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# ‘Machines à Comparer les Idées’ of Semen Korsakov: First Step Towards AI

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**Abstract.** This paper is devoted to forgotten Russian scholar Semen Korsakov and describes his life and scientific activity. The particular attention is paid to Korsakov’s main achievement – invention of five “intellectual machines”. These machines could be considered as the very first attempt to design a mechanical device capable to perform such intellectual operations as data analysis, comparison, and selection.

**Keywords:** Semen Korsakov, logical machine, intellectual machines, Homeoscope, Ideoscope, Comparator.

## 1 Introduction

The scientific discussions on the theme “can the machine think?” (i.e. on the possibility of creation of artificial intelligence) began in 1950s when after the development of first electronic computers Alan Turing published his paper “Computing Machinery and Intelligence” (1950; later this paper was published under the title “Can the Machine think?”). Philosophical (and quasi-philosophical!) discussions on these problems reached their peak in 1960-1970s. But in fact, when at the end of 1970s the program to design the fifth generation computer had been announced in Japan (so called “Japanese challenge”) and appropriate programs also had started in USSR and USA the main aspect of these discussions was the necessity of computer “intellectualization”. It meant not only the extending of fields where computer can solve various tasks effectively but also the rising of the level of communication between a computer and a man (even up to the level of natural language).

Logic machines are very interesting phenomena in the history of logic and computer technology. Martin Gardner gave a remarkable review of the history of logical machines in his classic work [1]. However, he did not describe some of them because of various reasons. Logical machines built in Russia are practically unknown abroad. Gardner did not mention them in his book. The most complete history of logical machines is described in [2] and its short description can be found in publication [3]. In our previous work [4] we described life, scientific activity and logical machine of Russian Professor Alexander Schukarev. In this article we tell

about the five extremely original logical (or intellectual) machines invented by his predecessor Semen Korsakov (Fig. 1).



**Fig. 1.** Semen Korsakov

## **2 Semen Korsakov: Biography**

He was born on January 14, 1787 in the famous Russian family. He was the first child in the family of Colonel Nikolay Korsakov and his wife Anna, born Mordvinova.

Nikolay Korsakov was not only a military man but an outstanding civil engineer. For example, he was the head of construction of the Kherson fortress and developed a ten-year plan for the construction of Sevastopol. Actually this city, famous in Russian history, was built according to his plan. Prince Potemkin wrote in his letter to the Empress Ekaterina the Great: “Korsakov, Mother, is an engineer we had never before ... This man should be preserved”.

Colonel Nicolay Korsakov perished on August 24, 1788 during the war between Russia and Ottoman Empire. After the death of her husband Anna Korsakova and her son lived in the family of her brother Nikolay Mordvinov who was taking care of them all his life and fully replaced the father to Semen Korsakov. Count Mordvinov (1754-1845) was a Russian naval commander and prominent public and state figure. He was the author of several books on economics, finance, banking and agriculture. In 1825-1840 he was a Chairman of the Free Economic Society and in 1829 Mordvinov received the title of academician of the St. Petersburg Academy of Sciences.

In 1805 Semen Korsakov served as a “collegiate junker” in the Archives of Collegium of Foreign Affairs with other boys from noble families who preferred the civil service to the military one.

At the beginning of 1807 he became adjutant of his uncle who was the Head of militia of Moscow Province established according to the Manifesto of Emperor Alexander I “On the preparation and formation of widespread temporary home guard or militias” from November 30, 1806 in one of the most tense moments of struggle

with Napoleon. However, after the signing of Treaties of Tilsit on July 7, 1807 it was no longer a need for the militia, dismissed at the beginning of the next year. Korsakov who during the service in militia received the rank of titular councilor returned to Collegium of Foreign Affairs. Soon he was promoted to the rank of collegiate assessor and then retired.

Semen Korsakov had joined the St. Petersburg militia in the beginning of the mobilization in 1812 and on 5<sup>th</sup> September marched against Napoleon. He participated in the assault of Polotsk (8<sup>th</sup> October), Chashniki battle (29<sup>th</sup> October), battles under Smolyans (13<sup>th</sup> – 14<sup>th</sup> November) and on the Berezina river (26<sup>th</sup> – 29<sup>th</sup> November). After the expulsion of Napoleon from Russia he took part in all foreign campaigns of the Russian army. He was contused during the siege of Danzig but finally succeeded to enter Paris. Korsakov was awarded the Order of Vladimir of IV degree, as well as the Prussian Order “For Merit” (“Pour le Mérite”). Later, the Order of Anna of II degree was added to his other military awards.

