovics gave an explanation and did a short notation: "this is clear from a single example".

The *Demonstratio* was a systematically built argument which had an innovative linguistic methodology. Sajnovics unified and synthesised the pieces of knowledge that had existed separately before, such as grammar-based evidence, regular sound changes, the importance of dialectal differences, the process of development of languages, the difference between original vocabulary and loanwords, and so on. Contrary to Hell's linguistic activities, Sajnovics took the scientific requirements in the language comparison very seriously.

We can state that the *Demonstratio* also met the requirements of modern science: because the structure was equivalent to the modern IMRD research model. The investigation

was theoretically based, the corpus contained selected and unified data and the research was verifiable.

5. Three contemporary reviews on the methodology of *Demonstratio*

Immediate attention was paid to the *Demonstratio*, and some of the critics concerned the research methodology of the work. At that time, there was already a scientific discourse community and accepted research methodology in science like astronomy, but there was not for the language comparisons. In the introduction of the *Transitus*, Hell addressed the world's astronomers (*Ad Astronomos*), but Sajnovics could not address the world's linguists (*ad Grammaticos*), only the audience of the Royal Society of Scientists. The lack of generally accepted research method made possible to criticize the methodology of Sajnovics. Now we present the main types of critics.

5.1. The review of the natural scientist

The review of the mineralogist Ignaz Born (1771) accepted the scientific methodology of *Demonstratio* and criticized it within that framework.

Born wrote that Sajnovics, being a mathematician, should know that a demonstration requires an exact and satisfactory method, but it was missing in this case. The terminology was inaccurate: for example, the term *identity* in mathematics means that two things are interchangeable, but this is not true for languages. According to Born the unification of data was insufficient and the three criteria made by Sajnovics were not fulfilled. As for spelling, the Lappish language has many different dialects, none of which has a stable orthography. As for pronunciation: Czechs can pronounce perfectly Hungarian or French words, but it does not mean linguistic kinship. As for the selection of the investigated words, there are many Slavic words in Hungarian, and there are many Swedish and Danish words in the Lappish language. The similarities can be explained by chance as well.

He wrote that the grammatical correspondences between Hungarian and the Lappish language were general characteristics of Eastern languages (nowadays these are called typological similarities).

5.2. The review of the historian

August Ludvig Schlözer, a historian in Göttingen who dealt with the history of the people today known as Finno-Ugrians criticized the research methodology from another point of view. Contrary to Born, Schlözer considered the methodology of *Demonstratio* rigid, inflexible and outdated so he suggested a new method.

In the age of Schlözer, a new wave of scientific methodology spread out from Göttingen: instead of rules and deduction, inductive investigation gathering many examples was preferred. The data were investigated in context while applying flexible categories, and searching for similarities referred to as affinity which became a key term for every scientific research as for the natural sciences as well for the humanities.

The review of Schlözer (1771) suggested this method. As for the terminology, for Born the identity in the title was inaccurate due to a lack of interchangeability. According to Schlözer (1772) the grade of similarity should be sought instead of defining the relationship as identity. “The title IDEM ESSE is an overstatement, the Hungarian-Lappish comparison of Sajnovics is far away from that what we can call identity.”²

² Quotes in this article are translated by the author.

Schlözer was right: one of the main methodological problems of *Demonstratio* was the use of black or white categories. The *Demonstratio* mentioned several times identity with no exception. For example: "...between Hungarians and Lapps, there is no room for regular sound changes or omissions of the kind I have just demonstrated for Danes and Germans. This is because Lapps use exactly the same number and the same kind of sounds and expressions as do the Hungarians" (Sajnovics 1770: 26). And "... there is no Hungarian word we couldn't find in the Finnish or in the Lappish of Sweden or the Lappish of Finmarchia".

The methodological discussion continued later in correspondence between Schlözer and Hell (who considered himself quasi-author of the *Demonstratio*). Schlözer (1772) suggested another, inductive research method also for word comparison. He wrote: "Dear Sir, let make a list of Hungarian roots, examine them one by one, and let note, which Hungarian root has a similar root in any other language ..."

5.3. The critique by the Hungarian nobles

The Hungarian nobles and the young writers (including György Bessenyei) in the court of the empress questioned the validity of the linguistic research declaring it an irrelevant research topic. They thought that the identity of a nation depends on the manners and moral character of the people. Therefore, it was an error to judge the kinship of two nations on the basis of language.

As Bessenyei (1986[1774]) wrote: "[B]ut it is impossible to displace something of such a great consequence, on the basis of so little circumstance [as language] ... Instead of words, you should consider moral character and manners." These nobles were shocked by the new direction of Hungarian origin based on the linguistic kinship between Hungarians and Lapps.

The Hungarian nobility based their privileges on the bravery of their Scythian ancestry. That's why they considered the kinship between the Hungarian language and people and the Lappish language and people very offending for themselves even if they knew Lapps only from books.

6. Summary

In summary it can be stated that the *Demonstratio* examined linguistic kinship according to the methodology used in the research of natural sciences. The reason for this was partly the fact, that both Sajnovics and Hell were qualified in mathematics and astronomy, and partly the age of the Enlightenment. Concerning the methodology, the *Demonstratio* is similar to Hell's *Transitus*.

The methodology of the first edition of the *Demonstratio* was criticized from different point of views. From the view point of the scientist, it was an insufficient demonstration. From the that of the historian, it was an inadequate demonstration. And from the point of view of the Hungarian nobles, it was an irrelevant research topic.

Shortly after the relevance of these critics was eliminated due to spread of romanticism. The research methodology of the Enlightenment had been replaced by the methodology of Romanticism. The next comparative work after the *Demonstratio*, Gyarmathi's *Affinitas* (1799) was made according to it under the supervision of Schlözer. In the romantic tradition, language became the base of national identity. The language comparison in the modern sense was born in the 19th century, and the *Demonstratio* was considered as its forerunner.

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