THE SAINT-PETERSBURG STATE UNIVERSITY

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THE COGNITIVE MODELING TECHNOLOGY FOR THE SYSTEM ANALYSIS OF THE INFORMATION-EDUCATIONAL ENVIRONMENTS

The specialty 05.13.01 – “The system analysis, control and information processing” (technical sciences)

THE APPENDIXES TO THE DISSERTATION

on the competition of scientific degree
of the doctor of technical sciences

English language

Volume 3

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Saint-Petersburg city
2010, 2024

Appendix 15 (mandatory).
The results of statistical processing of a posteriori data of research of the automated training environment with the properties of adaptation based on the cognitive models by means of the cognitive modeling technology for the system analysis of the information-educational environment for 2006-2008 y.

The realization of the various components of IEE of ART system requires the carrying out of the analysis of their functional appointment and capabilities, the accounting of technical and operational characteristics at the direct working of users of the different categories. The formation of knowledge of the trainee in the automated educational environment acts as the iterative process, which includes a sequence of the stages of information processing and the sensorimotor acts of interaction with the means of training, therefore for the analysis of IEE of ART system and the increasing of the resultativity of training, it is supposed to research sets of factors, influencing on the efficiency of information interaction between the subjects of training and the means of training.

For the realization of the contour of adaptation in IEE of ART system is used PCMB, which simultaneously acts as the information basis of the system analysis.

PCMB includes the two parametrical CM with the theoretical (initial) and actual (final) set of parameters: CM of the subject of training and CM of the means of training.

In the beginning of the primary and secondary mathematical processing of a posteriori data by means of a set of statistical methods it is necessary to verify the initial theoretical and used actual set of CM.

The primary mathematical processing of a posteriori data of research provides the analysis of the presence of abnormal emissions and artifacts by means of the linear normalization based on the rule of 1 sigma, 2 sigma and 3 sigma, the checking of compliance of the normality of distribution of a sequence of following of the nominal values in the samples with a posteriori data based on the analytical (the critical values of the measure of asymmetricity and the measure of sharpness) and the graphical criteria (the quartile and percentile graphs, and also the graphs of accumulated frequencies).

The secondary mathematical processing of a posteriori data is performed.

The appointment and tasks, realized by means of the parametrical CM of the subject and means of training in the adaptive educational environment have the dual basis:

- at-first,- they act as the information basis for the conducting of the system analysis with the purpose of the increasing of efficiency of the formation of knowledge of the trainees;
- at-second,- they act as the information basis for the realization of the contour of adaptation, allowing to provide the consistency of generation of the educational influences by the means of training with taking into account IFPST (CM of the subject of training) and the technical capabilities of the means of training (CM of the means of training).

The plan of mathematical processing with the using of statistical methods includes:

- the primary processing of a posteriori data, obtained by means of the automated diagnostics and formation of the analytical samples for the processing of data;
- the selecting of a set of the methods of statistical analysis adequate to the purposes of research and the obtained samples with a posteriori data for the mathematical processing;
- the carrying out of the analysis of correlation relationships, the revealing of the degree of influence (the fraction of dispersion) of a set of factors (the independent variables) on the resultativity of training as the dependent variable in the process of statistical analysis;
- the direct carrying out of the regression analysis for the formation of the equation of regression and the discriminant analyses, which allow to reveal the sensitivity of resultativity of training to the changing of a set of independent variables (the parameters of CM), and also quickly to calculate the estimation of the resultativity of training of the contingent of examinees based on the previously diagnosed IFPST (the values of combination of the physiological, psychological and linguistic parameters of CM of the subject of training), and also the way of presentation of a preset ordered sequence of information fragments (CM of the means of training).

The plan of experiment is directed on the achieving of the purpose of research, the confirming the hypothesis of dissertation, and also the reliability of the obtained scientific results and the adequacy of the proposed: approaches, principles, CMT, CM, methodical, brainware and software for the realization of the system analysis of organization.

The plan of experiment provides the complex research of the vectors of parameters, including into the basis of the parametrical CM of the subject of training and CM of the means of training, at this t accordingly includes the several important actions.

- the primary diagnostics of the nominal values of the considered parameters by means of use of a set of applied methods – is carried out on the basis of the applied DM, the practical use of which directly provides the automation of the execution of a sequence of routine operations and significantly reduces the period of execution of the program for the support of carrying out of a series of experimental researches (actions);
- the preliminary mathematical processing of a posteriori data of a series of experiments – is achieved due to the preliminary formation of samples with a posteriori data for the subsequent statistical processing;
- the mathematical processing of formed samples with a posteriori data by means of using of the statistical methods – the revealing of significant statistical regularities with the using of different methods.

P15.1. The features of the plan of carrying out of a series of experiments

The purpose of my scientific-research and dissertation work is the increasing the efficiency of functioning of IEE of ART due to the realization of the individually-oriented formation of knowledge of the trainee with the using of the adaptive of generation of educational influences based on the parametrical CM (PCMB).

The plan of experiment is directed on the achievement of purpose, confirming the hypothesis of dissertation research, and also the reliability of the obtained scientific results and the adequacy of the proposed approaches, principles, CM, CMT, methodical, brainware and software, and also the modifications in the organization of IEE and the technological process of controlled formation of knowledge of the contingent of trainees.

The plan of experiment provides the research of the vectors of parameters, including into the portraits of the parametrical CM of the subject of training and accordingly includes:

- the primary diagnostics (identification) of the considered parameters with the using of a set of applied methods – is carried out by means of the applied DM, the practical use of which provides the automation of performance of the routine operations and significantly reduces the performance of program of the experimental research by both the examinee and expert;
- the preliminary statistical processing of a posteriori data of the experiment – is achieved by the means of formation of the samples for the subsequent statistical processing of a posteriori data of a series of experiments;
- the statistical analysis of formed samples – the revealing of statistical regularities with the using of various methods of statistical analysis (the correlation analysis, the regression analysis, the discriminant analysis, multidimensional scaling, the cluster analysis and factor analysis).

At the stage of primary diagnostics the program of experimental researches included the automated diagnostics of the vectors of parameters of the physiological, psychological and linguistic portraits of CM of the subject of training (the structure of CM is presented in the dissertation, the previous report on SRW, monography and scientific articles).

The physiological portrait of CM of the subject of training is formed directly on the scientific basis of physiology of sensory systems (private physiology of analyzers).

The diagnostics of parameters of the physiological portrait of CM of the subject of training provides the use of the method of interviewing and a row of applied methods, realized in the basis of the applied DM, which directly allow to reveal the presence / absence of anomalies of the visual and auditory sensory systems.

A row of significant anomalies of the physiological portrait of CM of the subject of study are distinguished:

- the anomalies of refraction – the method of questionnaire and interviewing (the interviewing of examinee with the purpose of revealing astigmatism, myopia or hypermetropia);
- the anomalies of perception of space – the method of research of Sivtsev D.A. with the optotypes (acuity of vision) and the method of computer "perimeter" (field of view);
- the anomalies of color-perception (color-sensation) – the method of research of Rabkin E.B. with the polychromatic tables and the method of research of Justova E.N. with threshold tables (the revealing of achromates, abnormal trichromates, complete or partial dichromates: achromasia, protanopia, deuteranopia and tritanopia);
- the anomalies of auditory sensory system, caused by the violations of functions of the external, middle and internal ear (not considered in the work).

The diagnostics of parameters of the psychological portrait of CM of the subject of training provides the usage of a row of the applied methods, realized in the basis of the applied DM, allowing to reveal the level of development of the key parameters, characterizing the features of the mental activity of the psychophysiological construct of the head brain of examinee at the processing of incoming information:

- the convergent intellectual abilities – the method of research of Amthauer R. in the adaptation of Galkina T.V., “"The institute of psychology" of "RAS"” (the revealing of the level of development of verbal intellect, abilities of reasoning and analytical thinking, combinatorial abilities, deductive and inductive thinking, mnemonic abilities, planar and volumetric thinking);
- the divergent intellectual abilities - the method of research of Mednik S.A. and Torrens E.P. in the adaptation of Alekseeva L.G. and Galkina T.V., “"The institute of psychology" of "RAS"” (the revealing of the level of development of the verbal creativity: the index of associativity, the index of originality, the index of uniqueness and the index of selectivity; the revealing of the level of development of the figurative creativity: the index of associativity, the index of originality, the index of uniqueness and the index of selectivity);
- the bipolar cognitive styles (not measured) – the methods of Witkin H.A., Kagan J. and others (the revealing of the level of bipolar indicators: field-dependence and field-independence, impulsivity and reflexivity, rigidity and flexibility, concretization and abstraction, cognitive simplicity and cognitive difficulty, categorical narrowness and categorical width, analyticity and synthetism);
- the learning-ability (not measured directly) – the revealing of predisposition to the implicit or explicit learning ability of examinee based on the ratio of indicators, characterizing the level of development of convergent and divergent intellectual abilities, and also the indicators of academic-performance in the disciplines of average (general) education for the additional analysis.

The diagnostics of parameters of the linguistic portrait of CM of the subject of training provides the usage of a row of methods, realized in the basis of the applied DM, which allow to reveal the level of development of parameters, characterizing the linguistic abilities of the subject in the process of understanding of the content of information:

- the level of proficiency in the language of statement in the material – the method of research of "The Colchester educational centre" (The United kingdom of Great Britain and Northern Ireland) directly for the English language;
- the level of proficiency in the dictionary of terms – the method of research is proposed by the teacher-author of methodical support in the certain discipline;
- the level of proficiency in the elements of interface of the means of training – the method of research is offered by the technician supporting, carrying out the accompanying the automated means of training in the traditional or innovative IEE.

The registration of a posteriori data of the automated testing (diagnostics) of values of each of the vector of parameters of CM of the subject of training was carried out in parallel in DB of the complex of programs and on the specially developed personal cards for the registration of a posteriori data, that allows subsequently by the way of comparing of the values of indicators to reveal the correctness of functioning of the algorithms and procedures, realizing the methods of research of the parameters in the basis of the applied DM.

In the course of the automated testing of the contingent of trainees procedure of a posteriori data in the context of the several experimental groups were accumulated.

At the stage of preliminary statistical processing of a posteriori data a row of samples is formed, reflecting the nominal values of parameters of the physiological, psychological and linguistic portraits of CM of the subject of training of the several experimental groups of the examinees. The automation of the process of statistical processing and analysis of a posteriori data was achieved by the means of use of the various computer programs "MS Excel", "SPSS", "Statistica" and others.

The formation of tables and graphs of the distribution of frequencies did not allows to reveal the significant of heterogeneities in the distribution of the nominal values of parameters, so there was a need of the additional statistical analysis. As one from the most important requirements is the compliance to the normal law of distribution, then there was a need of the appropriate check with the using of the graphical (the quartile graphs and the graphs of accumulated frequencies), the analytical (asymmetry and eccentric) and criterion (criterion γ - Kolmogorov-Smirnov) methods.

The compliance to the normal law of distribution of a sequence of nominal values in the samples with a posteriori data acts on the choice of the method of mathematical processing of a posteriori data and the statistical analysis.

At the calculating of critical values for the asymmetry and excess (tabl. A15.1), the formulas, recommended by Pustyl'nik E.I. were used: $A_{кр} = 3\sqrt{\frac{6(n-1)}{(n+1)(n+3)}}$ and $E_{кр} = 5\sqrt{\frac{24n(n-2)(n-3)}{(n+1)^2(n+3)(n+5)}}$, where n – the volume of the analyzed sample of data. The error of representativeness of thegiven indicators is respectively $m_A = \sqrt{\frac{6}{n}}$ and $m_E = 2\sqrt{\frac{6}{n}}$. The comparison of the empirical (see the descriptive statistics for each sample) and critical values allows to talk with the sufficient certainty about the correspondence of the distribution of values to the normal law (at the condition $t_A = \frac{|A_{эмп}|}{m_A} \geq 3$ and $t_E = \frac{|E_{эмп}|}{m_E} \geq 3$).

For the case, that to exclude ("to filter") the abnormal values ("emissions") of the researched parameters it is necessary to note the characteristic feature of the normal distribution: 95,44% of values are located in the interval $\bar{x} \pm 2\sigma$, that allows to calculate the lower and upper threshold values for the analyzing of each sample of data. For illustrate presentation the deviation of nominal values in the samples from their average z-conversion on the basis $z_i = \frac{x_i - \bar{x}}{\sigma_x}$ is used. The procedure of standardization allows to convert the initial values and to select the optimal scale of measurement for their representation directly.

Table A15.1

The errors of representativeness and the critical values of asymmetry and excess for the primary statistical analysis of a posteriori data

The indicator / group	The experimental group of examinees			
	the first	the second	the third	the fourth
The volume of sample	20	21	25	18
The error of representativeness of asymmetry (m_A)	0,548	0,535	0,49	0,577
The critical value of asymmetry ($A_{кр}$)	1,458	1,43	1,334	1,517
The error of representativeness of excess (m_E)	1,095	1,069	0,98	1,155
The critical value of excess ($E_{кр}$)	3,805	3,777	3,656	3,856

P15.2. The features of the primary processing of a posteriori data

As in the course of experiments the methods for the automated diagnostics of the parameters of CM from the principally different subject areas are used (physiology of sensory systems, cognitive psychology, cognitive linguistics, economics and the financial analysis), then the registration of a posteriori data was carried out on the specially developed cards, and also in the general sheet of the results of testing of the contingent of examinees.

The research of parameters of the physiological, psychological and linguistic portraits of CM of the subject of training, and also LRKT in the studied disciplines were carried out in the several stages. In fact of the completion of diagnostic cycle with the using of a certain method of research of a posteriori results, calculated directly by the applied DM and the basic DM, were documented in the corresponding DB (the level of data bank) and entered by the examinees into the individual cards for the registration of data.

Subsequently to each group of examinees was associated the separate sample of a posteriori data with the answers to the questions, to be further processing.

For the research of dynamics and the tendences of changing of the average point (LRKT) and its average quadratic deviation (AQD) for 3 years (2004-2006 y. 8 groups of examinees of the day and evening department, studying the discipline “Informatics” were used.

For the solve of tasks of the primary mathematical processing of the formed samples of data by means of the various methods of statistical analysis was carried out: the searching of abnormal emissions (artifacts) in the values of measured signs, the checking of compliance to the certain (normal) law of distribution of the values of the measured sign, the calculating of descriptive statistics (the measures of central tendency) for the obtained samples of a posteriori data (the results of processing are presented below).

The critical values of asymmetry and excess were calculated for the analysis of compliance to the normal law of distribution of the values of measured features (calculation results are presented below), the graphs of accumulated frequencies and quartile graphs (the degree of compliance to the normal law of distribution is determined by the relative arrangement of the theoretical and empirical curves, not presented), the values of criterion of Kolmogorov-Smirnov and the probability of compliance to the normal law of distribution (if the value of probability is less than or equal to 0.05, then there is no the statistically significant difference).

The results of the primary statistical processing of the formed samples with a posteriori allow to speak about the absence of significant heterogeneities, which do not allow to conduct the further researches of statistical regularities, according to the presented plan of mathematical processing of a posteriori data.

P15.2.1. The finding of abnormal emissions and artifacts in a posteriori data

The samples with a posteriori data can contain “heterogeneities” and “features”, which manifest in the presence of abnormal emissions and artifacts.

The ejection – the critical value, acting as a local minimum or maximum, which can potentially may be replaced (by the average or other value).

The artifact – the critical value, which is factually correct, but acts as a local extremum, and also potentially cannot be replaced by another.

In tabl. A15.2 shows the results of replacement of the abnormal nominal values.

Table A15.2

The replacement of the nominal values of abnormal emissions and artifacts

№	The identifier of indicator	The number of group	The revealed emission (artifact) in the source data	The replace of the nominal value in the data
I.	The actual set of parameters of the cognitive model of the subject of training			
1.	The parameters of the physiological portrait			
1.1.	Age	6321	19	It is impossible
1.2.		6322	16	It is impossible
1.3.		6831	30	It is impossible
1.4.		6832	31	It is impossible
1.5.		7832	23	It is impossible
1.6.	K_7^1	6321	23	22
1.7.			21	20
1.8.			16	18
1.9.			15	17
1.10.		6322	17	19
1.11.			16	18
1.12.		6325	12	14
1.13.		6831	10	12
1.14.			14	16
1.15.		7371	18	19
1.16.		7831	16	17
1.17.		8371	16	17
1.18.		8391	14	17
1.19.		8392	7	11
1.20.		8831	15	16

The continuation of tabl. A15.2

1.21.	K_8^1	6321	17	15
1.22.			18	16
1.23.		6322	15	13
1.24.			14	12
1.25.		6325	14	12
1.26.			15	13
1.27.			16	14
1.28.		7371	18	16
1.29.		7391	4	8
1.30.		7831	5	6
1.31.		8371	6	7
1.32.		8392	4	6
1.33.		8831	18	17
1.34.		8832	19	18
1.35.	K_9^1	6321	17	15
1.36.			20	16
1.37.		6322	16	13
1.38.		7371	18	17
1.39.			12	14
1.40.		7391	5	9
1.41.		7392	16	12
1.42.		7831	6	8
1.43.		8371	4	6
1.44.		8391	20	19
1.45.		8392	5	7
1.46.		8831	18	17
1.47.		8832	19	18
2.	The parameters of the psychological portrait			
2.1.	K_{14}^1	6321	13	10
2.2.		6325	7	9
2.3.		7391	12	13
2.4.		7392	19	18
2.5.		7832	0	6
2.6.		8391	9	11
2.7.		8392	11	12
2.8.		8832	0	6

The continuation of tabl. A15.2

2.9.	K_{15}^{1}	6325	9	10
2.10.		7371	10	11
2.11.		7391	17	16
2.12.		7832	16	15
2.13.		8391	7	9
2.14.		8392	5	9
2.15.		8832	16	15
2.16.	K_{16}^{1}	7371	2	4
2.17.		8391	5	7
2.18.		8392	18	16
2.19.		8831	1	4
2.20.	K_{17}^{1}	6321	10	8
2.21.		7371	13	10
2.22.		7391	13	12
2.23.		7392	0	1
2.24.			8	7
2.25.		7831	12	10
2.26.		7832	16	9
2.27.		8371	14	11
2.28.		8831	13	10
2.29.		8832	0	1
2.30.	K_{18}^{1}	6831	0	5
2.31.		7371	2	3
2.32.		7831	13	12
2.33.		7832	18	14
2.34.		8392	4	5
2.35.		8831	14	12
2.36.	K_{19}^{1}	6321	6	7
2.37.		6831	0	7
2.38.		7371	3	4
2.39.		7391	2	3
2.40.		7831	17	16
2.41.		7832	18	17
2.42.			1	3
2.43.		8392	6	7
2.44.		8832	1	3

The continuation of tabl. A15.2

2.45.	K_{20}^1	6321	7	11
2.46.		6322	10	13
2.47.			11	14
2.48.		7371	8	9
2.49.		7391	9	10
2.50.		7392	9	10
2.51.		7831	6	7
2.52.		7832	5	6
2.53.		8371	9	11
2.54.		8391	8	12
2.55.		8392	11	13
2.56.	K_{21}^1	6321	14	13
2.57.		6322	16	15
2.58.		7371	18	15
2.59.		7391	6	7
2.60.		7392	15	13
2.61.		7832	4	5
2.62.		8371	7	8
2.63.		8391	6	7
2.64.		8392	24	20
2.65.	K_{22}^1	6321	19	18
2.66.		6322	4	6
2.67.		7371	4	6
2.68.		7391	4	5
2.69.		7392	20	18
2.70.		7832	0	2
2.71.		8391	4	5
2.72.		8832	0	2
2.73.	K_{23}^1	6321	7,29	4,3
2.74.			6,25	4
2.75.		6322	4,95	4,6
2.76.		6325	16,7	15,8
2.77.		6831	6,1	5,38
2.78.			6,36	5,45
2.79.		7371	6,49	6,2
2.80.			5,9	5,6
2.81.		7392	7,35	5,5
2.82.		7831	5,55	4,9
2.83.		8371	4,45	4,2
2.84.		8391	5,45	4,2
2.85.		8392	3	2,73
2.86.		8831	15	10,95

The continuation of tabl. A15.2

2.87.	$K_{24}{}^1$	6321	14,6	12,5
2.88.		7391	0	1,5
2.89.		7832	14,2	13,3
2.90.		8371	10,7	10,2
2.91.		8392	9,85	9,35
2.92.		8832	10,5	10,3
2.93.	$K_{25}{}^1$	6321	34	32
2.94.		7391	0	3
2.95.		7831	31	26
2.96.		8371	8	10
2.97.		8392	5	7
2.98.		8832	34	28,5
2.99.	$K_{27}{}^1$	6321	4,3	4
2.100.		6322	6,16	5
2.101.		6325	1,1	1,2
2.102.			2	2,1
2.103.			1,4	1,6
2.104.			1,1	1,3
2.105.			1,1	1,4
2.106.			8,3	4,01
2.107.		7391	4,3	4
2.108.		7392	2,7	2,55
2.109.		7831	0,05	0,15
2.110.			2,2	2,05
2.111.			0	2,2
2.112.		7832	2,5	2,03
2.113.		8371	4,9	4,14
2.114.		8391	6,3	4,17
2.115.		8392	4	3,66
2.116.		8832	2,5	2,32
2.117.	$K_{28}{}^1$	6321	0	0,8
2.118.			6,75	6
2.119.		7371	4,77	4,65
2.120.		7391	12,9	7
2.121.		7392	5,33	4,4
2.122.		8371	6	5,52
2.123.		8391	7	4,91
2.124.		8392	6,33	5,71
2.125.		8831	5	4,98

The completion of tabl. A15.2

2.126.	K_{29}^1	6322	12	11
2.127.			13	12
2.128.			16	13
2.129.		7391	39	16
2.130.		7392	8	7,3
2.131.		7831	11	9,7
2.132.		7832	7	6
2.133.		8371	14	12,81
2.134.		8391	11	10,6
2.135.		8392	16	12,74
2.136.		8832	11	10
3.	The parameters of the linguistic portrait			
3.1.	K_{45}^1	6322	7	It is impossible
3.2.		6325	7	It is impossible
3.3.		7371	8	7

At the carrying out of Z-normalization (the linear standardization) the abnormal nominal values of numbers were found in the different samples with a posteriori data (tabl. A15.2):

- in the sample "Age" it is not possible to replace all revealed abnormal values, but they do not have a significant influence on the measures of central tendence (average, standard deviation, mode, median and dispersion);
- in the sample "K_7^1" at the linear standardization with the using of rule $\bar{x} \pm 2\sigma$ it was the necessity of replacement (the increasing or decreasing) of the nominal values to the critical with the taking into account the average, maximal and minimal;
- in the samples "K_8^1 and K_9^1" at the normalization the equivalent replacement of supercritical nominal values on the critical analogues is carried out correctly;
- in the samples "K_{14}^1, K_{15}^1, K_{16}^1, K_{17}^1, K_{18}^1, K_{19}^1, K_{20}^1 and K_{21}^1" at the normalization the equivalent replacement of supercritical nominal values on the critical analogues for the providing of potential possibility of the mathematical processing;
- in the samples "K_{22}^1, K_{23}^1 and K_{24}^1" Z-normalization by the rule $\bar{x} \pm 2\sigma$ is carried out;
- in the samples "K_{25}^1, K_{27}^1 and K_{28}^1" at the normalization by means of Z-standardization based on the rule $\bar{x} \pm 2\sigma$ the equivalent replacement of supercritical nominal values on the critical analogues was carried out for the providing of the potential possibility of mathematical processing with the using of statistical methods;
- in the sample "K_{29}^1" at the normalization by means of Z-standardization based on the rule $\bar{x} \pm 2\sigma$ the equivalent replacement of supercritical nominal values on the critical analogues is carried out for the providing of potential possibility of mathematical processing with the using of statistical methods, and in the sample "K_{45}^1" the replacement of supercritical nominal values on the critical is not presented possible (the artifacts are revealed), that does not influence on the measures of central tendency in the analyzed sample of a posteriori data.

At the primary statistical analysis of the obtained samples with a posteriori data the significant nonlinearities and the anomalies were not visually revealed, that causes the necessity of carrying out of the analysis of compliance to the normal law of distribution by the means of using of the analytical criteria (the critical values of the measure of asymmetric and the measure of sharpness) and the graphical criteria (the graphs of accumulated frequencies of values and probabilities) for the providing of the potential possibility of use of a set of different methods of the statistical analysis of data.

At the analysis of statistical regularities is revealed a significant clarification of the form of distribution of a sequence of the nominal values of observed signs at the increasing of the quantity of records (measurements), that reveals in all samples of data.

At the plotting of graphs of the accumulated frequencies it is necessary to pay attention on:

- the theoretical curve of the normal law of distribution of the numbers in the samples of data;
- the experimental curve of the normal law of distribution of the measurements;
- the degree of compliance of the theoretical and obtained experimental curve.

At the plotting of the graphs of accumulated frequencies it is necessary to take into account:

- the main measure and auxiliary measure of central tendency;
  - the position of the main measure of central tendency in the diagram of accumulated frequencies;
  - the position of mode as the auxiliary measure of central tendency;
  - the position of median as the auxiliary measure of central tendency;
  - the degree of mutual coincidence of the average arithmetic, median and mode;
- the degree of deviation from the normal law of distribution of the numbers in the sample of data;
  - the measure of asymmetry of the distribution of numbers – a positive number corresponds to the displacement of the average arithmetic to the left (the left-hand asymmetry);
  - the measure of sharpness of the distribution of numbers – a negative number corresponds to the downward movement of the vertex (the two-vertex distribution);
- the graphs of the two-dimensional scattering of nominal values in the given samples;
  - the linearity of the distribution of nominal values in the presented samples – causes the possibility of the analysis of the normality of distribution of numbers and the selecting of the method of statistical analysis of a posteriori data;
  - the horseshoe of distribution – causes the necessity of dissection of the initial sample on the two equal parts and the separate analysis of data;
  - the nonlinearity of distribution – at the normalization causes the possibility of applying of the mathematical methods of nonlinear standardization.

A15.2.2. The compliance of the analytical criteria of the normal law of distribution

The application of the different mathematical methods for the statistical processing of a posteriori data causes the necessity of compliance to the requirements and restrictions, as the certain methods have the various levels of sensitivity.

The primary statistical analysis and the secondary statistical analysis are distinguished:

- the primary statistical analysis – involves the searching of the anomalies of a sequence of following of the nominal values in the samples with a posteriori data (the revealing of anomalous emissions and artifacts, the formation of the primary descriptive statistics, the calculation of critical values and the plotting of graphs);
- the secondary statistical analysis – involves the searching of a set of the various statistical methods for the mathematical processing of a posteriori data with taking into account of the vector of requirements and limitations to the initial a posteriori data of the experiment.

The primary statistical processing of a posteriori data of a series of experiments involves the performance of a row of different actions for the preliminary preparation:

- the analysis of compliance to the normal law of distribution of the values of indicators;
  - the analytical criterion based on the critical values of asymmetry (the measure asymmetry of distribution) and excess (the measure of sharpness of distribution);
  - the graphical criterion by means of using of the graphs of frequencies (the graph of frequency of the occurrence of values, the graph of probability of the appearance of values);
- the finding of anomalous emissions and artifacts in a sequence of nominal values by means of the analytical criterion based on the rule $\bar{x} \pm \sigma$, $\bar{x} \pm 2\sigma$ and $\bar{x} \pm 3\sigma$;
  - the rule "one sigma" – reflects the ratio of deviation of the nominal values from the average arithmetic in relation to the average quadratic deviation, at the same time about 30-40% of the measured nominal values of the observed signs (variables) are guaranteed to be filtered out;
  - the rule "two sigma" – reflects the ratio of deviation of the nominal values from the measure of central tendency in relation to the average quadratic deviation, at the same time about 20-30% of the measured values are guaranteed to be filtered out in the course of experimental researches;
  - the rule "three sigma" – reflects the ratio of deviation of the nominal values from the mathematical expectation in relation to the average quadratic deviation, at the same time about 10-20% of the measured values are guaranteed to be filtered out in the course of experimental researches.

For the providing of checking to the analytical criterion of compliance to the normal law of distribution of the numbers in the samples with a posteriori data, the critical values of asymmetry and excess were calculated, and then the resulting tabl. 15.3 was formed.

Table A15.3

The critical values of asymmetry and excess

№	The group	The initial volume of sample	The experimental volume of sample	The critical value of the measure of asymmetricity (asymmetry)	The critical value of the measure of sharpness (excess)
1.	4321	20	20	1,46	3,81
2.	4322	21	21	1,43	3,78
3.	4325	25	25	1,33	3,66
4.	5321	24	24	1,36	3,69
5.	5322	22	22	1,40	3,75
6.	5325	24	24	1,36	3,69
7.	5831	25	25	1,33	3,66
8.	5832	24	24	1,36	3,69
9.	6321	26	20	1,46	3,81
10.	6322	23	21	1,43	3,78
11.	6325	29	25	1,33	3,66
12.	6831	22	18	1,52	3,86
13.	6832	22	16	1,58	3,89
14.	7371	21	21	1,43	3,78
15.	7391	17	16	1,58	3,89
16.	7392	17	17	1,55	3,88
17.	7831	20	20	1,46	3,81
18.	7832	19	18	1,52	3,86
19.	8371	17	17	1,55	3,88
20.	8391	20	19	1,49	3,83
21.	8392	19	19	1,49	3,83
22.	8831	15	15	1,62	3,90
23.	8832	18	18	1,52	3,86

For the calculation of the critical values of asymmetry and excess the formulas of Pustyl'nik E.I. were used: $A_{KP} = 3\sqrt{\frac{6(N-1)}{(N+1)(N+3)}}$ and $Э_{KP} = 5\sqrt{\frac{24N(N-2)(N-3)}{(N+1)^2(N+3)(N+5)}}$.

In the result of the analysis of compliance to the normal law of distribution of a sequence of numbers in the samples with a posteriori data tabl. A15.4 is formed.

Table A15.4

The analysis of the compliance to the normal law of distribution by the means of using of the analytical criteria

№	The identifier of indicator	The compliance to the critical value of the measure of asymmetricity	The compliance to the critical value of the measure of sharpness	The analytical compliance to the normal law
I.	The actual set of parameters of the cognitive model of the subject of training			
1.	The parameters of the physiological portrait			
1.1.	Age	+	- (artifact)	+
1.2.	K_7^1	+	+	+
1.3.	K_8^1	+	+	+
1.4.	K_9^1	+	+	+
2.	The parameters of the phychological portrait			
2.1.	K_{14}^1	+	+	+
2.2.	K_{15}^1	+	+	+
2.3.	K_{16}^1	+	+	+
2.4.	K_{17}^1	+	+	+
2.5.	K_{18}^1	+	+	+
2.5.	K_{19}^1	+	+	+
2.6.	K_{20}^1	+	+	+
2.7.	K_{21}^1	+	+	+
2.8.	K_{22}^1	+	+	+
2.9.	K_{23}^1	+	+	+
2.10.	K_{24}^1	+	+	+
2.11.	K_{25}^1	+	+	+
2.12.	K_{27}^1	+	+	+
2.13.	K_{28}^1	+	+	+
2.14.	K_{29}^1	+	+	+
3.	The parameters of the linguistic portrait			
3.1.	K_{45}^1	+	+	+

The completion of tabl. A15.4

II.	The actual set of parameters of the cognitive model of the means of training			
1.	The physiological portrait			
1.1.	K_2^2	+	+	+
1.2.	K_4^2	+	+	+
1.3.	K_5^2	+	+	+
1.4.	K_6^2	+	+	+
1.5.	K_{15}^2	+	+	+
1.6.	K_{16}^2	+	+	+
1.7.	K_{17}^2	+	+	+
III.	The parameters of the efficiency of functioning of the information-educational environment and the automated training system (the resultativity of the formation of knowledge of the contingent of trainees)			
1.1.	The estimation of the level of residual knowledge of the contingent of trainees with the using of rough scale based on the quantity of correct answers after the studying of one chapter by means of the electronic textbook based on the adaptive representation of information fragments processor			
	Y_1	+	+	+
1.2.	The estimation of the level of residual knowledge of the contingent of trainees with the using of exact scale based on the analytical coefficients system after the studying of one chapter by means of the electronic textbook based on the adaptive representation of information fragments processor			
	Y_2	+	+	+
1.3.	The estimation of the level of residual knowledge of the contingent of trainees with the using of rough scale based on the quantity of correct answers after the studying of discipline			
	Y_3	+	+	+
1.4.	The estimation of the level of residual knowledge of the contingent of trainees with the using of exact scale based on the analytical coefficients system after the studying of discipline			
	Y_4	+	+	+

In the course of the preliminary statistical analysis of the formed samples with a posteriori data analytically showed no inconsistency to the normal law of distribution in the corresponding sequences of nominal values.

A15.2.3. The compliance to the graphical criteria for the compliance to the normal law of distribution

The graphical criteria for the estimation of the normal distribution have the important value.

For the extended detailed analysis of compliance to the normal law of distribution of a sequence of nominal values in the samples with a posteriori data the graphs of frequencies of occurrence, probability, the curve of distribution were built (tabl. A15.5).

Table A15.5

The analysis of compliance to the normal law of distribution by the means of using of the graphical criteria

№	The identifier of indicator	The compliance by the graph of occurrence of the values	The compliance by the graph of probability of the appearance of values	The compliance by the graph of frequencies of the occurrence of values	The compliance of curve of the normal distribution by the graph
I.	The actual set of parameters of the cognitive model of the subject of training				
1.	The parameters of the physiological portrait				
1.1.	Age	+	+	+ - (artifact	+ - (artifact
1.2.	K_7^1	+	+	+	+
1.3.	K_8^1	+	+	+	+
1.4.	K_9^1	+	+	+ - (emission)	+
2.	The parameters of the psychological portrait				
2.1.	K_{14}^1	+	+	+	+
2.2.	K_{15}^1	+	+	+ - (emission)	+
2.3.	K_{16}^1	+	+	+ - (emission)	+
2.4.	K_{17}^1	+	+	+ - (emission)	+ - (emission)
2.5.	K_{18}^1	+	+	+	+
2.6.	K_{19}^1	+	+	+	+
2.7.	K_{20}^1	+	+	+ - (emission)	+
2.8.	K_{21}^1	+	+	+	+
2.9.	K_{22}^1	+	+	+	+
2.10.	K_{23}^1	+ - (emission)	+	+ - (emission)	+ - (emission)
2.11.	K_{24}^1	+	+	+	+
2.12.	K_{25}^1	+	+	+	+
2.13.	K_{27}^1	+	+	+ - (emission)	+ - (emission)
2.14.	K_{28}^1	+	+	+ - (emission)	+ - (emission)
2.15.	K_{29}^1	+	+	+	+
3.	The parameters of the linguistic portrait				
3.1.	K_{45}^1	+	+	+	+

The completion of tabl. A15.5

II.	The actual set of parameters of the cognitive model of the means of training				
1.	The parameters of the physiological portrait				
1.1.	K_2^2	+ - (emission)	+	+	+
1.2.	K_4^2	+	+	+	+
1.3.	K_5^2	+	+	+ - (emission)	+ - (emission)
1.4.	K_6^2	+	+	+ - (emission)	+ - (emission)
1.5.	K_{14}^2, K_{15}^2, K_{16}^2	+	+	+	+
1.6.	L_{45}^2	+	+	+	+
III.	The parameters of the efficiency of functioning of the information-educational environment and the automated training system (the resultativity of the formation of knowledge of the contingent of trainees)				
1.	The estimation of the level of residual knowledge of the contingent of trainees with the using of rough scale based on the quantity of correct answers after the studying of one chapter by means of the electronic textbook based on the adaptive representation of information fragments processor				
	Y_1	+	+	+	+
2.	The estimation of the level of residual knowledge of the contingent of trainees with the using of exact scale based on the analytical coefficients system after the studying of one chapter by means of the electronic textbook based on the adaptive representation of information fragments processor				
	Y_2	+	+	+	+
3.	The estimation of the level of residual knowledge of the contingent of trainees with the using of rough scale based on the quantity of correct answers after the studying of discipline				
	Y_3	+	+	+	+
4.	The estimation of the level of residual knowledge of the contingent of trainees with the using of exact scale based on the analytical coefficients system after the studying of discipline				
	Y_4	+	+	+	+

The theoretical and experimental distribution of a sequence of following of the nominal values in the samples with a posteriori data, which are directly presented on the graphs of accumulated frequencies of occurrence of the nominal values, the accumulated probabilities of occurrence of the nominal values in the obtained samples with a posteriori data of experiments have the significant value.

In the course of the analysis of graphs with the theoretical and experimental distribution the insignificant deviations from the normal law of distribution in the samples is revealed:

- Age – all deviations are considered as the artifacts, which do not act the significantly influence on the compliance to the normal law of distribution;
- K_{20} – there is the insignificant deviation in the area of large values, which does not act the influence on the compliance to the normal law of distribution;
- K_{23} – there is the insignificant deviation in the area of small and large values, which do not act the influence on the compliance to the normal law of distribution;
- K_{25} – there is the insignificant deviation in the area of large values, which does not act the influence on the compliance to the normal law of distribution;
- K_{27} – there is the insignificant deviation in the area of small and large values, which do not act the influence on the compliance to the normal law of distribution.

In the course of the analysis of graphs with the theoretical and experimental probability of appearance of values the insignificant deviations from the normal law of distribution were revealed:

- K_{23} – there is the deviation in the area of small values of the theoretical and practical probability of the following of values, which does not act the significant influence on the compliance to the normal law of distribution of the probabilities;
- K_{27} – there is the deviation in the area of small values of the theoretical and practical probability of following of the values, which does not act the significant influence on the compliance to the normal law of distribution of the probabilities.

In the course of the analysis of graphs with the experimental frequency of occurrence of the values in the sample with a posteriori data and the theoretical curve with the normal distribution insignificant deviations from the normal law of distribution were revealed:

- Age – there is the left-hand offset of the vertex of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- SCH – there is the right-hand offset of the vertex of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- AST – there is the right-hand offset of the vertex of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{8} – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;

- K_9 – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{15} – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{16} – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{17} – there is the left-hand offset of the vertex of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{18} – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{19} – there is the right-hand offset of the vertex of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{20} – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{21} – there is the left-hand offset of the vertex of distribution of the frequency of occurrence of the nominal values in the formed sample with a posteriori data of a series of experiments, which does not act the significant influence on the compliance of the normal law of distribution of a sequence of following of the numbers;
- K_{23} – there is the non-big left-hand offset of the vertex with the main measure of the central tendency and the discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the number;
- K_{24} – there is the non-big left-hand offset of the vertex with the main measure of the central tendency and the discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;

- K_{25} – there is the non-big left-hand offset of the vertex with the main measure of the central tendency and the discrepancy in the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{27} – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{28} – there is the non-big left-hand offset of the vertex with the main measure of the central tendency and the discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{29} – there is the non-big left-hand offset of the vertex with the main measure of the central tendency and the discrepancy in the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- K_{45} – there is the left-hand offset of the vertex of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- L_{36N} – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- L_{37} – there is the non-big left-hand offset of the vertex with the main measure of the central tendency and the discrepancy in the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- L_{38} – there is the non-big discrepancy of the form of distribution of the frequency of occurrence of the values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of the numbers;
- Y_1, Y_2, Y_3 and Y_4 – there is the right-hand offset of the vertex of distribution of the frequency of occurrence of the nominal values in the sample with a posteriori data, which does not act the significant influence on the compliance to the normal law of distribution of a sequence of following of the numbers in the sample of data.

A15.3. The features of samples with a posteriori data

Directly after the preliminary analysis of the compliance to the normal law of distribution there is the significant necessity of formation and the primary statistical analysis of the samples with the available a posteriori data.

