

*Mirosław Krzyśko**

**JAN CZEKANOWSKI
ANTHROPOLOGIST AND STATISTICIAN**



This year marks the 125-th anniversary of birth of Jan Czekanowski – a great Pole and eminent scholar.

Professor Jan Czekanowski was born on 6 October 1882 in Głuchów near Grójec in Mazovia in a family of landed gentry. His father Wincenty was the owner of estates in Głuchów and Kośmin. His mother, nee Guthke, was German. Jan had elder sisters and

brothers: Natalia, Aleksander, Stanisław and Maria.

Initially, Jan was educated at home and in autumn 1894 he was sent to a well-known real school of Wojciech Górski in Warsaw.

In autumn 1898 he moved to the real school in Libawa, which he graduated from in June 1901. On September 1, 1901 he joined the army as a volunteer. Due to an oversight and contrary to regulations of 1888 he joined the artillery regiment which defended the harbour of emperor Alexander III in Libawa.

As a catholic he could not remain in artillery of the Vilnius province, and as a private he could not be transferred to another unit, so finally he was discharged from the army on medical grounds and soon after he left the country.

He travelled around Italy for a while and in spring 1902 he reached Switzerland where he enrolled at Mathematics and Natural Sciences Section of Philosophy Department of the Cantonal University in Zurich. He took up anthropological studies under the direction of the outstanding anthropologist R. Martin, anatomy studies under the direction of G. Ruge and mathematical studies under the supervision of H. Burghardt. These were the three subjects to which he devoted his long and laborious life. He approached anthropology in a humanistic way –

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as the knowledge about the man and his functions. The knowledge consisted of a variety of fields: anatomy and ethnography, anthropogenesis and typology, genetics, linguistics and statistics. Czekanowski perceived the human being as a creature which possesses a large number of linked and correlated features. He understood that investigating only a few of them must produce a picture which is limited, fragmentary and one-sided, and which obscures or even distorts the real man as the subject of research.

However, at the beginning of the previous century, when Czekanowski studied in Zurich, the multi-feature analysis of man was simply not feasible. The English school of statistics (Pearson, Yule, Fisher, Student) was just fledgling. Czekanowski was quick to recognize and appreciate the role that statistics could play in anthropology and became its supporter and pioneer.

His scientific career was launched when he was a second-term student and wrote a short article on statistics. It presented the application of Pearson correlation coefficient for the evaluation of different methods of measuring height of skull. Let us remind here that it took place in 1902, and Charles Pearson introduced his correlation coefficient a year earlier. In 1903 Czekanowski accompanied his professor Rudolf Martin to the congress of German anthropologists. Due to late registration he was not included in the list of speakers, yet his considerable knowledge of the latest methods used by English mathematic statisticians made such a great impression on German anthropologists that Felix von Luschan, the director of African and Australasian Department of the Royal Museum of Folk Culture in Berlin offered him the post of assistant which involved travelling to Africa or Australasia. Czekanowski agreed to accept the post offered but only after he had finished his studies in Zurich. The article, which turned out to be so important for his later life and career, came out in 1904 in "Archive fur Antropologie".

In the year 1903 Czekanowski wrote a paper on the application of the correlation coefficient for investigation of muscles anomaly; he compiled the materials whilst working as a deputy assistant of anatomy laboratory in the Anatomy Unit. The paper was an attempt to show how modern statistical tools can be used in anatomy and was published in 1906 in a commemorative book devoted to American anthropologist Franz Boas.

Czekanowski is known for his merits in popularizing biometry. When he was still a student of Zurich University he wrote an article on biometry which was published in 1904 as a preface to a well-known textbook of anthropology "Lerbuch der Antropologie" written by Rudolf Martin. The article, which gives an outline of statistical methods introduced to anthropology by English biostatisticians, was later included in Czekanowski's dissertation for the doctor's degree. In July 1906 he successfully finished his studies and obtained the degree of the doctor of philosophy (diploma issued a year later in 1907).

In autumn 1906 he decided to enrich his knowledge in the field of mathematics so he took up studies at the University of Berlin.