In fall of 1817 Korsakov began to serve in the Ministry of Police where he worked as a statistician and then continued his service in the statistics department of the Ministry of Justice.



**Fig. 2** The grave of Semen Korsakov

In 1827 Korsakov purchased Tarusovo estate in the Dmitrov district of the Moscow province, and settled in it. However, since his duties did not require his constant presence in St. Petersburg, he continued to serve in the Ministry of Justice. Beginning from 1835, he was serving as an officer for special assignments at the Ministry of the Interior and from time to time visited St. Petersburg and other places. In 1842 Semen Korsakov received a high rank of State Councillor (that corresponds to the military rank between the Colonel and Major-General) and retired. But next year he was invited to lead the Department of Statistics in the Ministry of the Interior and the family had to move to St. Petersburg for some time. However, already by 1845 Korsakov again retired and finally settled in Tarusovo.

There Semen Korsakov died on December 1<sup>st</sup>, 1853 and was buried in the churchyard of Trinity Church of the neighbouring village Troitsa-Vyazniki (Fig. 2).

### **3 Semen Korsakov as Researcher**

Although Korsakov never received a formal education, he was a very educated man. In his youth in Moscow he attended particularistic courses of physics and mineralogy, which were delivered at home by gymnasium professors. He was fluent in German, French, English and probably knew Latin. Later, in St. Petersburg he attended lectures on natural law and in May 1811 successfully passed exams in law, economics, physics, mathematics, history, geography and statistics at the Pedagogical Institute (most likely, it was the certification required for the service and advancement in rank). Scientific instruments, machines and mechanisms caused particular interest of Korsakov. He wanted to understand the principle of their action and always acquainted himself with the various production technologies at the factories he visited during the service. He built the home laboratory and carried out various experiments.

Korsakov was also an inventor. For example, his pocket astrolabe Nikolay Mordvinov “found very useful”. The lack of academic education sometimes left its mark on his work. Thus, trying to explore the hidden possibilities of a man Semen Korsakov in 1828 invented a device that was named “Dinamoscope”. It consisted of coloured wax balls suspended on strings to the grid. Participants of experiments tried to force these balls to swing, or to stop by their willpower ...

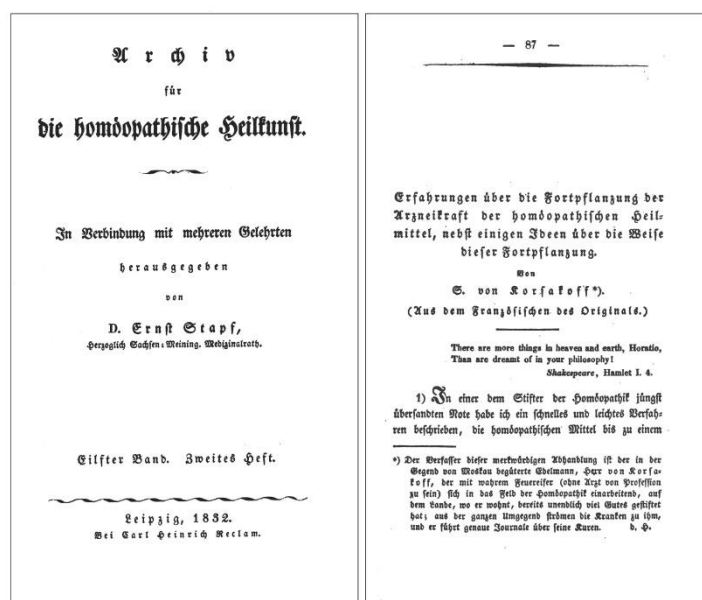
In addition to scientific experiments, Korsakov enthusiastically studied also medicine and especially homeopathy. Homeopathy at that time was still little known in Russia. Semen Korsakov became not only a promoter of homeopathy, but made a significant contribution to its development. Already at the beginning of 1829 on his estate he began to practice medicine. In a special notebook, which Korsakov was carefully kept for five years it was marked 11725 requests for help! He pondered on the nature of homeopathic remedies and their effects, conducted many experiments, trying to achieve the maximum efficiency. And very soon the practical results of his work were widely recognized. Several articles of Korsakov were published in Germany in the world’s first journal about homeopathy “Archiv für die homöopathische Heilkunst” (Fig. 3).

Founder of homeopathy German physician Samuel Hahnemann (1755-1843) who was in correspondence with Korsakov highly appreciated his achievements in this field. Hahnemann wrote to Korsakov in March of 1832:

“I admire the zeal with which you have dedicated yourselves to the beneficent art of therapeutic, not only to be able to treat members of your family and others, but also in order to penetrate in the secrets of nature that is proven by your valuable notes” [2, p. 93].