A row of features in the samples with a posteriori data need to be distinguished:

- for each difficult object, process or phenomenon the parametrical CM, which has the significant structural features is introduced into the consideration;
- the parametrical CM presents the repertoire of parameters, which is echeloned on a set of independent portraits, having the scientific justification and is stratified on a several sets, located at the two levels of allocated hierarchy, so the formed samples with a posteriori data are significantly “difficult” for the mathematical processing by the means of using of a set of different statistical methods of the analysis of data;
- the theoretical CM of the difficult object, process or phenomenon causes the potential appearance of the experimental CM with an actual set of parameters;
- at the analysis of CM of the subject of training the significant features are distinguished;
    - the physiological portrait of CM of the subject of training includes 04 samples with a posteriori data, which are subject to the deep statistical analysis;
        - *Age (Age)* – the index of age of the examinee;
        - K_8 – the index of protanopia (the absence of sensitivity to the red color);
        - K_9 – the index of deuteranopia (the absence of sensitivity to the green color);
        - K_{10} – the index of tritanopia (the absence of sensitivity to the blue color);
    - the psychological portrait of CM of the subject of training includes 28 samples of a posteriori data, which are subject to the deep statistical analysis;
        - K_{RU} *(RU)* – the index of estimation in the Russian language;
        - K_{LIT} *(LIT)* – the index of estimation in the Russian literature;
        - K_{NLG} *(NLG)* – the identifier of national or foreign language;
        - K_{LG} *(LG)* – the index of estimation in the foreign language;
        - K_{HIS} *(HIS)* – the index of estimation in history (the aggregate and average-weighted estimation in all sections of discipline or the subject of learning);
        - K_{GEO} *(GEO)* – the index of estimation in geography;
        - K_{BIO} *(BIO)* – the index of estimation in biology;
        - K_{ALG} *(ALG)* – the index of estimation in algebra;
        - K_{GEOM} *(GEOM)* – the index of estimation in geometry;
        - K_{FIZ} *(FIZ)* – the index of estimation in physics;
        - K_{CHEM} *(CHEM)* – the index of estimation in chemistry;
        - K_{SCH} *(SCH)* – the index of estimation in drawing;

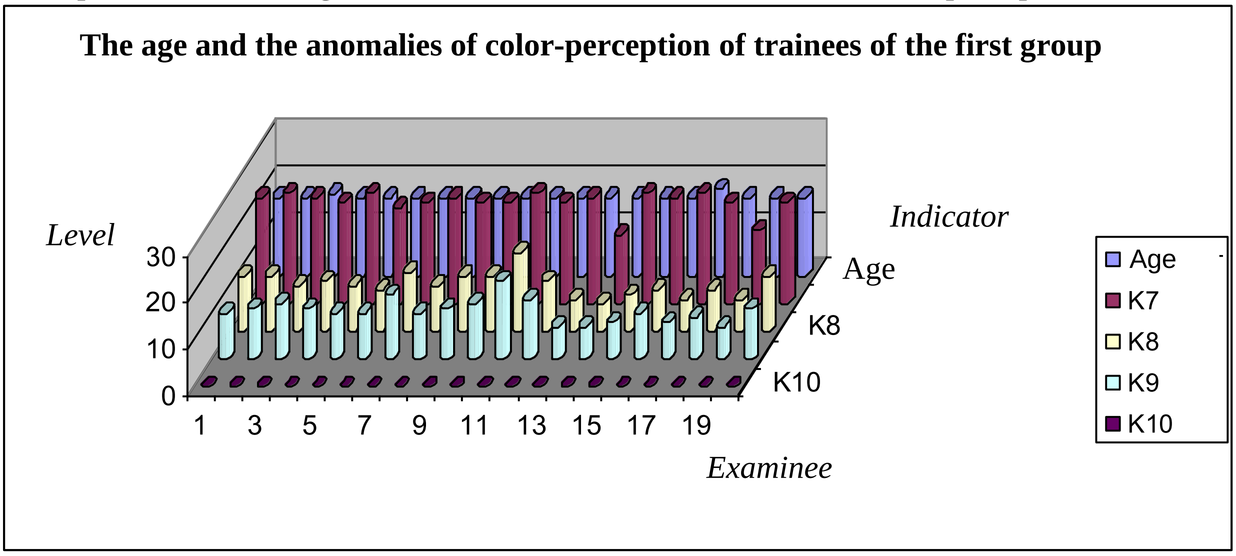
- K_{AST} *(AST)* – the index of estimation in astronomy;
- K_{14} – the convergent verbalization (the verbal intellect as the logical selection and the addition of sentences);
- K_{15} – the index of convergent deduction (the deductive speech thinking as the searching of general signs and the exclusion of word);
- K_{16} – the index of the convergent verbal combinatorial abilities (the searching of verbal analogies as the analyticity and associativity);
- K_{17} – the index of the convergent abilities to the reasoning (the consideration of the process of classification of the concepts and identification);
- K_{18} – the index of the convergent analytical thinking (the arithmetic abilities as the arithmetic tasks);
- K_{19} – the index of inductive thinking (the arithmetic thinking and the arithmetic combinatorial abilities as a numerical rows);
- K_{20} – the index of the convergent mnemonic abilities (memory);
- K_{21} – the index of the convergent planar thinking (the selection of flat figures);
- K_{22} – the index of the convergent volumetric thinking (the selection of cubes);
- K_{23} – the index of the divergent verbal originality;
- K_{24} – the index of divergent verbal associativity (the quantity of correct answers to the verbal stimulus);
- K_{25} – the index of the divergent verbal selectivity of the process of thinking;
- K_{27} – the index of the divergent figurative originality;
- K_{28} – the index of the divergent figurative associativity (the quantity of correct answers to each figurative stimulus);
- K_{29} – the index of the divergent figurative selectivity of the process of thinking;

- the linguistic portrait of CM of the subject of training includes 01 sample with a posteriori data, which are subject to the deep statistical analysis;
  - K_{45} – the index of the level of proficiency in the language of statement of the inf. fragments;

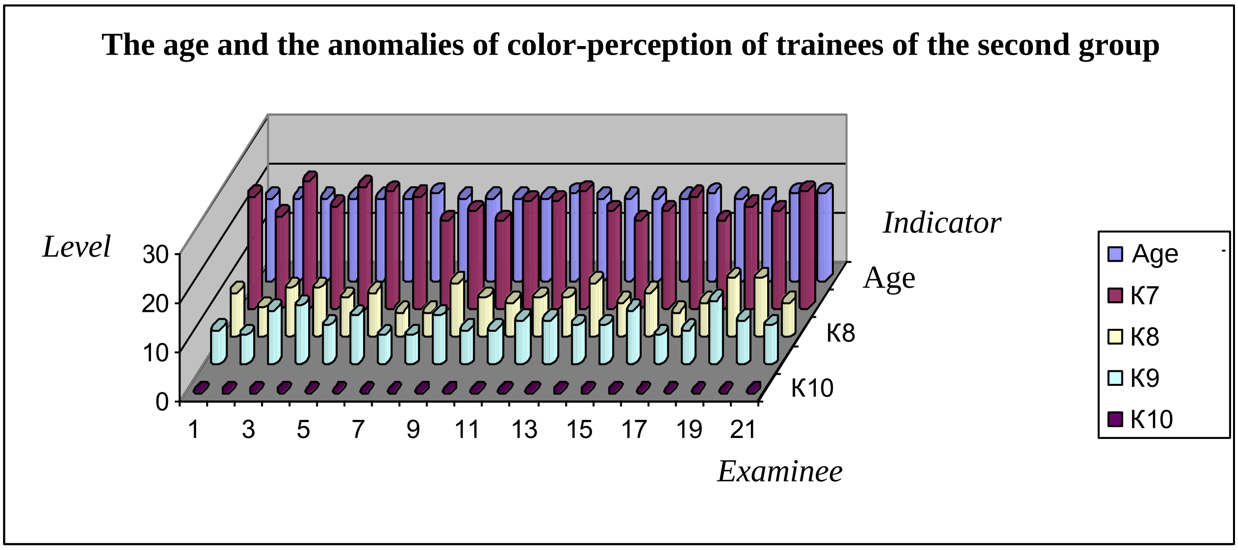
- at the analysis of CM of the means of training distinguish some features, which directly are the subject to the depth statistical analysis;
  - the physiological portrait of CM of the means of training includes 11 (14) samples with a posteriori data, which are the subject to the deep statistical analysis;
    - K_1 *($L_{35\,(36U)}$)* – the index of the type of pattern;
    - K_2 *(L_{36N})* – the index of the color of background;
    - K_3 *($L_{36\,(36K)}$)* – the index of the combination of colors;
    - K_4 *($L_{40\,(37G)}$)* – the index of the typeface of font;
    - K_5 *(L_{37})* – the index of the size of point-size of symbol (font);
    - K_6 *(L_{38N})* – the index of the color of symbol (font);
    - K_7, K_8, K_9 *and* K_{10} – the indexes of the color scheme;
    - K_{11} *(L_{11})* – the index of volume;
    - K_{12} *(L_{12})* – the index of timbre;
    - K_{13} *(L_{13})* – the index of the type of flow;
    - K_{14} *(L_{14})* – the index of the sound scheme;
  - the psychological portrait of CM of the subject of training includes 04 (31) samples with a posteriori data, which are the subject to the deep statistical analysis;
    - K_{15}–K_{22} *(L_{31N})* – the indexes of the kind of information (text, table, flat scheme and others);
    - K_{23}–K_{31} *(L_{33})* – the indexes of the way of switching between the information fragments;
    - K_{32}–K_{43} *(L_{35})* – the indexes of the style of presentation for the visual representation;
    - K_{44}–K_{45} *(L_{44})* – the indexes of the speed of displaying of the information fragments;
  - the linguistic portrait of CM of the subject of training includes 01 sample with a posteriori data, which are the subject to the deep statistical analysis;
    - K_{46}–K_{48}*(L_{45})* – the indexes of the level of statement of the material in the information fragments.

A15.3.1. The parameters of the physiological portrait of the cognitive model of the subject

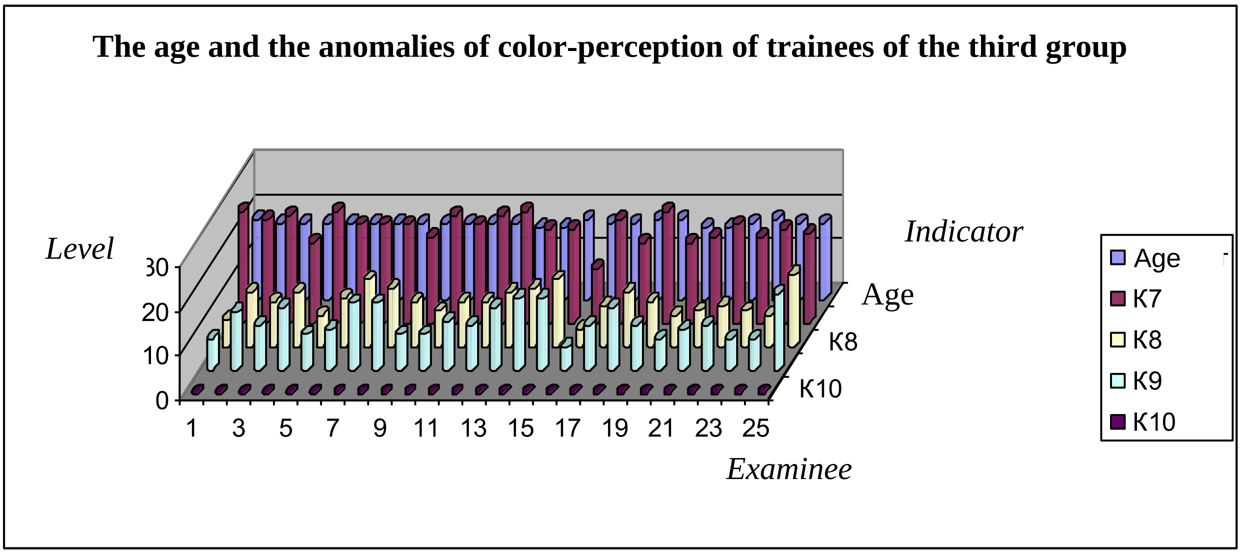
In pic. A15.1 the diagrams with the results of research of the color-perception is followed.



a

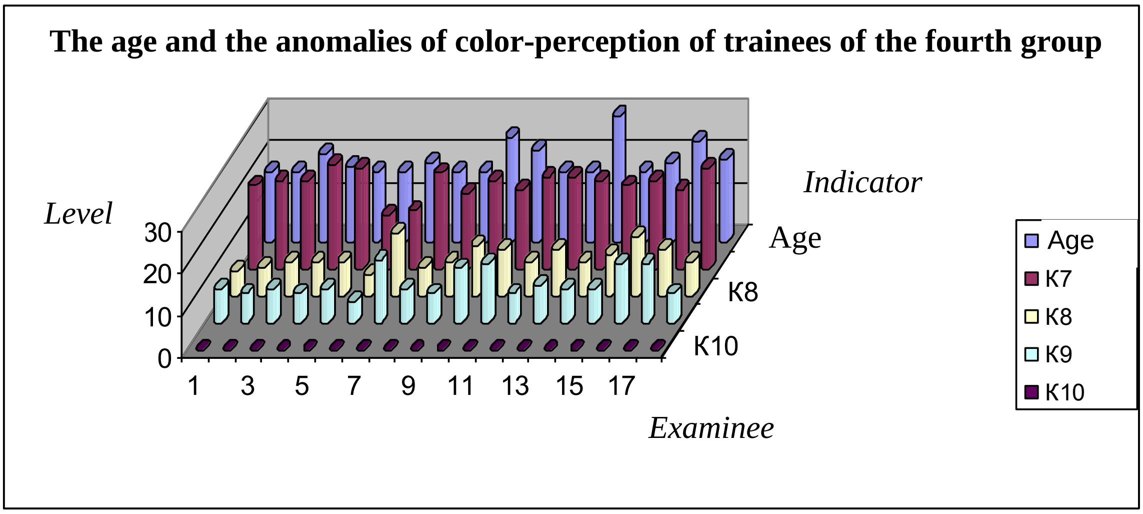


b

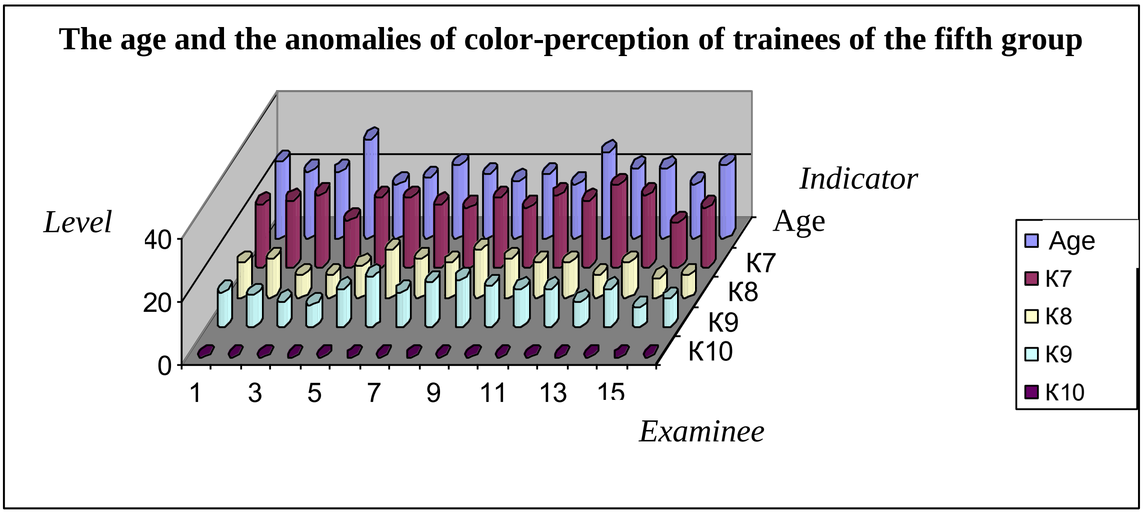


c

Picture A15.1. The color-perception of trainees of the three groups of day department in 2006 y.



a



b

Picture A15.2. The color-perception of trainees of the two groups of evening department in 2006 y.

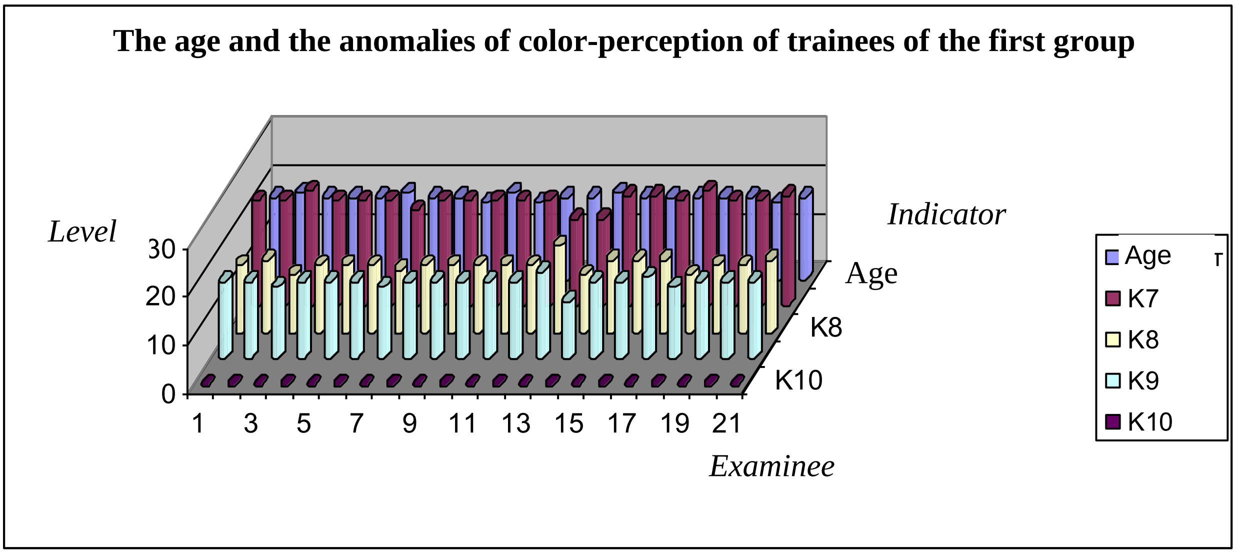
The primary statistical analysis of the samples with a posteriori data of research of color-perception allows to talk about the absence of significant heterogeneities in the view of obviously expressed emissions and artifacts, which acts the significant influence on the form of curve, corresponding to the normal distribution of nominal values.

The visual analysis of the nominal values of indicators “Age”, “K_7”, “K_8” and “K_9” does not cause the significant heterogeneities of the nominal values of measured indicators by the means of using of the applied DM and the questionnaire (testing).

At the researching of parameters of the physiological portrait of the parametrical CM of the subject of training the methods from the area of physiology of sensory systems were used:

- the color-perception – the developed computer variant of polychromatic tables of Rabkin E.B. and the threshold tables of Yustova E.N. (approved by “"IF" of "RAS"”);
- the field of vision – the independently developed computer variant of spherical perimeter of Forster K.F.R. (approved by “"IF" of "RAS"”);
- the acuity of vision – the independently developed computer variant of symbolic tables of Sivtsev D.A., Orlova E.M., Landol’dt E. (approved by “"IF" of "RAS"”).

Tritanopia has not been explicitly detected, as this is a very rare pathology of the different-type ganglion cells of conical apparatus of the retina of the visual sensory system, which provides the registration of the polychromatic spectrum of photon radiation.



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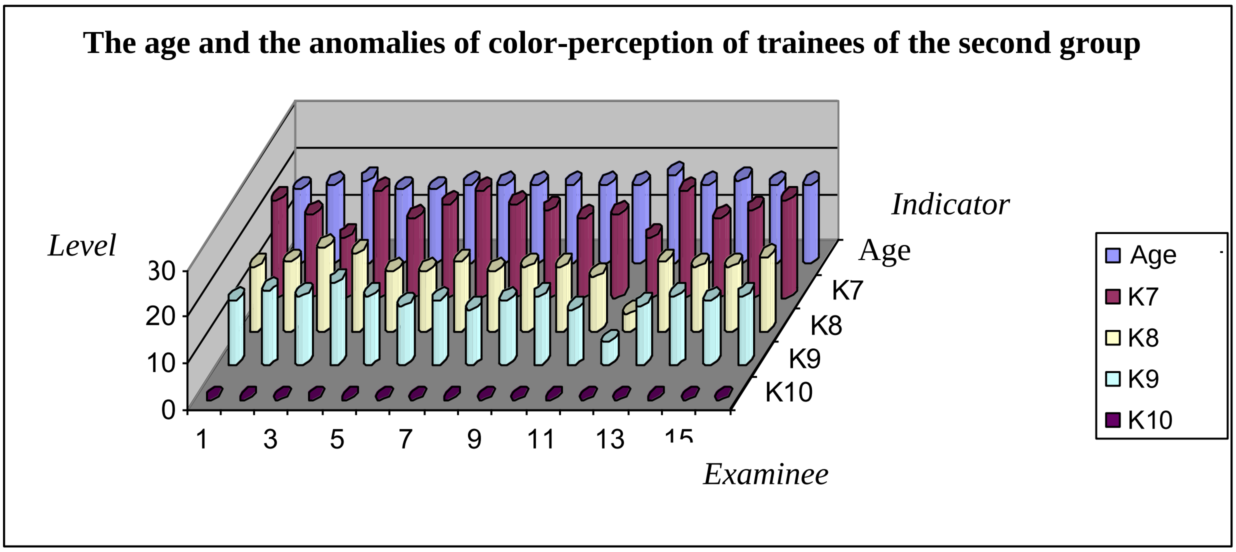

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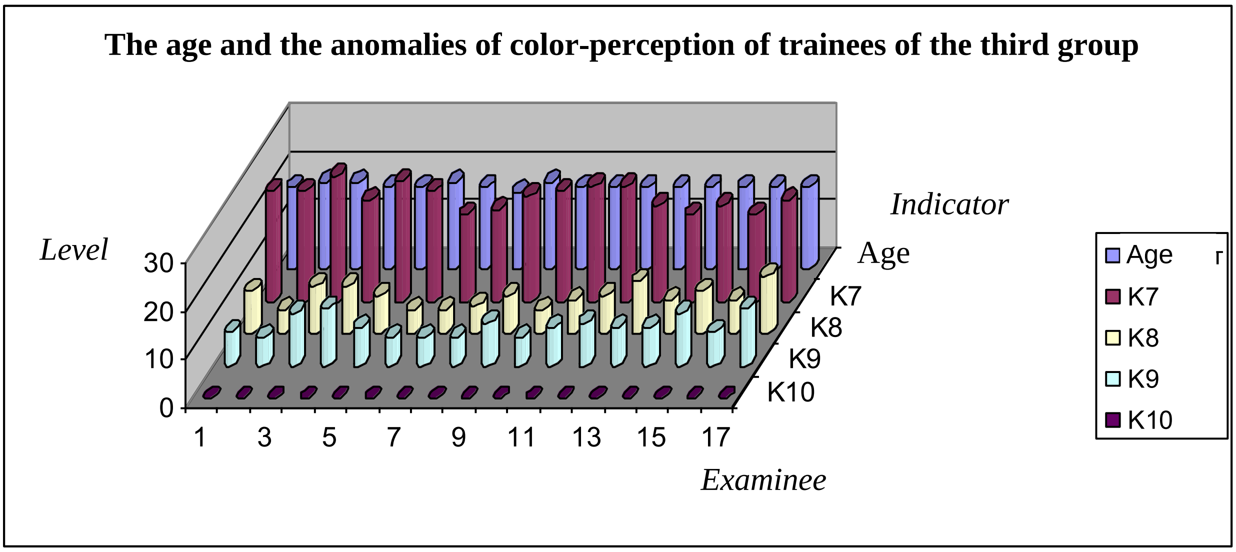
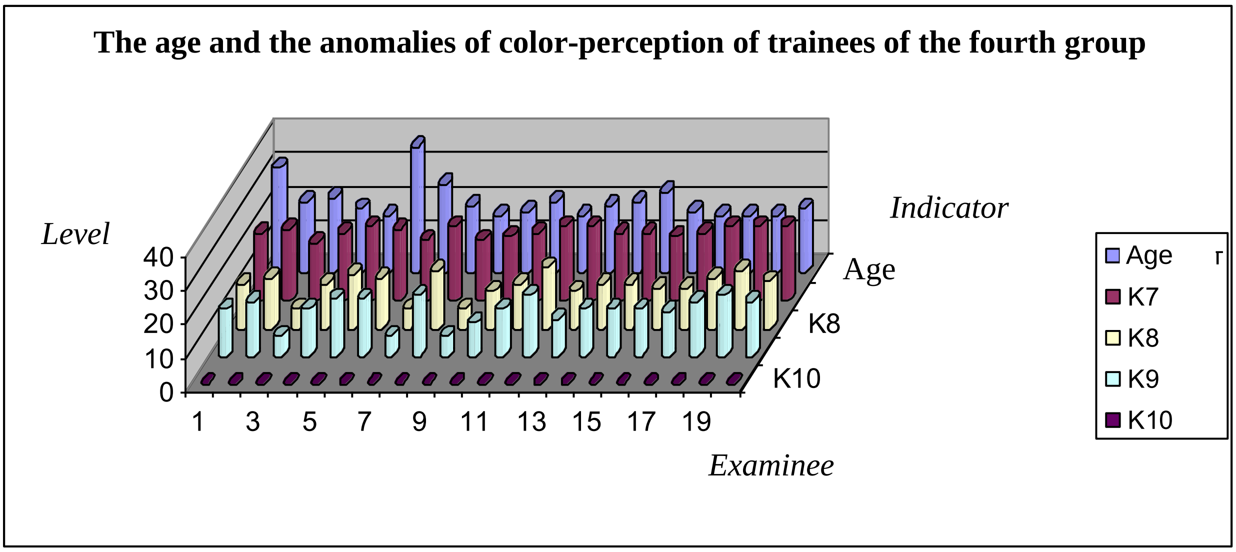


c

Picture A15.3. The color-perception of trainees of the three groups of day department in 2007 y.

In the result of the analysis of the obtained diagrams with the results of research of the color-perception (Age, K_7, K_8, K_9 and K_{10}) there are no heterogeneities in the three groups of day department.



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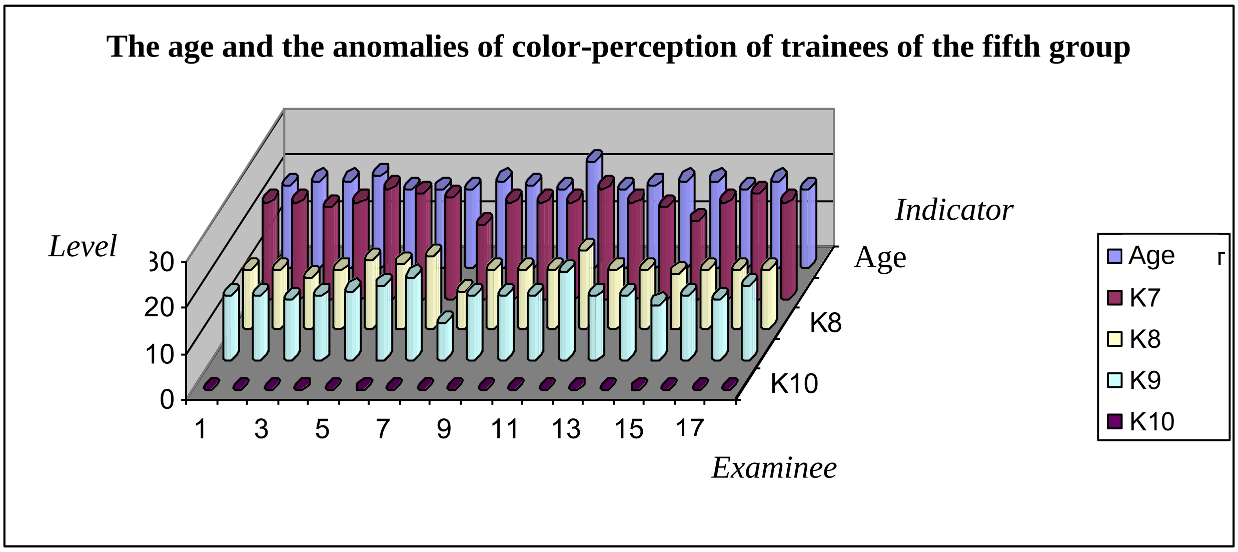


b

Picture A15.4. The color-perception of trainees of the two groups of evening department in 2007 y.

The visual analysis of the nominal values of indicators “Age”, “K_7”, “K_8” and “K_9” does not determine the significant heterogeneity of the nominal values of measured indicators by the means of use of the applied DM and the questionnaire.

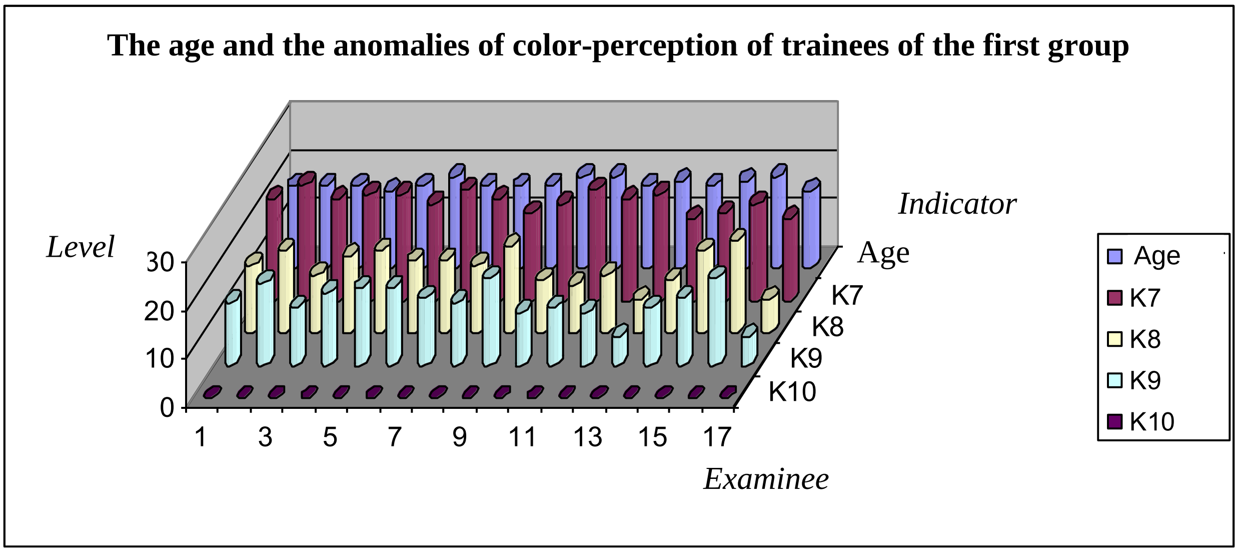
The normalization of indicators is not required, as a posteriori data are obtained by the means of use of the validated method of research of the color-perception.

The protanopia and deuteranopia fluctuate in the limits of the admissible norm, so all examinees belong to the class of normal trichromats without the expressed pathologies.

The tritanopia has not been explicitly revealed, so this is a very rare pathology of ganglion cells (the conical apparatus) of the retina of the visual sensory system.

Theoretically caused the absence of potential necessity of the using of the color schemes of displaying of a sequence of information fragments.

The contingent of trainees does not contain the significant heterogeneities of color-perception.



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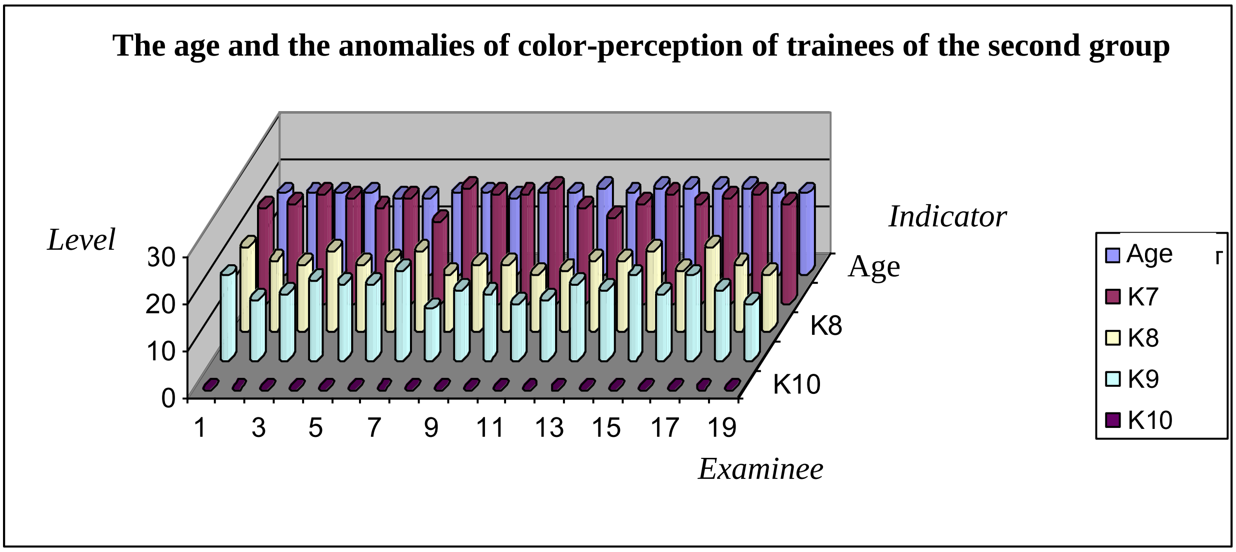

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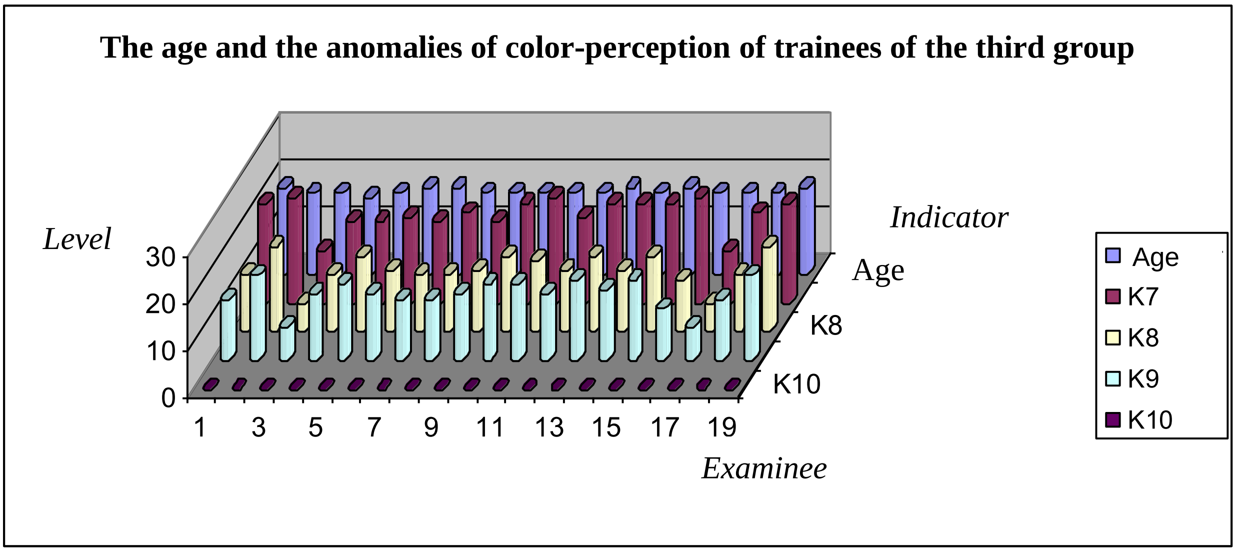
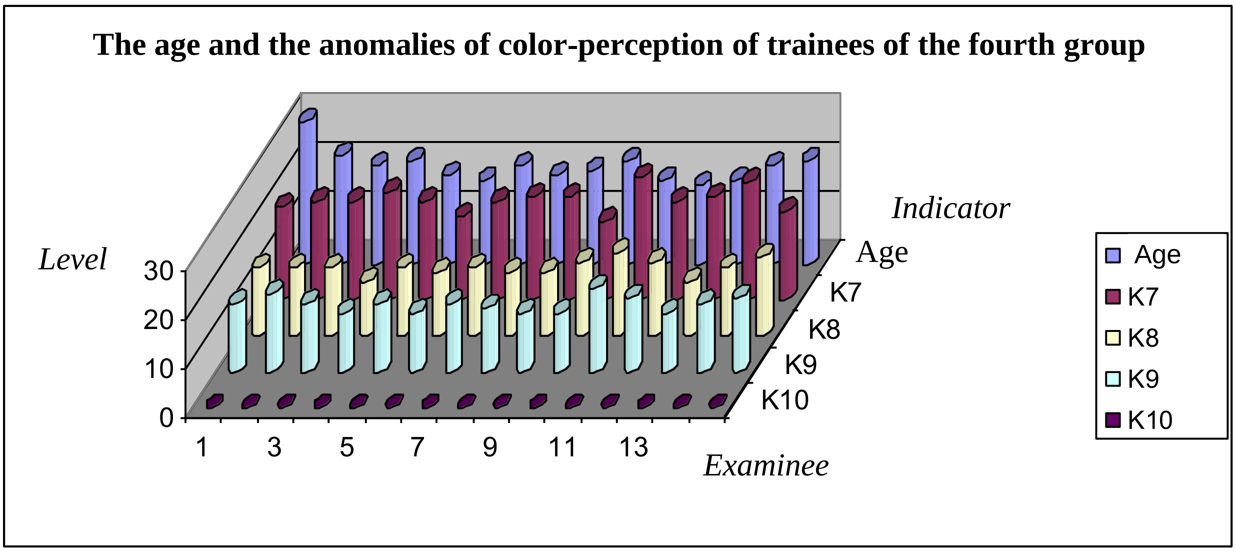


c

Picture A15.5. The color-perception of trainees of the three groups of day department in 2008 y.

In the result of the analysis of the obtained diagrams with the results of research of the color-perception (Age, K_7, K_8, K_9 and K_{10}) in the three groups of day department are no heterogeneities.



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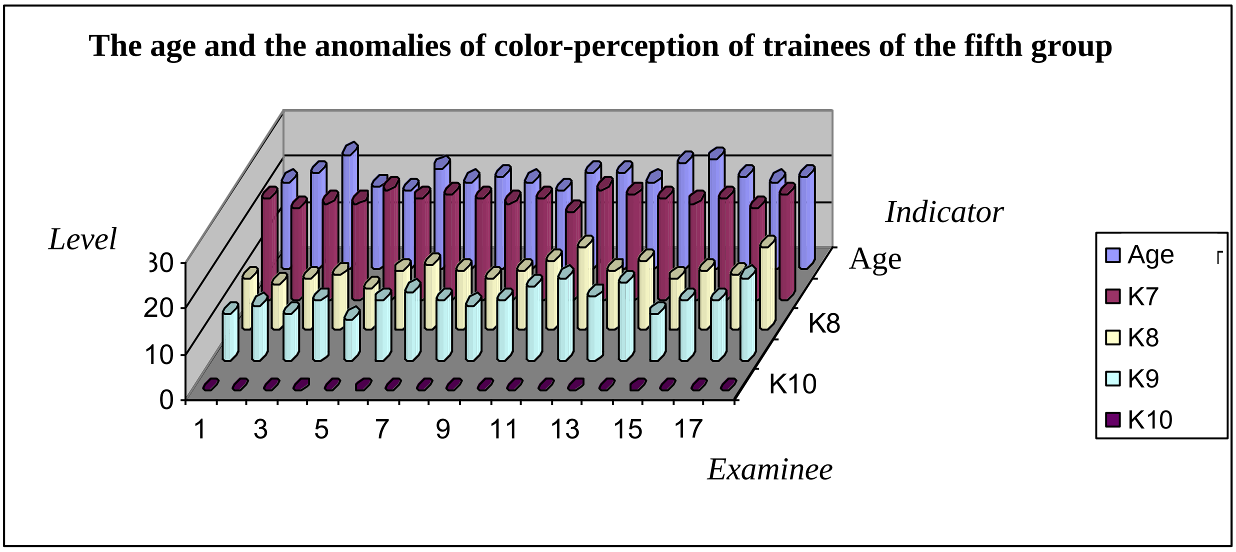


b

Picture A15.6. The color-perception of trainees of the two groups of evening department in 2008 y.

The visual analysis of the nominal values of indicators “Age”, “K_7”, “K_8” and “K_9” does not determine the significant heterogeneity of the nominal values of measured indicators by the means of use of the applied DM and the questionnaire.

The protanopia and deuteranopia fluctuate in the limits of admissible norm, so all examinees belong to the class of normal trichromats without the expressed pathologies.

Theoretically caused the absence of potential necessity of using of the color schemes of displaying of a sequence of information fragments.

It is potentially possible to use the several types of the color schemes of displaying of a sequence of information fragments by the means of training (ET) in dependence from the pathogenesis and the anomaly of color-perception of the subject of training:

- dichromatia (protanopia, deuteranopia and tritanopia) as the complete absence of sensitivity to the red, green or blue opponent color – involves the using of the scheme of complete displacement or complete replacement of color;
- dichromatia as the partial absence of sensitivity to the colors – involves the using of the scheme of compensation of color with the alignment of the spectrum of white color.

A15.3.2. The parameters of the physiological and linguistic portrait of the cognitive model of the means of training

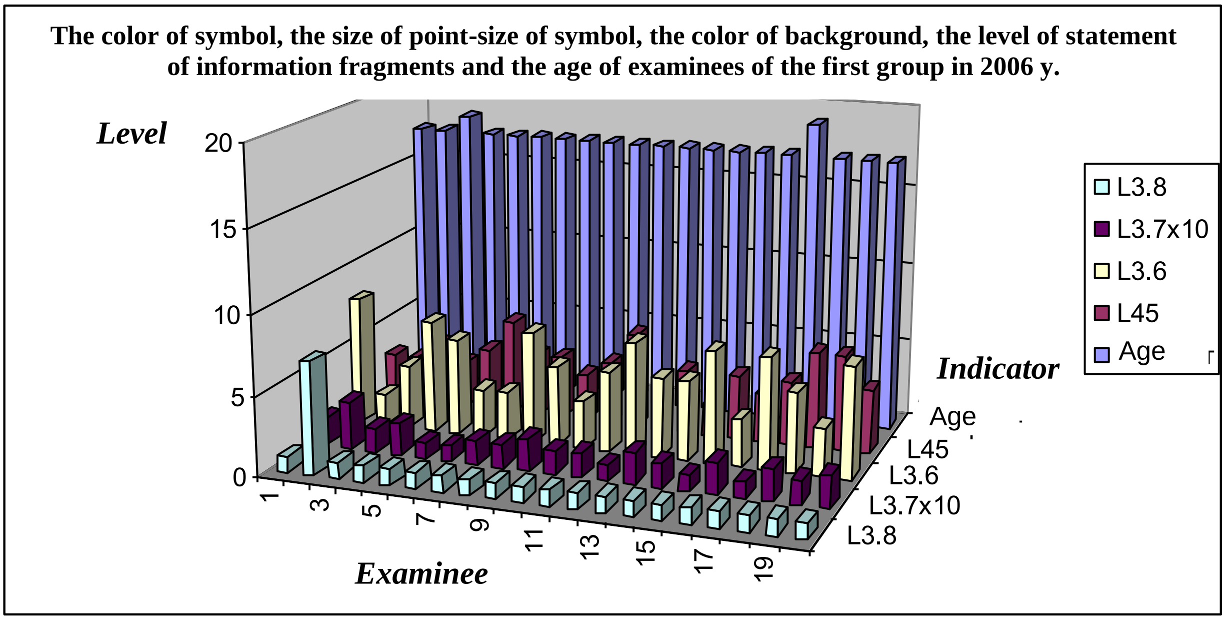
At the presenting of information in the view of the diverse information fragments of different kind and type the following parameters of visual representation are used:

- the physiological parameters (by default): the type of pattern – L_1 [Standard], the combination of colors – L_3 [Standard], the typeface of font – L_4 [Times New Roman], the color scheme – L_7 [For dichromats] ([For protanopes], [For deuteranopes], [For tritanopes] are admissible), without the sound flow as the main and accompanying (volume – L_{11}, timbre – L_{12}, the type of stream – L_{13}, the sound scheme – L_{14} are practically not measured, as the visual sensory system perceives up to 90% of information, and the auditory up to 30%);
- the physiological parameters (are calculated and worked out by the algorithm): the color of background – L_2 [Variable], the size of point-size of symbol – L_5 [Variable], the color of symbol – L_6 [Variable];
- the psychological parameters (are calculated and worked out by the algorithm): the kind of information (textual – L_{14} [used], tabular – L_{15} [used], the schematic planar – L_{16} [used], the schematic volumetric – L_{17} [not used], the sound as the main – L_{18} [not used], the sound as the accompaniment – L_{19} [not used], the combined – L_{20} [not used], the special scheme – L_{21} [not used]);
- the psychological parameters (by default): the enabling of the additional capabilities (the correction of a sequence of statement – L_{22} [the element of navigation], the navigation by the course – L_{23} [the navigator of the first type is used], the addition of modules – L_{24} [not used], the selection of the kind of information – L_{25} [not used], the selection of the style of presentation – L_{26} [not used], the selection of the speed of presentation – L_{27} [not used], the creative tasks – L_{28} [not used], the additional modules – L_{29} [not used], the additional literature – L_{30} [not used]; the style of presentation (the holistic presentation – L_{31} [not used] or detailed presentation – L_{32} [not used], the automatic – L_{33} [not used] or manual switching – L_{34} [not used], the constant – L_{35} [not used] or variable type of information – L_{36} [not used], the deep concretization – L_{37} [not used] or abstract statement – L_{38} [not used], the simplicity of statement – L_{39} [not used] or difficulty of statement – L_{40} [not used], the wide – L_{41} [not used] or narrow set of terms – L_{42} [not used]); the speed of representation of information fragments (high – L_{43} [used] or low – L_{44} [used]).

In pic. A15.7-A15.12 the diagrams with the results of research of the physiological parameters of the displaying of information by the means of training are presented directly.

In pic. A15.7 the diagrams, which reflecting the dynamics of the age and level of statement of the information in the three groups of day department in 2006 y. are presented directly, in particular the color of background, the color of symbol and the size of point-size of symbol, at the same time the following designations are used directly: $L_{3.6}$ – the color of background, $L_{3.8}$ – the color of font, $L_{3.7}$ (x10) – the size of point-size, L_{45} – the level of statement of the content of information fragments and Age – the age.

The codifiers of color are used: Navy (blue) – 0, Black (black) – 1, Green (green) – 2, Lime (lime) – 3, Aqua (bluish) – 4, Silver (silver) – 5, Fuchsia (fuchsite) – 6, Yellow (yellow) – 7, White (purple) – 8 and Purple (purple) – 9.