On November 1, 1906 as a graduate of Zurich University, Czekanowski assumed the post of assistant at the Royal Museum of Folk Culture in Berlin. The post offered a chance to travel to Africa thanks to a grant from the Prussian government. This meant that his youthful dreams of expedition to Africa were about to come true. The young Czekanowski was invited by the Duke Adolph Frederick of Mecklenburg to take part in the scientific expedition to Central Africa at the doab of the Nile and the Congo River. For over two years (May 1, 1907–July, 7 1909) he was staying in the Sudan, Congo, Uganda and the German part of East Africa. Taking the route through Egypt, Syria and the Balcans he finally went back to Berlin. During the expedition Czekanowski was responsible for devising the ethnographic map.

The expedition was an enormous undertaking; 2230 carriers were recruited and 7 camps were organized along the route. They were equipped with food and drink, medicines and clothes, tools and tents, guns or even folded bathtubs made of waterproof material – in short, everything the explorers might need. Wherever possible, the expedition members stayed with missionaries, in borderland forts or they were guests at the courts of African rulers. Czekanowski crossed the territories of north-west Tanzania, Rwanda, and two vast borderlands – between Uganda and Zair and between Zair and the Sudan. The whole undertaking was quite exceptional; the exploration territory, which was twice the territory of Switzerland, encompassed the area which was inaccessible neither for European colonists nor for Arab, Hindu or even African merchants. The time was rough and the territory explored by the expedition was politically unstable and its future was uncertain. Czekanowski spent over two years in Africa and managed to collect extensive, often unique, materials on unknown and untapped areas of Africa. The materials dealt with anthropological problems, the problems related to ethnology and ethnography and, to some extent, to problems of sociological nature. It took Czekanowski many years to publish all of those materials; some came out even after the Second World War. The majority, however, came out in print between the years 1911–1927 as a vast monograph entitled “Forschungen im Nil- Kongo Zwischengebeit”.

In recognition of his accomplishments during the African expedition Czekanowski was presented with the Order of the Belgian Crown and the Order of Mecklenburg Griffon, and The Mecklenburg Commemorative Medal.

The most valuable achievement of Czekanowski was in the field of taxonomy of races and the structure of population. His ideas led to the revolution in anthroposystematics and it consisted in introducing a new taxonomy method for race analysis. It was originated in 1909 and called Czekanowski diagraphic method.

The method was first published in the fundamental methodological work of Jan Czekanowski entitled "Zur differentialdiagnose der neandertalgruppe" and it was a starting point and a model for his followers for many years to come.

Let us now discuss Czekanowski diagraphic method of linear ordering of objects characterized by a variety of features.

1. We construct tables of distances between the ordered points.
2. Distances in the tables are divided into k groups in an arbitrary way, making sure that the groups are possibly equal in number.
3. Zero and the smallest distances in group I are assigned to the colour black, the remaining $k-2$ groups are assigned to different types of lines, and the last group, with the longest distances, is assigned to the colour white.
4. We construct Czekanowski diagram by replacing numbers in boxes of the table with blackened or lined boxes.
5. Lines and columns of the diagram are rearranged so long that boxes of the diagram are as close to the diagonal of the diagram as possible.

The method will be illustrated with the example taken from the book by Julian Perkal "Mathematics for Farmers", Part I, Polish Scientific Publishers, Warsaw, 1958.

The source seems to be reliable as, in a sense, it was authorized by Jan Czekanowski himself. In the foreword to his book Julian Perkal wrote: "I am extremely grateful to Professor S. Barbacki, Professor J. Czekanowski, Cand. Sc. R. Elandt, Z. Moroń, M.Sc., Professor M. Oleksiewicz, J. Sekuła, M.Sc.,

Professor Steinhaus, F. Szczotka, M.Sc., and Profesor Świętochowski for going through the manuscript and for their invaluable remarks.

Let me now make a short diagraphic on some of the people mentioned above. Hugo Steihaus – the remarkable mathematician does not need to be introduced. Stefan Brabacki was the creator of the Poznan school of statistics and cooperated with R.A. Fisher. His disciples were, among others, Regina Elandt-Johnson, Professor emeritus of University of North Carolina, and Tadeusz Caliński, Professor emeritus of the Academy of Agriculture in Poznan. Professor Caliński educated a large group of statisticians, Four of the professors present in this room i.e. Bronisław Ceranka, Krystyna Katulska, Mirosław Krzyśko and Wiesław Wagner wrote their doctoral dissertations under his scientific guidance. Mikołaj Olekiewicz, the deceased professor of Lublin University was the founder of the Lublin school of statistics. Professor Wiktor Oktaba was one of his disciples. Professor Olekiewicz was one of the pioneers of discriminant analysis in Poland. Two of his extensive works have become the source of my investigations in the early 80-ties They resulted in my writing the habilitation thesis on sequential analysis.