Correspondence with another respondent Nikolay Muravyov (1768-1840) whom Korsakov himself drew in homeopathy had very important consequences. Nikolay Muravyov was not only a famous military and public figure but also had serious knowledge of mathematics and natural sciences. In one of his letters to Korsakov Muravyov explained “methodical table of painful symptoms cured by each drug”:

“All of these symptoms (say, 1000) are supposed to be arranged alphabetically by numbering each one of them. After that, on the sheet divided into columns according to the number of drugs with the inscription of the specific drug in each column, one should mark by numbers all the symptoms cured by the drug in alphabetical order. Then, during the treatment for a correct choice of drug all seizures of the patient should be written on a special sheet and designated by numbers. After that they should be compared with the table and the drug with the more coincided numbers must be chosen. This idea [Korsakov] probably later tried to use for the development of his Homeoscope. Twenty tables found in his papers with graphic designations for review of the action of various plant and mineral drugs, acids, alkalis, leaves, roots, crusts, etc. on the different parts of the human body could be the reason for this conclusion” [2, p. 95].



**Fig. 3** The cover of the journal and the first page of the Korsakov's article

Muravyov's idea had come on already prepared soil. Statistics studied by Korsakov during his service stipulate extremely labor-intensive processing of large amounts of data. It is very difficult (and sometimes virtually impossible) to perform manually. Therefore, we may assume that his thoughts to store such data in a structured (tabular) form appeared earlier. Korsakov put in tables the information about the victims on December 14<sup>th</sup>, 1825, his patients, their diseases and medicaments. And it is clear that his innovative idea of mechanization of the labor-intensive process of search and selection of necessary information finally took shape in connection with his interest of homeopathy.

## 4 The Letter to St. Petersburg Academy of Science

On September 11<sup>th</sup>, 1832 collegiate councillor Semen Korsakov sent a letter (in French, which was the common language of communication for Russian scientists at that time) to the St. Petersburg Academy of Science of the following content:

“I have discovered the new very important in its applications investigation method. Taking to account that its immediate publication will be useful for human knowledge I felt it my duty to present five models of intellectual machines. All of them work on common principle. I hope the Academy can evaluate my own free will to reject the exclusive privilege I might have demanded. I also expect from Academy to establish special Commission for consideration of my method and results of its application for various actions of human mind.

Your obedient servant,

*Semen Korsakov*, collegiate councillor

St. Petersburg

September 11, 1832” [5, p. 557].

The four-page document (also in French) under the title “Report about the new investigation method” was attached to the letter. Korsakov described in details his proposals. Next day the letter was received and read. Academicians treated it seriously and reacted quickly. A week later the General Assembly of Academy considered the Korsakov’s proposals and decided: “To establish the Commission of Mr. Parrot, Mr. Kupfer, Mr. Ostrogradsky and Mr. Brandt for examination of new invention. Secretary will inform Mr. Korsakov and invite him next Saturday 24<sup>th</sup> September at 11 o’clock” [5, p. 579].

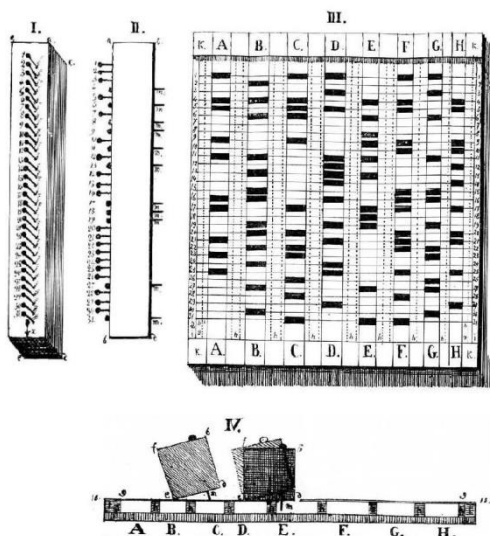
## 5 Machines à Comparer les Idées, or Machines Intellectuelles

What did Korsakov propose? He presented five “machines for comparison of ideas” or “intellectual machines”. Each of them according to the inventor’s opinion could compare various complex scientific conceptions. Properties of these conceptions should be previously organized in a special table. Let’s describe these machines and method of utilization as their inventor had done in the brochure published in French in St. Petersburg [6]. The brochure consists of two parts. The first part, from the first to eighth pages, was textually almost identical with the above mentioned “Report about the new investigation method”. The second one (pages from 9 to 22) contains sufficiently detailed description of the device and operation of all five “intellectual machines”.