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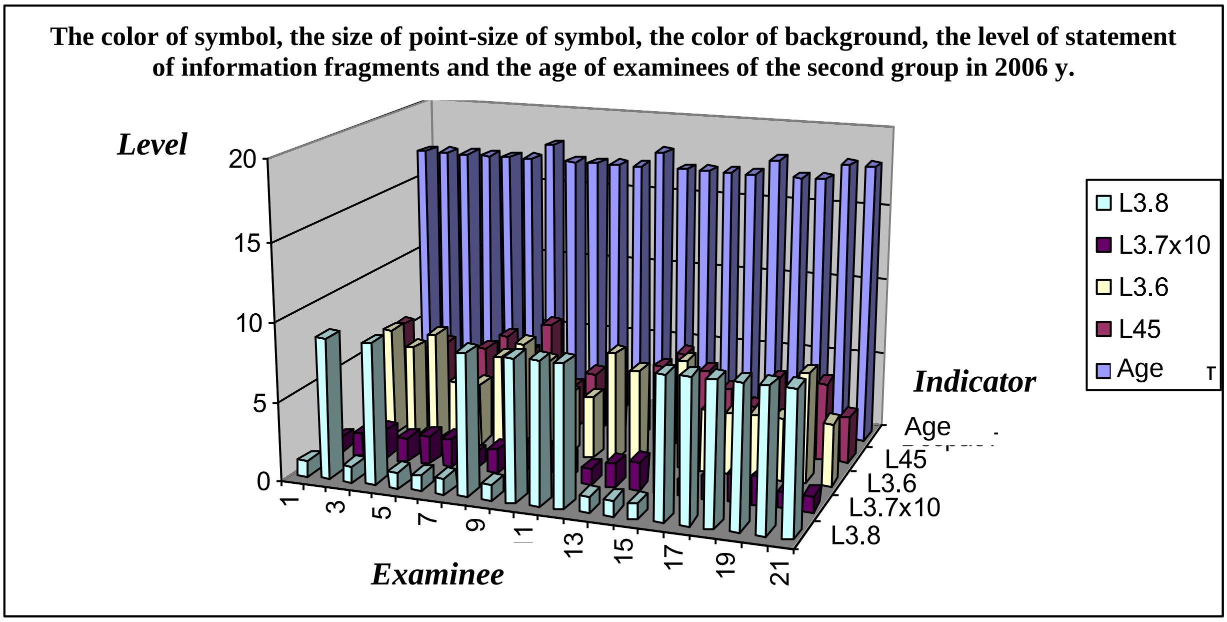

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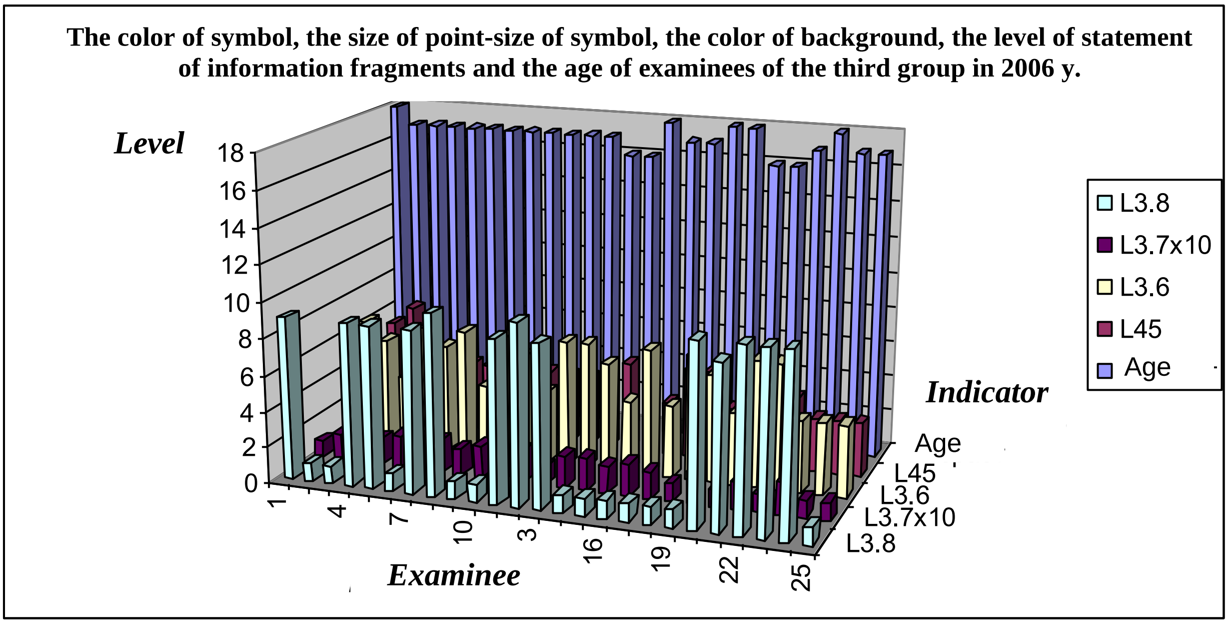
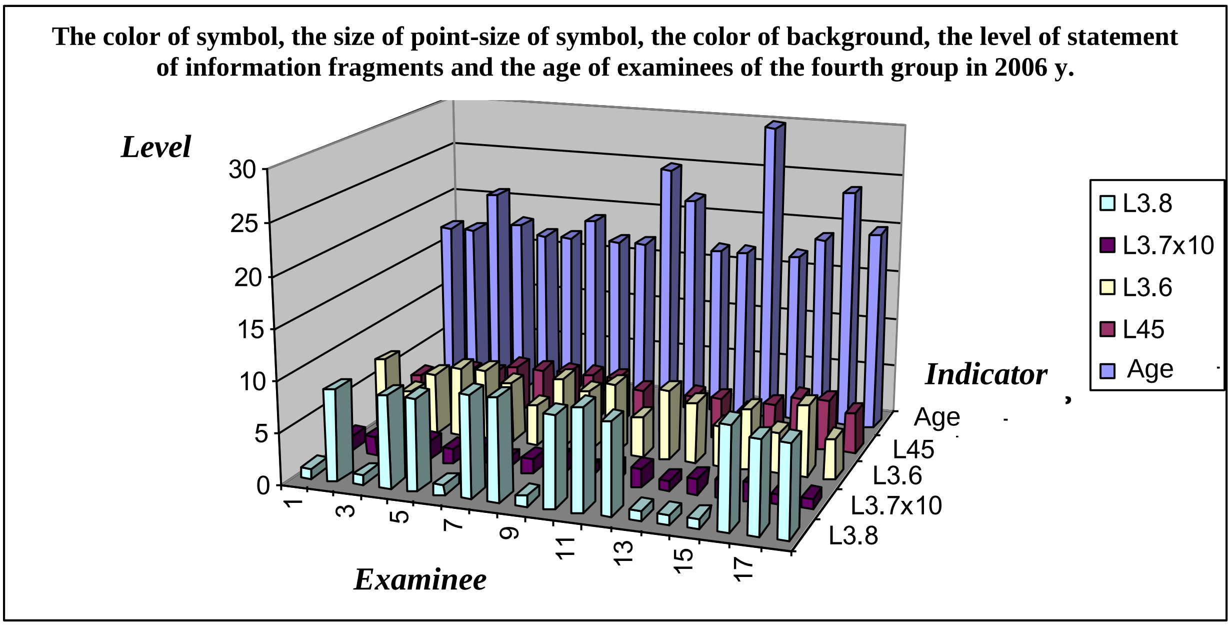


c

Picture A15.7. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2006 y.

In pic. A15.8 presents directly the diagrams, which reflecting the dynamics of the age and level of statement of the information in the two groups of evening department in 2006 y., in particular the color of background, the color of symbol and the size of point-size of symbol, at the same time the following designations are used directly: $L_{3.6}$ – the color of background, $L_{3.8}$ – the color of font, $L_{3.7}$ (x10) – the size of point-size, L_{45} – the level of statement of the content of information fragments and Age – the age.

The codifiers of color are used: Navy (blue) – 0, Black (black) – 1, Green (green) – 2, Lime (lime) – 3, Aqua (bluish) – 4, Silver (silver) – 5, Fuchsia (fuchsite) – 6, Yellow (yellow) – 7, White (white) – 8 and Purple (Purple) – 9.



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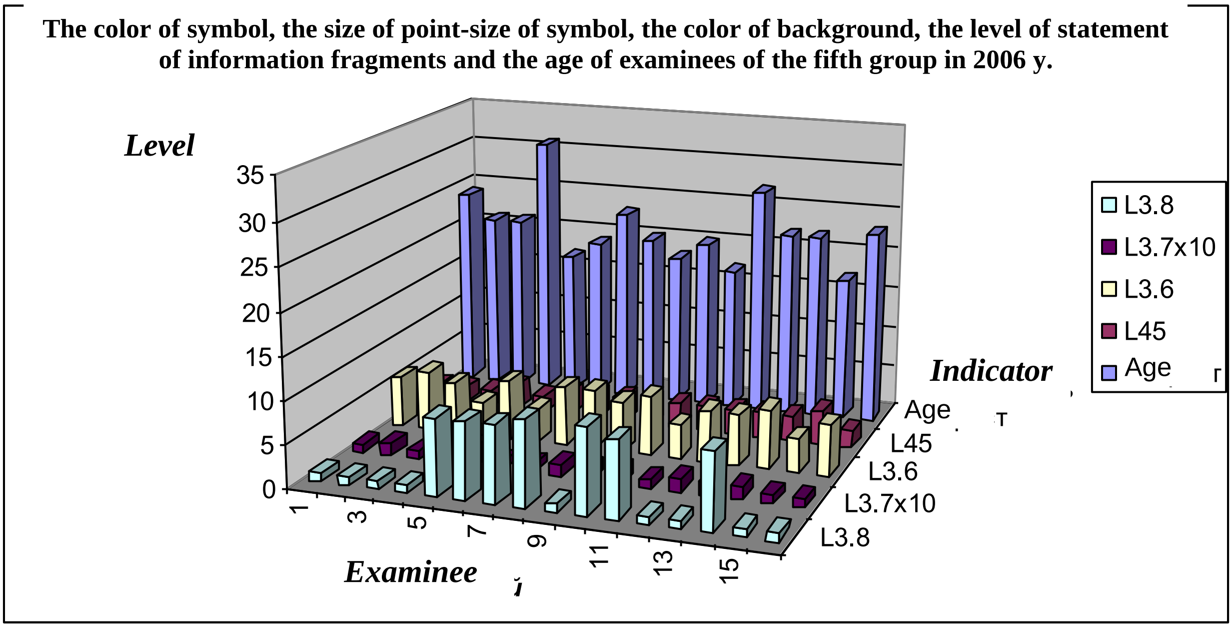


b

Picture A15.8. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the evening department in 2006 y.

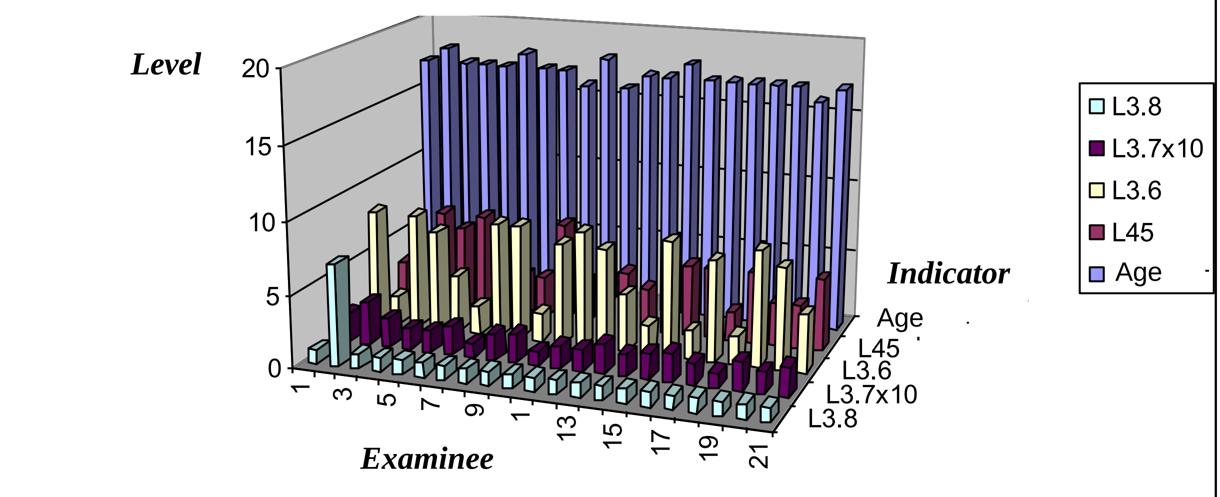
In the presented samples with a posteriori data of research of the parameters of displaying of the information fragments in 2006 y. the heterogeneities were not detected:

- there are no the significant anomalies in the three groups of day department of the chair "ACP";
  - the sample $L_{3.8}$ (the color of font) – has the heterogeneities of nominal values, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information fragments processor;
  - the sample $L_{3.6}$ (the color of background) – has the unexpressed heterogeneities of nominal values, that is caused by the specifics of the coding of color and by the features of functioning of the adaptive representation of information processor;
  - the sample L_{45} (the level of statement of the information) – has the non-significant heterogeneities of nominal values, that is caused by the level of proficiency in the national or foreign language and the features of functioning of the adaptive representation of information fragments processor;
- in the two groups of evening department of the chair "APU" there are no the significant heterogeneities directly;
  - the sample $L_{3.8}$ (the color of font) – has the heterogeneities of nominal values, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information fragments processor;
  - the sample Age – has the non-significant heterogeneities of nominal values, that is caused by the differentiation of trainees of the evening department by the age.

In pic. A15.9 presents directly the diagrams, which reflecting the dynamics of the age and level of statement of information in the three groups of day department in 2007 y., in particular the color of background, the color of symbol and the size of point-size of symbol, at the same time the following designations are used directly: $L_{3.6}$ – the color of background, $L_{3.8}$ – the color of font, $L_{3.7}$ (x10) – the size of point-size, L_{45} – the level of statement of the content of information fragments and Age – the age.

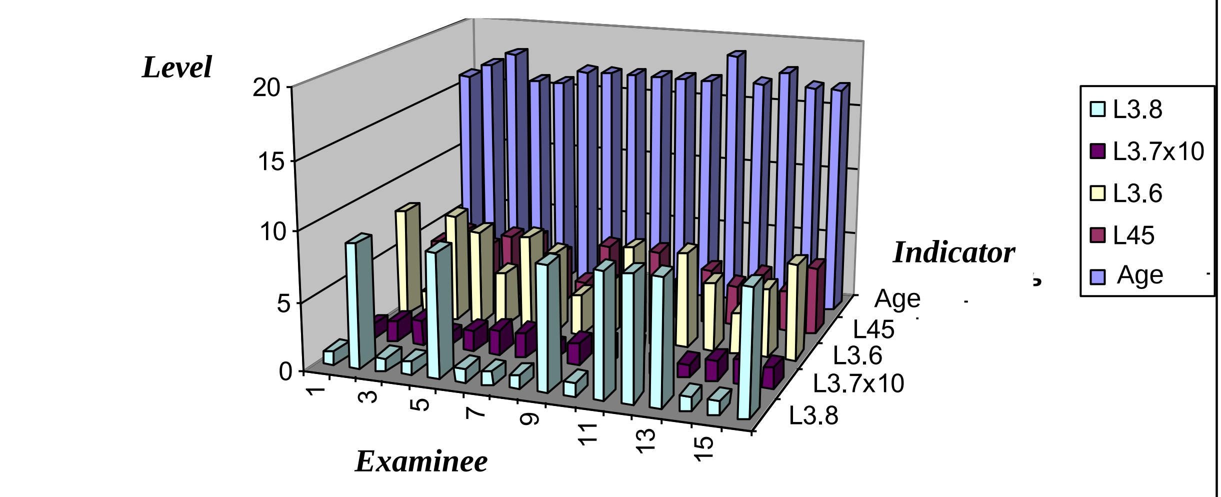
The codifiers of color are used: Navy (blue) – 0, Black (black) – 1, Green (green) – 2, Lime (lime) – 3, Aqua (bluish) – 4, Silver (silver) – 5, Fuchsia (fuchsite) – 6, Yellow (yellow) – 7, White (white) – 8 and Purple (purple) – 9.

The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of examinees of the first group in 2007 y.

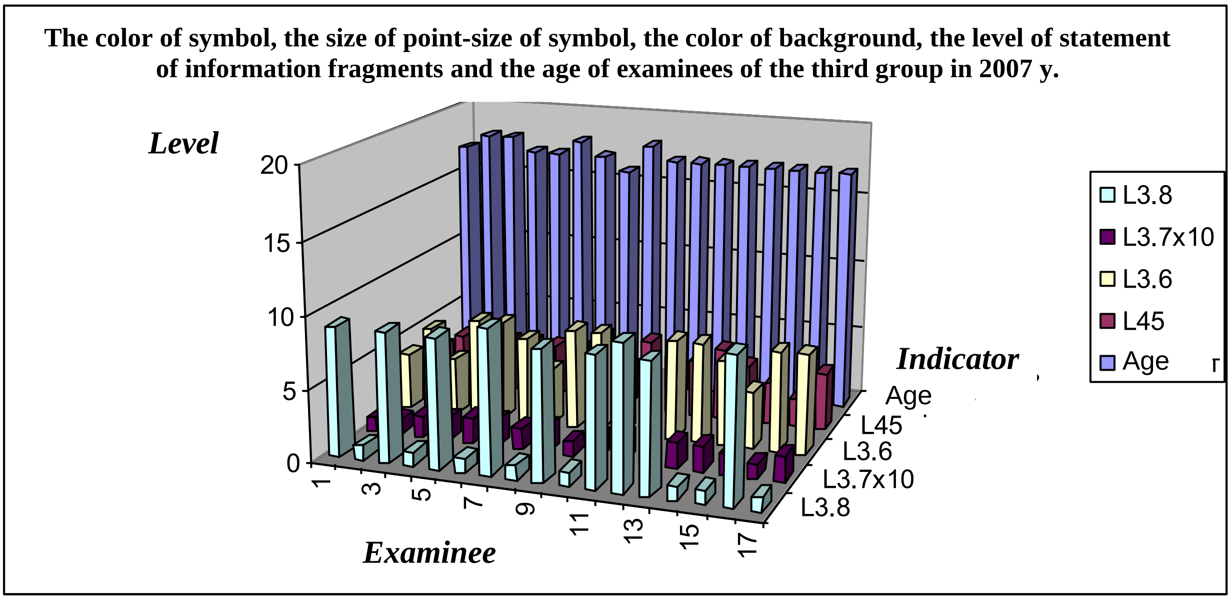


a

The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of examinees of the second group in 2007 y.



b

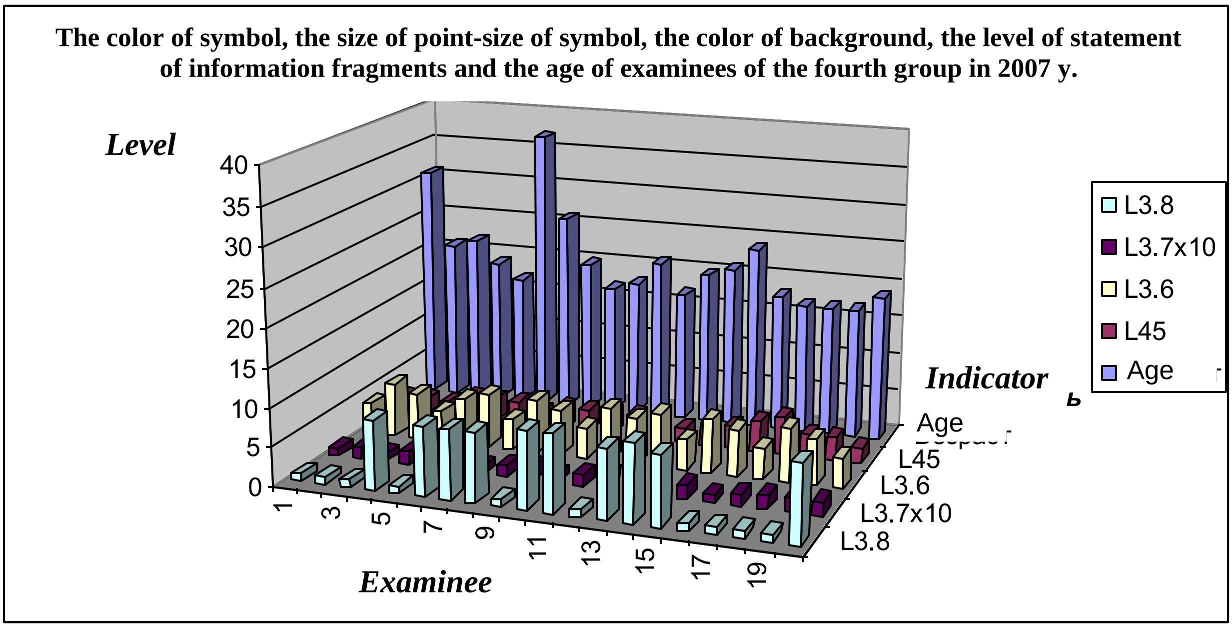


c

Picture A15.9. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of the information fragments and the age of the three groups of examinees of the day department in 2007 y.

In pic. A15.10 presents directly the diagrams, which reflecting the dynamics of the age and level of statement of the information in the two groups of evening department in 2007 y., in particular the color of background, the color of symbol and the size of point-size of symbol, at the same time the following designations are used directly: $L_{3.6}$ – the color of background, $L_{3.8}$ – the color of font, $L_{3.7}$ (x10) – the size of point-size, L_{45} – the level of statement of the content of information fragments and Age – the age.

The codifiers of color are used: Navy (blue) – 0, Black (black) – 1, Green (green) – 2, Lime (lime) – 3, Aqua (bluish) – 4, Silver (silver) – 5, Fuchsia (fuchsite) – 6, Yellow (yellow) – 7, White (white) – 8 and Purple (purple) – 9.



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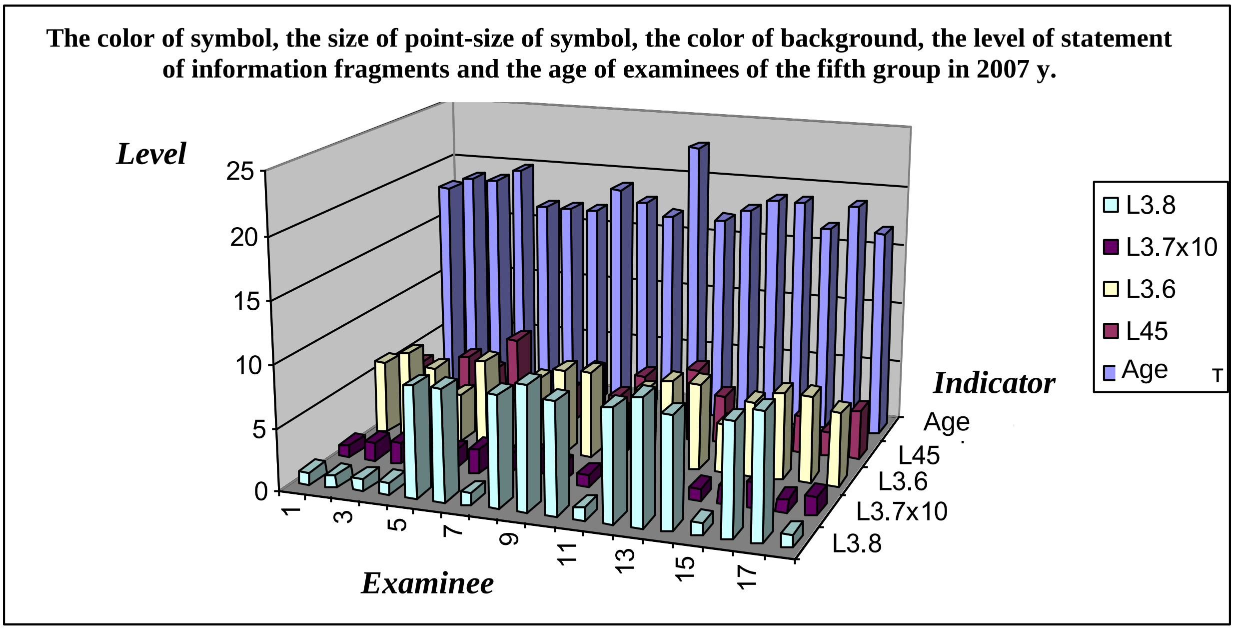


b

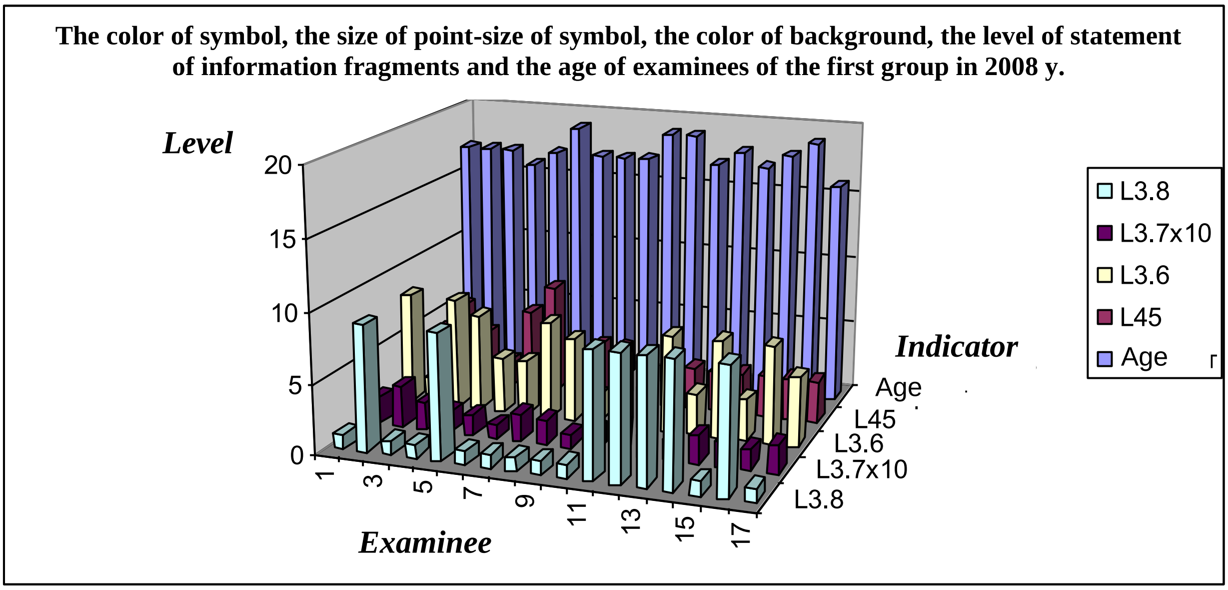
Picture A15.10. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the evening department in 2007 y.

In the presented samples with a posteriori data of research of the parameters of displaying of the information fragments in 2007 y. the heterogeneities were not revealed:

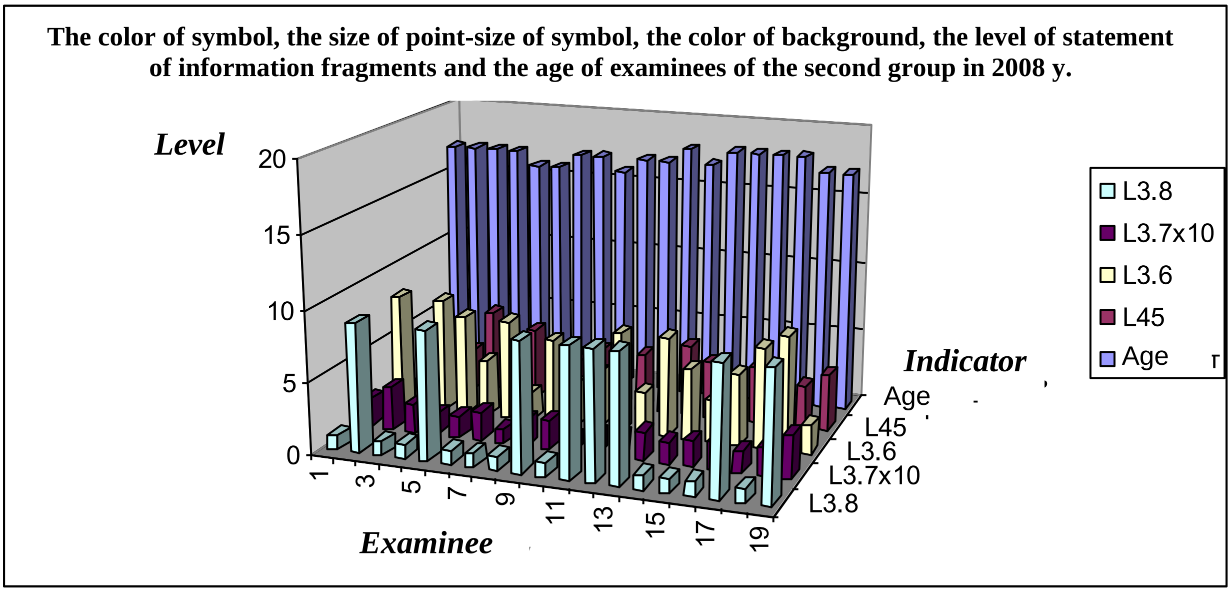
- there are no the significant anomalies in the three groups of day department of the chair “ACP”;
  - the sample $L_{3.8}$ (the color of font) – also has the heterogeneities of nominal values, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information fragments processor;
  - the sample $L_{3.6}$ (the color of background) – also has the unexpressed heterogeneity of values, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information fragments processor;
  - the sample L_{45} (the level of statement of information) – also has the non-significant heterogeneities of nominal values, that is caused by the level of proficiency in the national or foreign language and the features of functioning of the adaptive representation of information fragments processor;
- in the two groups of evening department of the chair “ACP” there are no the significant heterogeneities directly;
  - the sample $L_{3.8}$ (the color of font) – also has the heterogeneities of nominal values, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information fragments processor;
  - the sample Age – also has the non-significant heterogeneities of nominal values, that is caused by the differentiation of trainees of the evening department by the age.

In pic. A15.11 presents directly the diagrams, which reflecting the dynamics of the age and level of statement of the information in the three groups of day department in 2008 y., in particular the color of background, the color of symbol and the size of point-size of symbol, at the same time the following designations are used directly: $L_{3.6}$ – the color of background, $L_{3.8}$ – the color of font, $L_{3.7}$ (x10) – the size of point-size, L_{45} – the level of statement of the content of information fragments and Age – the age.

The codifiers of color are used: Navy (blue) – 0, Black (black) – 1, Green (green) – 2, Lime (lime) – 3, Aqua (bluish) – 4, Silver (silver) – 5, Fuchsia (fuchsite) – 6, Yellow (yellow) – 7, White (white) – 8 and Purple (purple) – 9.



a



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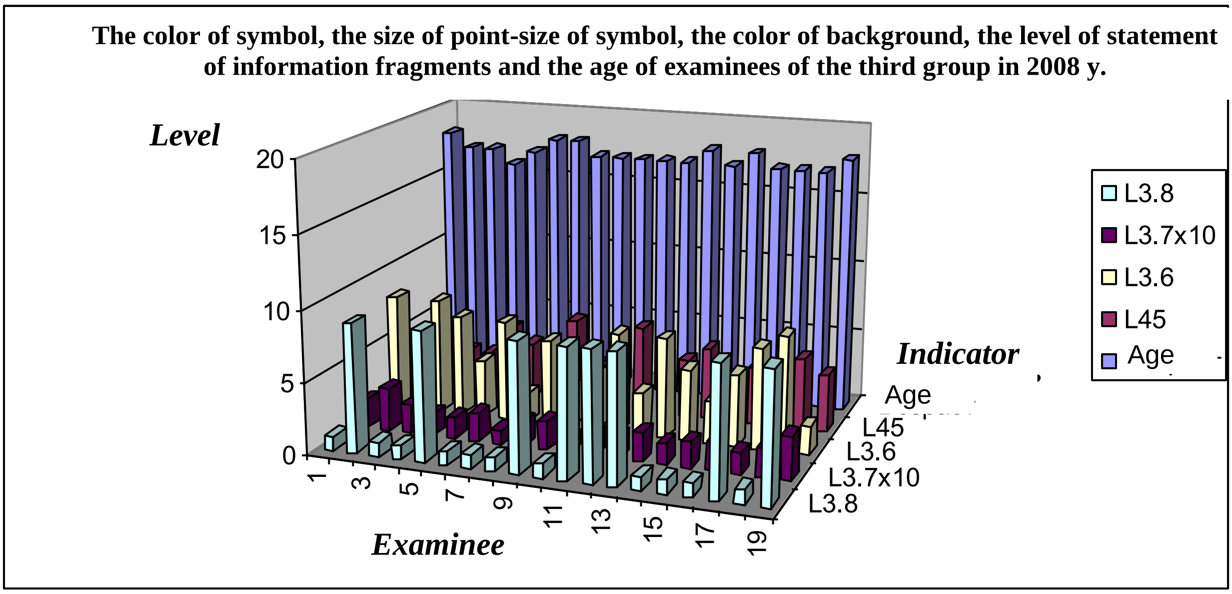
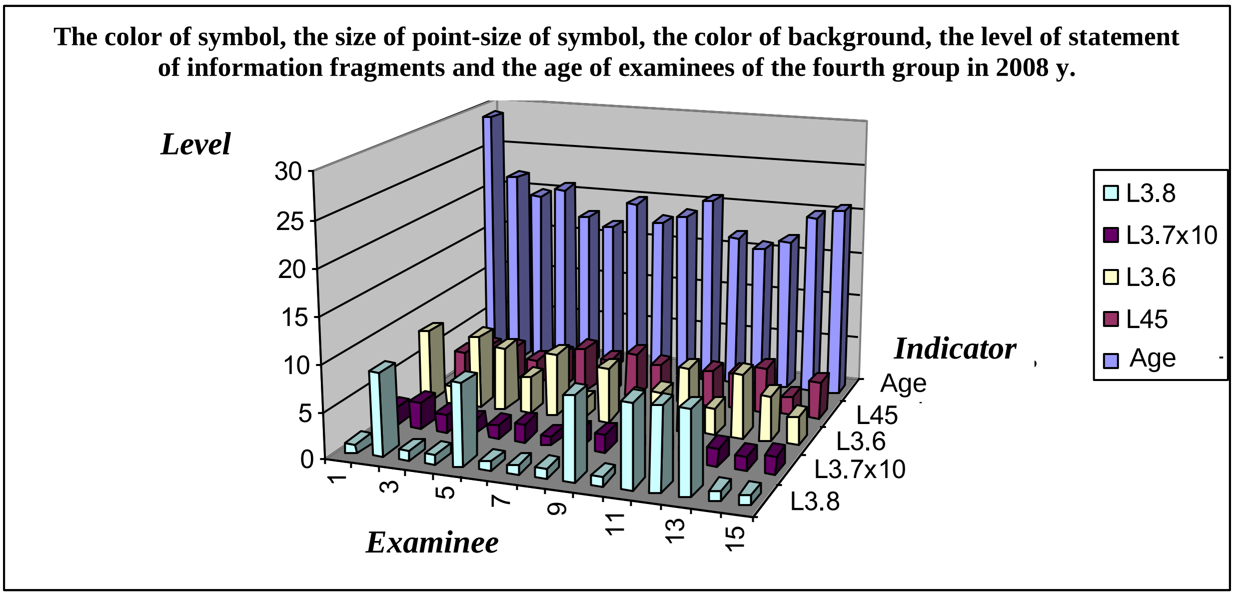


c

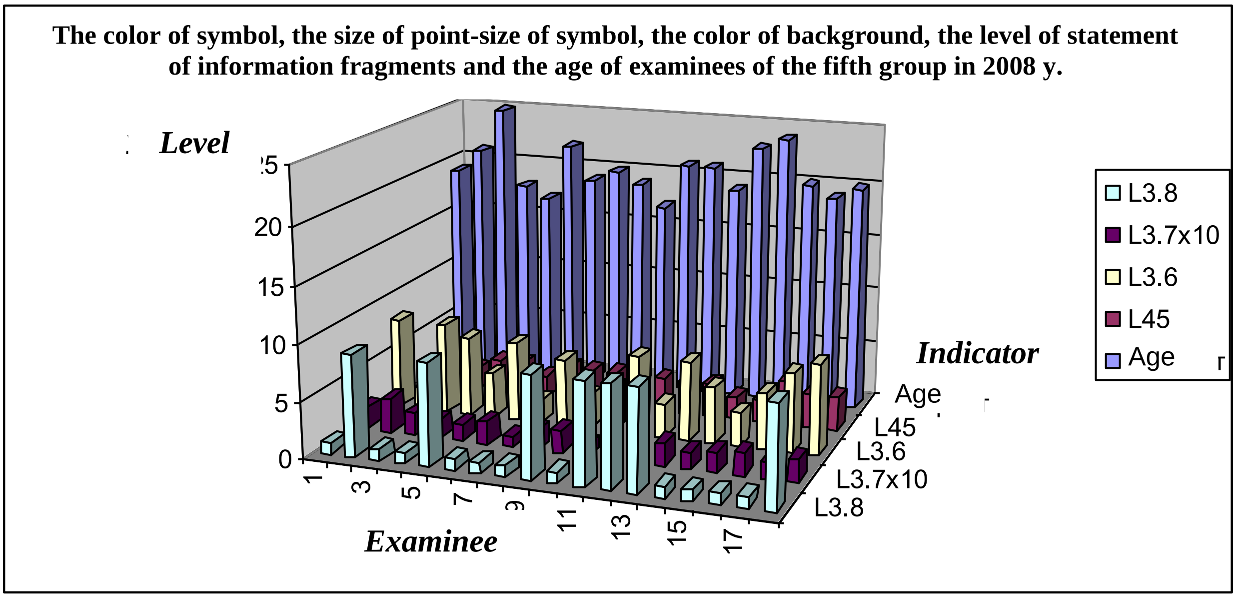
Picture A15.11. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2008 y.

In the pic A15.12 presents directly the diagrams, which reflecting the dynamics of the age and level of statement of the information in the two groups of evening department in 2008 y., in particular the color of background, the color of symbol and the size of point-size of symbol, at the same time the following designations are used directly: $L_{3.6}$ – the color of background, $L_{3.8}$ – the color of font, $L_{3.7}$ (x10) – the size of point-size, L_{45} – the level of statement of the content of information fragments and Age – the age.

The codifiers of color are used: Navy (blue) – 0, Black (black) – 1, Green (green) – 2, Lime (lime) – 3, Aqua (bluish) – 4, Silver (silver) – 5, Fuchsia (fuchsite) – 6, Yellow (yellow) – 7, White (white) – 8, Purple (purple) – 9.



a



b

Picture A15.12. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of the information fragments and the age of the two groups of examinees of the evening department in 2008 y.

In the presented samples with a posteriori data of research of the parameters of displaying of the information fragments in 2008 y. the heterogeneities were not detected:

- there are no the significant anomalies in the three groups of day department of the chair "ACP";
  - the sample $L_{3.8}$ (the color of font) – the heterogeneities of nominal values are saved, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information fragments processor;
  - the sample $L_{3.6}$ (the color of background) – the unexpressed heterogeneities of nominal values are saved, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information processor;
  - the sample L_{45} (the level of statement of the information) – the non-significant heterogeneities of nominal values are saved, that is caused by the level of proficiency in the national or foreign language and the features of functioning of the adaptive representation of information fragments processor;
- in the two groups of evening department of the chair "ACP" there are no the significant heterogeneities directly;
  - the sample $L_{3.8}$ (the color of font) – the heterogeneities of nominal values are saved, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information fragments processor;
  - the sample Age (age) – the heterogeneities of nominal values are saved, that is caused by the differentiation of trainees of the evening department by the age.

A15.3.3. The parameters of the psychological portrait of the cognitive model of the subject

The developed CMT includes the methods and algorithms, allows directly to realize the setting and conducting of a series of experiments for the research of different parameters in the basis of the portraits of CM of the subject of training and CM of the means of training.

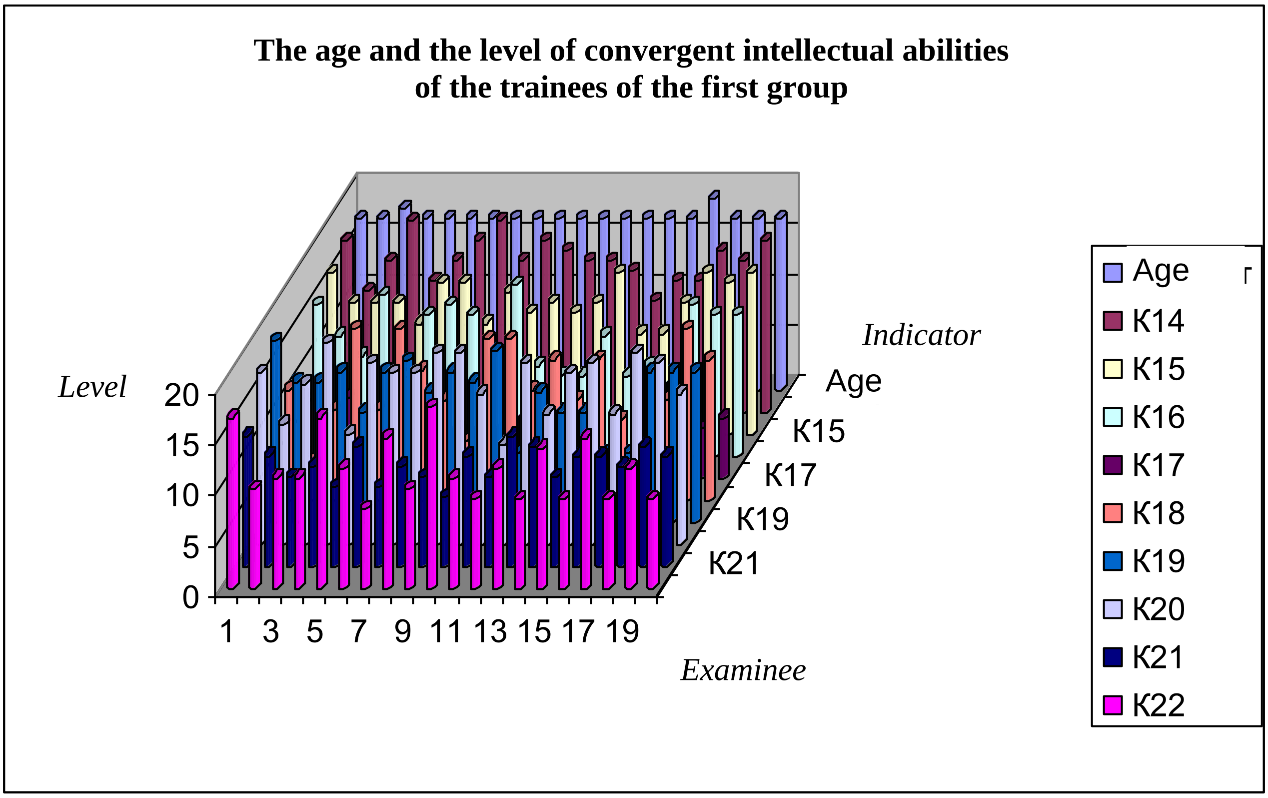
At the research of parameters of the psychological portrait of the parametrical CM of the examinee is carried out the diagnostics of convergent and divergent intellectual abilities by means of the applied DM, which acts as the basic component of the automated training system with the properties of adaptation based on PCMB.

The convergent intellectual abilities determine the potential ability to choose the normative single or the several correct variants of answer on the question among a set of proposed with the minimal temporary costs.

The divergent intellectual abilities determine the potential ability to analyze the simple or difficult verbal or figurative stimulus and to generate a set of arbitrary verbal or graphical associative answers.

In pic. A15.13-A15.18 presents the diagrams with a posteriori results of research of the convergent intellectual abilities in the group of day and evening departments.

In pic. A15.13 the column diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the three groups of day department for 2006 y. is presented.