Let us now go back to the example taken from Perkal's book. Let us consider 6 types of plants of the cabbage family.

- Cabbage (Bł)
- Red cabbage (Cz)
- Cauliflower (Kf)
- Savoy cabbage (Wł)
- Brussels sprouts (Br)
- Turnip cabbage (Kp)

These varieties are characterized by fractions of 7 chemical substances included in them viz.

- water
- nitric compounds
- fats
- sugar
- nitrogen-free compounds
- cellulose
- others

Table 1 presents average differences between vegetables of the cabbage family.

	Bł	Cz	Kf	Wł	Br	Kp
Bł	0.00	0.28	0.51	1.16	1.85	1.65
Cz	0.28	0.00	0.47	1.00	1.76	1.58
Kf	0.51	0.47	0.00	1.09	1.85	1.70
Wł	1.16	1.00	1.09	0.00	0.96	1.01
Br	1.85	1.76	1.85	0.96	0.00	0.67
Kp	1.65	1.58	1.70	1.01	0.67	0.00

We now construct Czekanowski diagram by replacing numbers in the tables of average differences with blackened or lined boxes.

We divide average differences into 4 groups:

I 0.28 0.47 0.51 0.67

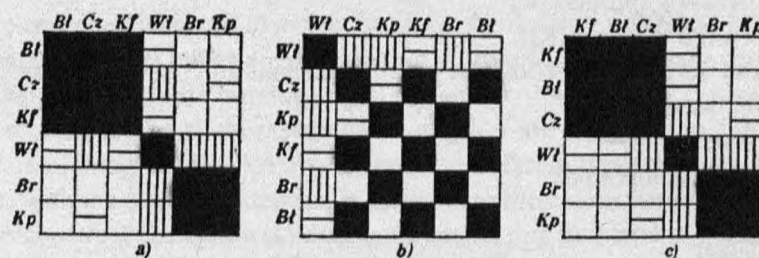
II 0.96 1.00 1.01

III 1.09 1.16 1.58

IV 1.65 1.70 1.76 1.85

Figure 1 presents a diagram of average differences between vegetables of the cabbage family. Fig.1a corresponds to the following ordering: Bł, Cz, Kf, Wł, Br, Kp: Diagram in Fig.1b corresponds to random ordering, and diagram in Fig 1c corresponds to ordering: Kf, Bł, Cz, Wł, Br, Kp. As we can see the last ordering, according to Czekanowski, is the best. In the diagram presented in Fig. 1c

two black squares can be seen. The first square is formed by the group : Kf, Bl and Cz; the second one by Br and Kp. The Savoy cabbage (Wl) is an 'agent' vegetable which links both the groups.



Rys. 1.

The main fault which can be found in Czekanowski's method is the lack of precision. Re-arranging lines and columns in Czekanowski diagram is more a matter of trying, and it is not known whether the obtained ordering is really the best or whether it is possible to obtain a better ordering if we continue to re-arrange the objects. The person who performs the operation is also important; they decide on the number of groups and the number of distances in a given group. The method is a pioneer one and although it is not fully objective it still arouses a lot of interest.

On the Internet one can find a programme for data classification called MaCzek 3.3 which creates and edits Czekanowski diagrams (if you use Google search engine type in: Archeo-Data: MaCzek).

For the sake of comparison let us now construct the shortest dendrite on the basis of average differences. It is presented in Fig.2. We obtained similar ordering of vegetables of cabbage family, with regard to content of different chemical elements in them.

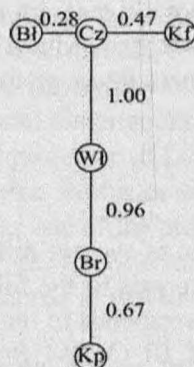


Fig. 2.

On March 2, 1910 Jan Czekanowski got married to Elżbieta Sergiejewska who was born in Tula. Elżbieta gave birth to two daughters: Zofia Teresa (born on 25 Sept. 1927) and Anna Katarzyna (born on 25 June 1929). The elder daughter was incurably ill and unfit to be educated. The younger, Anna Czekanowska – Kuklińska studied musicology at Poznan University between 1948 and 1952. Since 1957 she worked in the Institute of Musicology of Warsaw University where in 1976 she was made professor. In the years 1975–1991 she held the post of the director of the Institute. Professor Anna Czekanowska-Kuklińska is the author of numerous works and articles devoted to folk music, which were published in Polish and foreign scientific periodicals, and a few musicology textbooks. She is still an active member of several learned societies both in Poland and abroad.