First of them is the **Rectilinear Homeoscope with immovable parts** (Fig. 4). Korsakov described it so: “among many table presentations it finds one that contains another given complex presentation in all details. Machine gives this result by

stopping itself during the operation. <...> Number of details could be hundreds” [5, p. 559].

Korsakov supposed that this device could have found its application in medicine. Properties of complex presentation in this case are the symptoms of disease. Result of the work is the appropriate medicament. This process is depicted on Fig. 4.



**Fig. 4** Rectilinear Homeoscope with immovable parts

Every column of table III describes the disease. Its symptoms are presented as the holes in table cells. Pins (the pin position number coincides with one of the disease symptom numbers) are stuck in rectilinear bar I (specifically this bar Korsakov calls Homeoscope). Height of the bar is equal to the height of the table column. Pins corresponding to the disease symptoms are stuck in the bar with protruding ends (II). Then the bar moves along the table from left to right parallel to the columns with down pin ends (IV). The bar falls down on that column where all pin ends coincide with the holes. “Device stops itself” (see column E) and we may read the appropriate medicament for the disease with given symptoms.

**Rectilinear Homeoscope with movable parts** (Fig. 5). This is designed for the same purpose as the above described device but in addition “lists and immediately distinguishes all the appropriate and non-appropriate properties from given complex presentation during their contact with the table properties” [5, p. 559].

Homeoscope in this device is not a bar but a rectilinear wooden frame (V on Fig. 5). The shaft from thick steel wire penetrates through frame short crossbars. Movable rotating parts (small levers) made from thinner wire, are fastened on the shaft. Numbered round paper label is installed on the long arm of every lever. Another end of the lever arm is a short hook curved on 90 degree. In initial position all the levers



Fig. 1. A vertical section of a machine. It features a central vertical shaft with a series of horizontal arms or blades extending from it. The shaft is labeled with 'V' at the top and 'VI' at the bottom. The arms are numbered 1 through 24. The machine is supported by a base labeled 'a' and 'b'. A long vertical rod is labeled 'X'.

It is worth mentioning the very interesting Korsakov's idea. He suggested not only to confirm the coincidence but to determine a degree of its significance. He wrote if "there is a need to express the importance of every property than this action could be done easily with the help of numbered labels. These labels can move along the pillar  $x$

of every part. So, by fixing them on the specific lever at various distances from the axis (see IX on Fig. 5) one may evaluate their importance” [6, p. 17]. Above this, Korsakov proposes to paint various table lines in different colours for greater visibility.

**Plane Homeoscope.** Korsakov wrote that this device “... immediately shows the difference between two complex compared presentations with more than ten thousand and even more properties” [5, p. 559]. Construction of the Plane Homeoscope is very simple. In fact, it consists of two tables A and B (Fig. 6). Every line in table B corresponds to some complex presentation. The presence or absence of properties in this presentation is determined by the presence or absence of the holes in the appropriate cell. In table A which has the same dimensions as table B the presence of some property in complex presentation is fixed by the pin installed in an appropriate hole. There are holes in all cells of table A in contrast to table B. Both tables are organized in the form of platens but “legs” for table A are longer. Table A is put on table B. Pins fall in the holes in case of property coincidence and doesn't fall in other case.