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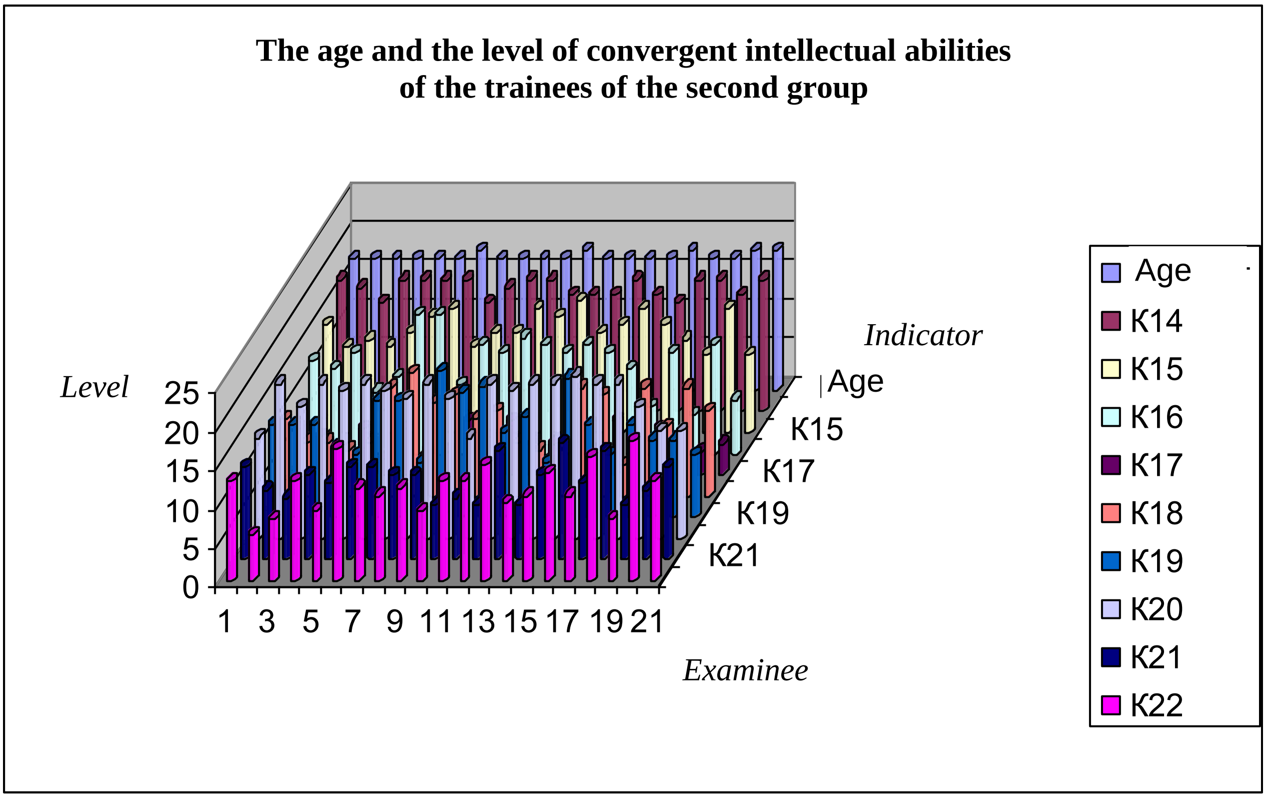
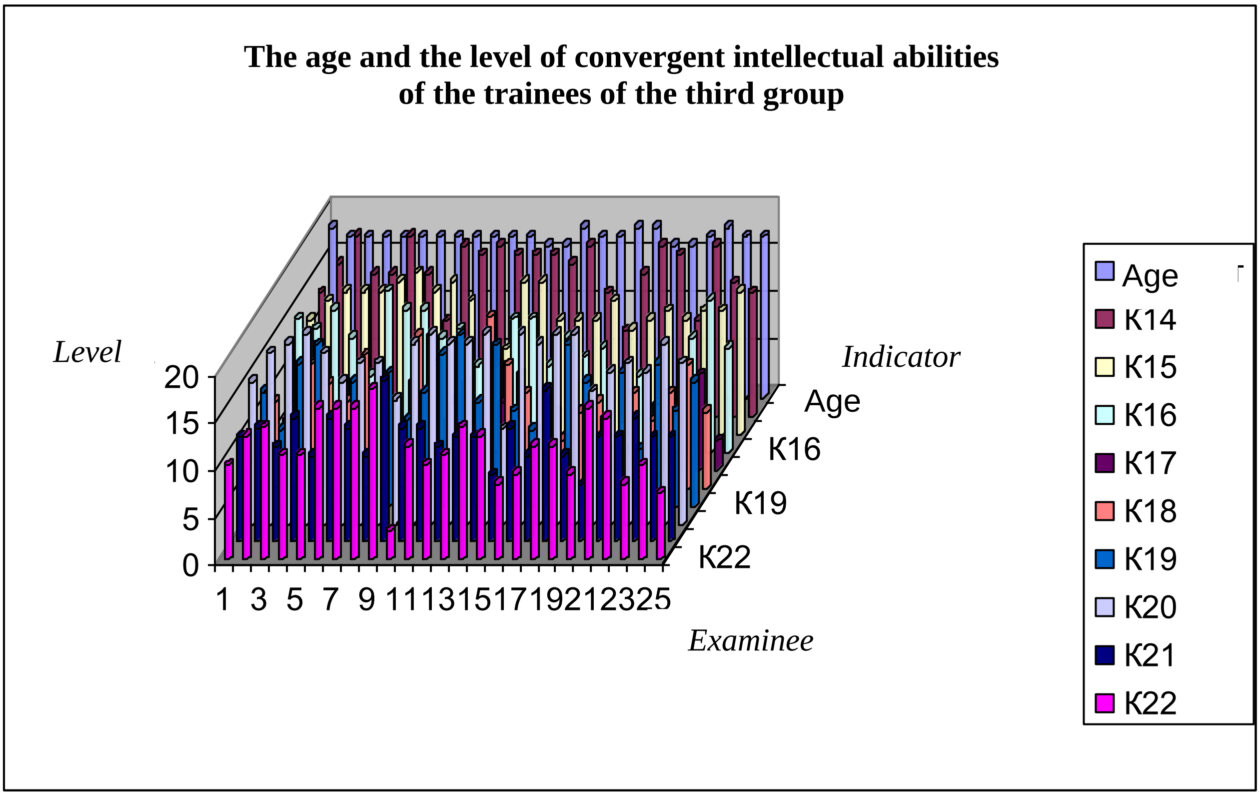


b

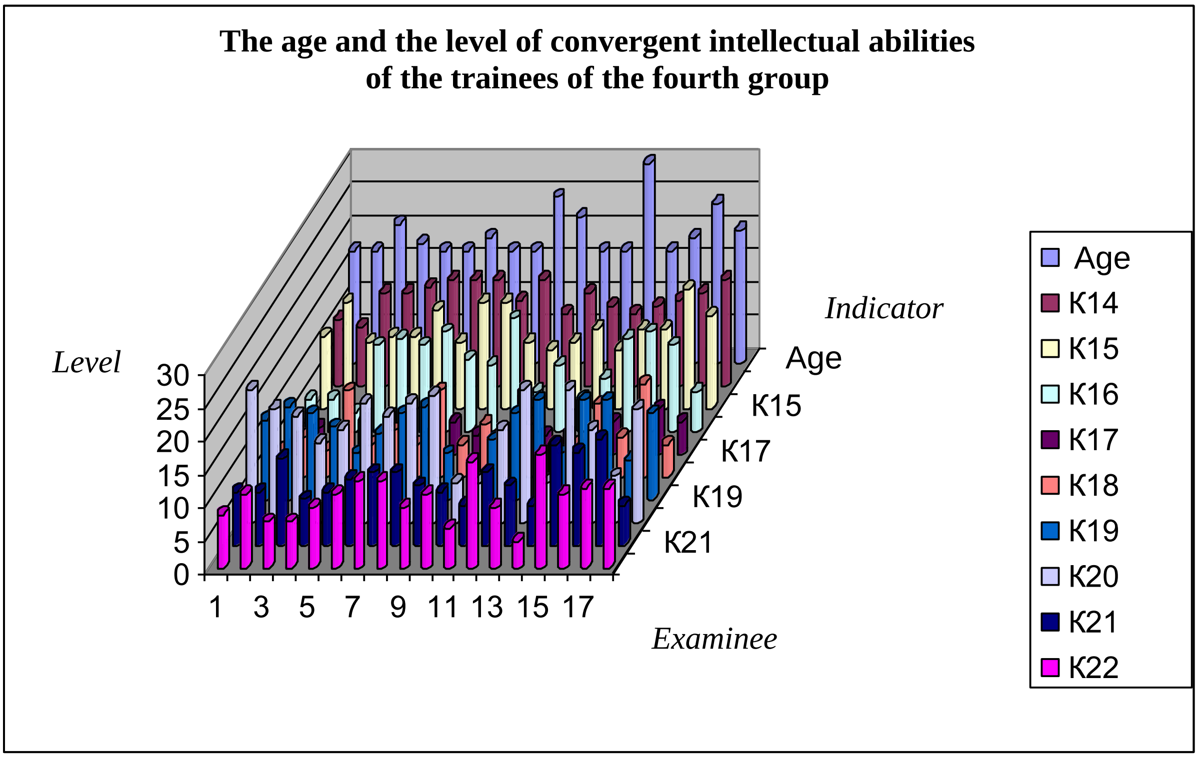


c

Picture A15.13. The convergent abilities of trainees of the day department in 2006 y.

In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (Age, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the three groups of day department of the chair "ACP" the essential heterogeneities were not revealed.

In pic. A15.14 presents the column diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the two groups of evening department for 2006 y.



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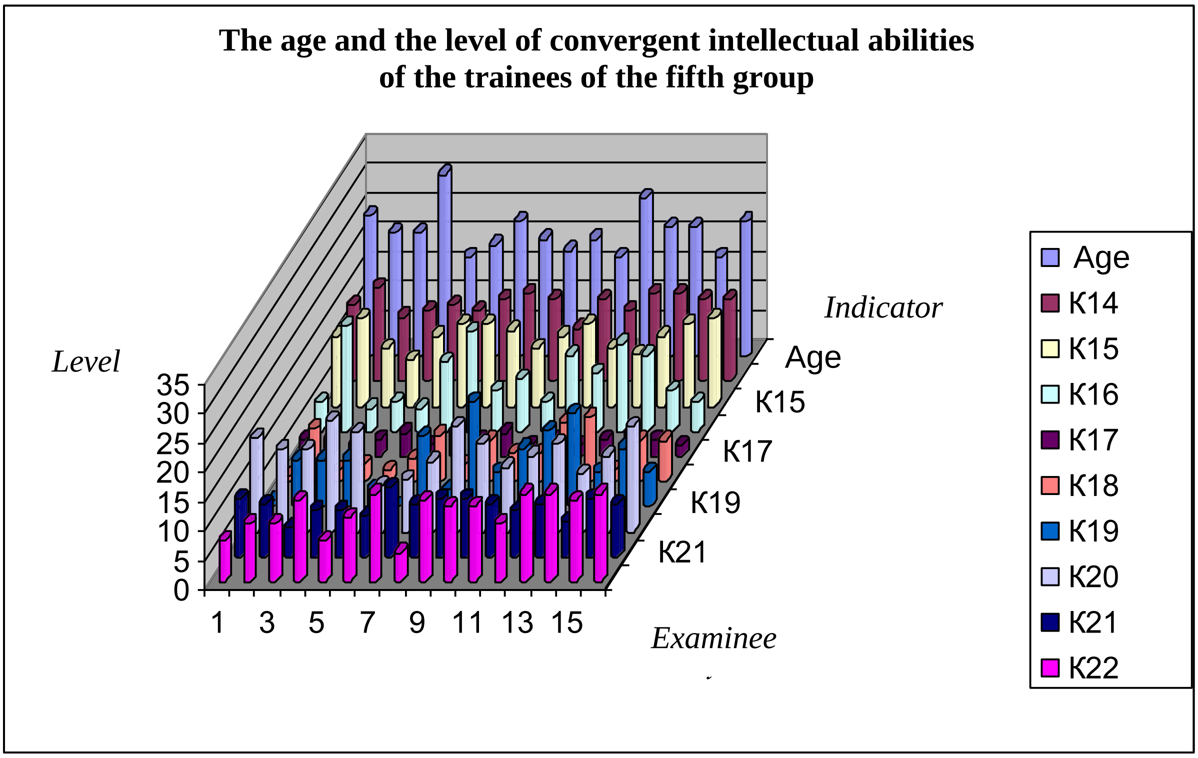


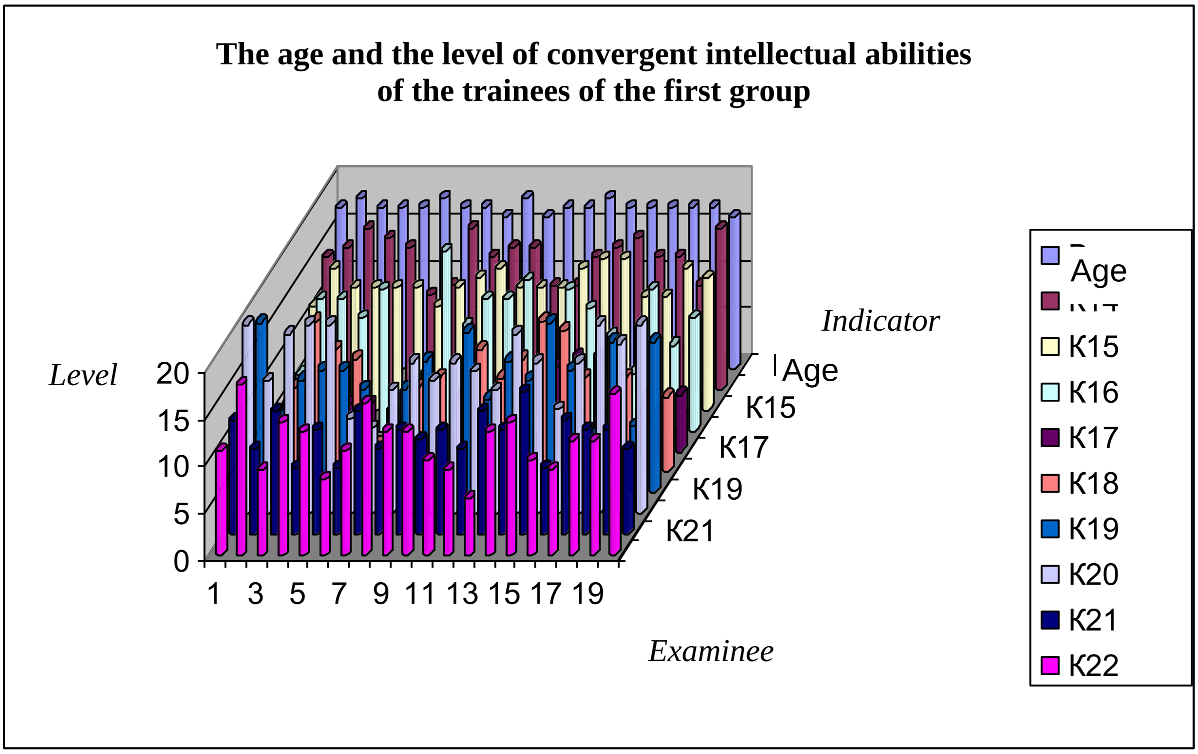
b

Picture A15.14. The convergent abilities of trainees of the evening department in 2006 y.

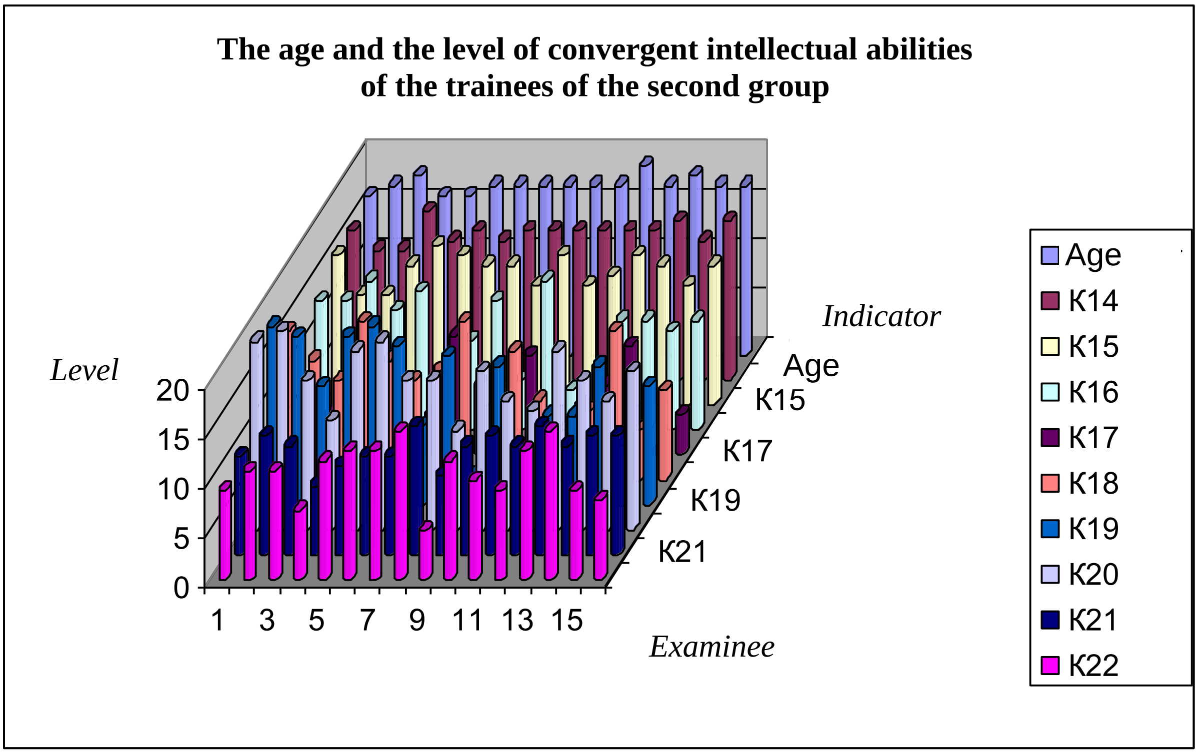
In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (Age, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the two groups of evening department the essential heterogeneities were not revealed.

In pic. A15.15 the column diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the three groups of day department for 2007 y., which allows to realize the analysis of the distribution of values and their tendency of following.

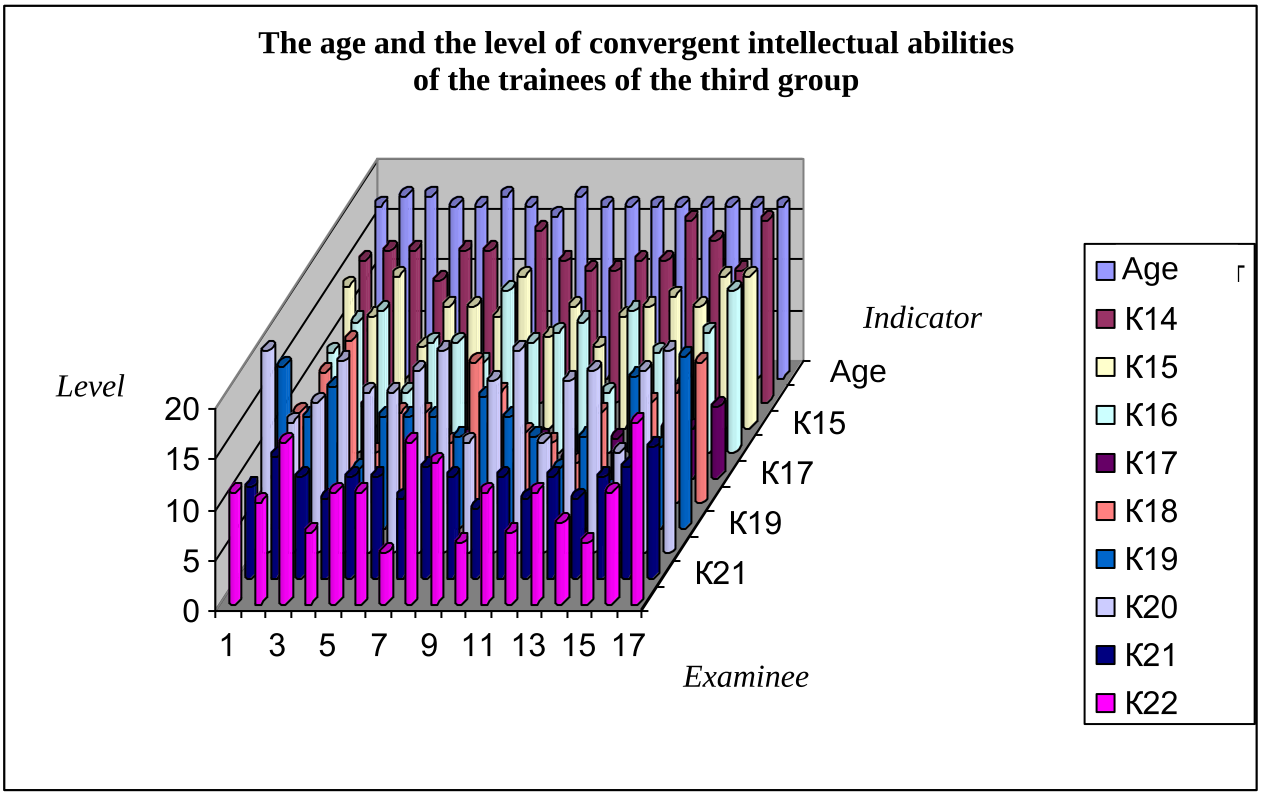
The following designations in the presented diagrams are used directly: K_{14} – verbalization, K_{15} – generalization, K_{16} – analyticity, K_{17} – classification, K_{18} – arithmetic abilities, K_{19} – combinatorics, K_{20} – mnemonics, K_{21} – planar thinking and K_{22} – volumetric or spatial imagination.



a



b



c

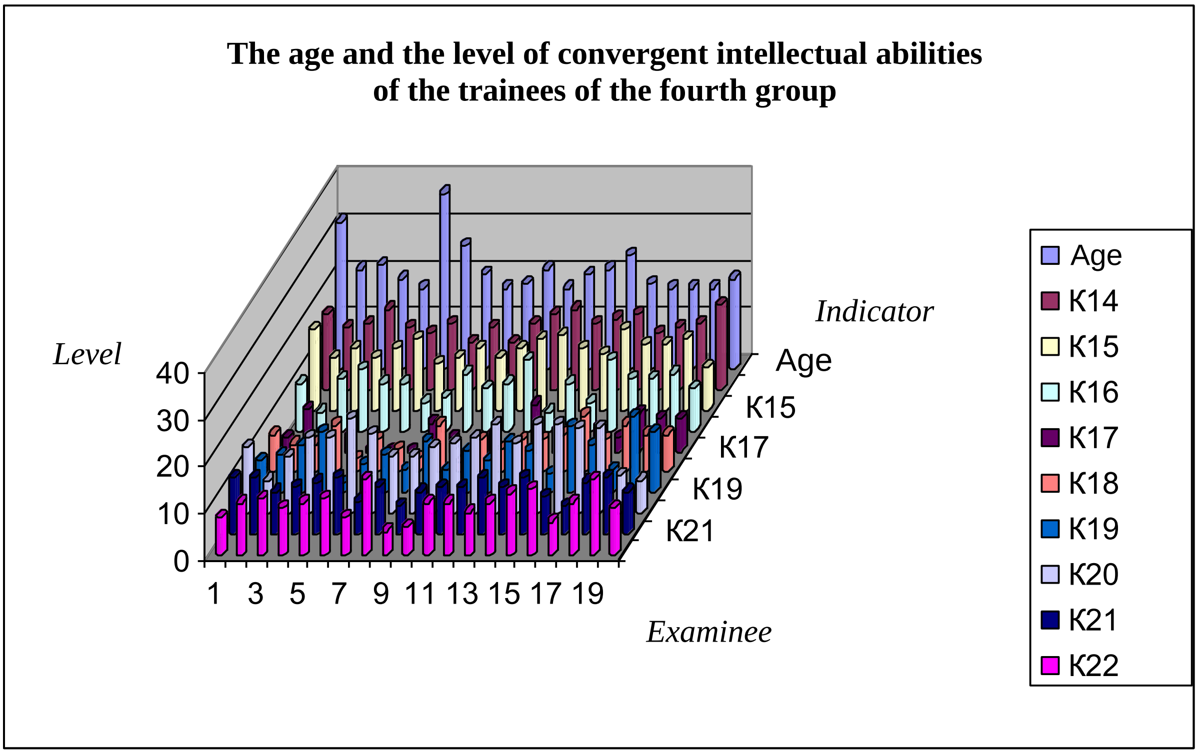
Picture A15.15. The convergent abilities of trainees of the day department in 2007 y.

In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (Age, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the three groups of day department the significant heterogeneities were not revealed.

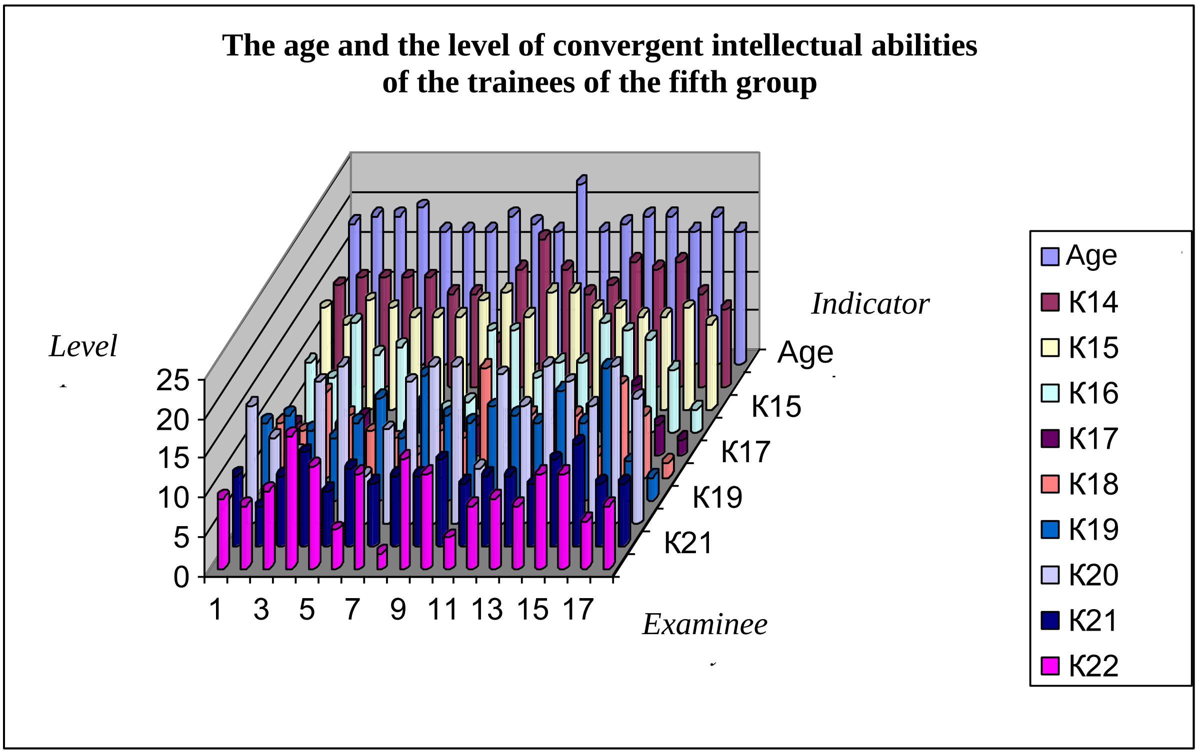
In 2007 y. in the three groups of day department at the analysis of the nominal values of different indicators as the parameters of the psychological portrait of CM of the subject of training:

- in the three groups of examinees the indicator "K_{22} – the spatial imagination" – has the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{21} – the planar imagination" – has the less pronounced fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{20} – mnemonics and the properties of memory" – has the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{19} – the combinatorial abilities" – has the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{18} – the arithmetic abilities" – has the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{16} – the analyticity of thinking" – the relatively insignificant fluctuations of nominal values (the anomalies of examinees).

In pic. A15.16 the column diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the two groups of evening department for 2007 y. is presented.



a



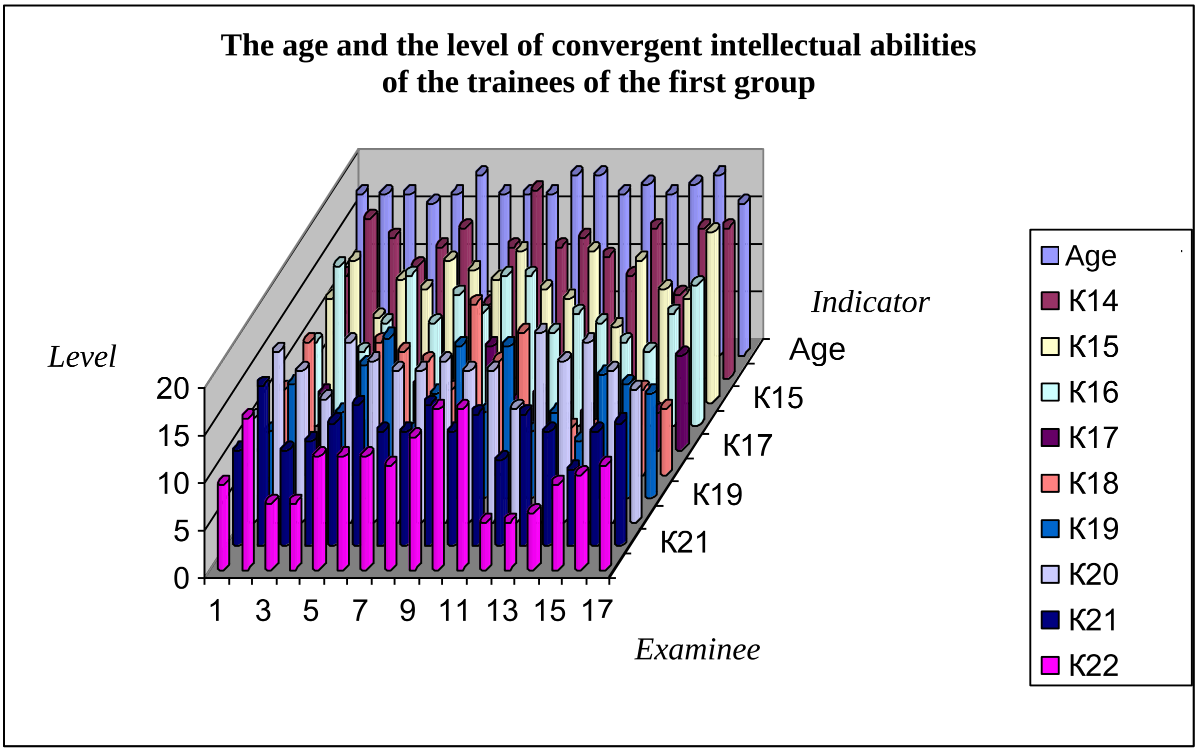
b

Picture A15.16. The convergent abilities of trainees of the evening department in 2007 y.

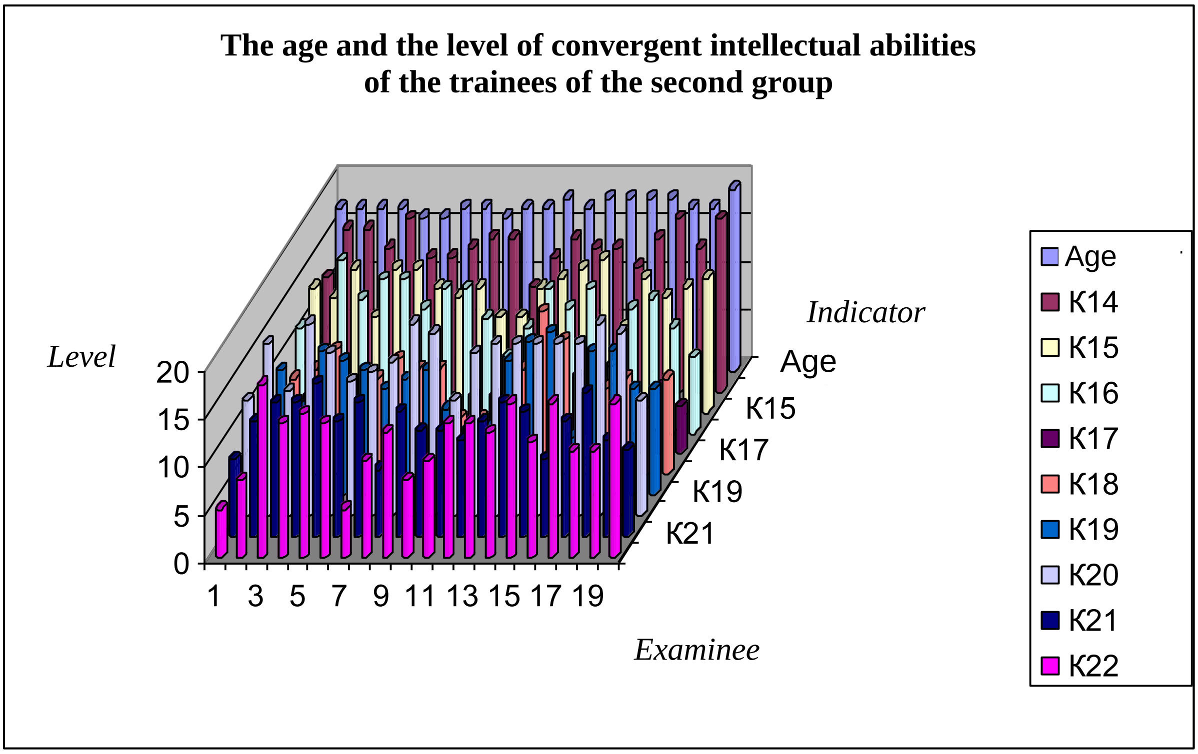
In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (Age, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the two groups of evening department the significant heterogeneities were not revealed. There are the unevenness of distribution of the age of examinees of the fourth group.

In pic. A15.17 the columnar diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the three groups of day department for 2008 y. is presented.

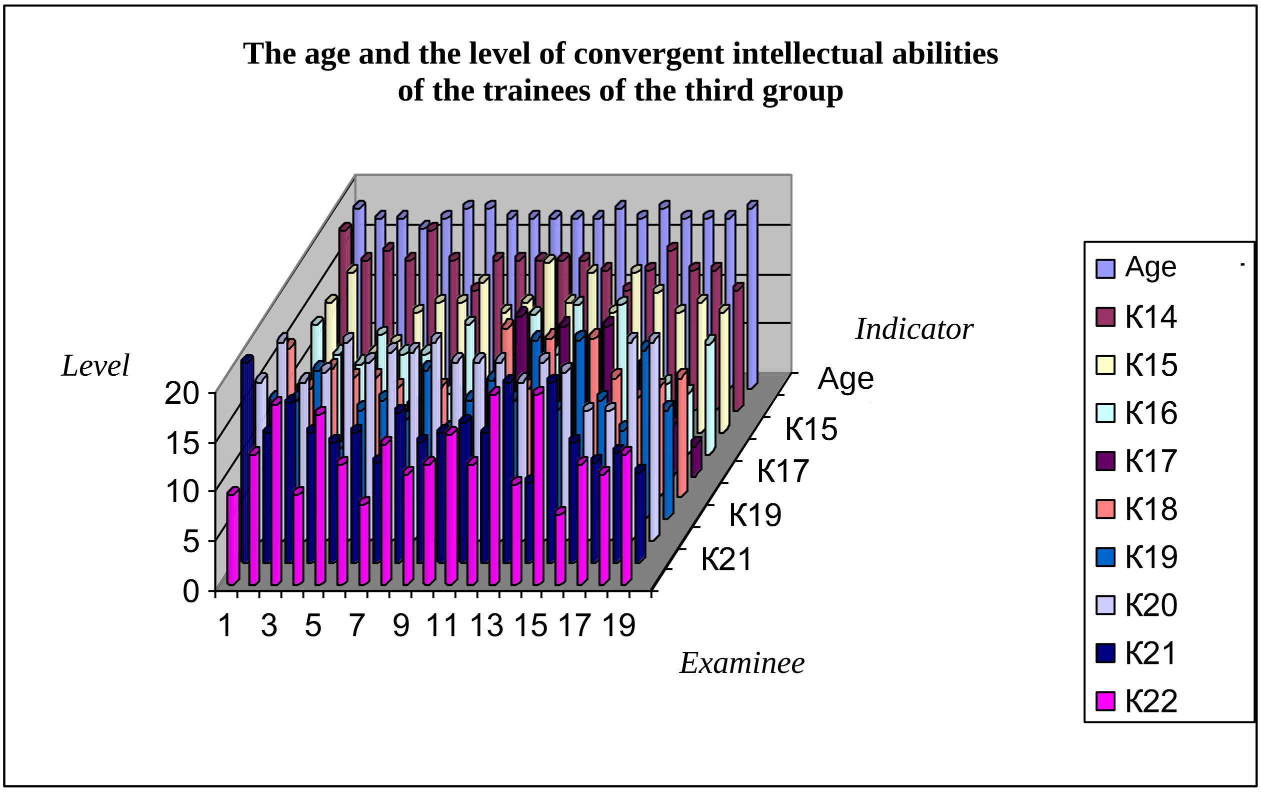
The following designations in the presented diagrams are used directly: K_{14} – verbalization, K_{15} – generalization, K_{16} – analyticity, K_{17} – classification, K_{18} – the arithmetic abilities, K_{19} – combinatorics, K_{20} – mnemonics, K_{21} – the planar thinking and K_{22} – the volumetric or spatial imagination.



a



b



c

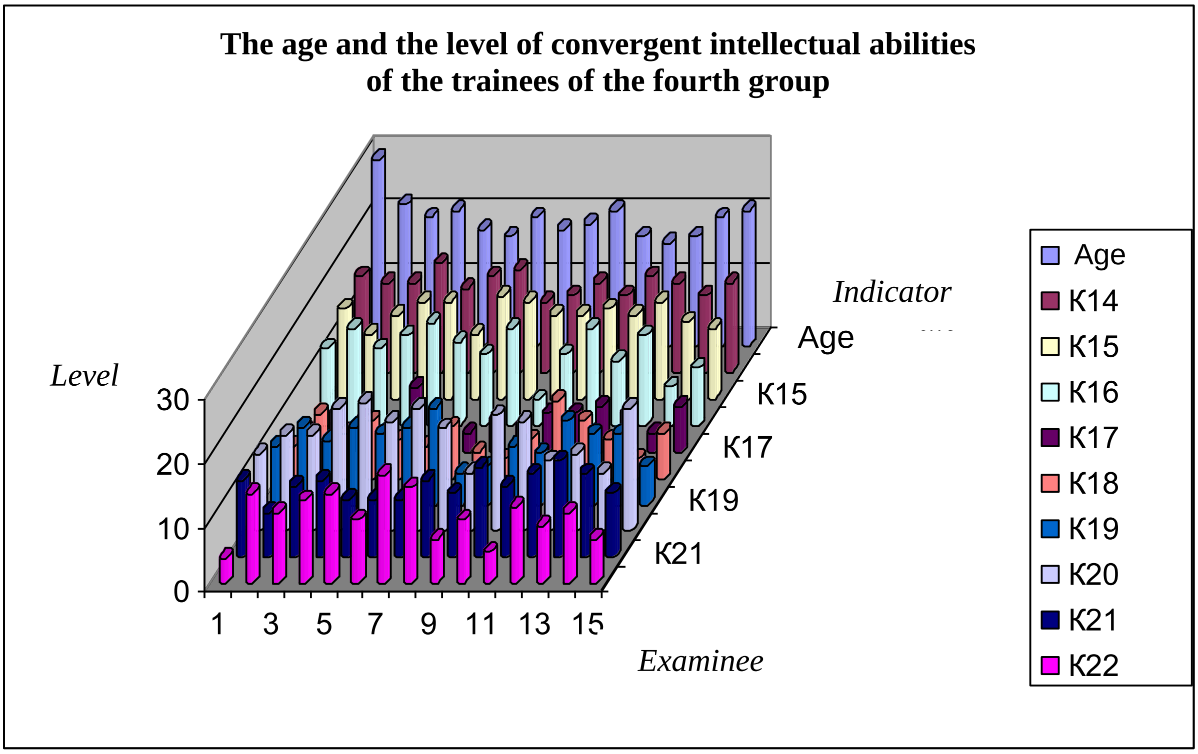
Picture A15.17. The convergent abilities of trainees of the day department in 2008 y.

In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (Age, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the three groups of day department the significant heterogeneities were not revealed.

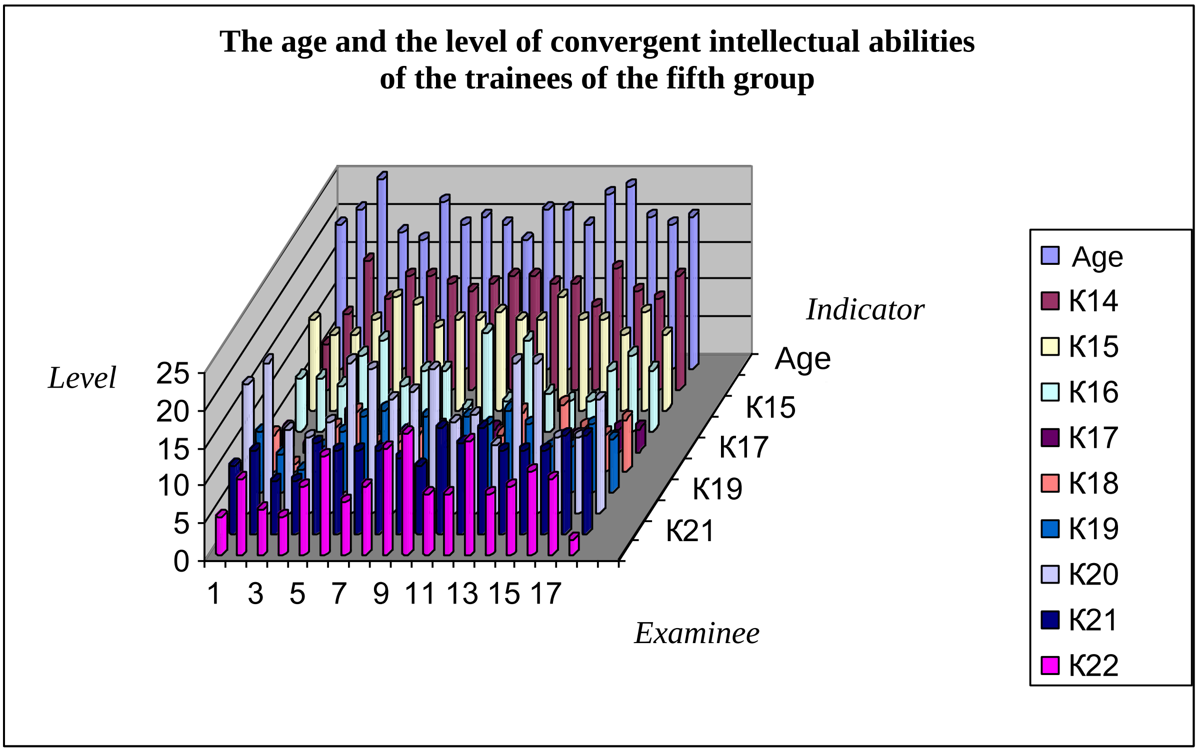
In 2008 y. in the three groups of day department at the analysis of the nominal values of different indicators as the parameters of the psychological portrait of CM of the subject of training in the basis of PCMB for the directly realization of the system analysis of IEE of the automated training system (at distance or remote training):

- in the three groups of examinees the indicator "K_{22} – the spatial imagination" – there are the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{21} – the planar imagination" – has the less pronounced fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{20} – mnemonics and the properties of memory" – has the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{18} – the arithmetic abilities" – has the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator "K_{16} – the analyticity of thinking" – the relatively insignificant fluctuations of nominal values (the anomalies of examinees).

In pic. A15.18 the column diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the two groups of evening department for 2008 y. is presented.



a



b

Picture A15.18. The convergent abilities of trainees of the evening department in 2008 y.