The year 1910 was also important for the professional life of Jan Czekanowski. On October 1 he was appointed the custodian of the Ethnographic Museum of the Imperial Academy of Sciences in St. Petersburg. He moved there at the beginning of 1911 and he occupied the post until the end of September 1913. While still working in St. Petersburg he received an offer from a renowned zoologist J. Nussbaum-Hilarowicz to habilitate and take up the Chair of Anthropology at Lvov University. After a long period of consideration and hesitation Czekanowski finally decided to move to Lvov. He was appointed the professor of anthropology and ethnology at the Philosophy Department only on the basis of his merits which were confirmed by the letter of the Austro-Hungarian Ministry of Faith and Education dated 11.08.1913 and coming in force on 01.10. 1913.

He beginning of the academic year 1913/1914 was also the beginning of a long – lasting until 1944 – period of his life spent in Lvov

In those early years he not only gave lectures but he also was involved in the process of organizing the Anthropology and Ethnology Unit and carrying out research on Polish anthropology. However, due to the outbreak of the First World War it had to be stopped. As a Russian subject, who worked as Austrian civil servant he had to leave Lvov. In August 1914 he went to Krynica and Busko and in September he settled in Luvacovice in Moravia and started working on the materials which he gathered during his African expedition. After the directive which recognized the rights of citizens of the Kingdom of Poland came in force he got his passport, and on 10 October 1916 he came back to Lvov. He resumed his duties at the University as a full professor and continued his lectures until November 1, 1918 when Lvov was seized by the Ukrainians. On 10 of December he left for Paris where took part in the works of the Polish Delegation at the Versailles Peace Conference

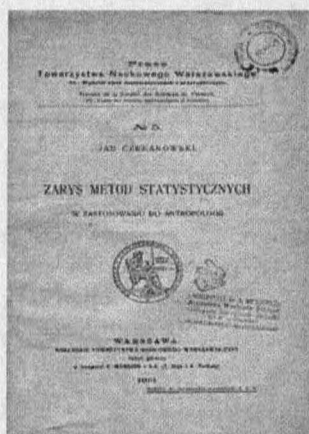
First as an expert and then as the Delegation member. Between March and May 1919 he was the secretary for political issues in the Polish National Committee then since May to June 15 he worked again for Polish Delegation, and

finally, until October 1919 he became the head of the Bureau of the Polish Delegation and took over from the Secretary General of the Delegation Mr Stanisław Koziakry. He was nominated again and worked in his capacity as a scientific expert of the Polish Delegation until 15 March, 1920.

In his order of April 9, 1920 the Commander in Chief of Poland appointed Jan Czekanowski the full professor of ethnology and anthropology at Jan Kazimierz University in Lvov. After he had come back to Lvov Jan Czekanowski started again lecturing at the University on 15 of April 1920.

In 1913 the Warsaw Scientific Society published the book by Jan Czekanowski "An Outline of Statistical Methods in Anthropology". It was the first textbook of statistics in the Polish language dealing with contemporary methods of collecting empirical data and appropriate interpretation of results.

The book came out in print merely two years after the first ever textbook of statistics namely "An introduction to the theory of statistics" by George Yule



appeared. Czekanowski's book played an important role in popularizing biometry among Polish scholars in the years before and after the First World War. The textbook, which is both precise and modern, includes not only descriptive statistics but also inference based on correlation coefficient, multiple regression and Czekanowski diagraphic taxonomy method. At this point I would like to encourage all the authors undertaking the work on contemporary statistics textbook to study the almost 100-year-old book by Czekanowski.

It is undeniable that Czekanowski made an enormous contribution to the development of statistics.

Moreover, this outstanding scholar contributed like no other to the development of Polish anthropology. Thanks to him it won recognition all over the world. Professor Czekanowski was the founder of the Lvov School of Anthropology which for many years played the lead in all anthropological research in Poland; that is why we frequently speak of the Polish School of Anthropology which was characterized by an original approach in the area of individual intrapopulation taxonomy of man.

It is worth noticing that at roughly the same time and at the same University the Polish School of Mathematics, initiated by Stefan Banach, came into existence.