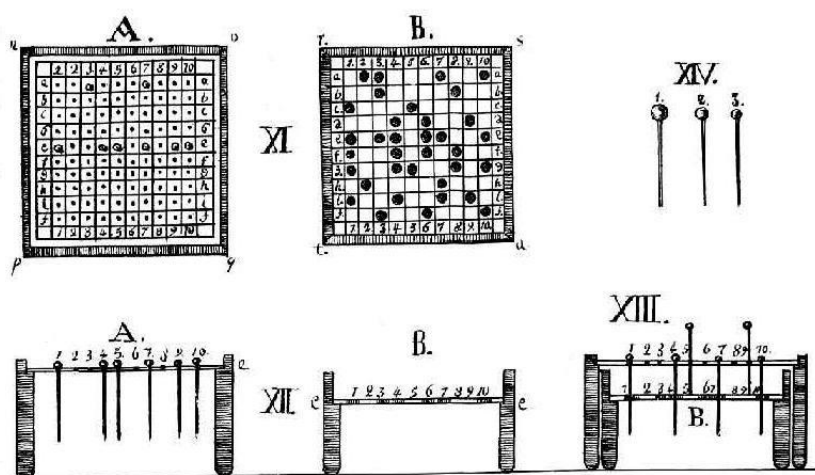


Fig. 6. Plane Homeoscope

Korsakov in his brochure gives the examples of Plane Homeoscope application. Let the letters a, b, c etc. are related to the human body parts: “head, nose, eyes, belly, etc.”. Various human “diseases: tumor, pain, redness, weakness, gripes, fever, chills, etc.” [6, p. 19] are numbered. Thus, the hole in one of the table B cell corresponds to some disease symptom. “For example, if letter *e* corresponds to chest and number 4 is gripes then the cell *e4* will designate the chest gripes” [6, p. 19]. Table B contains the full collection of disease symptoms and determines the appropriate medicament. Such tables could be produced for various medicaments. Then the pins must be installed to

all the holes of table A corresponding to the disease symptoms. After that table A must be consequentially put on table B. Table, which pins fall to all the holes, will determine the medicament. Korsakov suggested indicating the importance of every symptom by the pin heads of various dimensions (XIV on Fig. 6). It is a very interesting idea. In this case the doctor has the opportunity not to consider less significant symptoms if some pins don't fall in the table B holes. On Fig. 6 the conception *e* from table A coincide with conception *e* from table B according only to the four signs (1, 4, 7, 10). 10,000 properties mentioned by the inventor mean that the dimension of each table could be 100×100.

**Ideoscope** (Fig. 7). According to Korsakov this device can just in several minutes compare large a number of complex presentations from a special table. Ideoscope is a wooden bar working with the table as in both Rectilinear Homeoscopes. But this bar and the table are constructed in another way. There is a set of quadrangular through holes in Ideoscope located on equal distances from each other. Tetrahedral metal pins are installed in the holes. The upper part of the pin is round and contains the shaft *c* with the wire lever *lh* and paper numbered label (XVI B on Fig. 7). Shafts can move freely up and down without friction in their holes. Holes have buttresses *ff* which force the lever to move accordingly to the pin's movement. The main difference of this table from the others is that quadrangular holes have various depths. A hole's depth is proportional to the importance of the property depicted in the table. Above this, the bottom of the hole has the 45 degree angle incline. Thus, if there is no hole under the pin the lever can stay in one of two positions (XVII A) – on the left or right bar side. If there is a shallow hole under the pin then the lever would take horizontal position on the left or right bar side (XVII B) as well. Finally if there is a deep hole the lever would rise up (XVII C).

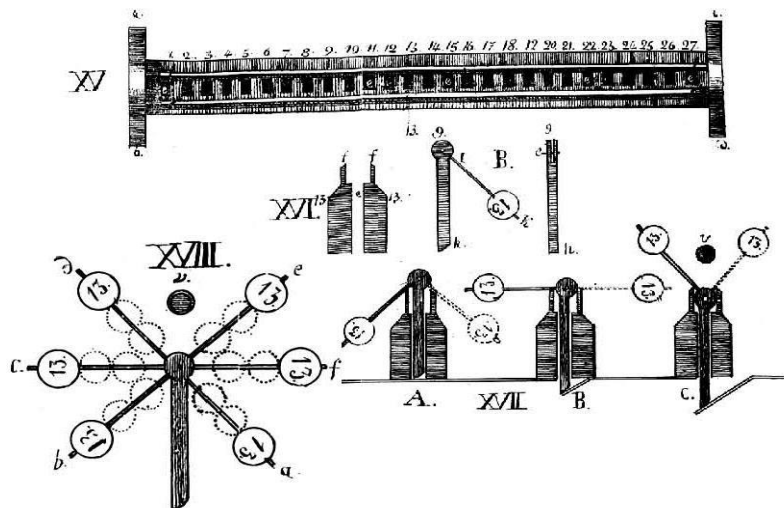


Fig. 7. Ideoscope

Work of Ideoscope is similar to the work of Rectilinear Homeoscope with movable parts. In order to compare some presentation with table presentation it is necessary to move on left all levers whose label numbers correspond to the numbers of presentation properties. The special rod is installed in Ideoscope rack. This rod divides leftward and rightward levers (v on XVII C). Finally, Ideoscope is installed on the left side of the table and moved from left to right in parallel to the columns. The position of the levers displays the results of comparison when Ideoscope is above of the next table column. Ideoscope determines not only coinciding and mismatching properties of two presentations but also the difference between them. Korsakov so described the possibilities of Ideoscope:

- Property which is discovered in some conception of the table but not in that table where Ideoscope is;
- Property which is discovered in the given conception but is absent in the compared conception;
- Property which is common for the two compared conceptions;
- Common property which has high importance for the conception from the table;
- Property of high importance which is absent in the given conception but is present in the conception from the table;
- Property which is absent in the given conception but is present in the conception from the table [6, p. 23].