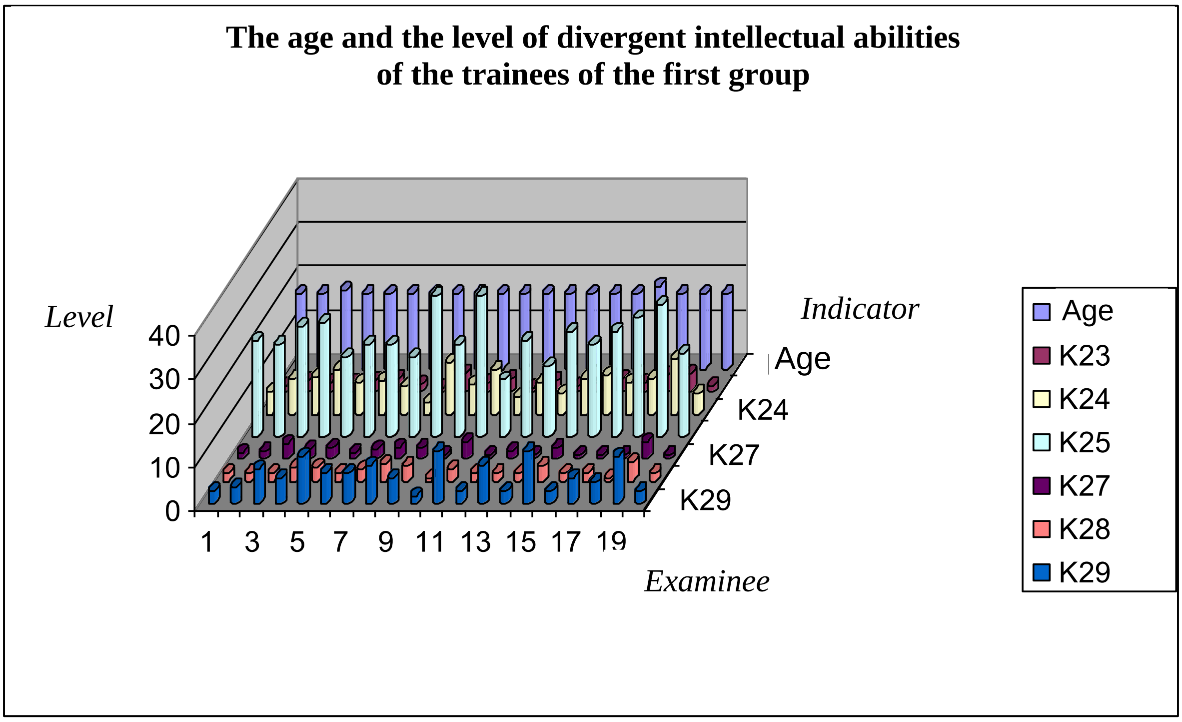
In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (Age, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the two groups of evening department the essential heterogeneities were not revealed.

In general in the evening department the insignificant differentiation of age is observed.

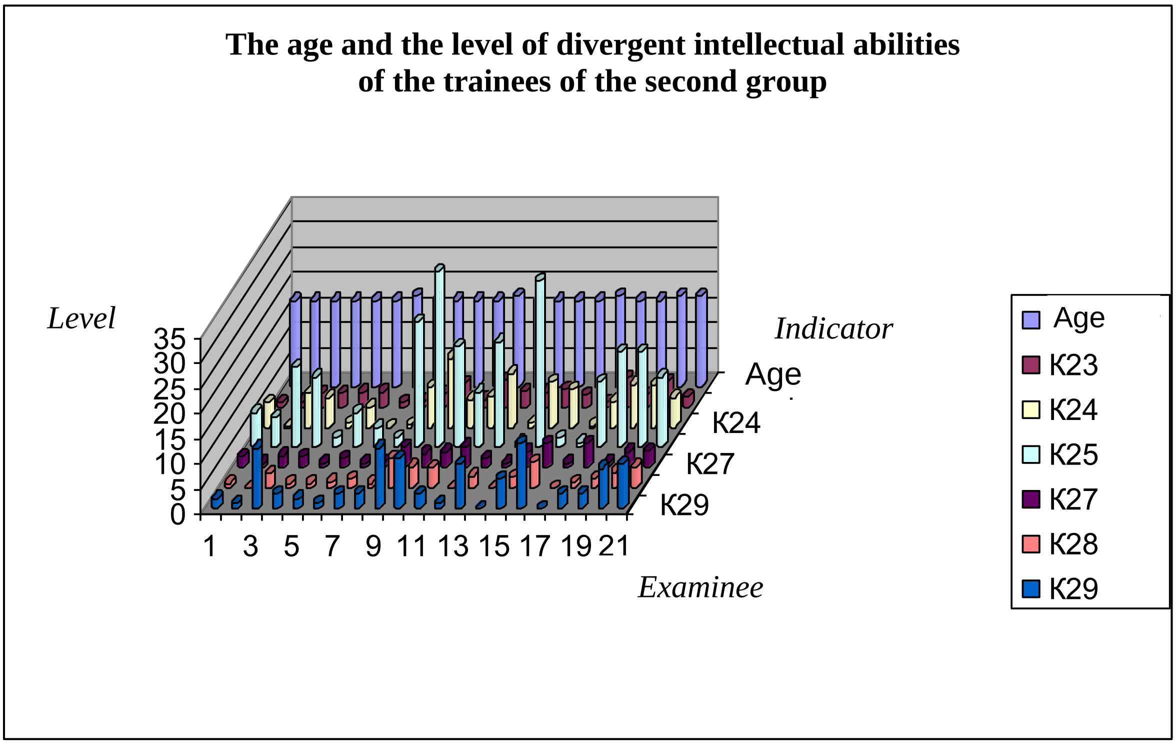
The divergent intellectual abilities determines the features of displaying of the diverse information fragments by the components of the automated (remote) training system based on the innovative PCMB, and also the interval of time on the development of the normative single or several variants of answer to the question:

- the means of training (ET) – the basic and additional information fragments;
- DM – the basic block and additional block of control questions.

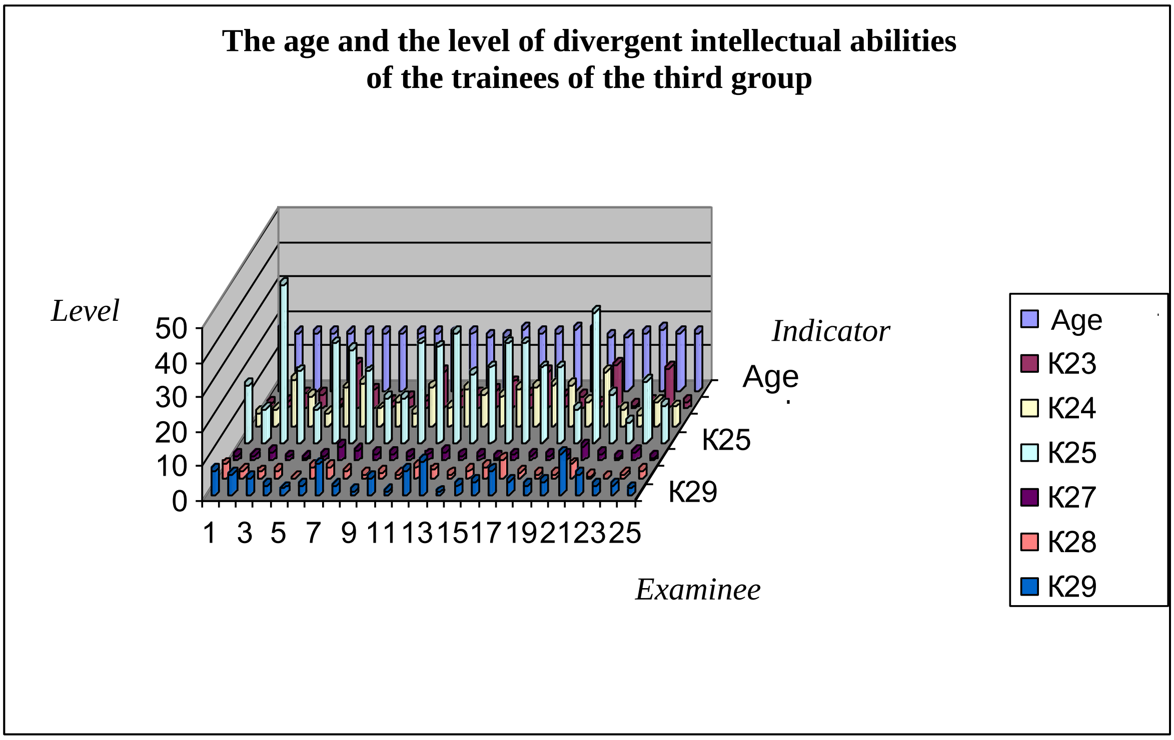
In in pic. A15.19 the columnar diagram with a posteriori data of diagnostics of the divergent intellectual abilities of the three groups of day department for 2006 y. is presented.



a



b



c

Picture A15.19. The divergent abilities of trainees of the day department in 2006 y.

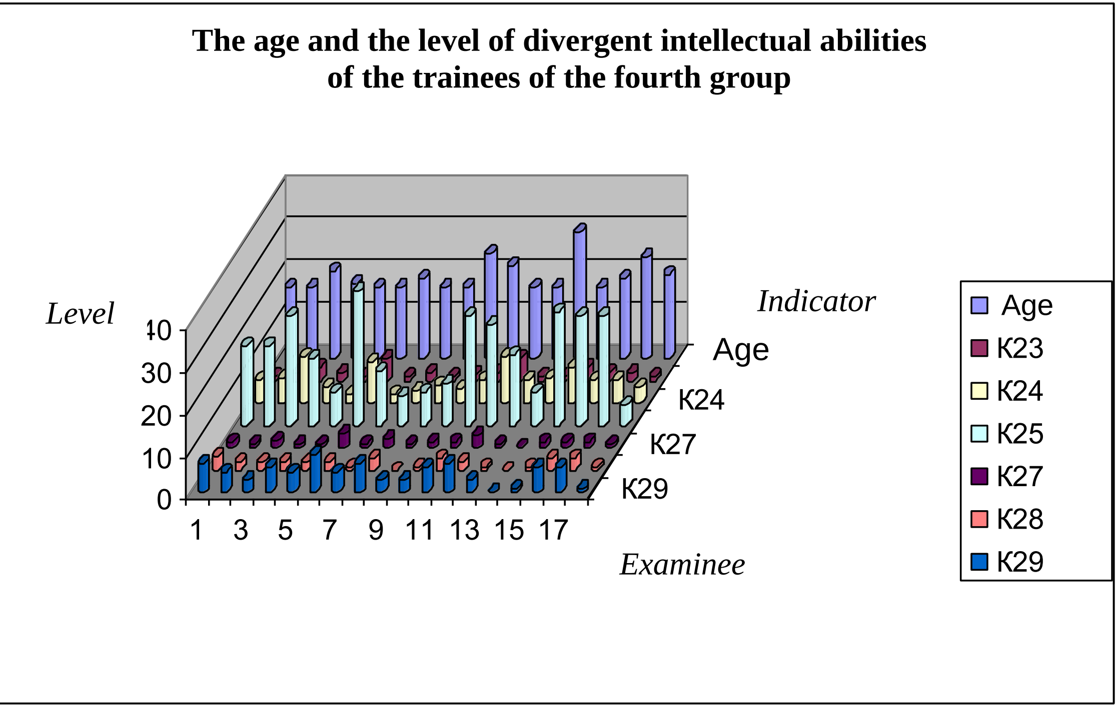
In the result of the analysis of the obtained diagrams with the results of research of the divergent intellectual abilities of examinees (Age, K_{23}, K_{24}, K_{25}, K_{27}, K_{28} and K_{29}) in the three groups of day department of the essential heterogeneities were not revealed.

In the result of the analysis of the distribution of nominal values in the samples with a posteriori data the insignificant heterogeneities in the values were revealed:

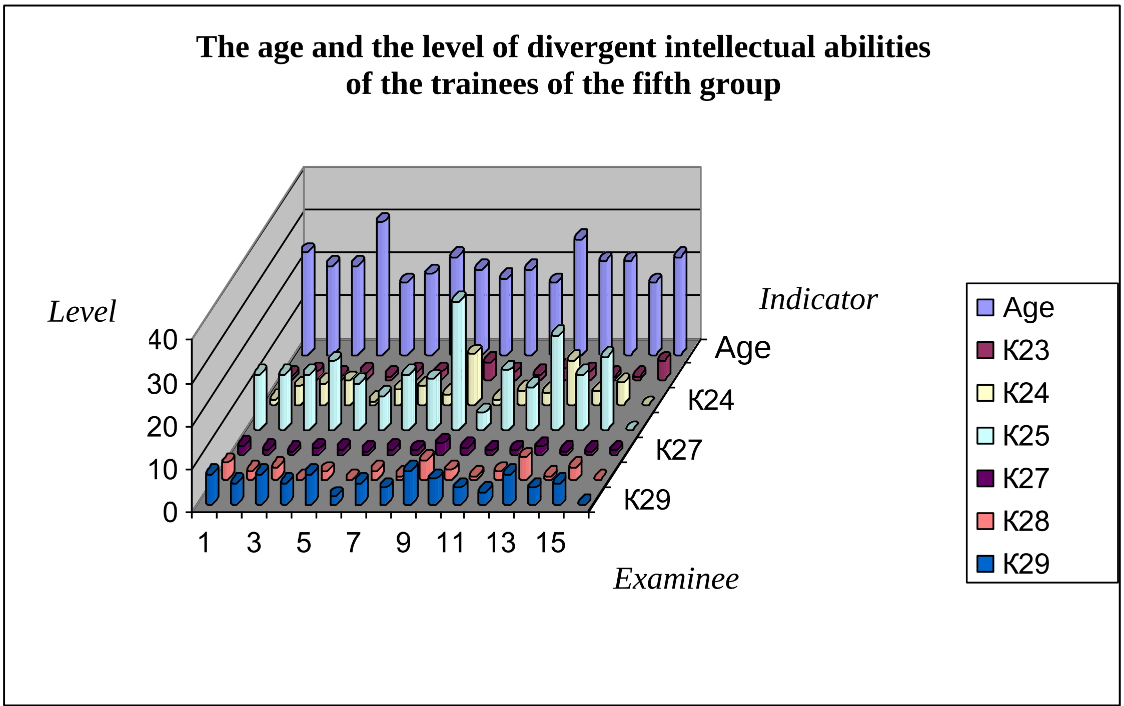
- in the sample "K_{24} – the verbal associativity of the process of thinking" there is directly the relatively small fluctuation of nominal values, which do not influence on the measures of the central tendency of nominal values;
- in the sample "K_{25} – the verbal selectivity of the process of thinking" there is directly the relatively average fluctuation of nominal values, which do not influence on the measures of the central tendency of nominal values;
- in the sample "K_{27} – the verbal originality of the process of thinking" there is directly the relatively small fluctuation of nominal values, which do not influence on the measures of the central tendency of nominal values;
- in the sample "K_{29} – the visual selectivity of the process of thinking" there is directly the relatively slight fluctuation of nominal values, which do not influence of the measures of the central tendency of nominal values.

The significant anomalies in the distribution of nominal value were not revealed.

In in pic. A15.20 the columnar diagram with a posteriori data of diagnostics of the divergent intellectual abilities of the two groups of evening department for 2006 y. is presented.



a



b

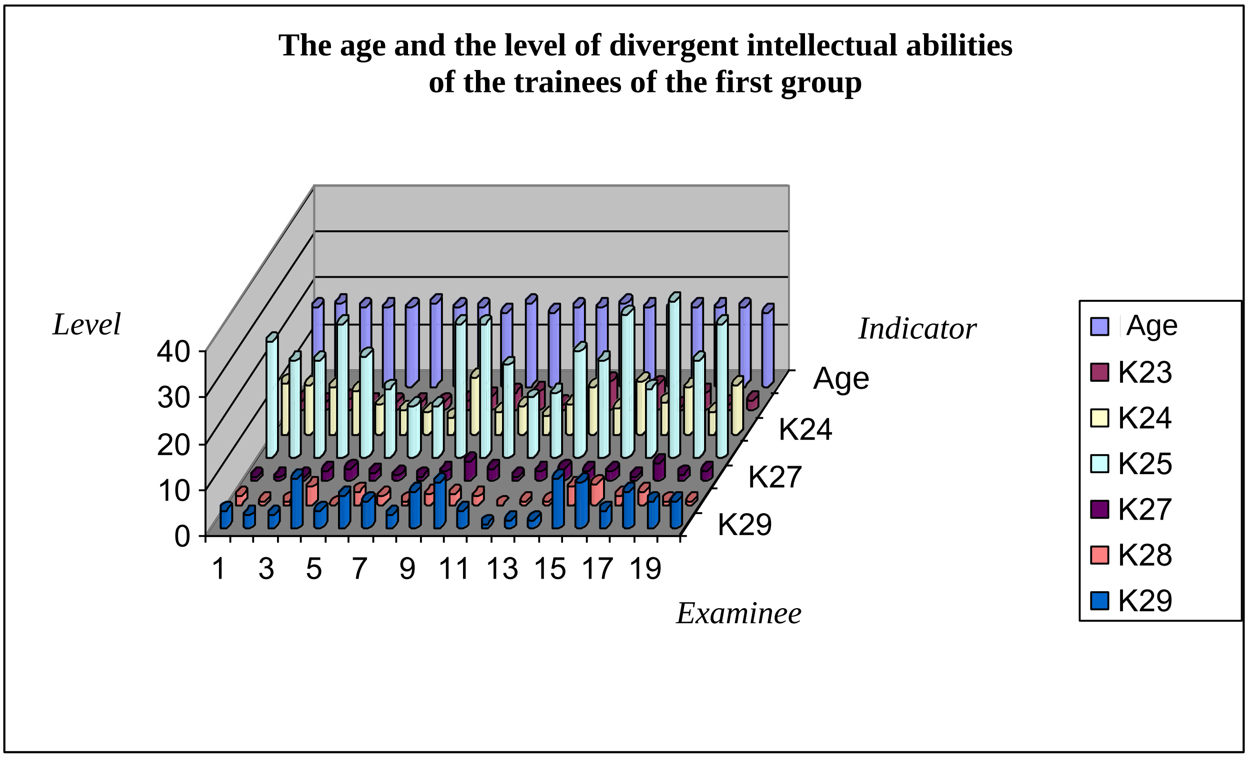
Picture A15.20. The divergent abilities of trainees of the evening department in 2006 y.

In the result of the analysis of the obtained diagrams with a posteriori data of research of the divergent intellectual abilities of examinees (Age, K_{23}, K_{24}, K_{25}, K_{27}, K_{28} and K_{29}) in the two groups of evening department the essential heterogeneities were not revealed.

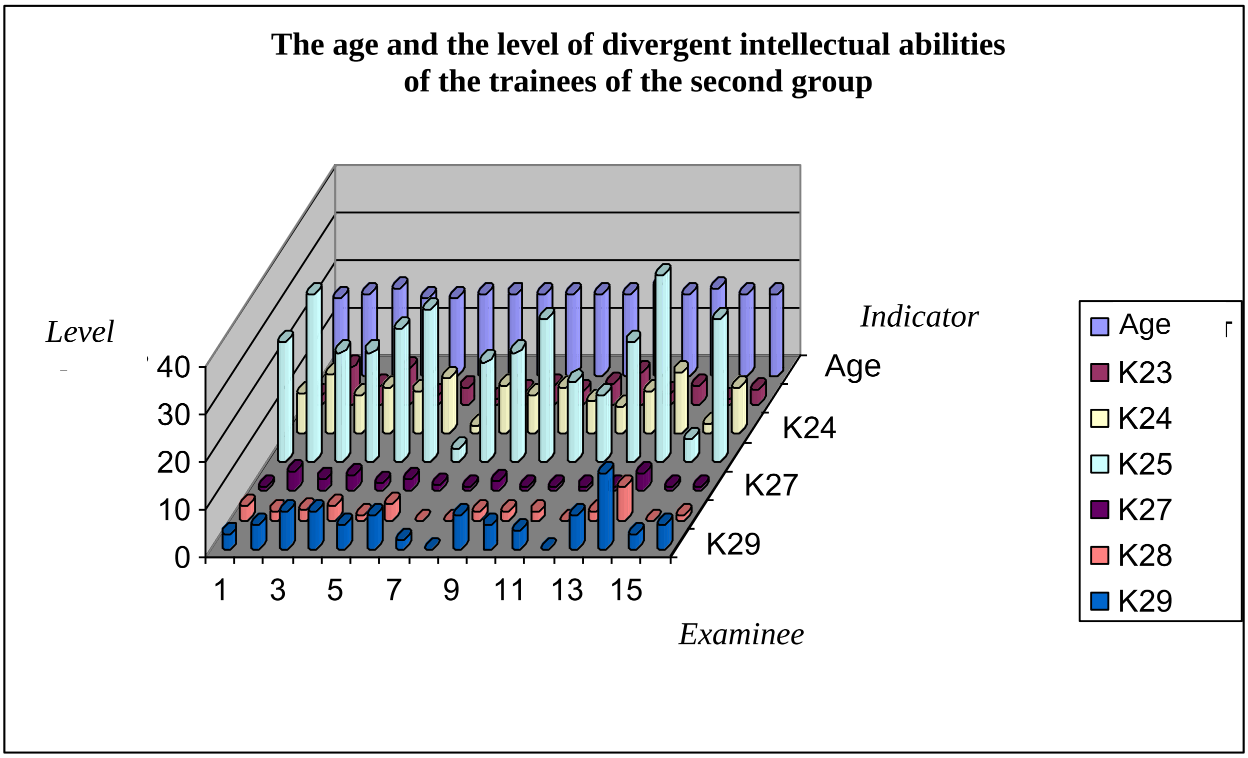
There are the several insignificant emissions in the variables Age and K_{25}, which do not influence on the measures of central tendency of a sequence of nominal values.

In pic. A15.21 the columnar diagram with a posteriori data of diagnostics of the convergent intellectual abilities in the three groups of day department for 2007 y. is presented.

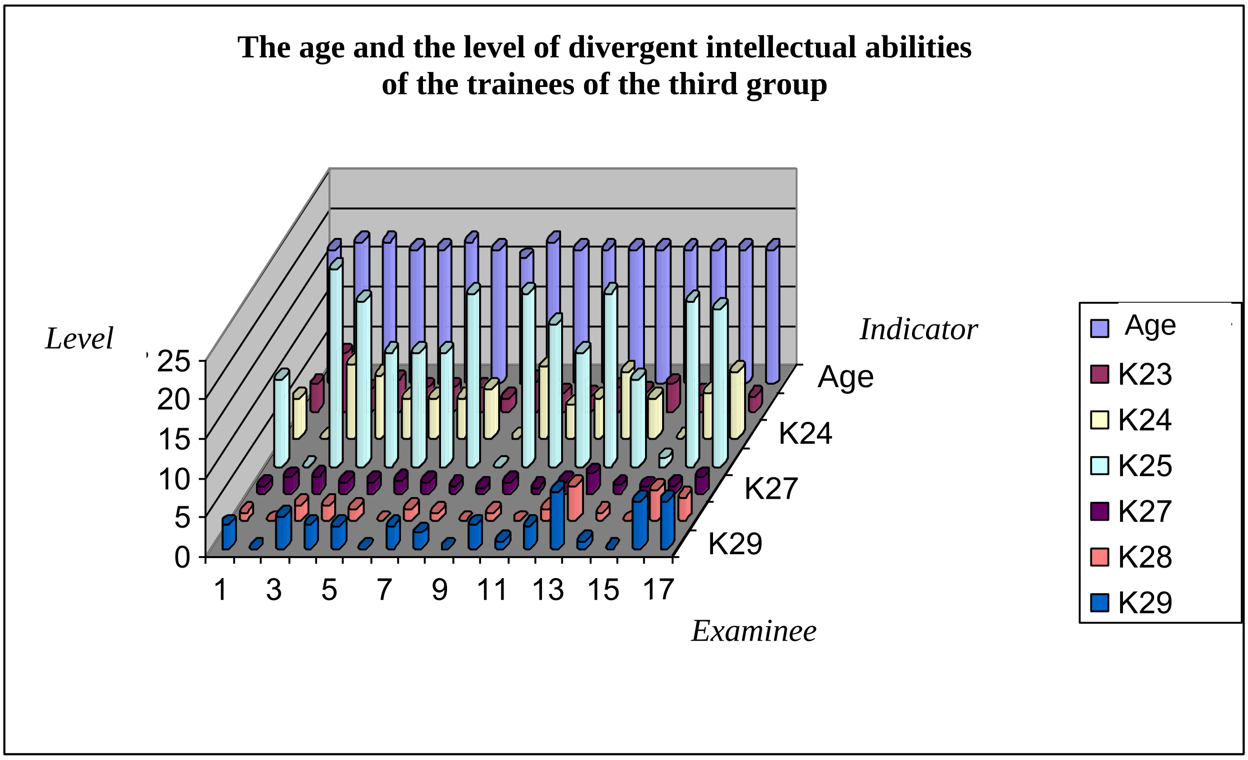
The following designations in the presented diagrams are used directly: Age – the age, K_{23} – the verbal originality, K_{24} – the verbal associativity, K_{25} – the verbal selectivity, K_{27} – the figurative originality, K_{28} – the figurative associativity and K_{29} – the figurative selectivity.



a



b



c

Picture A15.21. The divergent abilities of trainees of the day department in 2007 y.

In the result of the analysis of the obtained diagrams with a posteriori data of research of the divergent intellectual abilities of examinees (Age, K_{23}, K_{24}, K_{25}, K_{27}, K_{28} and K_{29}), in the three groups of day department the significant heterogeneities were not revealed.

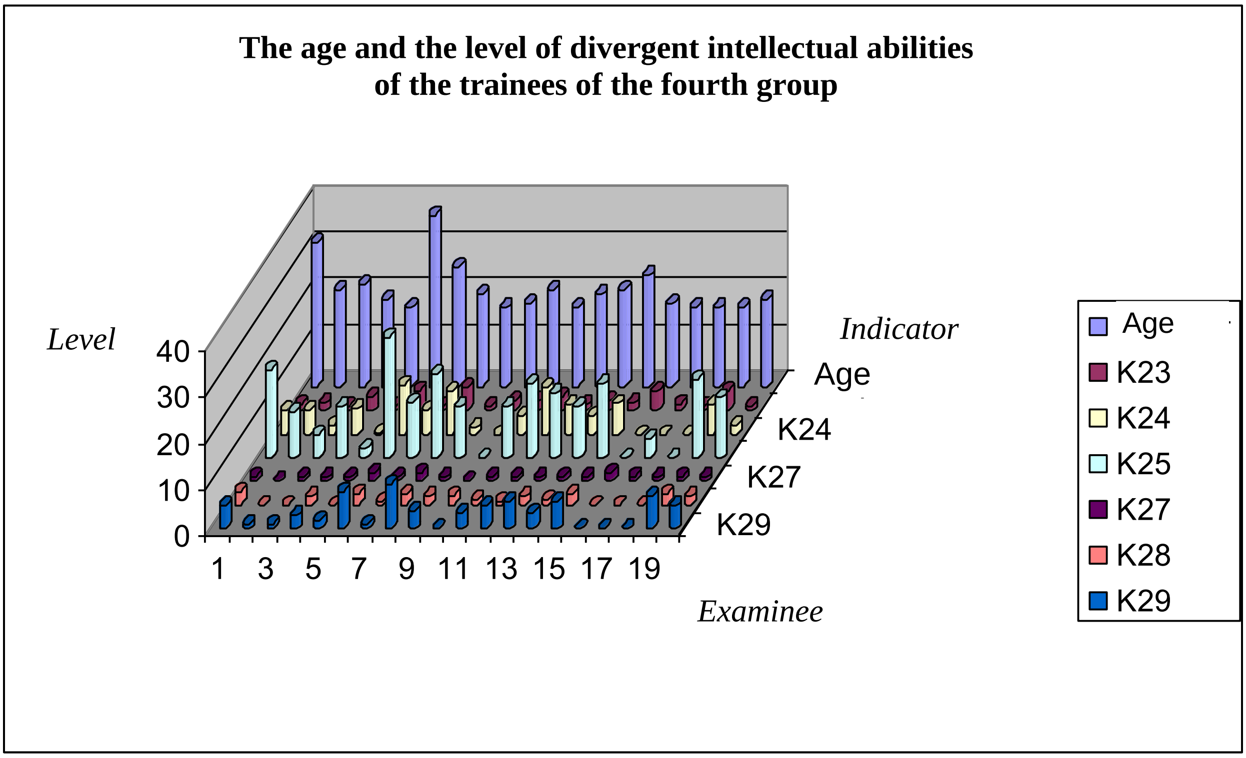
In the result of the analysis of the distribution of nominal values in the samples with a posteriori data the insignificant heterogeneities in the values are revealed:

- in the sample "K_{24} – the verbal associativity of the process of thinking" – there is directly the relatively small fluctuation of nominal values;
- in the sample "K_{25} – the verbal selectivity of the process of thinking" – there is directly the relatively average fluctuation of nominal values;
- in the sample "K_{29} – the verbal selectivity of the process of thinking" – there is directly the relatively insignificant fluctuation of nominal values.

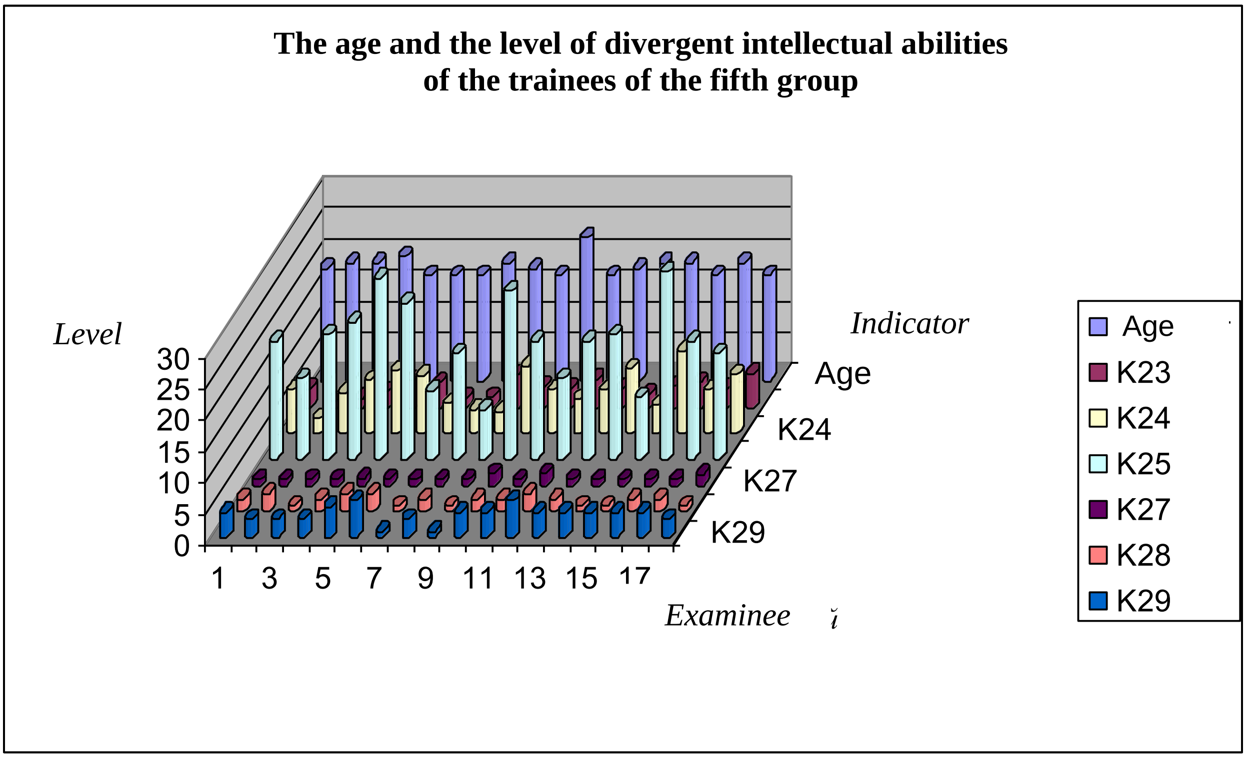
The significant anomalies in the distribution of values were not revealed, besides, the graphical presentation in the view of the columnar diagrams does not have the pronounced anomalies.

The graphical presentation allows with the sufficient accuracy for the practical purposes visually to determine the significant heterogeneities in the distribution of nominal values in the different samples with a posteriori data of experiments, which provide the measurement and research of the parameters of PCMB by means of a set of the methods from the area of psychophysiology, cognitive psychology and applied linguistics.

In pic. A15.22 the columnar diagram with a posteriori data of diagnostics of the divergent intellectual abilities of the two groups of evening department for 2007 y. is presented.



a



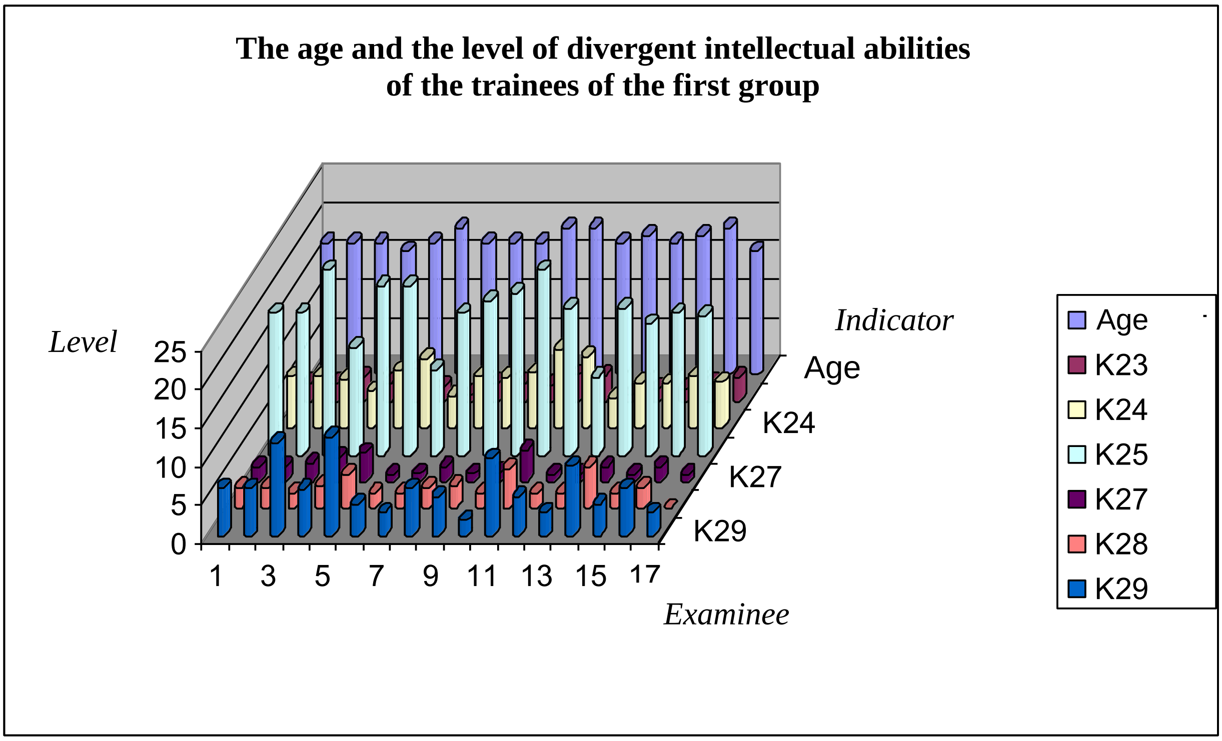
b

Picture A15.22. The divergent abilities of trainees of the evening department in 2007 y.

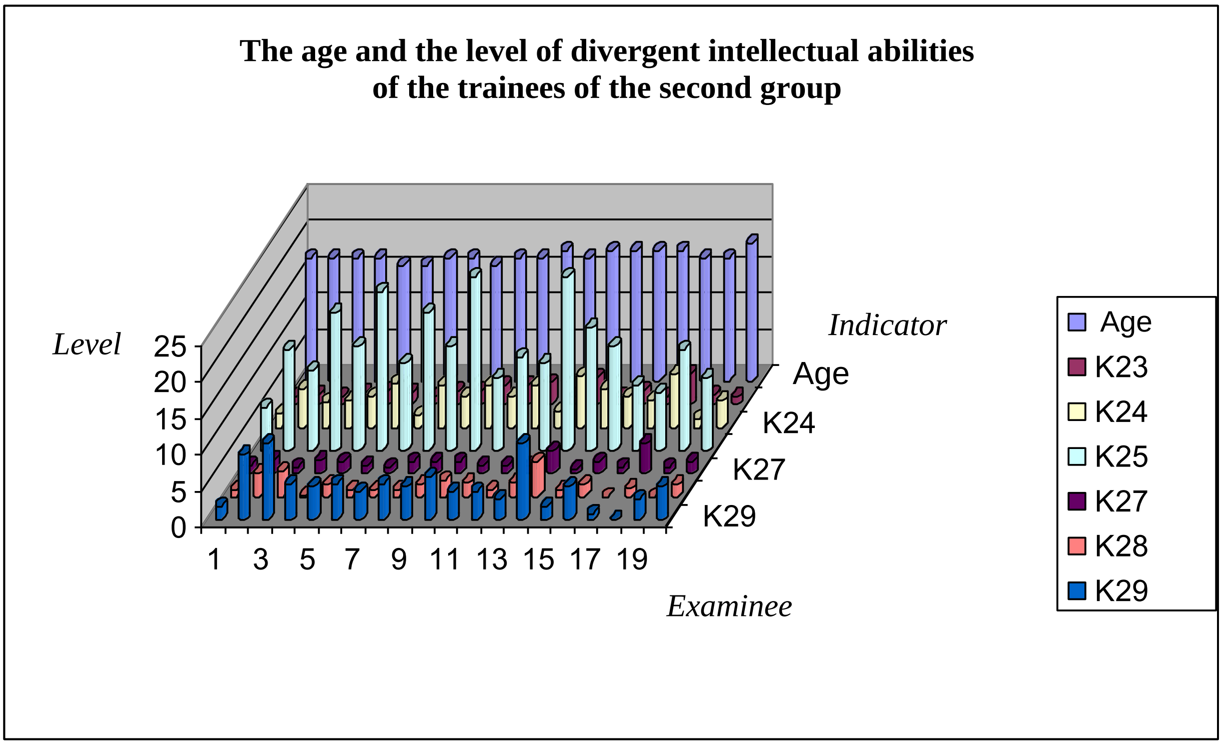
In the result of the analysis of the obtained diagrams with a posterior data of research of the divergent intellectual abilities of examinees (Age, K_{23}, K_{24}, K_{25}, K_{27}, K_{28} and K_{29}) in the two groups of evening department the significant heterogeneities were not revealed.

In pic. A15.23 the columnar diagram with a posteriori data of diagnostics of the divergent intellectual abilities of the three groups of day department for 2008 y. is presented.

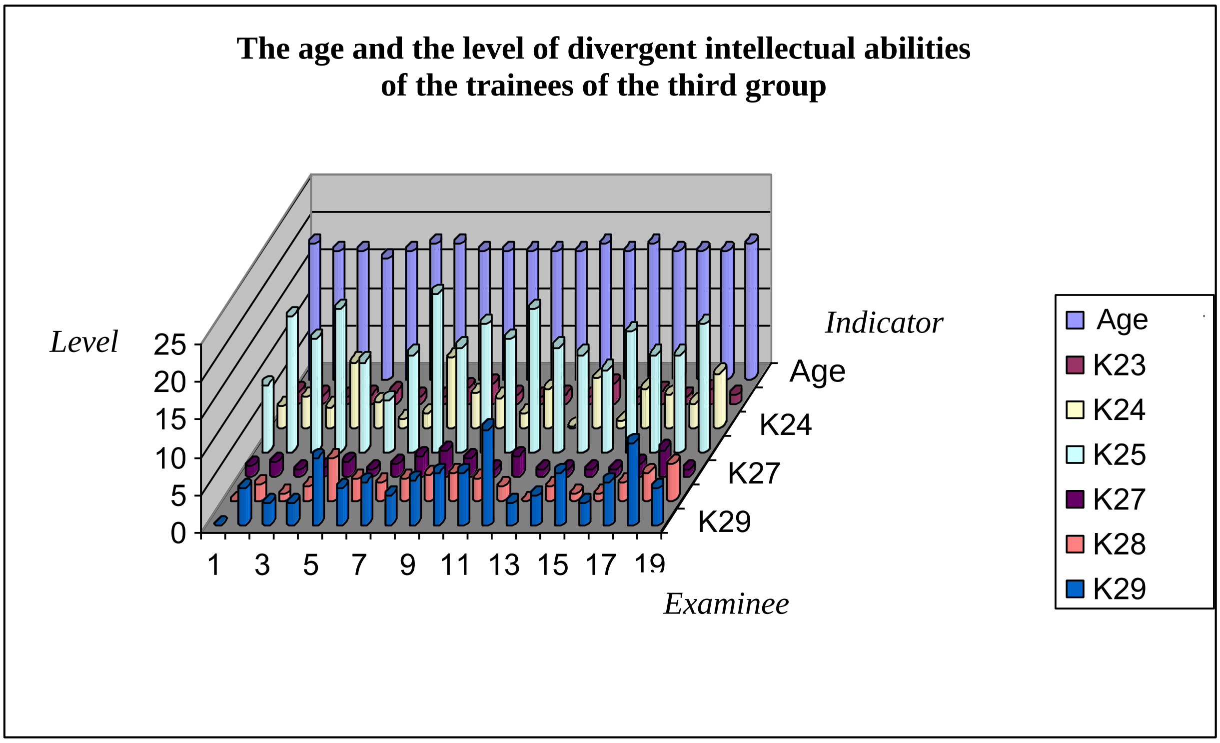
The following designations in the presented diagrams are used directly: Age – the age, K_{23} – the verbal originality, K_{24} – the verbal associativity, K_{25} – the verbal selectivity, K_{27} – the figurative originality, K_{28} – the figurative associativity and K_{29} – the figurative selectivity.



a



b



c

Picture A15.23. The divergent abilities of trainees of the day department in 2008 y.

In the result of the analysis of the obtained diagrams with the results of research of the divergent intellectual abilities of examinees (Age, K_{23}, K_{24}, K_{25}, K_{27}, K_{28} and K_{29}) in the three groups of day department the significant heterogeneities were not revealed.

In the result of the analysis of the distribution of nominal values in the samples with a posteriori data the insignificant heterogeneities in the values were revealed:

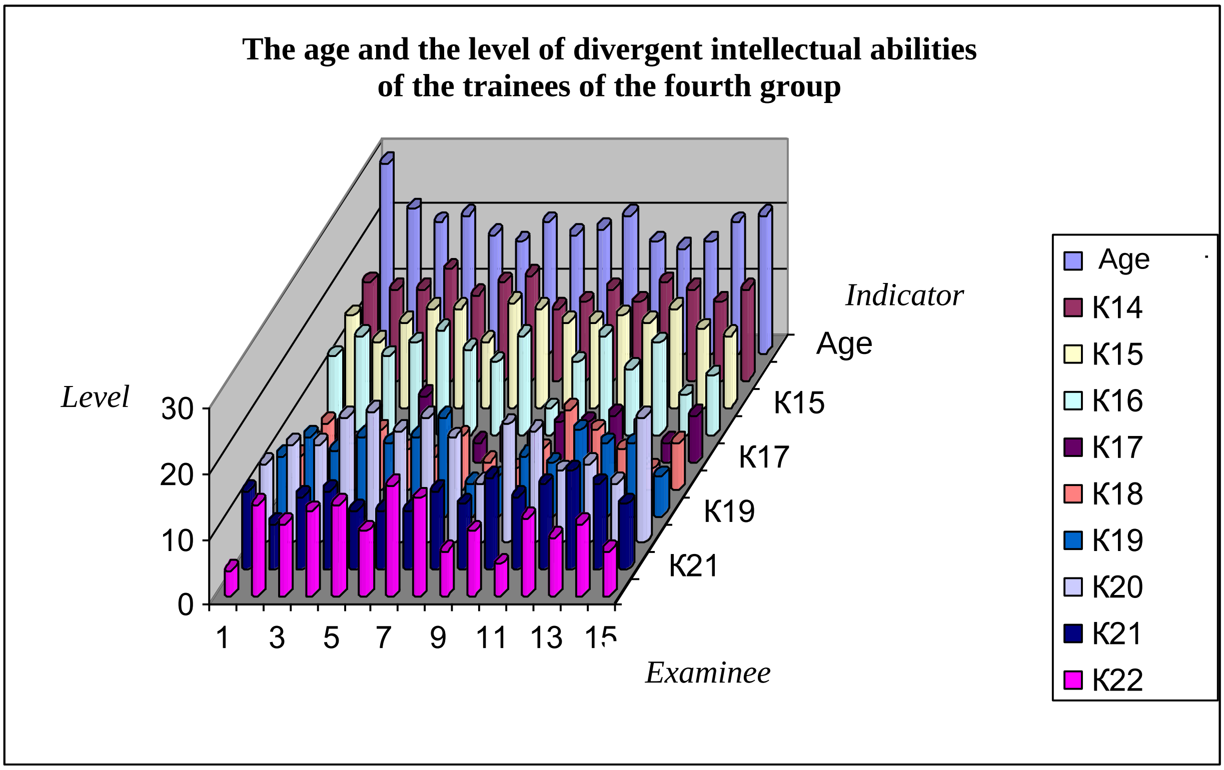
- in the sample "K_{25} – the verbal selectivity of the process of thinking" – there is directly the relatively average fluctuation of nominal values;
- in the sample "K_{29} – the figurative selectivity of the process of thinking" – there is directly the relatively insignificant fluctuation of nominal values.