Professor Jan Czekanowski was a member of the Learned Society in Lvov. The active resident members of its Department III (mathematics and natural sciences) were: Stefan Banach and Hugo Steinhaus; and active non-resident members were: Maria Skłodowska-Curie (Paris), Waclaw Sierpiński (Warsaw) and Stanisław Zaremba (Cracow).

In the years 1934–1936 he held the post of the President of Jan Kazimierz University in Lvov.

On 30 July, 1941 – the day when the German army entered Lvov – Jan Czekanowski was deprived of the possibility of working in the Anthropology Unit. Fortunately, all his most important books and materials were kept at home so this gave him an opportunity to continue his scientific work even during the years of the Nazi occupation. Officially, he had a letter of attorney, which confirmed that he administered Kośmin estate near Grójec, and made him safe from the German Arbeitsamt. The document also allowed him to place his family in the nearby Głuchowo and to visit them from time to time as well as to go to Warsaw.

Let us mention here that the owner of Kośmin estate at that time was the brother of Jan Czekanowski – Stanisław who took it over from their father Wincenty in 1895. Stanisław Czekanowski was born on 17 September 1868 in Ktery near Łęczycza. Initially, he studied law and since 1889 natural sciences, and finally he completed his education by studying agriculture in Halle and in Cracow. He was a man of exceptional energy – active both in social and professional spheres of life. He started as the co-owner and co-editor of “Agricultural Gazette”, since 1907 he was active in Agriculture Section of the Society for Russian Trade and Industry, then he worked in Credit Society, and during the First World War in Central Citizens Committee.

After the war, since 1927 he was the director of Department of Plant Production and Department of Farm Production in the Ministry of Agriculture and Agricultural Reform. In the years 1933–1939 he held the post of Government Commissioner of the Chamber of Agriculture in Wołyń and Kielce region, performed the function of the chairman of Council of Unions of Agriculture Cooperatives, and the chairman of Stanisław Staszic Foundation in Dziekanów where he successfully managed the land owned by the foundation. Encouraged by the famous novelist Maria Dąbrowska he wrote down his memories of the years 1878–1944 and entitled them “Annals of the Long Life of Mine”. The manuscript is in the collection of Ossolineum Library. After the Second World War, at the recommendation of the government, he took up the post of the delegate and head of the Seed Department of Land Office in Szczecin. He retired in 1949 at the age of 81 and died on 10 February 1963 in Poznan. He was buried in Worowo near Grójec.

On 8 May, 1944 Jan Czekanowski and his family left Lvov and stayed at Professor Jerzy Fuhrich’s house in Broniszów near Ropczyce. Later, taking advantage of the change in the position of the Soviet Army, he moved to a village of Cmolas, near Kolbuszowa, where he taught till the end of April. Czekanowski’s name is still remembered there as the local Primary School was named after him. He received the nomination to the position of professor at the Catholic

University of Lublin as early as in November 1944, yet due to the problems with transportation he was unable to go there. Thanks to the help from the Minister of Education he finally moved there and started his lectures in anthropology.

Czekanowski was nominated to the position of full professor of anthropology at the Department of Medicine of Poznan University in an official letter of the President Bolesław Bierut dated 28 February, 1946. He assumed his duties and the Chair of Anthropology on 1 March, 1946. After the Department of Medicine had been transformed into autonomous Academy of Medicine he started working at the Department of Mathematics and Natural Sciences which was later subdivided into Department of Biology and Earth Sciences.

He was the head of the Chair of Anthropology and simultaneously lectured at The Catholic University until 1949 when the Ministry of Education did not grant him the consent to work at two universities.

Let us now introduce a few scientific episodes from the long and laborious life of Jan Czekanowski.

– During the First World War he devised ethnic and religious statistics of the territory of Poland. They were used by the Polish Delegation for the Peace Conference in Versailles which Czekanowski attended as an expert and the head of the Delegation Office.

– In the period of the Nazi rule in Germany Czekanowski questioned the idea of existence of clean race types in prehistoric times e.g. German, Slavonic or Finno-Ugric, and called it a Utopian idea. He proved his view right when he was carrying out measuring of recruits for the Polish army. He found out that the highest coefficient of the Nordic element i.e. closest to the Aryan ideal of German Nazis is to be found in young Jews from Warsaw.

– The ethnic minority of Karaims, who lived in the south of Poland, escaped the fate of Jews and Gypsies only because Professor Czekanowski used his authority and testified to their Turkish origin when asked by Germans in 1942.