Herewith it is very important that there is a possibility to “determine the relative degree of property significance” [5, p. 559]. This could be done by two methods. Firstly, the significance degree of the properties of compared presentations is determined by the angle of lever inclination. Secondly, this degree could be set by shifting the labels nearer or farther from the lever axis (see XVIII).

**Simple Comparator** “...gives the same results as Ideoscope but can work only on two complex presentations compared with each other. It covers only several dozens of properties but ... it doesn’t need a table” [5, p. 559].

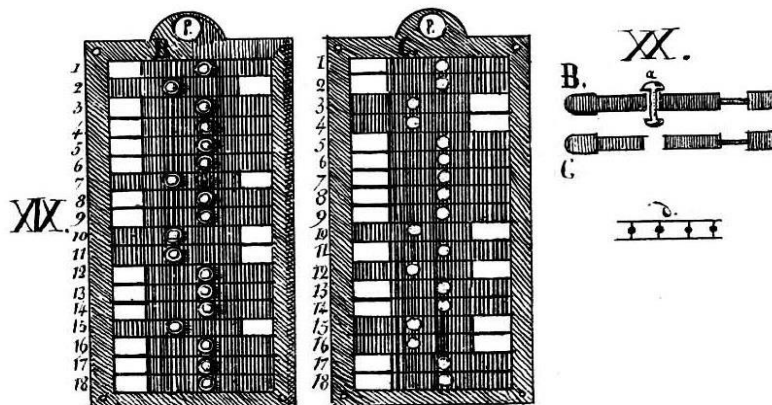


Fig. 8 Simple Comparator

Simple Comparator consists of two wooden frames B and C of equal dimensions. Both frames have the equal number of rectilinear plates which could be moved to stop to the right or left. Plates have one hole. Ivory details (*a* on Fig. 8) are placed in the holes of frame B plates. Frame C holes has larger diameter and properties *a* heads can freely come through.

For example, it is needed to compare two objects B and C (Korsakov compared two men according their “physical abilities”. The number of these abilities is not more than a number of plates in the frame). Let take the frame B and if man B has some physical ability then appropriate plate is moved to the left to stop. The same action should be done with frame C. After that, frame B is laid on frame C and Korsakov wrote about four possible results:

- All properties *a* in left plates under the holes of frame C left plates fall in these holes pointing which physical abilities are common for the both men.
- Other properties *a* of left plates not under the holes rise pointing which physical abilities have man B in contrast to man C.
- Remaining on right properties *a* rise. They point which physical abilities have man C in contrast to man B.
- Remaining on right properties *a* fall in the holes of frame C plates and point which physical abilities are absent for both men.

## 6 Academy Commission Decided...

Four academicians were the members of Academy Commission: physicist Egor Parrot (1767-1852), mineralogist and physicist Adolf Kupfer (1799-1865), mathematician Mikhail Ostrogradsky (1799-1865) and zoologist Fiodor Brandt (1802-1879). Korsakov thought that his devices could be used in medicine for choosing the medicaments and for classification of plants and animals. So, the members of Commission were not the casual people: exactly zoology (or botany) and mineralogy could have been the main field of Korsakov's devices application. Mathematician and physicist had to evaluate the possibility of devices realization. Commission had no chairman but probably E. Parrot was responsible for decisions. He later redacted Commission Decision and presented it at an Academy conference.

Commission met with Korsakov on September 24<sup>th</sup> and asked several questions. It is interesting that on this same day, September 24<sup>th</sup>, permission was obtained of censor Semenov to print the brochure [6]. The text of the first part of the brochure is dated 13<sup>th</sup> September by the author, i.e. after Korsakov's appeal to Academy. Naturally, there is a question: what was the reason for Korsakov to present so quickly his invention to the Academy without waiting for so soon brochure issuing? It is quite possible that if academicians had a detailed description of Korsakov's machines, there would have been much less questions ... It is also interesting to know if the members of Commission had seen brochure before the announcement of their decision. Or, maybe Korsakov did not even submit it to Academy. Most likely this is true, otherwise the brochure would have to be preserved in the Academy archives.

However, it seems that the introduction with the brochure could hardly force the members of the Commission to change the prevailing opinion ... This is confirmed by the next episode. To one of the Commission's questions Korsakov replied in the letter written next day 25<sup>th</sup> September. It concerned a possibility to improve the design of Plane Homeoscope.