The significant anomalies in the distribution of values were revealed, besides, the graphical presentation in the view of columnar diagrams does not have the pronounced anomalies.

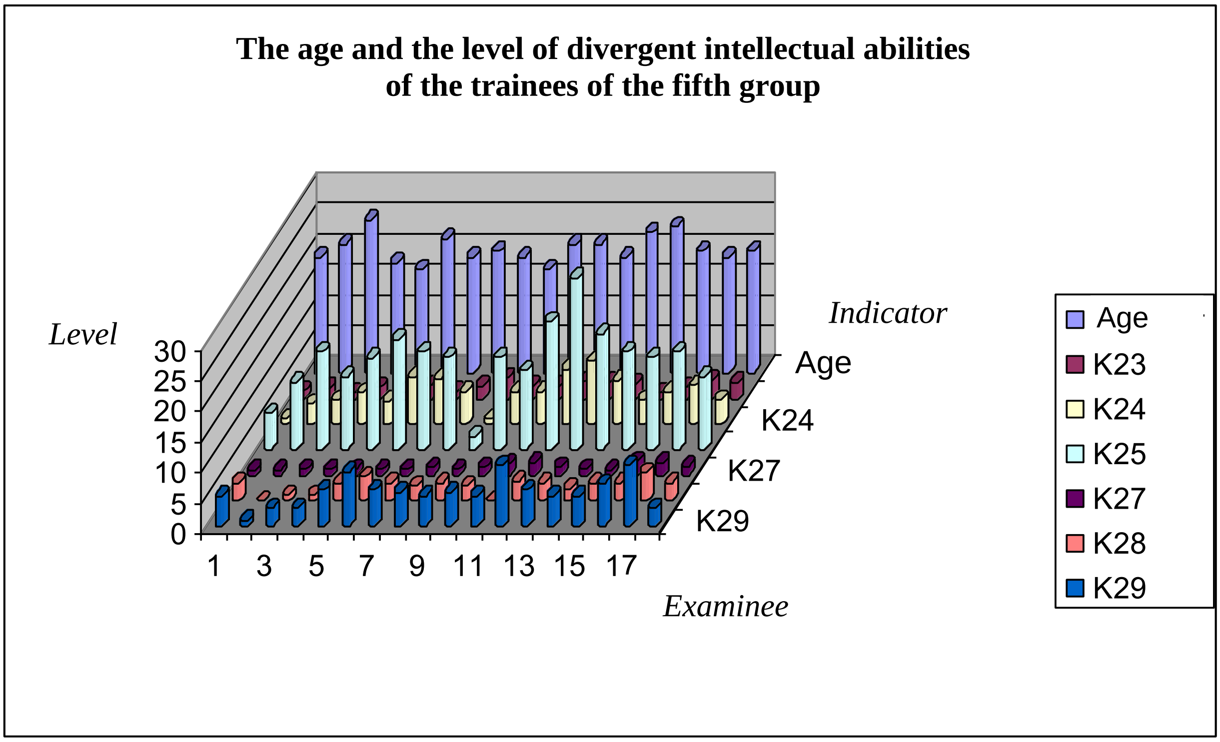
The graphical presentation allows with the sufficient accuracy for the practical purposes visually to determine the significant inhomogeneities in the distribution of nominal various in the various of samples with a posteriori data of experiments.

The research of parameters of the psychological portrait of CM of the subject of training was carried out by the means of use of the applied DM on the basis of a formed set of methods, which have the certain scientific justification in the area of physiology of sensory systems, cognitive psychology and applied linguistics, that allows directly to estimate the efficiency of functioning of the algorithms in the basis of program realization and the methods of research in DB of program.

In pic. A15.24 the columnar diagram with a posteriori data of diagnostics of the divergent intellectual abilities of the two groups of evening department for 2008 y. is presented.



a



b

Picture A15.24. The divergent abilities of trainees of the evening department in 2008 y.

In the result of the analysis of the obtained diagrams with the results of research of the divergent intellectual abilities of examinees (Age, K_{23}, K_{24}, K_{25}, K_{27}, K_{28} and K_{29}) in the two groups of evening department the significant heterogeneities were not revealed.

In general the several important features can be distinguished in the sequences of following of nominal values in the samples with a posteriori data of experiments:

- the examinees of day and evening department are significantly differentiated by a set of indicators, characterizing the divergent intellectual abilities;
- there are a row of significant differences in the dynamics of the distribution of nominal values in the samples with a posteriori data of the day and evening department;
- in a posteriori data of the day department the several abnormal nominal values is revealed, representing the emissions and artifacts;
    - the forms of distribution in the samples “K_{23}, K_{24}, K_{25} and K_{29}” insignificantly differ from the normal, but practically have no influence on the measures of central tendency;
- in a posteriori data of the evening department of examinees the several abnormal values were revealed, which are presented the emissions and artifacts;
    - the sample “Age” contains the differentiated values, as the contingent of examinees significantly differs by the age in the two groups.

The nominal values of the parameters of CM of the subject of training in the day and evening department have the significant differences, which are directly related with the features of examinees and the conditions of carrying out of a series of experiments (researches).

In the day department at the trainees any more the significant anomalies were not revealed.

On the abnormal fluctuation of values is acting the significant influence of the physiological fatigue of the biological construct of organism in the evening time.

The important value have the anomalous values, which significantly influencing on the form of distribution, which is significantly reflected on the measures of central tendency (the main measure of central tendency, median, mode, minimum and maximum):

- the anomalous emissions – the anomalous minimum and maximum, which can potentially possible to be replaced on the average arithmetic mean for the correction of sample;
- the abnormal artifacts – the abnormal critical values, which are potentially impossible to replace on any other or average arithmetic mean.

The diagnostics of various parameters of the psychological portrait of CM of the subject of training was carried out successfully without the significant deviations from the technological process of conducting of the experimental researches and with taking into account the organization of researches.

The setting up and conducting of a series of experiments involved the practical use of the applied DM, and also a set of different of the applied methods of research:

- the convergent abilities – the method of research Amthauer R. (in the adaptation and localization of Voronina T.A., “"IP" of "RAS"”);
- the divergent abilities – the several methods of research, approved “"IP" of "RAS"”;
    - the verbal creativity – the method of research of Mednik S.A. (in the adaptation and localization of Galkina T.V. and Voronina T.A.);
    - the figurative creativity – the method of research of Torrens E.P. (in the adaptation and localization of Galkina T.V. and Voronina T.A.);
- the learning-ability – the methods of research of the implicit and explicit learning-ability;
- the cognitive styles – the methods of analysis of the bipolar properties (Gutke Yu., approved by “"IP" of "RAS"”).

A15.3.4. The parameters of the psychological portrait of the cognitive model of the means

The parameters of the psychological portrait of CM of the means of training allow to calculate the kind of information, the style and speed of presentation of the information fragments.

At the presenting of information in the view of a sequence of information fragments of the various kind and type the following parameters of displaying are used:

- the psychological parameters (are calculated and fulfilled by the algorithm);
  - the kind of information (the textual – L_{14} [used], the tabular – L_{15} [used], the schematic planar – L_{16} [used], the schematic volumetric – L_{17} [not used], the sound as main – L_{18} [not used], the sound as accompaniment – L_{19} [not used], the combined – L_{20} [not used], the special scheme – L_{21} [not used]);
- the psychological parameters (by default, if the processor is switch off);
  - the inclusion of additional capabilities (the correction of a sequence of statement – L_{22} [the element of navigation], the navigation by the course – L_{23} [the navigator of the first type is used], the addition of modules – L_{24} [not used], the selection of the kind of information – L_{25} [not used], the selection of the style of presentation of the information fragments – L_{26} [not used], the selection of the speed of presentation – L_{27} [not used], the creative tasks – L_{28} [not used], the additional modules – L_{29} [not used], the additional literature and sources – L_{30} [not used]);
  - the style of presentation (the holistic presentation – L_{31} [not used] or the detailed presentation – L_{32} [not used], the automatic – L_{33} [not used] or manual switching – L_{34} [not used], the constant – L_{35} [not used] or variable type of information – L_{36} [not used], the deep concretization – L_{37} [not used] or the abstract statement – L_{38} [not used], the simplicity of statement – L_{39} [not used] or the complexity of statement – L_{40} [not used], the wide – L_{41} [not used] or narrow set of terms – L_{42} [not used] at the displaying of information fragments);
  - the speed of visual representation of the information fragments (the high – L_{43} [used], the low – L_{44} [used]).

The procedure of processing of the psychological parameters in the basis of the adaptive representation of information fragments processor directly provides the calculation of the optimal psychological parameters of displaying of the information.

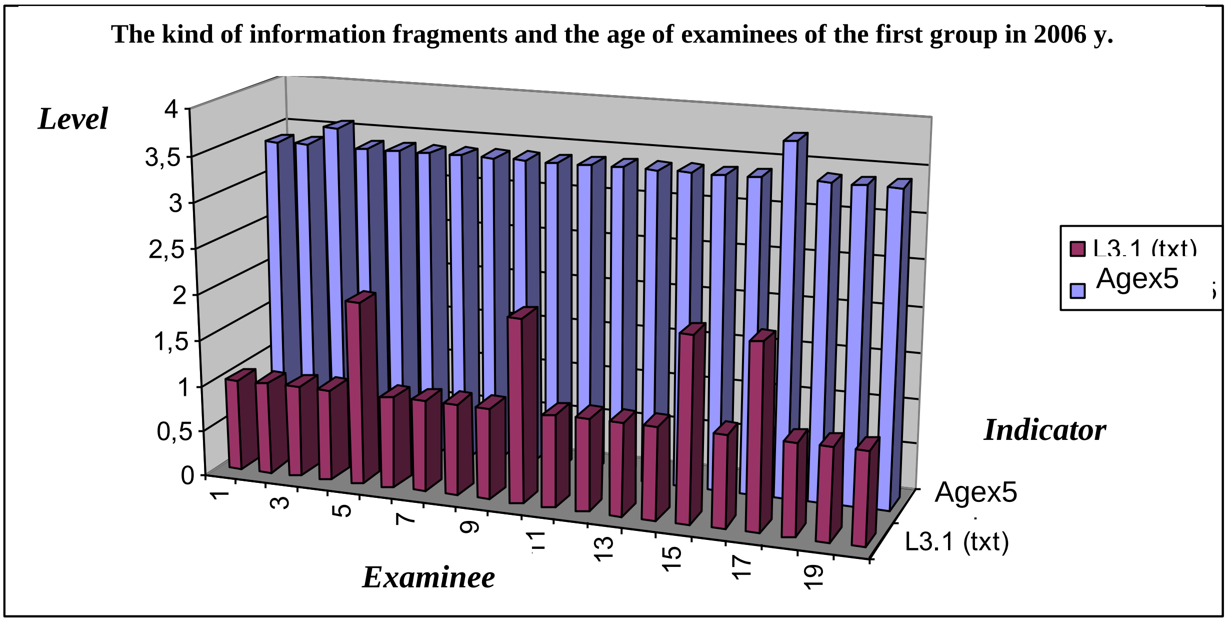
In pic. A15.25-A15.30 the diagrams with the results of research of the psychological parameters of displaying of the information by the means of training are presented directly.

In pic. A15.25 the diagrams are presented directly, which reflect the dynamics of age and the kind of information fragments in the three groups of day department in 2006 y., at the same time the several important designations for the providing of interpretation are used directly:

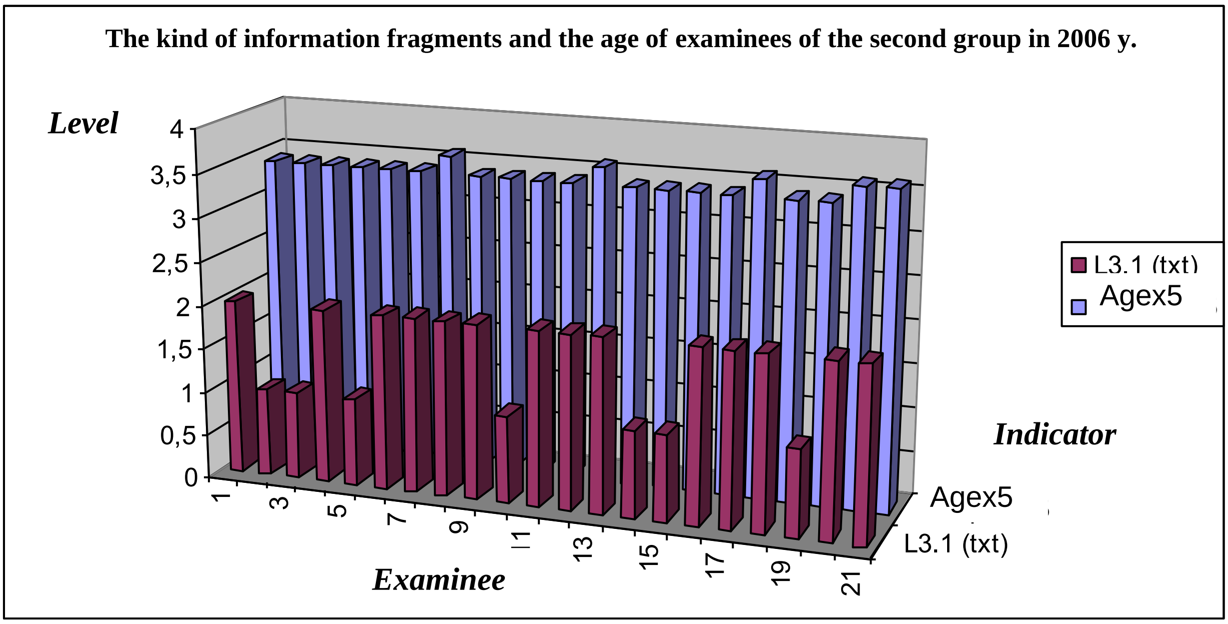
- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- Age – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

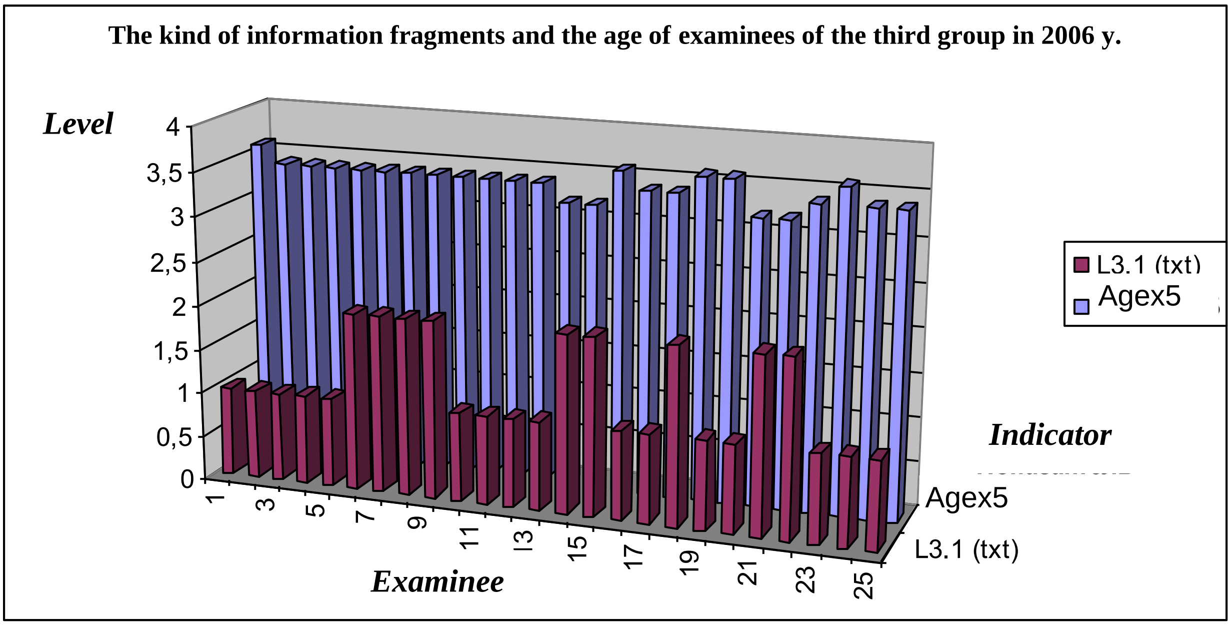
- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



a



b



c

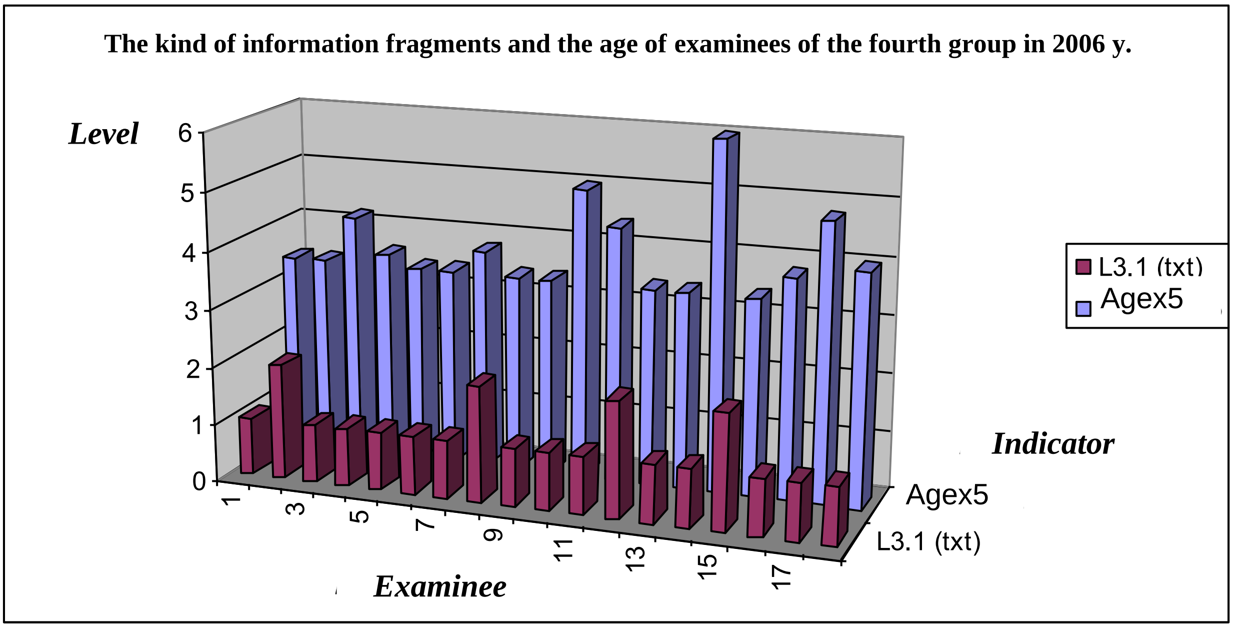
Picture A15.25. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2006 y.

In pic. A15.26 the diagrams are presented directly, which reflect the dynamics of the age and the kind of information fragments in the two groups of evening department in 2006 y., at the same time the several important designations (indexes and identifiers) are used:

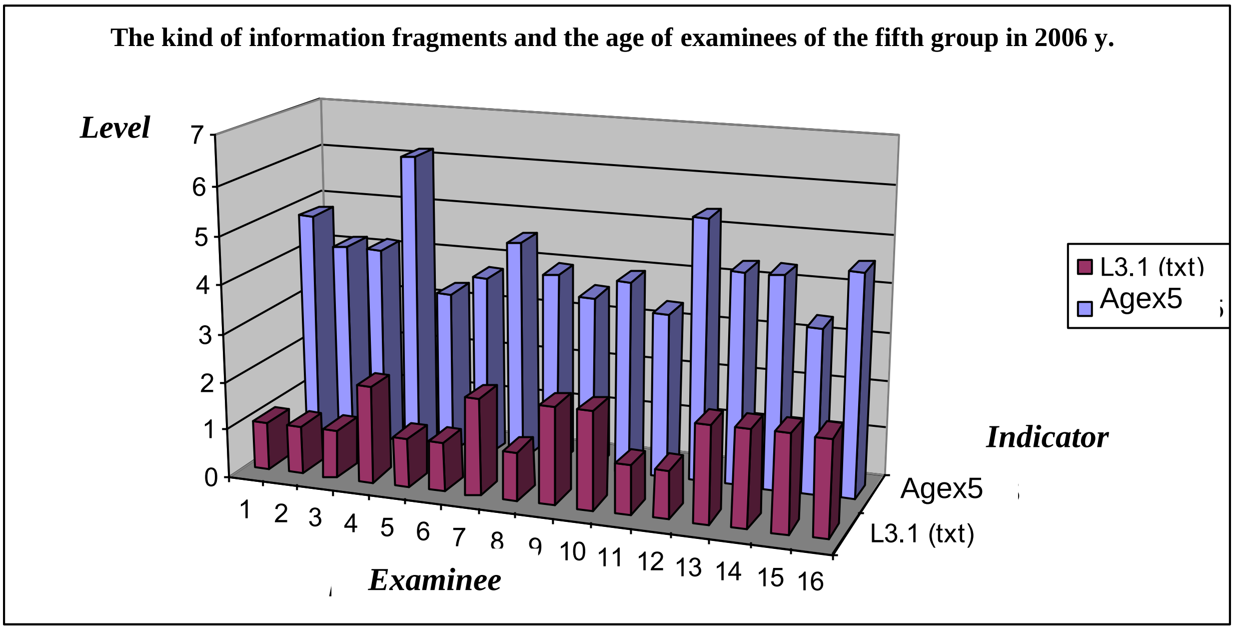
- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- Age – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



a



b

Picture A15.26. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the evening department in 2006 y.

In the presented samples with a posteriori data of research of the parameters of displaying of the information fragments in 2006 y. the heterogeneities were not revealed:

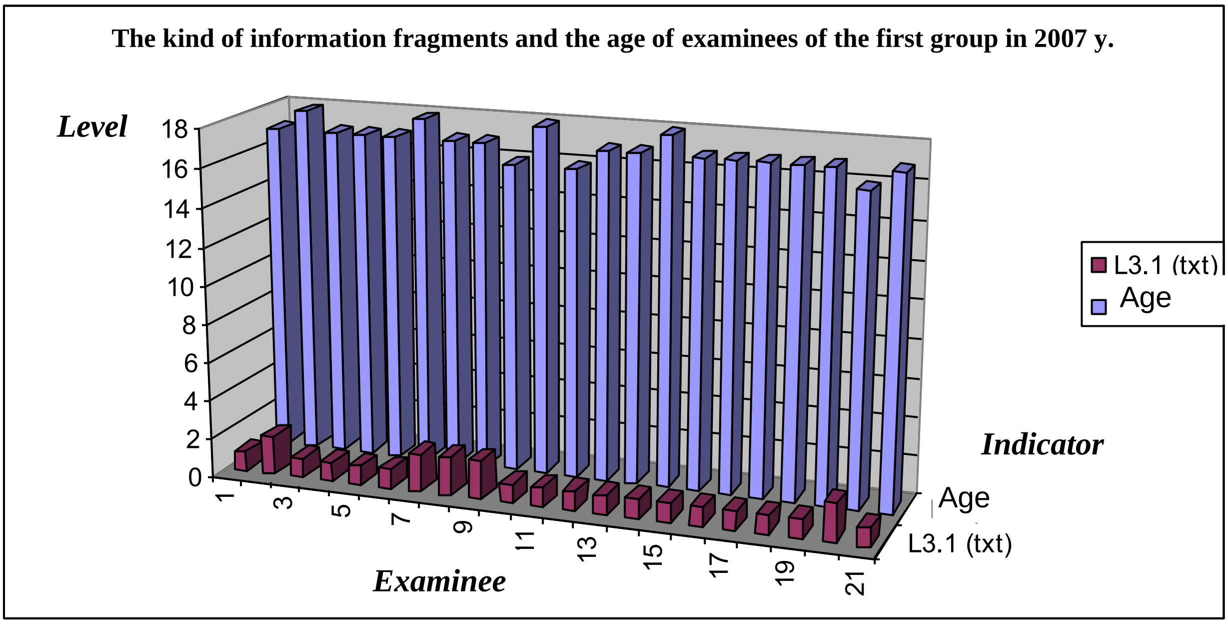
- in the three groups of day department of the chair “ACP” there are no the significant anomalies, which allows to speak about the suitability of data for the statistical processing;
    - the sample $L_{3.1}$ (the kind of information fragment) – there are heterogeneities of nominal values, that is caused by the specifics of encoding of the way of displaying of the information fragment and the features of functioning of the adaptive representation of information fragments processor;
    - the sample Age (the age) – there are the heterogeneities of nominal values, that is caused by the differentiation of trainees of the day department by the age;
- in the two groups of evening department there are no the significant heterogeneities, that allows to speak about the suitability of data for the statistical processing;
    - the sample $L_{3.1}$ (the kind of information fragment) – there are the heterogeneities of nominal values, that is caused by the specifics of encoding of the way of displaying of the information fragment and the features of functioning of the adaptive representation of information fragments processor;
    - the sample Age (the age) – there are the heterogeneities of nominal values, that is caused by the differentiation of trainees of the day department by the age.

In pic. A15.27 the diagrams is presented directly, which reflect the dynamics of age and the kind of information fragments in the three groups of day department in 2007 y., at the same time the several important designations (the indexes and identifiers) are used:

- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- Age – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



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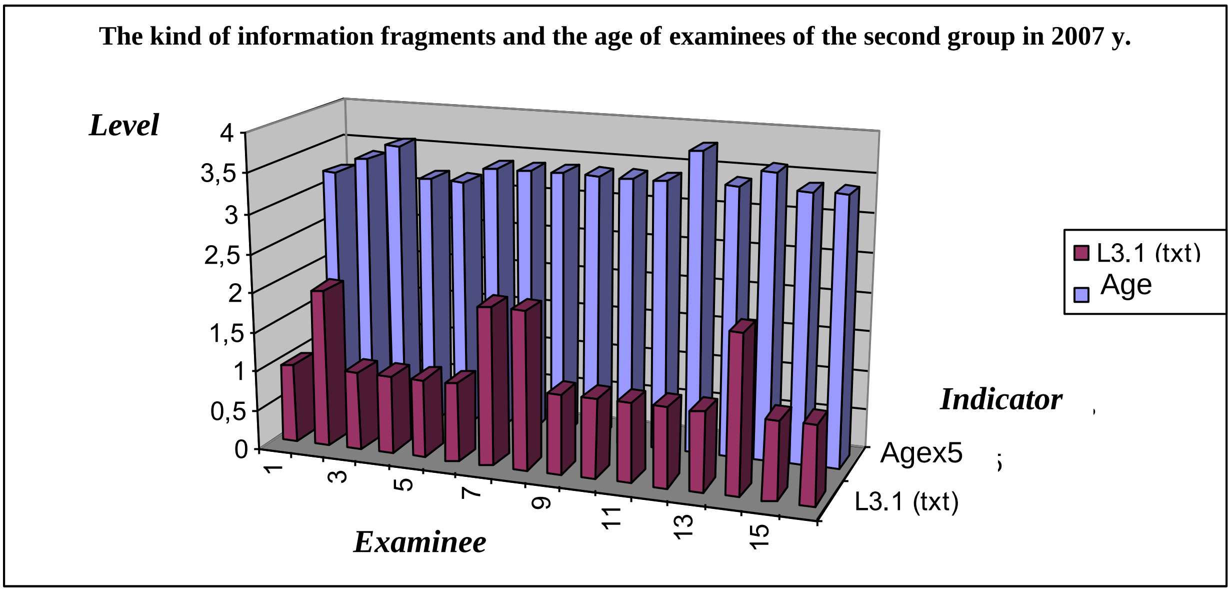

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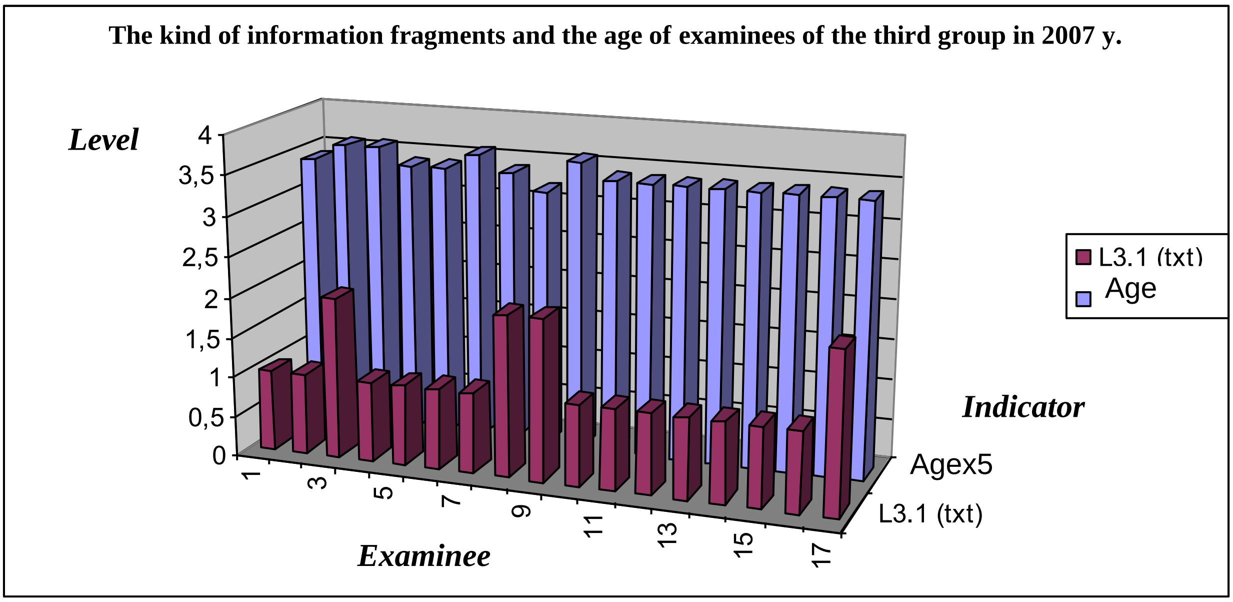


c

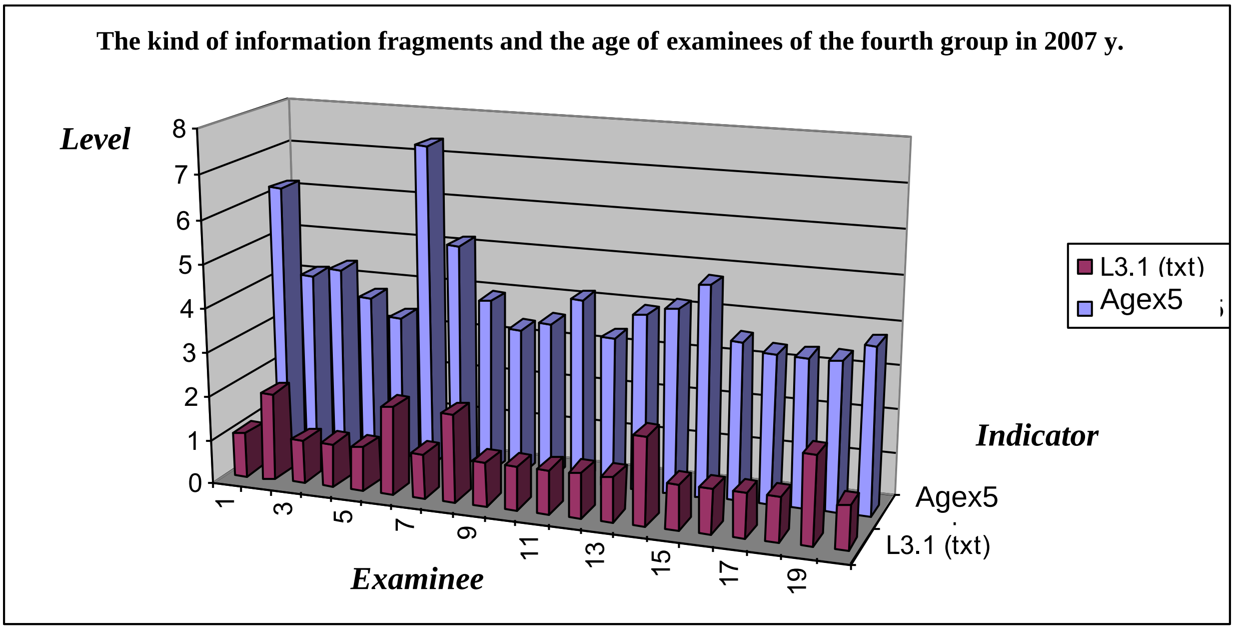
Picture A15.27. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2007 y.

In pic. A15.28 the diagrams is presented directly, which reflect the dynamics of age and the kind of information fragments in the two groups of evening department in 2007 y., at the same time the several important designations (the indexes and identifiers) are used:

- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- Age – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



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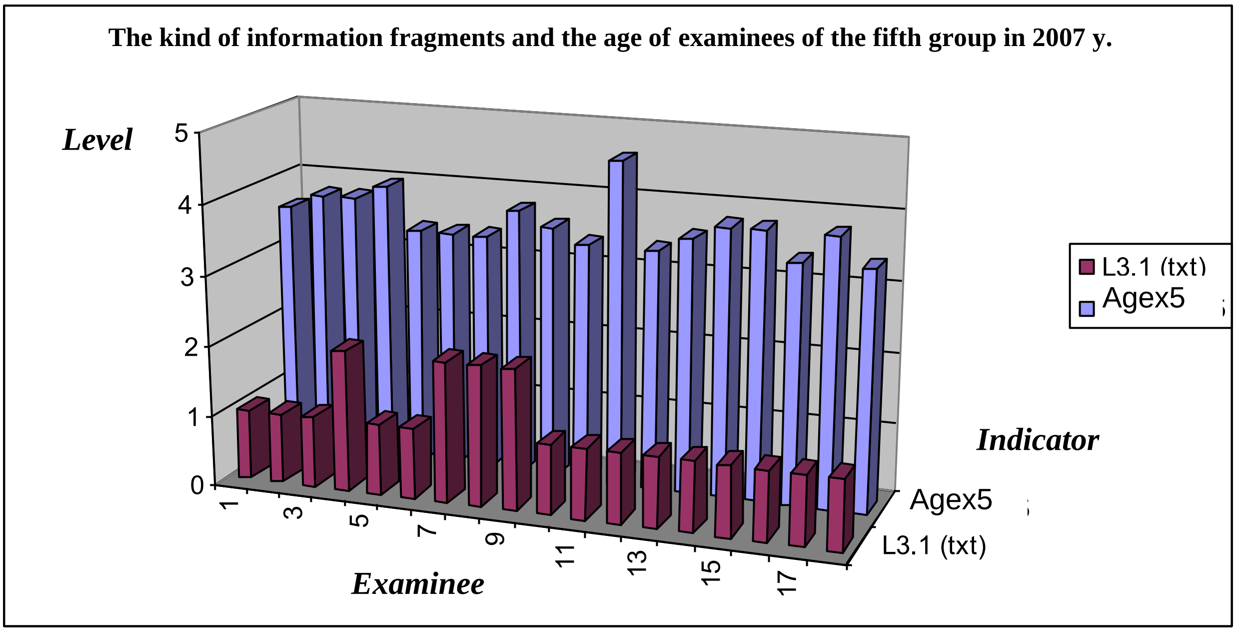


b

Picture A15.28. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2007 y.

In the presented samples with a posteriori data of research of the parameters of displaying of the information fragments in 2007 y., the heterogeneities were not revealed:

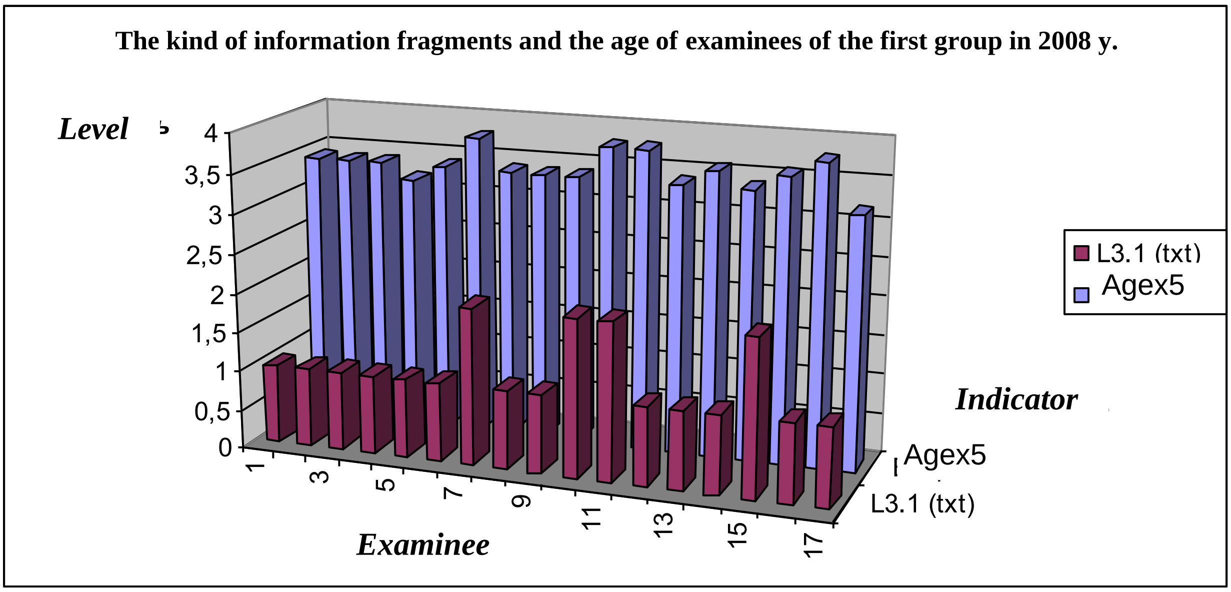
- In the three groups of day department of the chair "ACP" there are no the significant anomalies, that allows to speak about the suitability of data for the statistical processing;
    - the sample $L_{3.1}$ (the kind of information fragment) – there are the heterogeneities of nominal values, that is caused by the specifics of encoding of the way of displaying of the information fragment and the features of functioning of the adaptive representation of information fragments processor;
    - the sample Age (the age) – there are heterogeneities of nominal values, which is caused by the differentiation of trainees of the day department by the age;
- in the two groups of evening department of the chair "ACP" there are no the significant heterogeneities, that allows to speak about the suitability of data for the statistical processing;
    - the sample $L_{3.1}$ (the kind of information fragment) – there are the heterogeneities of nominal values, that is caused by the specifics of encoding of the way of displaying of the information fragment and the features of functioning of the adaptive representation of information fragments processor;
    - the sample Age (the age) – there are the heterogeneities of nominal values, that is caused by the differentiation of trainees of the evening department by the age.

In pic. A15.29 the diagrams are presented directly, which reflect the dynamics of age and the kind of information fragments in the three groups of day department in 2008 y., at the same time the several important designations (indexes and identifiers) are used:

- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- Age – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



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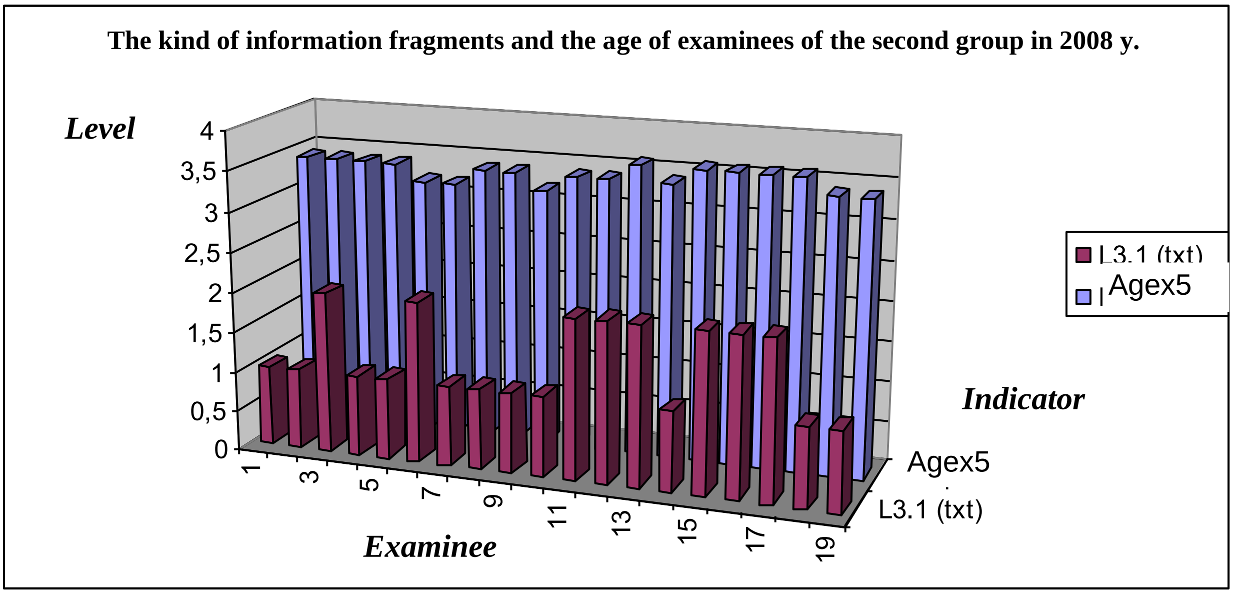

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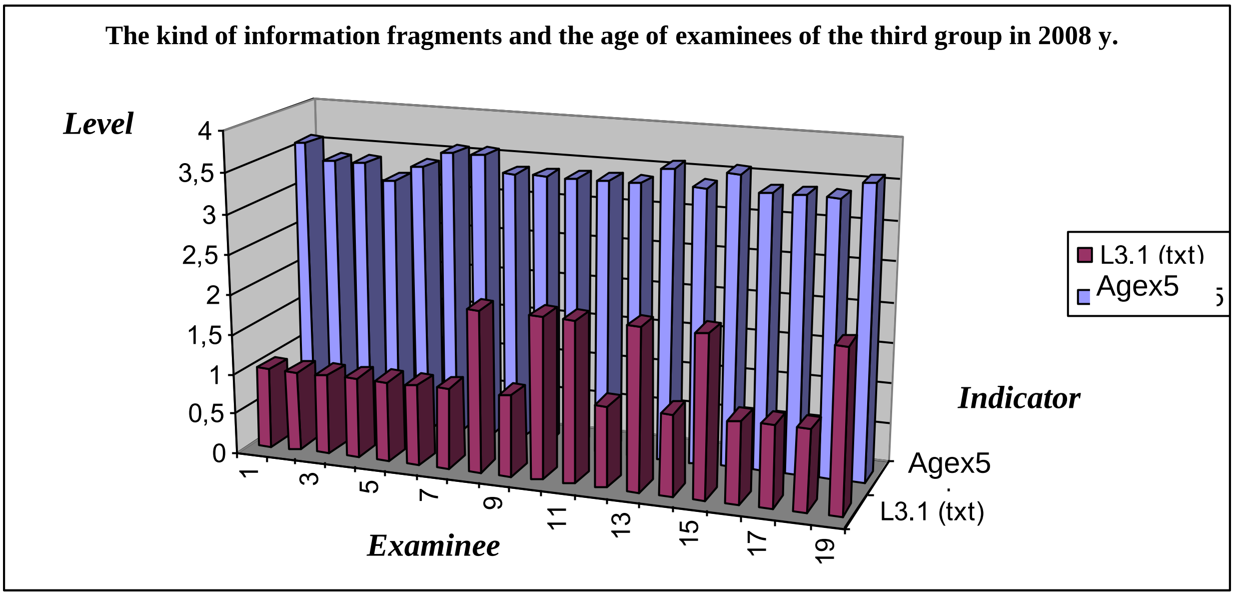


c

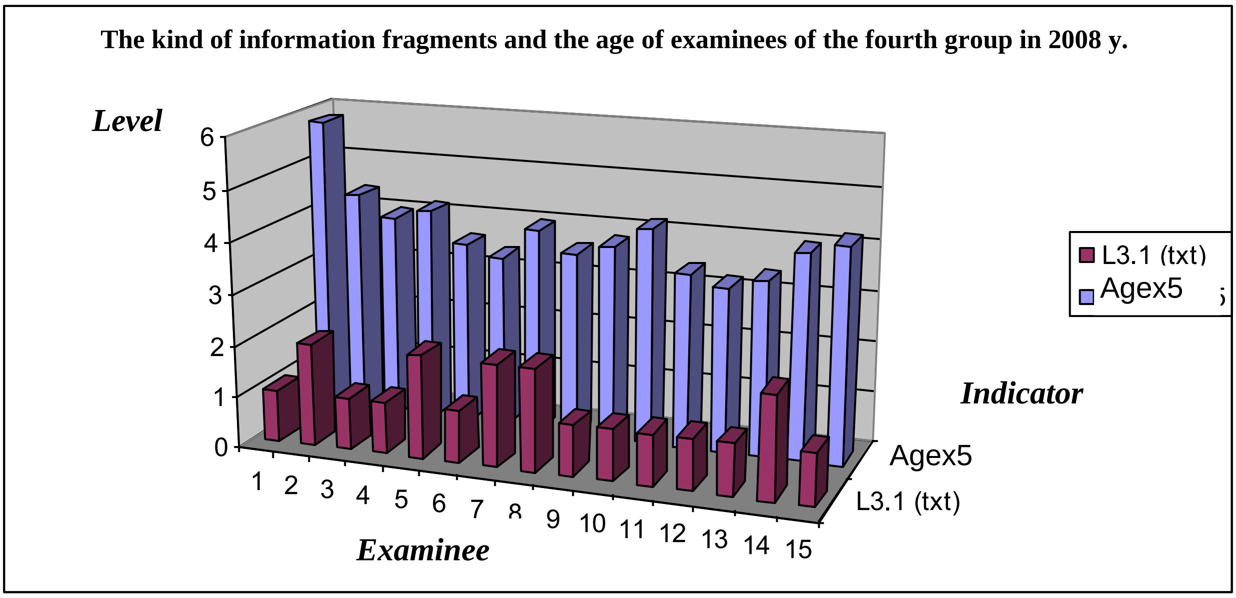
Picture A15.29. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2008 y.