– In his diary Jan Oderfeld wrote:

“... The following problem was reported by the army to the Polish Committee for Standardization. Army uniforms go in standard sizes ; how many sizes should there be so that uniforms fit 90% of soldiers ? I set up a commission whose members were: Hugo Steinhaus – mathematician, Jan Czekanowski – anthropologist and a Mr Elert – a tailor. A tailor he was but an exceptional one! He only took your measurements once – the anthropometric ones – and you could collect your suit in due time without any corrections. The PCS resolved the problem reported by the army and I – willy – nilly – had to study the tool which was used i.e. mathematical statistics. As it turned out later I did one or two things which were good enough for Hugo Steinhaus to encourage me to write my doctoral dissertation”.

In the year 1960, due to his old age, Jan Czekanowski took retirement but he continued to hold seminars on anthropology for post-graduate students.

Jan Czekanowski was a man of extremely wide and versatile mind- that is why his scientific activity extended to different aspects of human life and the man himself.

However, his greatest achievements come in theoretical anthropology, where he used statistical methods to gather anthropometric materials; in ethnography and ethnology, and finally, in Slavonic studies, where he proved the thesis on the existence of homeland of Slavonic tribes in the doab of the Vistula River and the Oder River. This thesis was rejected by German scientists, some of their Czech counterparts and, what is surprising, even by some Polish scholars who found it difficult to accept Czekanowski's documentation and arguments.

Poland appreciated the fact that Czekanowski rendered considerable services to the country and its people. He became the real member of the Polish Academy of Sciences. He was conferred the honorary doctorate from two universities – Wroclaw University in 1959 and Poznan University in 1962. The state authorities awarded him with the Commander's Cross of Polonia Restituta Order and First Class Order of Work Banner.

Czekanowski was the honorary member of the Polish Anthropological Society and Anthropological Societies in Brno (Moravia) and in Zurich, as well as the corresponding member of the Anthropological Society in Paris and the Royal Anthropological Institute of Great Britain and Northern Ireland. He was also an active member and the vice- president of two Polish societies viz. the Polish Statistical Society and Polish Folk Culture Society. He was engaged in the work of the Polish Oriental Society and, finally, he was the founder member and chairman of the Scientific Board of the Polish Biometric Society since it was established in 1962 until his death.

The authors of a substantial article on the history of anthropology in Poland (T. Bielicki, T. Krupiński, J. Strzałko, *Historia antropologii w Polsce, Przegląd Antropologiczny* 53, z 1–2, 1987) write:

“Czekanowski was the scholar of the grand, old style; a wise man adored by some, admired by many and hated by a few. That tall, well-built man with piercing, light blue eyes and a cigarette at the corner of his mouth appeared to be kind and “soft”. Yet his good manners disguised sharp language and scathing tone used in polemics and discussions. He was a polyglot, speaking not only impeccable German, French and Russian but being able to hold conversations in English, Italian and Czech. As he was the representative of landed gentry and the citizen of the world he was well – acquainted with dozens of European aristocratic families and even, as the story has it, with one crowned head. He was a charming companion who liked, as he got older, to entertain his guests with juicy anecdotes about parties thrown in swimming pools in Zurich at the turn of

the century, or about drunken revels of Russian officers who stationed in Kalisz, the city on the borderline of the Russian Empire.

Professor was the person who could, in his time, speak eruditely and discuss at length the problems of anthropology, Mendelian genetics, European archaeology, Slavonic linguistics, Slavonic and African ethnography and mathematical statistics.

Ladies and Gentlemen, the mentioned above Professor Jan Strzałko, the anthropologist of the Poznan School and a former seminar student of Jan Czekanowski, has become the continuator of His ideas. He was also the co-writer of my paper on application of multivariate statistical methods, published in *Anthropological Review*, the periodical, whose editor-in-chief he is now.

We became acquainted back in the "good, old student days" when we both did student military course and studied in the Collegium Maius building located at Fredro Street No. 10. Professor Jan Czekanowski, the founding father of the Polish School of Anthropology and Professor Władysław Orlicz, the co-originator of the Polish School of Mathematics, shared not only the same building but also many ideas.

Ladies and Gentlemen, during my talk about Jan Czekanowski I have mentioned many prominent figures of the Polish scientific life. Let me express my hope that those Eminent Scholars and Great Poles will become role-models for our academic youth because as we all know "verba docent, exempla trahunt".

Thank you for your attention.