“Dear Sir,

You suggested me to find a way to determine the various degrees of significance of the disease symptoms, which could be expressed in Plane Homeoscope. I thought about it and consider that this could be done by using numbered labels, which could be shifted from the axis to a greater or lesser distance <...>” [5, p. 560].

So fast reply was produced undoubtedly due to the fact that this method had already been invented and described by Korsakov (although in relation to Ideoscope) in his brochure: “More or less degree significance could be set by shifting the labels nearer or farther from the lever axis” [6, p. 23].

On September 27<sup>th</sup>, Academician Parrot handed answer of Korsakov to the other members of Commission asking them to decide if it could “affect the opinion they will give of this invention”. Because, as we know, it was not affected on the decision of academicians it is likely they hardly would have changed their opinion even after the familiarity with the full text of the brochure.

But the decision was being delayed and Parrot on 13<sup>th</sup> October asked his colleagues to inform him about their resolution “as soon as possible”. However, academician Ostrogradsky had already made his opinion: “I believe that the invention of Mr. Korsakov cannot deserve the approval of the Academy. Though, I wish that a condescending attitude should be shown to the inventor in our report” [5, p. 580].

Commission Decision dated 24<sup>th</sup> October was presented at the conference of Imperial St. Petersburg Academy of Science and it was adopted on the same day. Certified copy of the Decision was sent to Korsakov. Unfortunately for him, the Decision was negative. Academicians positively evaluated the originality of the idea and ingenuity of the inventor. However, they fully rejected the practicality of the idea and decreased Korsakov's optimism about its possibilities.

Indeed, Korsakov wrote: “...it would be naturally to suppose that the invention of the method which can extend the applications of the higher human organ - mind - must have... important sequences. It's only necessary that outstanding scientists should understand the principle and make tables for its application to the various branches of human knowledge” [5, p. 560].

Thus, we may see that Korsakov did not think to restrict the application of his machines only for searching and comparing. He thought he proposed something greater – method of investigation and instrument for receiving of new knowledge. But Commission absolutely fairly did not agree with that: “Members of Commission did not adopt application of this method of investigation to the other branches of science. First of all, not pure, nor applied mathematics cannot get any benefit from these methods because their essence is impossible to reduce to the tables. The same thing is for physics and chemistry” [5, p. 562].

The reason is simple. It is evident that you can extract from the table only what you have previously placed in it. The same logical error was made by Raymund Lull five hundred years before Korsakov. In fact, the emergence of new conceptions is the result of scientific cognition of the world, but not its precondition. Commission pointed out that Korsakov's machines couldn't be used if speaking about some new conception: "If somebody untutored in science (exactly for these people the author invented his method) will find plant, animal or mineral absolutely unknown or not contained in the table he cannot give it the name or include in the general system according to the method" [5, p. 562]. Even "...if the table is correct and it is possible to find the medicament..." however "...practical medicine usually see in symptoms the reason for using several medicaments simultaneously. That is why this method cannot be used. Moreover, this method doesn't take into account the force and relative significance of symptoms" [5, pp. 562-563].

But, at the same time Commission noted the possible applications of Korsakov's ideas: "Zoology, botany and mineralogy if to consider only their system aspect determined by nomenclature could use this method". However, Commission also pointed out on the problems in practical realization: "... almost countless number of objects doesn't give any hope on its (Korsakov's method – *Auth.*) full utilization". For example, it was mentioned that more than 60,000 plants were known in botany. That is why, "Forming of the table could be tremendous and time consuming work. It is doubtful that one botanist or even the whole society of botanists would do this. The same thing is for other branches of natural science" [5, pp. 562-563]. The dimensions of such a table containing all known characteristics would be 1666×14 ft. according to the very moderate estimations of academicians! The cost of this table would have been about 5-6 thousand rubles that was colossal sum for these times.

The Commission summarized: "If these considerations prove to the members of Commission (and a number of such considerations could be easily increased) that the method of investigation proposed to their attention in any way cannot be approved, but it is by no means a reason to disappoint the author. On the contrary, it is desirable to offer him to apply his talent and his diligence to the methods more applicable in practice. Mr. Korsakov has spent too much mind to teach others to live without mind" [5, p. 564].

Semen Korsakov never undertook more attempts to publish his inventions and ideas after that time.

## **7 The Fate of Korsakov's Heritage**

The homeopathic community is cherishing the memory of Korsakov, though his pioneering work on "intellectual machines" has been completely forgotten.