In pic. A15.30 the diagrams are presented directly, which reflect the dynamics of age and the kind of information fragments in the two groups of evening department in 2008 y., at the same time the several important designations (indexes and identifiers) are used:

- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- Age – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



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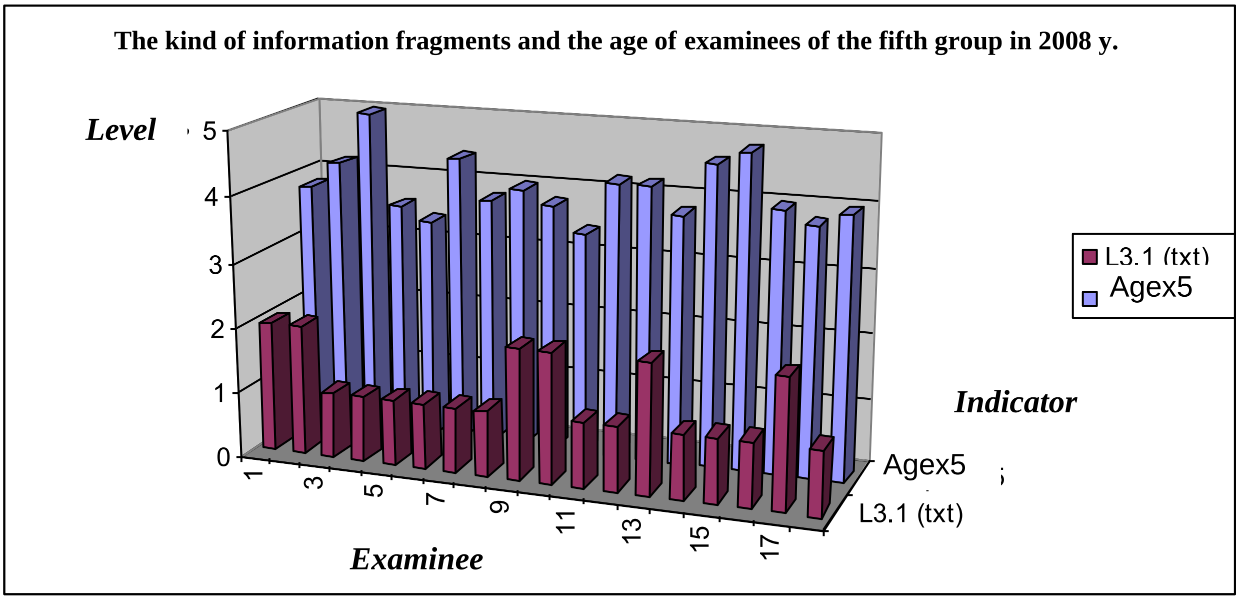


b

Picture A15.30. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2008 y.

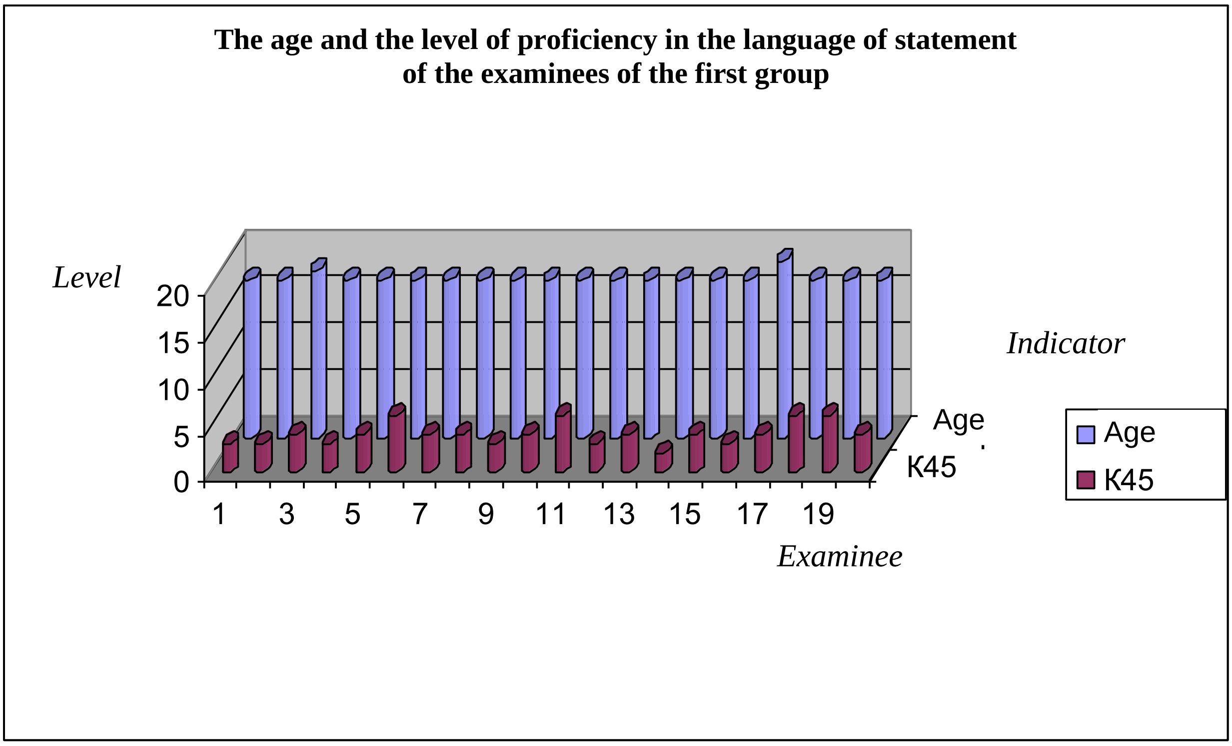
In the presented samples with a posteriori data of research of the parameters of displaying of the information fragments in 2008 y. the heterogeneities were revealed:

- in the three groups of day department of the chair "ACP" there are no the significant anomalies, that allows to speak about the suitability of data for the statistical processing;
  - the sample $L_{3.1}$ (the kind of information fragment) – there are the heterogeneities of nominal values, that is caused by the specifics of encoding of the way of displaying of the information fragment and the features of functioning of the adaptive representation of information fragments processor;
  - the sample Age (the age) – there are the heterogeneities of nominal values, that is caused by the differentiation of trainees of the day department by the age;
- in the two groups of evening department of the chair "ACP" there are no the significant heterogeneities, that allows to speak about the suitability of data for the statistical processing;
  - the sample $L_{3.1}$ (the kind of information fragment) – there are the heterogeneities of nominal values, that is caused by the specifics of encoding of the way of displaying of the information fragment and the features of functioning of the adaptive representation of information fragments processor;
  - the sample Age (the age) – there are the heterogeneities of nominal values, that is caused by the differentiation of trainees of the evening department by the age.

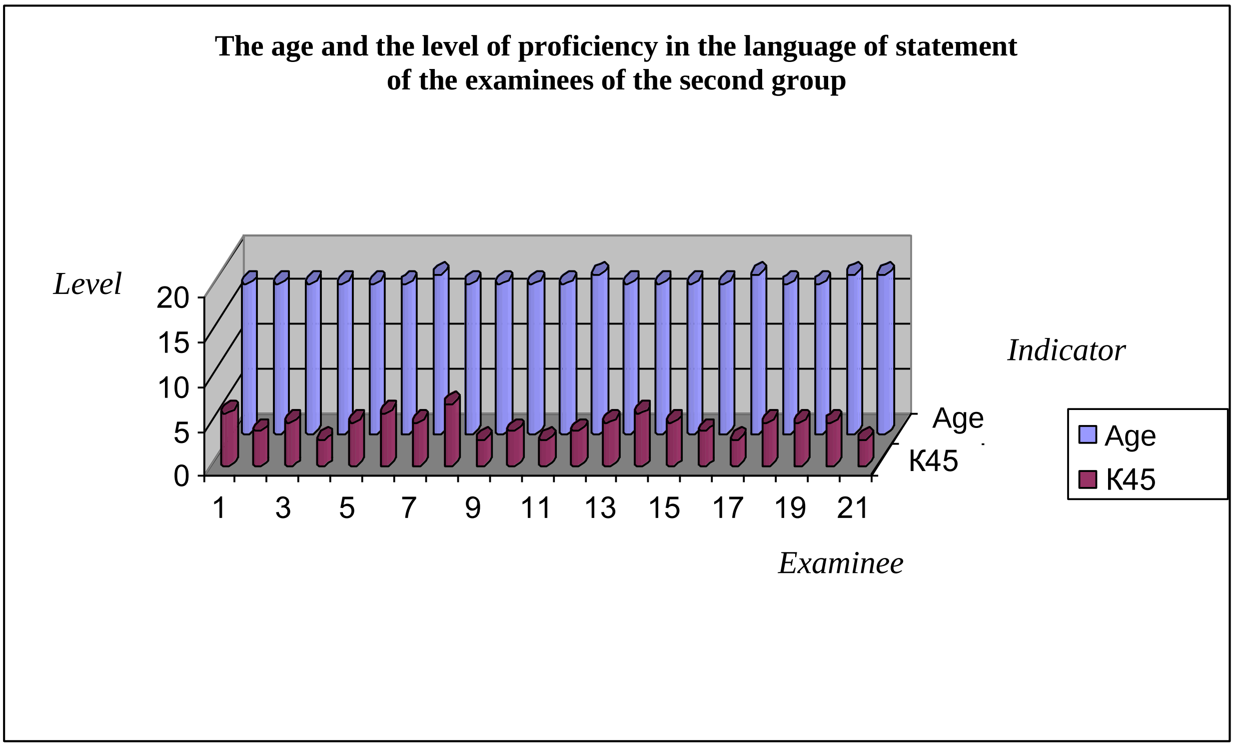
A15.3.5. The parameters of the linguistic portrait of the cognitive model of the subject

The linguistic abilities of the subject of training are determined by the level of proficiency in the language of statement of the material and the potential ability to understand the content of a sequence of information fragments on the certain level of statement, measured by the means of using of the various tests in BD of the applied DM.

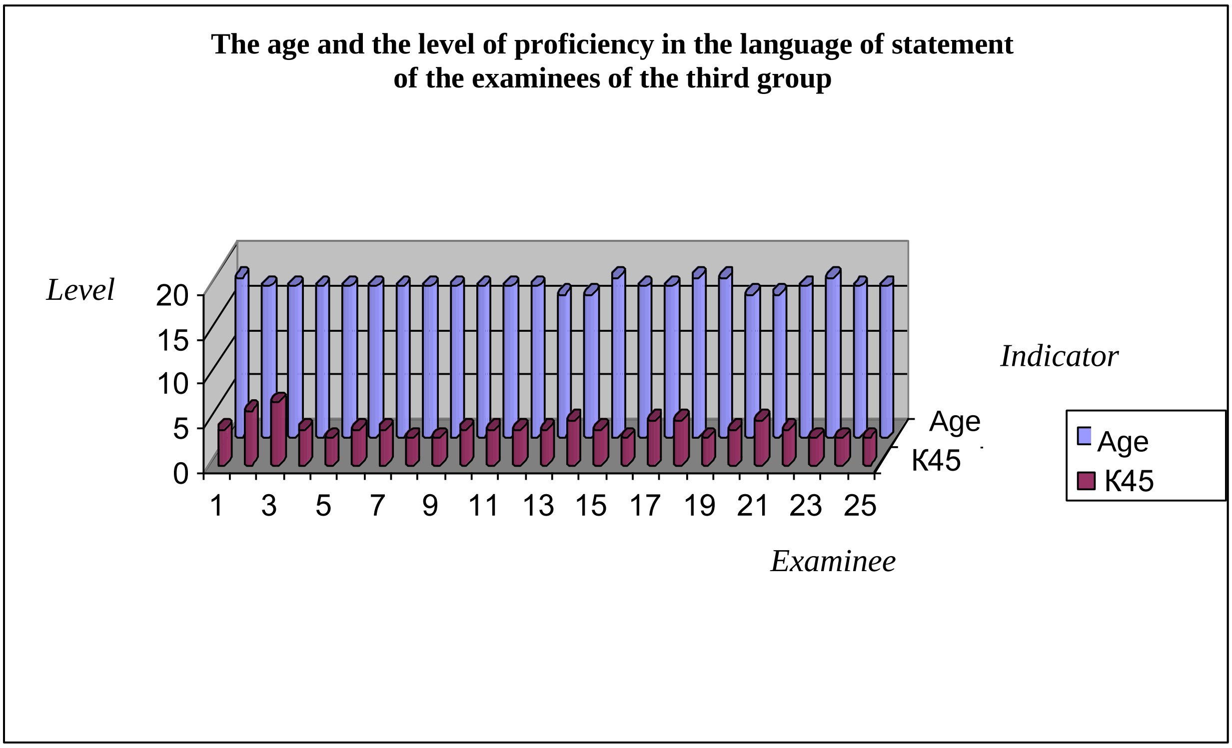
In pic. A15.31 the columnar diagram with a posteriori data of diagnostics of the linguistic abilities of the two groups of evening department for 2006 y. is presented directly.



a



b

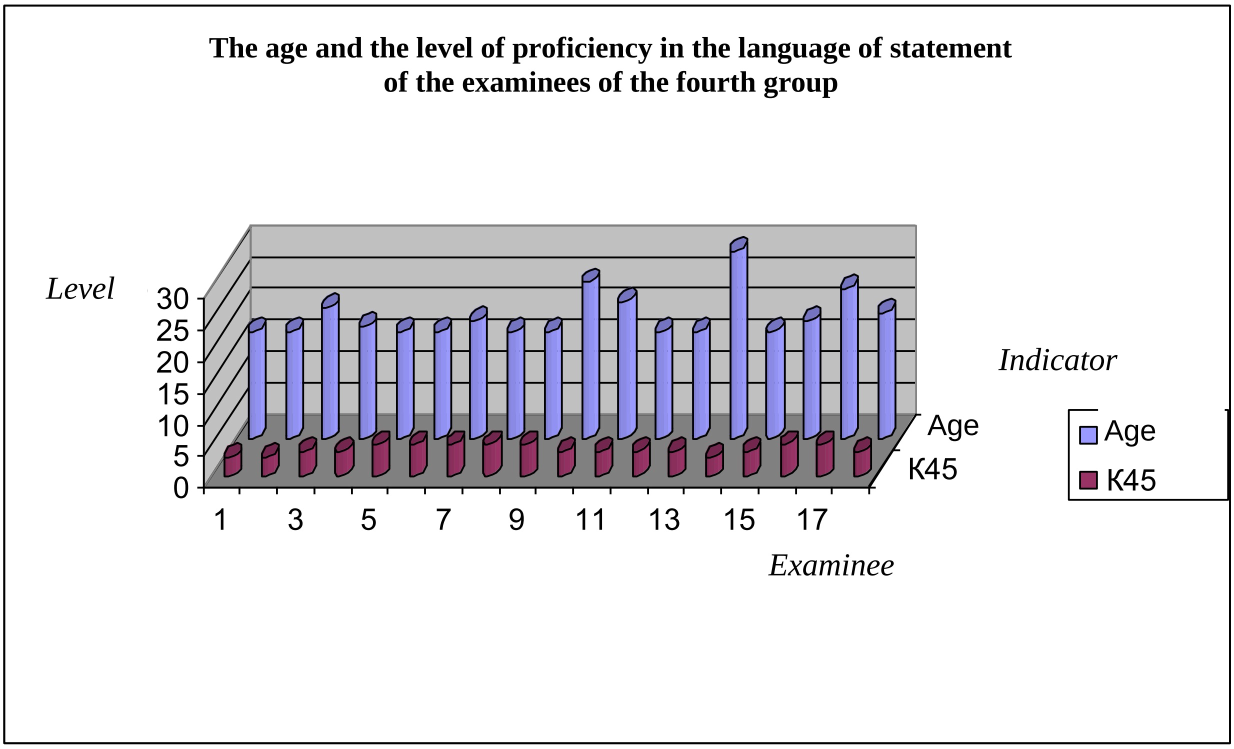


c

Picture A15.31. The level of proficiency in the language of statement of the trainees of day department in 2006 y.

In the result of the analysis of the obtained diagrams with the results of research of the level of proficiency in the language of statement of the examinees (Age and K_{45}) in the three groups of day department the heterogeneities were not revealed, the measures of central tendency were not changed.

There are the very insignificant fluctuations in the variables Age and K_{45}, which do not influence on the measures of central tendency of a sequence of nominal values.



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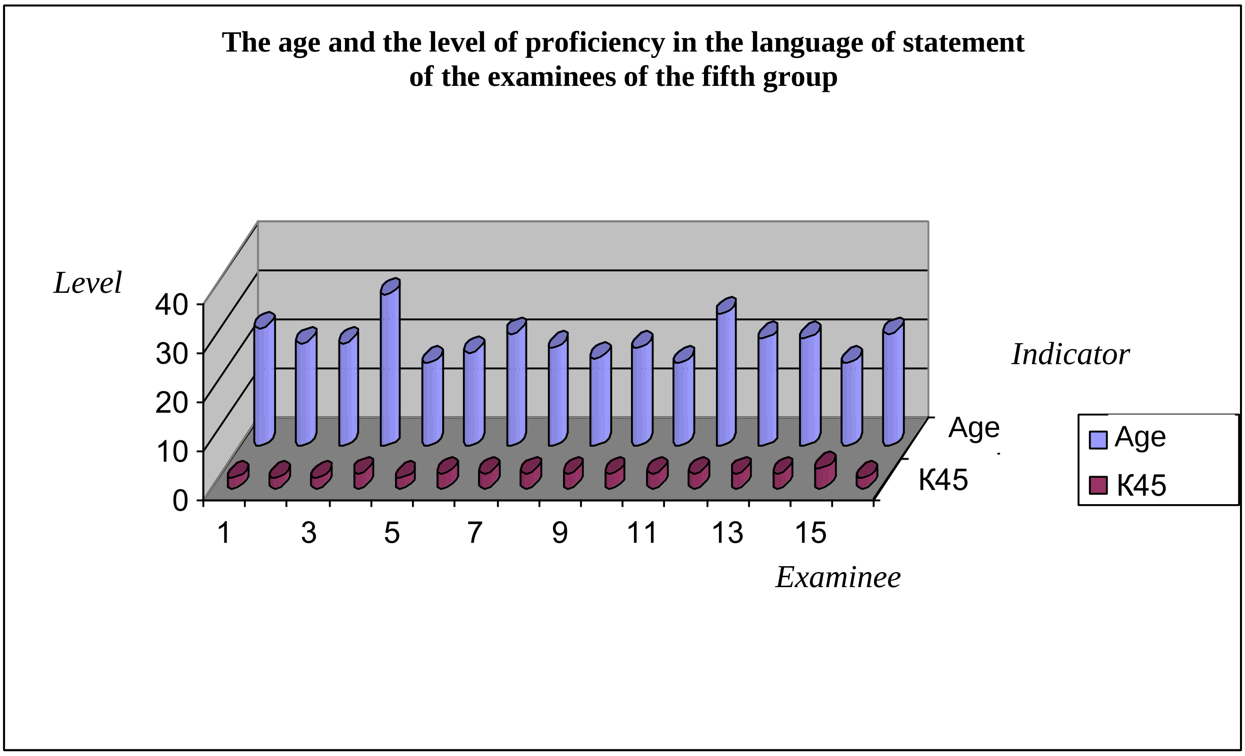
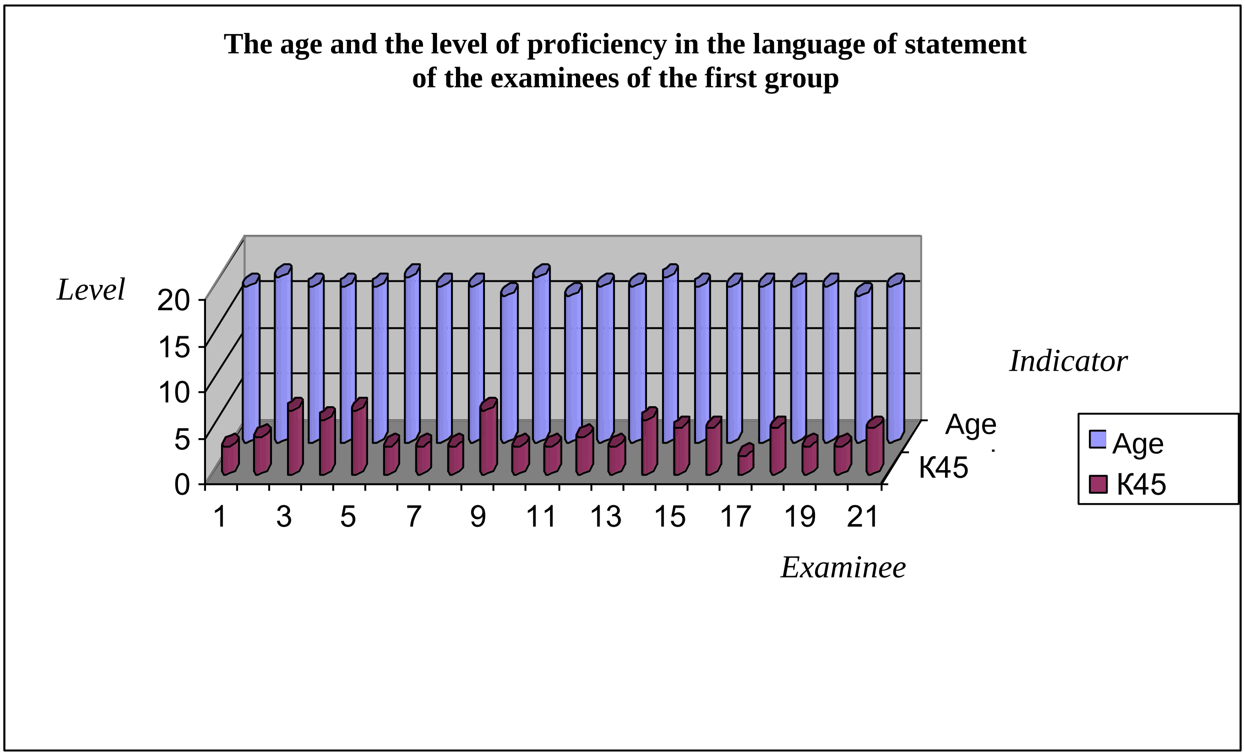


b

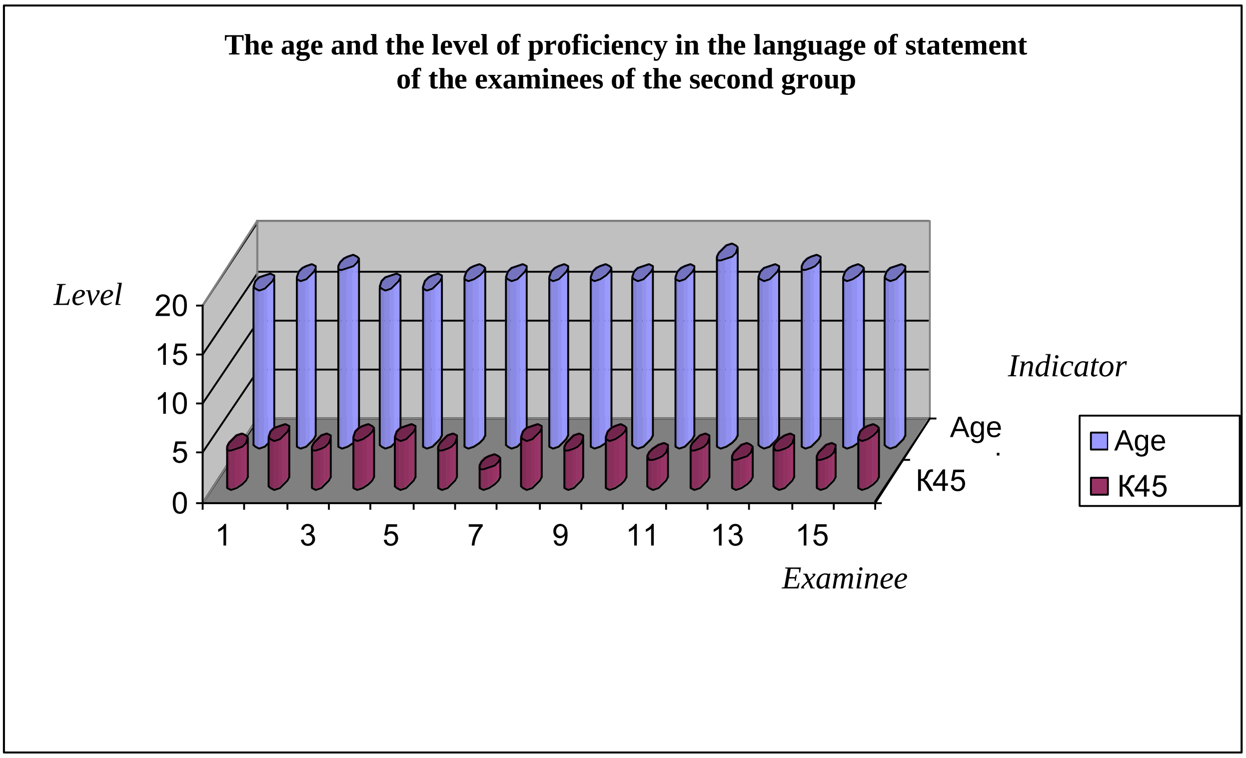
Picture A15.32. The level of proficiency in the language of statement of the trainees of evening department in 2006 y.

In the result of the analysis of the obtained diagrams with the results of research of the level of proficiency in the language of statement (Age and K_{45}) in the two groups of evening department the heterogeneities were not revealed, but the fluctuations are more pronounced in relation to the daytime.

There are the several relative emissions in the variables Age and K_{45}, which do not influence on the measures of central tendency of a sequence of nominal values.



a



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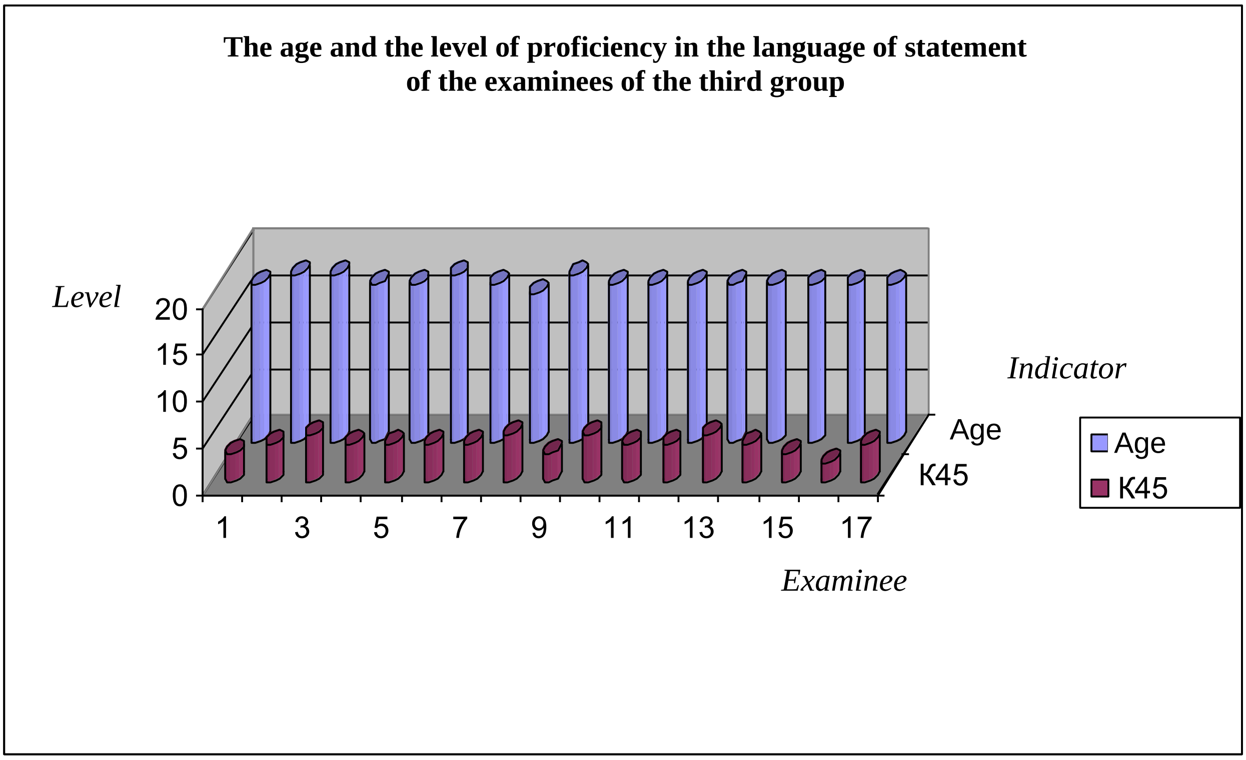
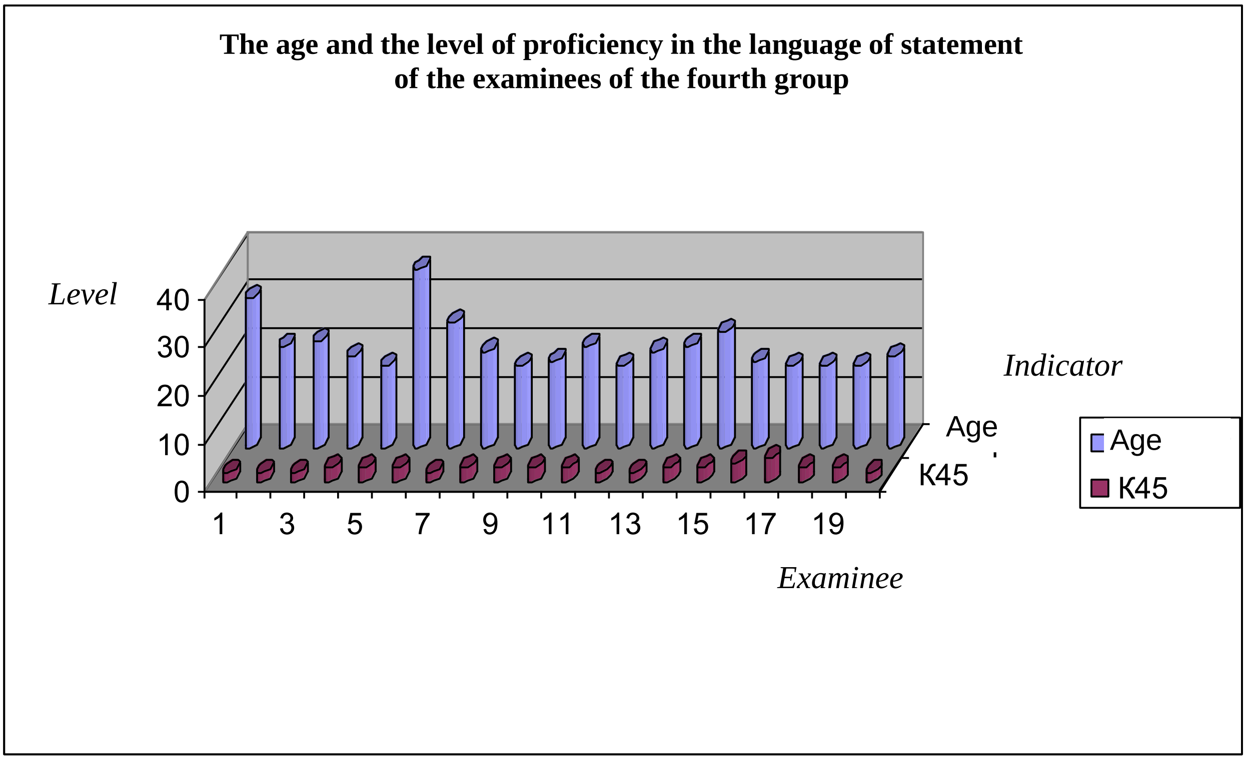


c

Picture A15.33. The level of proficiency in the language of statement of the trainees of day department in 2007 y.

In the result of the analysis of the obtained diagrams with the results of research of the level of proficiency in the language of statement of the examinees (Age and K_{45}) in the three groups of day department the heterogeneities were not revealed, the measures of central tendency without changes.

There are the very insignificant fluctuations in the variables Age and K_{45}, which do not influence on the measures of central tendency of a sequence of nominal values.



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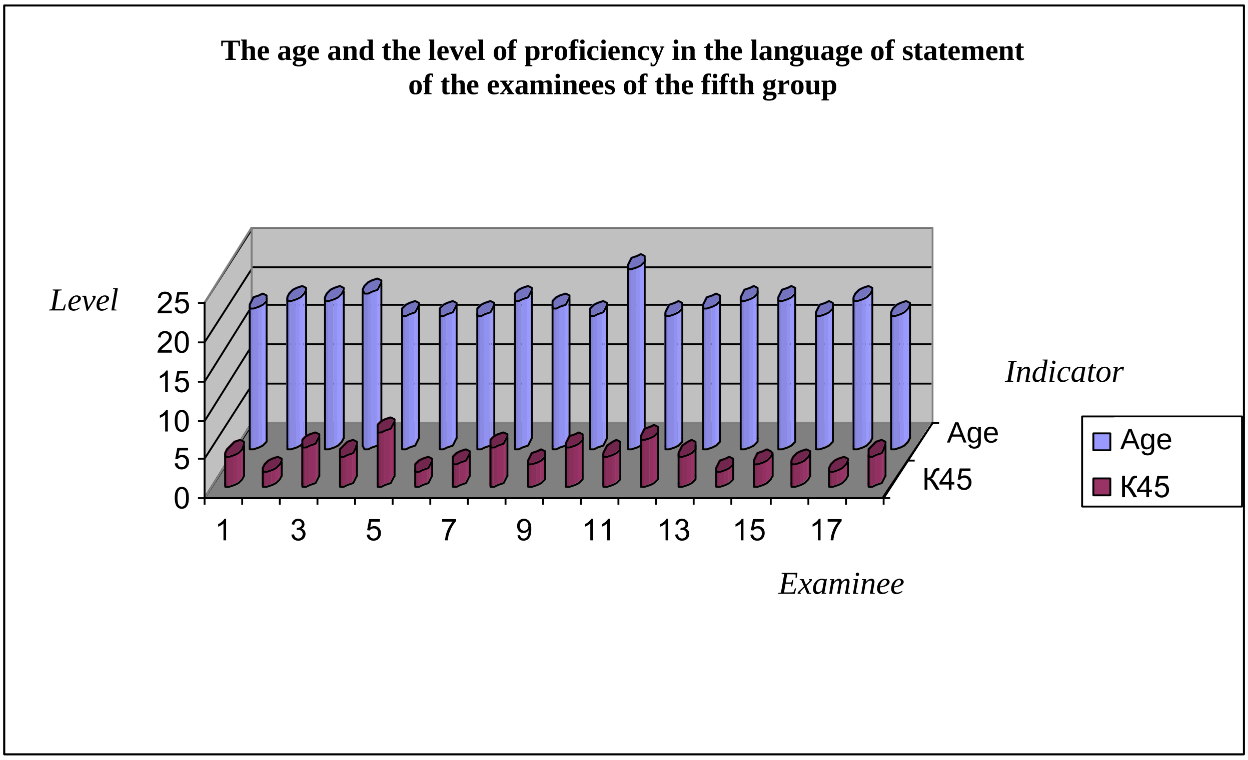


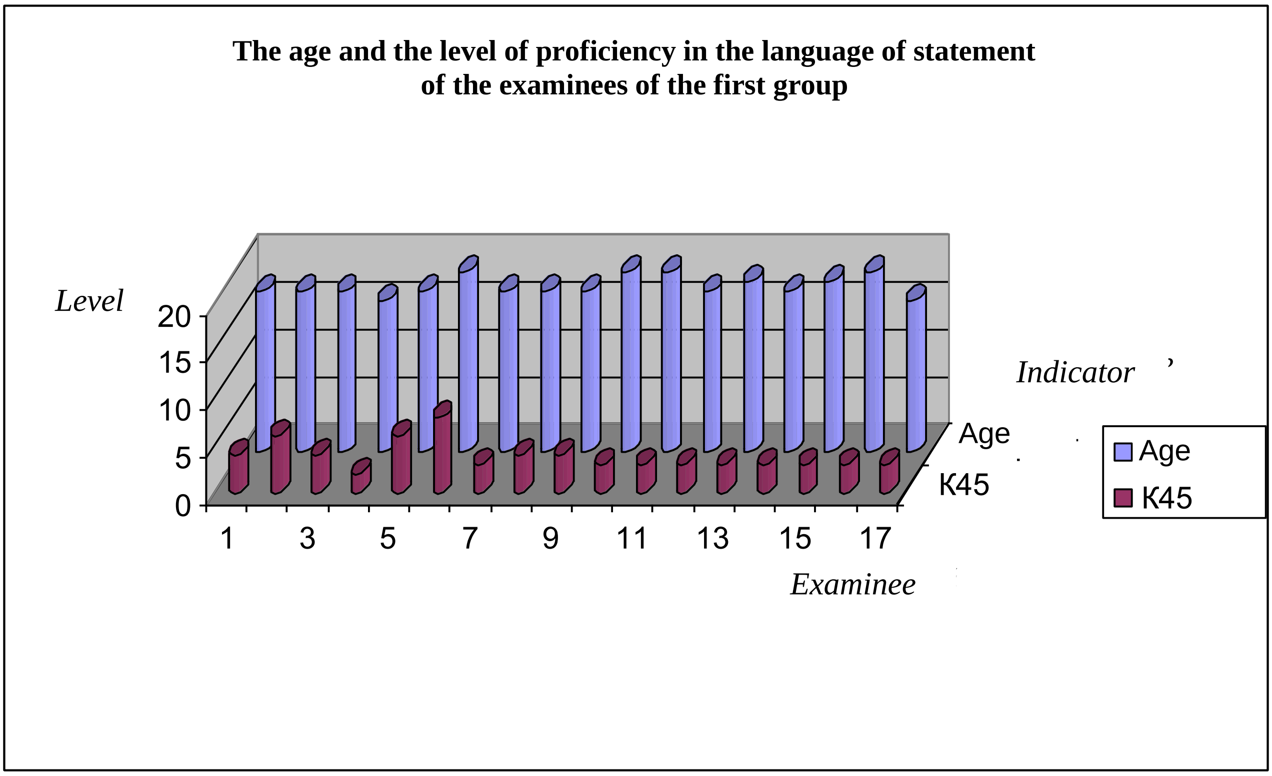
b

Picture A15.34. The level of proficiency in the language of statement of the trainees of evening department in 2007 y.

In the result of the analysis of the obtained diagrams with the results of research of the level of proficiency in the language of statement (Age and K_{45}) in the two groups of evening department the heterogeneities were not revealed, but the fluctuations are more pronounced in relation to the daytime.

There are the several relative emissions in the variables Age and K_{45}, which do not influence on the measures of central tendency of a sequence of nominal values.

The level of proficiency in the language of statement acts as the key indicator, which characterizing the quality of technological process of the formation of knowledge of the trainee, which includes a set of diverse technological gaps of the primary sensory perception, the secondary processing and understanding of the content of information fragments, that allows directly detailed to realize the system analysis of IEE.