The first publication of several important documents about intellectual machines of Korsakov [5] had been done only in 1961. Then, after 40 years (!) it was issued a small article of Prof. Gellius Povarov in English [7], in which the author announced the discovery of Semen Korsakov's brochure (in French) [6] in the Russian State Library. This brochure with the description of intellectual machines was issued in 1832 in St. Petersburg. Then, one more article [8] based on the materials of Povarov

has appeared. Due to this paper the wide public in Russia has learned about Korsakov machines. Moreover, illustrations of the part of “intellectual machines” and some biographical information about their inventor were published for the first time. These drawings allowed to give exact description of the functioning of Korsakov’s machines [9, pp. 13-15]. Finally, two different translations in Russian of Korsakov’s works appeared in 2009.

Today the person of Semen Korsakov is attracting an increasing attention of Russian scientists: historians, specialists in computing and homeopathy. At the beginning of 2012, the first book dedicated to Korsakov was published. It was a collection of articles “The warrior, scientist, and citizen. To the 225<sup>th</sup> anniversary of the birth of S. N. Korsakov” [10]. In this book, as well as in number of other publications ([11] and others) some very interesting articles were issued. For the first time the biography of Semen Nikolaevich Korsakov was reconstructed and various interpretations of his inventions based on the vast archival materials were presented.

Nevertheless, a detailed study of intellectual machines of Korsakov (unfortunately, nothing is known about the fate of the models submitted to the Academy, nor about the fate of drawings and descriptions stored at the estate near Moscow) and real understanding of their place in the history of computer science, artificial intelligence and information technologies yet have to be done.

Semen Korsakov was undoubtedly a dilettante in science, but he could be rightly called as a *dilettante brillante*. Though brilliant insights of the amateurs are often combined with surprising and inexplicable professional scientist prejudices and misconceptions (it is enough to recall “Dinamoscope”). Korsakov’s passion of homeopathy is also characteristically in this regard. On one hand, some of his results (in first turn the process for preparing dilutions in the single test-tube) were widely used and are still being used. However, some of his proposals were naive. For example, outstanding Russian physician Karl Boyanus (1818-1897) who highly appreciates Korsakov as a homeopath notes the “immaturity and imperfection of Korsakov’s research and observations over the actions of various drugs on different parts of the human body”. Some other proposals of Korsakov are also the subject of criticism from the representatives of homeopathic medicine.

Of course, the question of establishing the truth between the views of various schools of homeopathy (as well as the question of the value of homeopathy as itself) is not the theme of this paper. However, having agreed with the high estimation of Korsakov as homeopath, we should not uncritically consider any of the thoughts he had expressed ... Similarly, the work of Korsakov in designing of “intellectual machines” is highly original, interesting, and important *per se*. It is not necessary to attribute to him the design of the world’s first punch-card tabulator and neural computer, nor the invention of the conception of the algorithm, or successful use of Korsakov’s “intellectual machines” in modern homeopathy and so on as some enthusiastic authors have done.

It is not necessary also to oppose the works of Korsakov to the works of Charles Babbage and Herman Hollerith. On the contrary, it would be very interesting to compare the project of Korsakov with the projects of above mentioned scientists, as well as with other investigations of his predecessors and contemporaries.

From the viewpoint of philosophy of the XVIII century (Era of Enlightenment) the use of methods of mechanics for the mechanization of the method was quite logical.



This idea was considered by the outstanding French philosopher and mathematician Nicolas Condorcet (1743-1794) who suggested that machine could be utilized for solving the problems of scientific knowledge classification. He wrote in one of the sketches, which was first published only in 1962:

“I will not speak here about mechanical means that could be applied; it is easy to imagine them, but this mechanism will seem funny until experience shows the usefulness of these tables for discovering relations and general laws between actual entities, observed facts and phenomena options...” [12, p. 120].

It is clear that Korsakov could not be acquainted with the manuscript of Condorcet. But in any case, he obviously tried to make something that Condorcet had not even begun.

If Condorcet in some aspects anticipated Korsakov, Alfred Smee (1818-1877), on the other hand, could be considered as his successor. One of the authors of this article in his works [13, 14] pointed out the obvious similarity of one of the hypothetical logical machine of Smee and the Simple Comparator of Korsakov.

Unfortunately, intellectual machines of Semen Korsakov are practically unknown outside Russia. A short publication in English [7] still remains the only one dedicated to his inventions. We hope that our article will help to draw attention to the pioneering work of Korsakov, which must occupy its rightful place in the history of computing and artificial intelligence.

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