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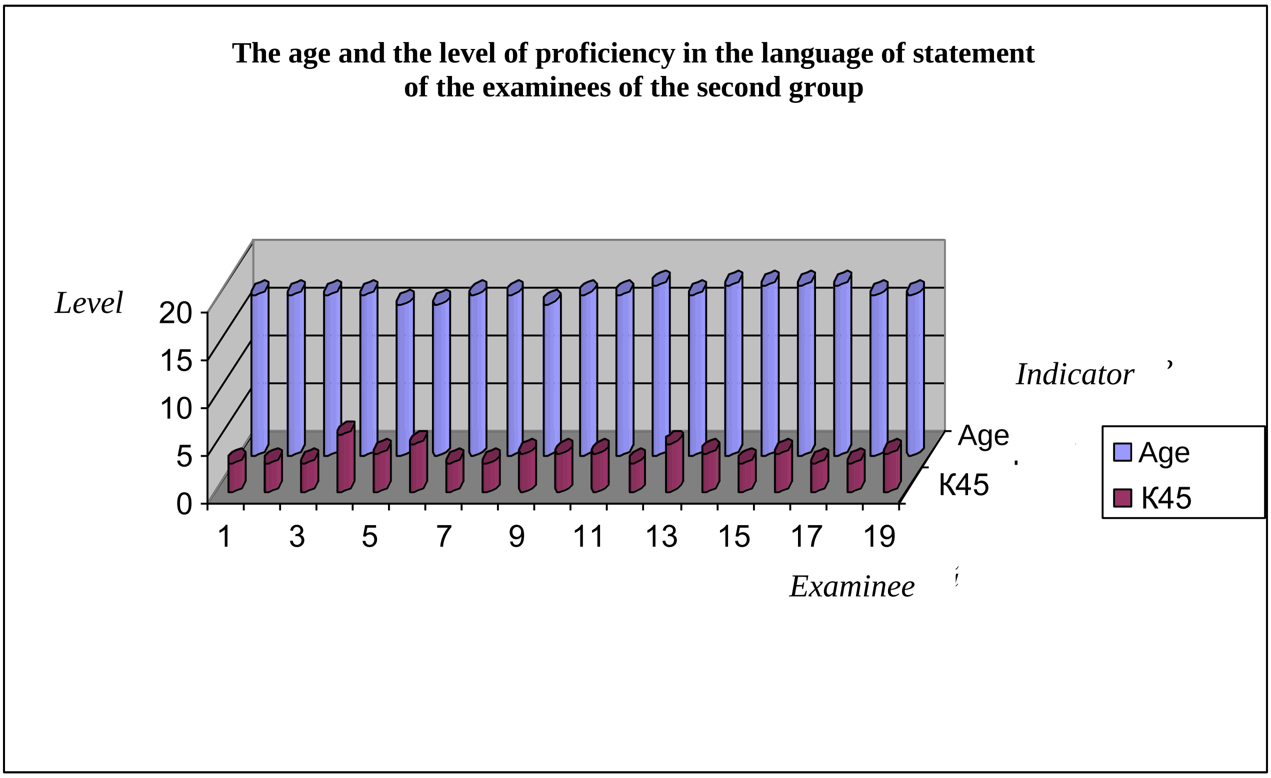

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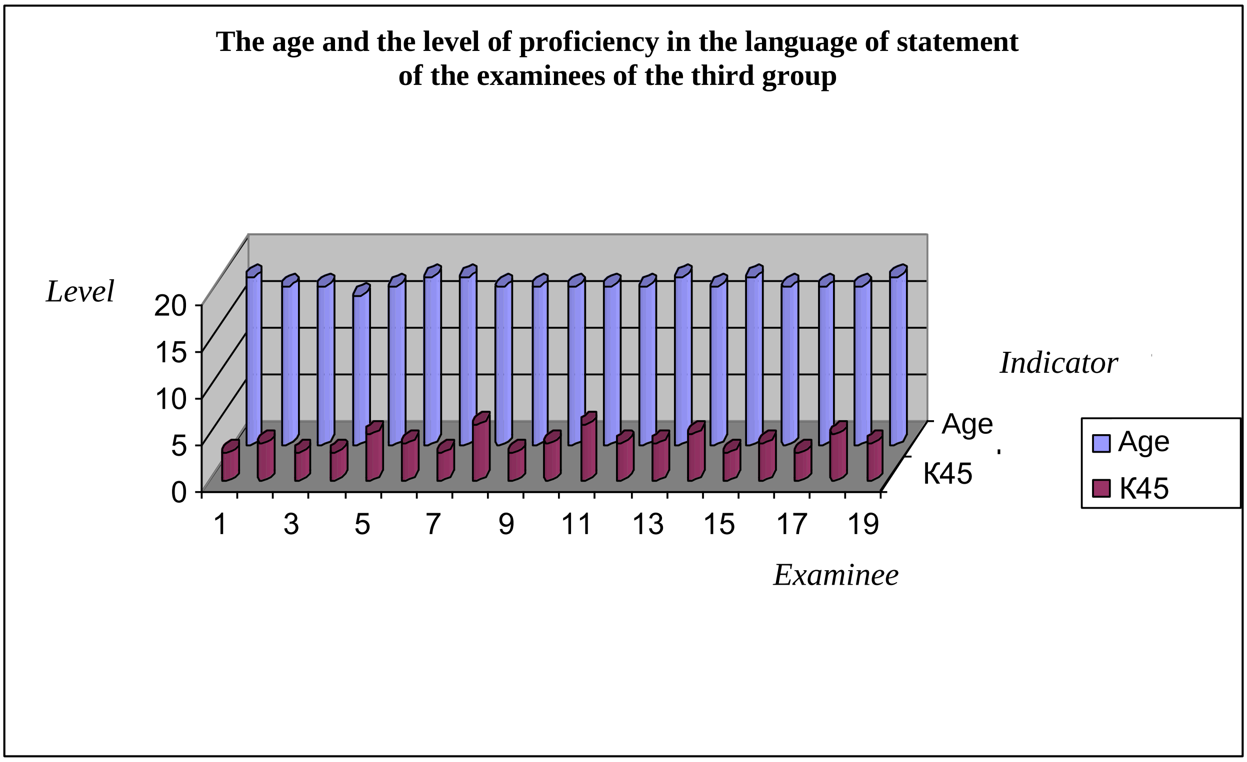
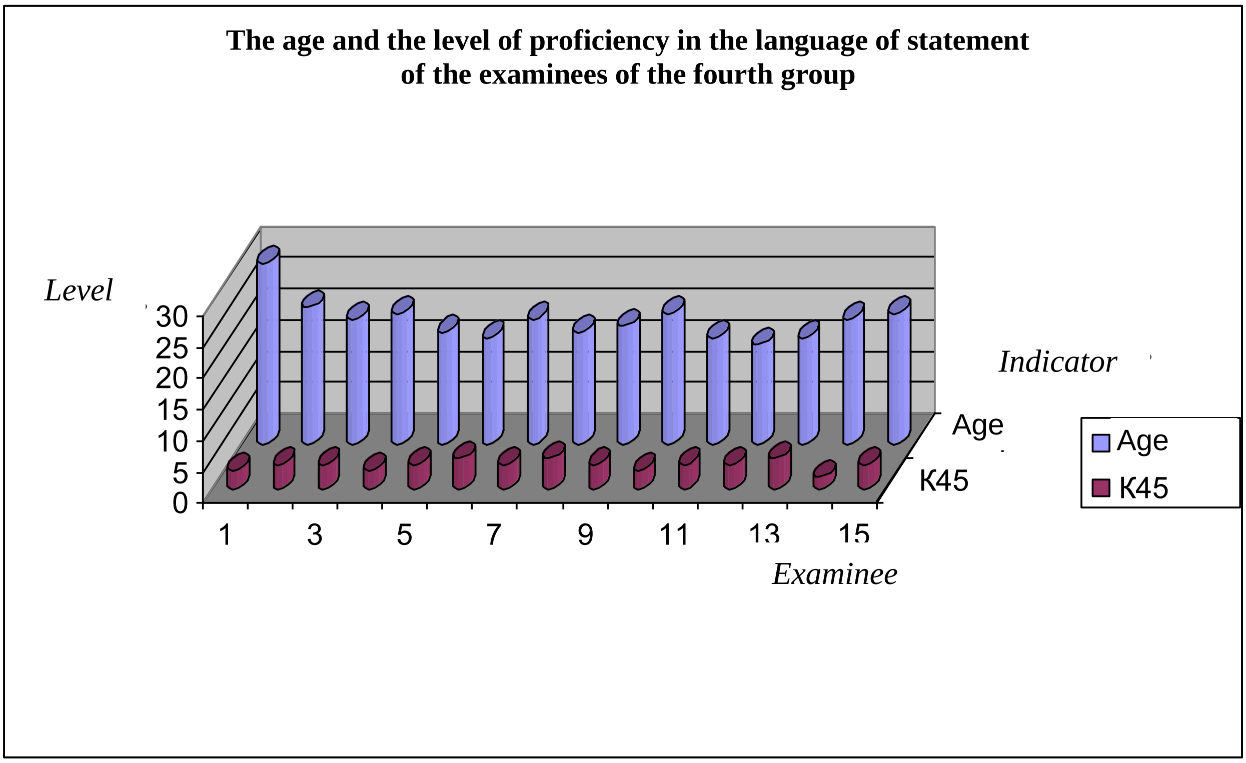


c

Picture A15.35. The level of proficiency in the language of statement of the trainees of day department in 2008 y.

In the result of the analysis of the obtained diagrams with the results of research of the level of proficiency in the language of statement of the examinees (Age and K_{45}) in the three groups of day department the heterogeneities were not revealed, the measures of central tendency without changes.

There are the very insignificant fluctuations in the variables Age and K_{45}, which do not influence on the measures of central tendency of a sequence of nominal values.



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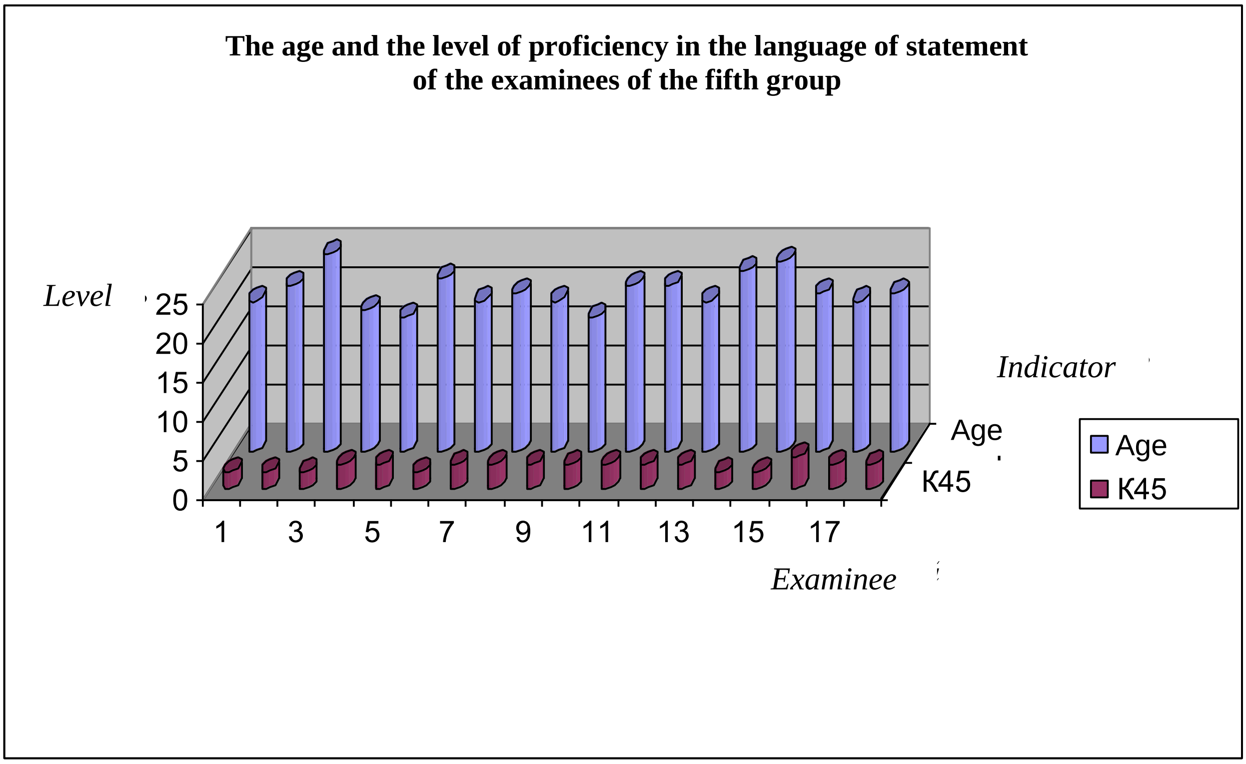

b

Picture A15.36. The level of proficiency in the language of statement of the trainees of evening department in 2008 y.

In the result of the analysis of the obtained diagrams with the results of research of the level of proficiency in the language of statement (Age and K_{45}) in the two groups of evening department there are the fluctuations of values, the measures of central tendency are practically without changes.

There are the several insignificant emissions in the variables Age and K_{45}, which do not influence on the measures of central tendency of a sequence of nominal values.

In general the several important features can be distinguished in a sequences of following of the values in the samples with a posteriori data of a series of experiments:

- the examinees of day and evening departments are differentiated by the level of proficiency in the language of statement, which is taken into account in the information fragments;
- the day and evening departments significantly differ by the dynamics of distribution of nominal values of the level of proficiency in the language of statement in a posteriori data;
- the several abnormal nominal values in the view of emissions and artefacts were revealed directly in the process of the analysis of a posteriori data of day department;
  - the form of distribution in the sample “K_{45}” is slightly different from the normal, that has no effect practically on the measures of central tendency;
- in the process of the analysis of a posteriori data of the evening department the several abnormal nominal values in the view of emissions and artifacts were revealed;
  - the sample “Age” contains the relatively differentiated values, because the examinees significantly differ by the age in the two groups.

A15.4. The justification of choosing of a set of methods of the statistical processing of a posteriori data

The degree of compliance to the normal law of distribution and the values of obtained descriptive statistics allow to limit a set of reasonable methods of the statistical analysis for the using with taking into account the requirements and restrictions.

The calculation of descriptive statistics (the measures of central tendency) by the samples with a posteriori data, taking into account the used scales of measured sign.

The dispersion statistical analysis of the variability of the resultativity of training under the influence of various factors requires the compliance of the values of measured parameters to the normal law of distribution and the homogeneity (the statistical homogeneity) of dispersions in the analyzed samples of a posteriori data, that is factually partially satisfied, so at the given moment it is not caused the advisability of using of the given method for the mathematical processing of data.

The factor analysis acts as the means of reduction of a set of investigated parameters, which causes the influence on the resultativity of technological process of the formation of knowledge (training), that allows to allocate the uncorrelated set of factors in the context of preliminary preparation to the regression and discrimination analysis (in view of the accumulated experience of conducting of the experimental researches, the labor-intensity of given method, and also the insignificant increasing of the values of CMC and CMD in the course of subsequent regression analysis of the new factorized space the method of factor analysis complexly was not used).

As the resultativity of training as the dependent value can be measured the quantitatively (the nominal value of estimation of LRKT) and nominatively (the name of estimation of LRKT or the group of trainees, formed by the value of estimation of LRKT), then the multiple regression analysis, or the discriminant analysis can be used.

The multiple regression analysis is intended for the research of relationship and the prediction of the resultativity of training in dependence from the values of a set of various factors, acting as the analogue of dispersion analysis. The results of its application with the using of the reverse step-by-step method.

The multidimensional scaling allows to construct the dendrograms, which reflect a sequence of formation of a new reduced set of observed signs.

The discriminant analysis acts as an alternative to the multiple regression analysis, if the resultativity of training is considered nominatively – LRKT, that allows (predictively) to distinguish the groups of excellent-students, good-students, triplet-students and twin-students.

The personal cards of a certain format for the registration of a posteriori data of testing of IFPST and LRTK are presented directly in the application.

A15.5. The correlation analysis

In the basis of the statistical correlation analysis is put the formation of correlation matrixes (tables), which directly reflect the correlations between the actual set of different independent variables and their nominal values.

1. The correlation analysis of the parameters of color-perception K_i.

In tabl. A15.6-A15.20 the correlation tables of the parameters of color-perception for 2006 y. is located.

Table A15.6

The correlations of the parameters of color-perception of the first group of examinees in 2006 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	0,21586	1		
K_8	-0,27221	0,441	1	
K_9	-0,13764	0,397185	**0,923393**	1

In tabl. A15.6 the strong correlation connection between deuteranopia (K_8) and $_8$tritanopia (K_9) is revealed.

Table A15.7

The correlations of the parameters of color-perception of the second group of examinees in 2006 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	0,235429	1		
K_8	-0,23367	0,043785	1	
K_9	-0,24312	0,197225	**0,771272**	1

In tabl. A15.7 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9) is revealed.

Table A15.8

The correlations of the parameters of color-perception of the third group of examinees in 2006 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	0,081659	1		
K_8	0,019212	0,16348	1	
K_9	-0,05512	0,133745	**0,943174**	1

In tabl. A15.8 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9) is revealed.

Table A15.9

The correlations of the parameters of color-perception of the fourth group of examinees in 2006 y.

		K_7	K_8	K_9
	1			
K_7	0	1		
K_8	0,248049	-0,17041	1	
K_9	0,390901	-0,24081	**0,88747**	1

In tabl. A15.9 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9) is revealed.

Table A15.10

The correlations of the parameters of color-perception of the fifth group of examinees in 2006 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	-0,25912	1		
K_8	-0,26936	0,302237	1	
K_9	-0,33901	0,357197	**0,910633**	1

In tabl. A15.10 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9) is revealed.

In tabl. A15.6-A15.10 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9) is revealed.

In tabl. A15.11-A15.15 the correlation tables of the parameters of color-perception for 2007 y. is located.

Table A15.11

The correlations of the parameters of color-perception of the first group of examinees in 2007 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	-0,21436	1		
K_8	-0,07144	-0,27001	1	
K_9	-0,29971	0,165016	**0,79847**	1

In tabl. A15.11 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), and also the negative weak connections between the age (Age) and protanopia (K_7), the age (Age) and tritanopia (K_9), protanopia (K_7) and deuteranopia (K_8) are revealed.

Table A15.12

The correlations of the parameters of color-perception of the second group of examinees in 2007 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	**-0,66609**	1		
K_8	**-0,5064**	0,429755	1	
K_9	**-0,64723**	0,408325	**0,905483**	1

In tabl. A15.12 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), the weak connection between protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9), and also the negative average connections between the age (Age) and protanopia (K_7), the age (Age) and deuteranopia (K_8), the age (Age) and tritanopia (K_9), protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9) are revealed,- with the age the sensitivity of retina of the visual sensory system is getting worse.

Table A15.13

The correlations of the parameters of color-perception of the third group of examinees in 2007 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	0,471319	1		
K_8	-0,06972	0,096927	1	
K_9	0,071607	0,143863	**0,825528**	1

In tabl. A15.13 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), and also the weak connection between protanopia (K_7) and tritanopia (K_9), the age (Age) and protanopia (K_7) are revealed.

Table A15.14

The correlations of the parameters of color-perception of the fourth group of examinees in 2007 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	-0,14629	1		
K_8	-0,0839	**0,87351**	1	
K_9	-0,02421	**0,854841**	**0,984665**	1

In tabl. A15.14 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9), and also the negative weak correlation connection between the age (Age) and protanopia (K_7) is revealed.

Table A15.15

The correlations of the parameters of color-perception of the fifth group of examinees in 2007 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	-0,34017	1		
K_8	-0,38174	**0,834785**	1	
K_9	-0,41964	**0,788871**	**0,942489**	1

In tabl. A15.15 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), the average correlation connection between protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9), and also the weak negative connections between the age (Age) and protanopia (K_7), the age (Age) and deuteranopia (K_8), the age (Age) and tritanopia (K_9) of the visual sensory system are revealed.

In tabl. A15.16-A15.20 the correlation tables of the parameters of color-perception for 2008 y. are located.

Table A15.16

The correlations of the parameters of color-perception of the first group of examinees in 2008 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	0,067994	1		
K_8	0,031091	<u>0,119203</u>	1	
K_9	<u>0,133679</u>	<u>0,163056</u>	**<u>0,951196</u>**	1

In tabl. A15.16 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), the very weak connections between protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9), the age (Age) and tritanopia (K_9) are revealed, that is caused by the features of color-perception.

Table A15.17

The correlations of the parameters of color-perception of the second group of examinees in 2008 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	-0,04219	1		
K_8	<u>0,157671</u>	<u>-0,3337</u>	1	
K_9	0,0329	<u>-0,43971</u>	**<u>0,911729</u>**	1

In tabl. A15.17 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), the weak correlation connection between the age (Age) and deuteranopia (K_8), and also the negative weak connections between protanopia (K_7) and $_7$deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9) are revealed.

Table A15.18

The correlations of the parameters of color-perception of the third group of examinees in 2008 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	<u>0,249339</u>	1		
K_8	<u>0,275574</u>	**<u>0,774022</u>**	1	
K_9	<u>0,254378</u>	**<u>0,774968</u>**	**<u>0,984207</u>**	1

In tabl. A15.18 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9), and also the weak correlation connection between the age (Age) and protanopia (K_7), the age (Age) and deuteranopia (K_8), the age (Age) and tritanopia (K_9) are revealed.

Table A15.19

The correlations of the parameters of color-perception of the fourth group of examinees in 2008 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	<u>-0,2315</u>	1		
K_8	0,020816	-0,0089	1	
K_9	0,042105	<u>0,367788</u>	**<u>0,749105</u>**	1

In tabl. A15.19 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), the weak correlation connection between protanopia (K_7) and tritanopia (K_9), and also the weak negative correlation connection between the age (Age) and protanopia (K_7) are revealed.

Table A15.20

The correlations of the parameters of color-perception of the fifth group of examinees in 2008 y.

	Age	K_7	K_8	K_9
Age	1			
K_7	<u>-0,27751</u>	1		
K_8	<u>0,113561</u>	<u>0,294211</u>	1	
K_9	0,038368	<u>0,179172</u>	**<u>0,941079</u>**	1

In tabl. A15.20 the strong correlation connection between deuteranopia (K_8) and tritanopia (K_9), the weak correlation connection between protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9), the age (Age) and deuteranopia (K_8), and also the weak negative connection between the age (Age) and protanopia (K_7) are revealed, which need to take into account in the color schemes at the displaying of information fragments.

In 2006 y. the significant anomalies in the samples with a posteriori data were not revealed, at the analysis of the content of correlation tables the regularities were revealed in the parameters of color-perception of the physiological portrait of CM of the subject of training:

- in the three groups of day department **the steady correlation relationship is revealed** between deuteranopia (K_8) and tritanopia (K_9), which is linked with the relatively equal sensitivity of the conical apparatus of retina of the visual sensory system (it is need to take into account in the color schemes of displaying);
- in the two groups of evening department **the steady correlation relationship is revealed** between deuteranopia (K_8) and tritanopia (K_9), which is linked with the relatively equal sensitivity of the conical apparatus of retina of the visual sensory system (it is need to take into account in the color schemes of displaying).

In 2007 y. the significant anomalies in the samples with a posteriori data were not revealed, at the analysis of the content of correlation tables the regularities were revealed in the parameters of color-perception of the physiological portrait of CM of the subject of training:

- in the three groups of day department **the revealed steady correlation relationship is saved** between deuteranopia (K_8) and tritanopia (K_9), which is linked with the relatively equal sensitivity of the conical apparatus of retina of the visual sensory system (it is need to take into account in the color schemes of displaying), and also **the relatively steady negative correlation relationship is revealed** between the age (Age) and protanopia (K_7) (the inverse dependence), **the less steady negative correlation relationship is revealed** between the age (Age) and deuteranopia (K_8) (the weak inverse dependence), **the relatively very unsteady negative correlation relationship is revealed** between the age (Age) and tritanopia (K_9) (the weak inverse dependence), that is reflected in the color schemes of displaying of the information fragments;
- in the two groups of evening department **the steady correlation relationship is revealed** between deuteranopia (K_8) and tritanopia (K_9), and also **the relatively strong correlation relationships were revealed** between protanopia (K_7) and deuteranopia (K_8), **the less strong statistical correlation relationships is revealed** between protanopia (K_7) and tritanopia (K_9), which are related with the relatively equal sensitivity of the three components of the conical apparatus in the basis of the structure of retina of the visual sensory system of human (it is need to take into account in the color schemes of displaying of the information).

In 2008 y. the significant anomalies in the samples with a posteriori data were not revealed, at the analysis of the content of correlation tables the regularities were revealed in the parameters of color-perception of the physiological portrait of CM of the subject of training:

- in the three groups of day department **the revealed steady corr. relationship is saved** between deuteranopia (K_8) and tritanopia (K_9), which is linked with the relatively equal sensitivity of the conical apparatus of retina of the visual sensory system (it is need to take into account in the color schemes of displaying), and also **the relatively steady less obvious negative correlation relationship is revealed** between the age (Age) and protanopia (K_7) (the inverse dependence), **the less steady less obvious positive correlation relationship is revealed** between the age (Age) and deuteranopia (K_8) (the weak inverse dependence), **the very unsteady less obvious positive correlation relationship is revealed** between the age (Age) and tritanopia (K_9) (the weak inverse dependence), and also **the relatively strong correlation statistical relationships are revealed and saved** between protanopia (K_7) and deuteranopia (K_8), **the relatively strong correlation statistical relationships are revealed and saved** between protanopia (K_7) and tritanopia (K_9);
- in the two groups of evening department **the steady correlation relationship has been revealed and continues to be saved** between deuteranopia (K_8) and tritanopia (K_9), and also **the decreasing of relatively weak statistical correlation relationships is revealed** between protanopia (K_7) and deuteranopia (K_8), **the decreasing of very weak statistical correlation relationships is revealed** between protanopia (K_7) and tritanopia (K_9), which are directly linked with the relatively equal sensitivity of the three components of the conical apparatus of retina of the visual sensor system (it is need directly to take into account in the color schemes of displaying).

In the result of processing of a posteriori data of research of the color-perception in the three groups of day department and in the two groups of evening department for 2006-2008 y. at the other equal conditions the following deduction (conclusions) can be stated:

- at the absence of pronounced dichromatia invariant the presentation of information fragments with the using of green and blue colors, as **the steady correlation relationship has been revealed and continues to be saved** between deuteranopia (K_8) and tritanopia (K_9) of the visual sensory system;
- at the absence of pronounced dichromatia with the increasing of age the sensitivity of the conical apparatus of the visual sensory system (increased dichromatia) is reduced significantly at the perceiving of red (the increasing of protanopia), green (the increasing of deuteranopia) and blue (the increasing of tritanopia) colors.

2. The correlation analysis of the parameters, characterizing the convergent abilities.

In tabl. A15.21-A15.25 the correlation tables of convergent abilities for 2006 y. is located, and also the following designations are used directly: Age – the age, K_{14} – the verbalization, K_{15} – the generalization, K_{16} – the analyticity, K_{17} – the classification, K_{18} – the arithmetic tasks, K_{19} – the combinatorics, K_{20} – the mnemonic abilities, K_{21} – the flat thinking and K_{22} – the spatial imagination.

Table A15.21

The correlations of the parameters of the convergent intellectual abilities of the first group of examinees in 2006 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,23094	1								
K_{15}	-0,05701	**0,329913**	1							
K_{16}	**-0,37505**	***0,692987***	***0,508575***	1						
K_{17}	-0,04762	**0,481956**	0,201801	0,097235	1					
K_{18}	**-0,45369**	**0,450071**	0,150512	**0,430608**	0,177155	1				
K_{19}	**-0,38288**	***0,537747***	***0,569605***	***0,637842***	0,215684	**0,435865**	1			
K_{20}	-0,23364	**0,445594**	0,131016	***0,520349***	0,085297	**0,446209**	**0,477924**	1		
K_{21}	0,006368	-0,04655	**0,423184**	-0,03381	0,099763	0,060092	0,126921	0,047279	1	
K_{22}	0,1853	0,027154	**-0,32217**	0,034472	-0,22026	0,065986	0,022874	0,024778	-0,12561	1

The note: the underlined – the weak connection, the bold italic – the medium connection. The most significant connection between the verbalization (K_{14}) and analyticity (K_{16}).

Table A15.22

The correlations of the parameters of the convergent intellectual abilities of the second group of examinees in 2006 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,19365	1								
K_{15}	0,206999	-0,13857	1							
K_{16}	-0,02504	0,121244	***0,641293***	1						
K_{17}	-0,38098	0,303379	0,052411	0,080699	1					
K_{18}	0,057677	0,362244	0,231374	**0,4839**	0,16207	1				
K_{19}	-0,24618	0,38606	**0,404801**	***0,607456***	**0,403098**	***0,50251***	1			
K_{20}	-0,17676	-0,18146	0,002612	0,06267	0,006673	-0,12934	0,038855	1		
K_{21}	-0,07774	0,103223	0,238388	0,060351	0,23471	0,399403	0,09768	0,196014	1	
K_{22}	**0,261567**	0,055132	***0,542398***	0,374326	0,255449	**0,465994**	0,108356	-0,14006	***0,53779***	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the generalization (K_{15}) and analyticity (K_{16}), analyticity (K_{16}) and arithmetic abilities (K_{19}).

Table A15.23

The correlations of the parameters of the convergent intellectual abilities of the third group of examinees in 2006 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,3248	1								
K_{15}	-0,30132	0,055114	1							
K_{16}	-0,0599	0,148151	***0,590164***	1						
K_{17}	-0,35728	0,292297	0,336406	0,38468	1					
K_{18}	-0,11476	0,310687	***0,59776***	**0,410745**	***0,52047***	1				
K_{19}	0,075942	0,064385	-0,0838	0,082027	0,159108	0,115151	1			
K_{20}	-0,14554	-0,12476	-0,02224	0,040119	-0,04698	-0,03451	0,362733	1		
K_{21}	0,168048	-0,00888	0,393664	0,309036	**0,447825**	**0,421161**	0,159625	0,173826	1	
K_{22}	-0,13295	-0,04721	0,3616	0,017721	***0,522716***	0,229891	-0,08029	-0,29071	0,189961	1

The note: the underlined – the easy connection, the bold italic – the average correlation. The most significant connection between the generalization (K_{15}) and mnemonics (K_{18}), generalization (K_{15}) and analyticity (K_{16}), classification (K_{17}) and spatial imagination (K_{22}).

Table A15.24

The correlations of the parameters of the convergent intellectual abilities of the fourth group of examinees in 2006 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,03599	1								
K_{15}	-0,2879	0,097874	1							
K_{16}	0,024094	***0,546752***	0,039016	1						
K_{17}	-0,00388	-0,16189	0,183999	-0,02303	1					
K_{18}	0,002454	0,232381	0,383213	**0,445588**	**0,460434**	1				
K_{19}	***-0,57275***	-0,15853	-0,00207	-0,29214	0,059976	-0,07021	1			
K_{20}	***-0,82075***	-0,02907	0,306937	-0,23532	-0,2805	-0,2363	***0,67009***	1		
K_{21}	-0,15021	0,159999	0,315766	0,340752	0,113415	0,389925	0,263471	0,17613	1	
K_{22}	-0,44154	0,342105	0,322037	**0,422768**	0,051122	0,367862	0,396331	0,367472	***0,569937***	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the age (Age) and mnemonics (K_{20}).

Table A15.25

The correlations of the parameters of the convergent intellectual abilities of the fifth group of examinees in 2006 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,1668	1								
K_{15}	**-0,48827**	0,332101	1							
K_{16}	-0,06567	***0,575351***	0,282686	1						
K_{17}	-0,19642	***0,549401***	-0,03455	0,294434	1					
K_{18}	0,06021	0,300111	0,05099	***0,577661***	-0,09976	1				
K_{19}	0,0553	0,213757	-0,38957	0,372563	0,237741	***0,718371***	1			
K_{20}	0,270004	-0,14041	**-0,44975**	***-0,57929***	-0,00327	-0,02732	0,166626	1		
K_{21}	-0,08393	0,188628	0,297796	0,209289	0,288656	**0,422847**	0,285006	0,087446	1	
K_{22}	0,120724	0,060074	-0,06048	0,32852	0,098858	**0,43765**	***0,564144***	-0,00924	0,164421	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the arithmetic abilities (K_{18}) and combinatorics (K_{19}).

The significant anomalies in the samples with a posteriori data were not revealed, at the analysis of the content of correlation tables the regularities were revealed in the parameters of convergent abilities of the psychological portrait of CM of the subject of training:

- in the three groups of day department **the steady average statistical correlation relationship is revealed** between the verbalization (K_{14}) and analyticity (K_{16}), verbalization (K_{14}) and combinatorics (K_{19}), generalization (K_{15}) and analyticity (K_{16}), the generalization of concepts (K_{15}) and arithmetic abilities (K_{18}), generalization (K_{15}) and combinatorics (K_{19}), generalization (K_{15}) and spatial imagination (K_{22}), analyticity (K_{16}) and combinatorics (K_{19}), analyticity (K_{16}) and mnemonics (K_{20}), the classification of concepts (K_{17}) and arithmetic abilities (K_{18}), the classification of concepts (K_{17}) and spatial imagination (K_{22}), arithmetic abilities (K_{18}) and the combinatorics of thinking (K_{19}), planar thinking (K_{21}) and spatial imagination (K_{22}), and also **the steady average statistical correlation relationship is revealed** between the age (Age) and verbalization (K_{14}), the age (Age) and analyticity (K_{16}), the age (Age) and classification (K_{17}), the age (Age) and arithmetic abil. (K_{18}), the age (Age) and combinatorics (K_{19}), the age (Age) and mnemonics (K_{20}), verbalization (K_{14}) and the generalization of concepts (K_{15}), verbalization (K_{14}) and classification (K_{17}), verbalization (K_{14}) and arithmetic abil. (K_{18}), verbalization (K_{14}) and combinatorics (K_{19}), verbalization (K_{14}) and mnemonics (K_{20}), generalization (K_{15}) and classification (K_{17}), generalization (K_{15}) and planar thinking (K_{21}), analyticity (K_{16}) and mnemonics (K_{18}), the analyticity of thinking (K_{16}) and spatial imagination (K_{22}), the classification of concepts (K_{17}) and the combinatorics of thinking (K_{19}), the classification of concepts (K_{17}) and planar thinking (K_{21}), arithmetic abilities (K_{18}) and planar thinking (K_{21}), combinatorics (K_{19}) and mnemonics (K_{20}), which directly is linked with the properties of psychodynamic construct of the head brain and the calculation of the optimal way of displaying of the information fragments (text, table, the static or dynamic flat or volumetric scheme, the audio or video-stream) are provided;

- in the two groups of evening department **the steady average statistical correlation relationship is revealed** between the age (Age) and combinatorics (K_{19}), the age (Age) and mnemonics (K_{20}), verbalization (K_{14}) and analyticity (K_{16}), verbalization (K_{14}) and classification (K_{17}), analyticity (K_{16}) and arithmetic abil. (K_{18}), analyticity (K_{16}) and mnemonics (K_{20}), arithmetic abil. (K_{18}) and combinatorics (K_{19}), the combinatorial thinking (K_{19}) and spatial imagination (K_{22}), and also **the steady average statistical correlation relationship is revealed** between the age (Age) and generalization (K_{15}), the age (Age) and spat. imagination (K_{22}), verbalization (K_{14}) and generalization (K_{15}), verbalization (K_{14}) and arithmetic abil. (K_{18}), the verbalization of concepts (K_{14}) and planar thinking (K_{21}), the verbalization of concepts (K_{14}) and spatial imagination (K_{22}), generalization (K_{15}) and analyticity (K_{16}), generalization (K_{15}) and arithmetic abil. (K_{18}), the generalization of concepts (K_{15}) and combinatorial thinking (K_{19}), the generalization of concepts (K_{15}) and planar thinking (K_{21}), the generalization of concepts (K_{15}) and spatial imagination (K_{22}), the analyticity of thinking (K_{16}) and planar thinking (K_{21}), the analyticity of thinking (K_{16}) and spatial imagination (K_{22}), the classification of concepts (K_{17}) and arithmetic abilities (K_{18}), the classification of concepts (K_{17}) and combinatorial thinking (K_{19}), the classification of concepts (K_{17}) and planar thinking (K_{21}), arithmetic abilities (K_{18}) and planar thinking (K_{21}), arithmetic abilities (K_{18}) and spatial imagination (K_{22}), combinatorial thinking (K_{19}) and planar thinking (K_{21}), which directly is related with the properties of the psychodynamic construct of the head brain and the calculation of the optimal way of displaying of the information fragments (text, table, the static or dynamic flat or volumetric scheme, the static or dynamic audio- or video-stream) are provided.

In tabl. A15.26-A15.30 the correlation tables of convergent abilities for 2007 y. are located, and also the following designations are used directly: Age – the age, K14 – verbalization, K15 – generalization, K_{16} – analyticity, K_{17} – classification, K_{18} – arithmetic tasks, K_{19} – combinatorics, K_{20} – mnemonic abilities, K_{21} – the flat thinking and K_{22} – the spatial imagination.

Table A15.26

The correlations of the parameters of the convergent intellectual abilities of the first group of examinees in 2007 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,22431	1								
K_{15}	0,205299	0,252066	1							
K_{16}	-0,0409	**0,482622**	0,303568	1						
K_{17}	0,073574	0,258807	***0,694818***	0,077245	1					
K_{18}	-0,11135	**0,482575**	**0,411495**	***0,661513***	0,395459	1				
K_{19}	**-0,46354**	0,326851	0,034605	0,200011	**0,424943**	**0,469776**	1			
K_{20}	-0,26929	0,39785	-0,06031	0,299861	0,209303	**0,451068**	**0,469779**	1		
K_{21}	-0,1817	-0,03229	-0,15844	-0,037	-0,10923	0,267993	0,121009	0,16738	1	
K_{22}	0,004054	**0,475209**	0,344601	**0,423986**	0,286199	0,079098	0,033259	0,275336	-0,21068	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the generalization (K_{15}) and classification (K_{17}).

Table A15.27

The correlations of the parameters of the convergent intellectual abilities of the second group of examinees in 2007 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,14954	1								
K_{15}	**-0,42197**	**0,439728**	1							
K_{16}	-0,27057	-0,20387	0,20129	1						
K_{17}	0,255463	0,0098	0,333591	0,263191	1					
K_{18}	-0,37704	0,228845	**0,415703**	***0,621999***	0,341754	1				
K_{19}	-0,37396	0,081007	**0,473147**	***0,629005***	0,123019	***0,819297***	1			
K_{20}	-0,26966	-0,36432	0,378165	**0,409046**	0,244968	0,38301	***0,623483***	1		
K_{21}	0,369825	-0,29151	-0,17171	0,105153	0,148108	-0,07951	-0,15177	0,346542	1	
K_{22}	0,160982	-0,19784	0,355529	0,283633	***0,561703***	**0,480791**	0,336954	***0,525743***	**0,489283**	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the arithmetic tasks (K_{18}) and combinatorics (K_{19}).

Table A15.28

The correlations of the parameters of the convergent intellectual abilities of the third group of examinees in 2007 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,09678	1								
K_{15}	-0,21432	***0,537829***	1							
K_{16}	-0,02734	0,399791	**0,495589**	1						
K_{17}	-0,22253	0,238779	***0,667827***	0,117972	1					
K_{18}	0,236884	0,366374	***0,558855***	***0,688043***	0,395273	1				
K_{19}	0,264351	0,17137	0,318725	0,303424	0,314339	***0,637326***	1			
K_{20}	***-0,50166***	-0,02598	0,239211	**0,411055**	0,206053	-0,05613	-0,09576	1		
K_{21}	0,141598	**0,484609**	0,367486	***0,653674***	0,193958	***0,777188***	**0,443852**	0,036251	1	
K_{22}	0,105885	***0,509286***	**0,473267**	***0,778704***	0,271568	***0,771717***	**0,414963**	0,24102	***0,737343***	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the analyticity (K_{16}) and spatial imagination (K_{22}), arithmetic tasks (K_{22}) and planar thinking (K_{21}), arithmetic tasks (K_{18}) and spatial imagination (K_{22}).

Table A15.29

The correlations of the parameters of the convergent intellectual abilities of the fourth group of examinees in 2007 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,01825	1								
K_{15}	0,15764	0,179814	1							
K_{16}	-0,26739	0,156643	0,396034	1						
K_{17}	-0,30316	0,226711	0,078195	-0,30186	1					
K_{18}	-0,02404	***0,539498***	0,368506	0,397521	0,346468	1				
K_{19}	-0,25507	***0,508361***	0,140652	0,329446	**0,426705**	***0,591546***	1			
K_{20}	0,25527	0,013873	**0,42678**	0,1167	-0,37209	0,148892	-0,32125	1		
K_{21}	0,343175	0,147692	0,240487	-0,31344	0,270399	-0,08503	-0,26047	-0,0308	1	
K_{22}	0,015887	0,011505	0,129215	0,069381	0,252078	0,04665	0,07958	-0,1055	**0,485351**	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the arithmetic tasks (K_{18}) and combinatorics (K_{19}).

Table A15.30

The correlations of the parameters of the convergent intellectual abilities of the fifth group of examinees in 2007 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	0,060455	1								
K_{15}	**0,44**	-0,08557	1							
K_{16}	0,057484	***0,739068***	0,220467	1						
K_{17}	-0,20254	0,379365	-0,12851	***0,595612***	1					
K_{18}	-0,15742	**0,488786**	0,082341	***0,585516***	***0,637679***	1				
K_{19}	0,071447	0,097229	0,242167	0,20853	***0,505309***	0,285954	1			
K_{20}	-0,27929	0,082513	0,049286	**0,401642**	0,32702	0,208883	-0,1112	1		
K_{21}	-0,13043	0,270716	0,052172	0,333796	***0,674118***	**0,430591**	0,265368	0,145487	1	
K_{22}	-0,2675	***0,543568***	-0,18555	***0,521869***	0,284262	0,207468	-0,22053	**0,362142**	**0,390042**	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the verbalization (K_{14}) and analyticity (K_{16}).

In 2007 y. the significant anomalies in the samples with a posteriori data were not revealed, at the analysis of the content of correlation tables the regularities in the parameters of the convergent abilities of the psychological portrait of CM of the subject of training were revealed:

- in the three groups of day department **the steady average statistical correlation relationship is revealed** between the generalization (K_{15}) and classification (K_{17}), the generalization of concepts (K_{15}) and arithmetic abilities (K_{18}), the analyticity of thinking (K_{16}) and arithmetic abilities (K_{18}), the analyticity of thinking (K_{16}) and the combinatorics of thinking (K_{19}), the analyticity of thinking (K_{16}) and planar thinking (K_{21}), the analyticity of thinking (K_{16}) and spatial imagination (K_{22}), the classification of concepts (K_{17}) and spatial imagination (K_{22}), arithmetic abilities (K_{18}) and combinatorial abilities (K_{19}), arithmetic abilities (K_{18}) and planar thinking (K_{21}), arithmetic abilities (K_{18}) and spatial imagination (K_{22}), combinatorial abilities (K_{19}) and mnemonic abilities (K_{20}), mnemonic abilities (K_{20}) and spatial imagination (K_{22}), planar thinking (K_{21}) and spatial imagination (K_{22}), and also **the steady easy statistical correlation relationship is revealed** between the age (Age) and verbalization (K_{14}), the age (Age) and generalization (K_{15}), the age (Age) and combinatorics (K_{19}), the age (Age) and mnemonics (K_{20}), verbalization (K_{14}) and generalization (K_{15}), verbalization (K_{14}) and analyticity (K_{16}), the verbalization of concepts (K_{14}) and the classification of concepts (K_{17}), the verbalization of concepts (K_{14}) and arithmetic abilities (K_{18}), the verbalization of concepts (K_{14}) and the combinatorics of thinking (K_{19}), the verbalization of concepts (K_{14}) and spatial imagination (K_{22}), generalization (K_{15}) and analyticity (K_{16}), generalization (K_{15}) and the classification of concepts (K_{17}), the generalization of concepts (K_{15}) and arithmetic abilities (K_{18}), generalization (K_{15}) and combinatorics (K_{19}), generalization (K_{15}) and mnemonics (K_{20}), generalization (K_{15}) and spatial imag. (K_{22}), analyticity (K_{16}) and mnemonics (K_{20}), the classification of concepts (K_{17}) and arithmetic abilities (K_{18}), the classification of concepts (K_{17}) and combinatorial abilities (K_{19}), the classification of concepts (K_{17}) and spatial imagination (K_{22}), arithmetic abilities (K_{18}) and mnemonic abilities (K_{20}), combinatorial abilities (K_{19}) and planar thinking (K_{21}), combinatorial abilities (K_{19}) and spatial imagination (K_{22}), which are linked directly with the properties of the psychodynamic construct of the head brain and the calculation of the optimal way of displaying of the information fragments (text, table, the static or dynamic flat or volumetric scheme, the static or dynamic audio- or video-stream);

- in the two groups of evening department **the steady easy statistical correlation relationship is revealed** between the age (Age) and the generalization of concepts (K_{15}), the age (Age) and classification (K_{17}), verbalization (K_{14}) and analyticity (K_{16}), verbalization (K_{14}) and classification (K_{17}), verbalization (K_{14}) and arithmetic abil. (K_{18}), verbalization (K_{14}) and combinatorics (K_{19}), verbalization (K_{14}) and spatial imag. (K_{22}), the analyticity of thinking (K_{16}) and the classification of concepts (K_{17}), the analyticity of thinking (K_{16}) and arithmetic abilities (K_{18}), the analyticity of thinking (K_{16}) and spatial imagination (K_{22}), classification (K_{17}) and arithmetic abil. (K_{18}), classification (K_{17}) and combinatorics (K_{19}), classification (K_{17}) and combinatorics (K_{21}), arithmetic abil. (K_{18}) and combinatorics (K_{19}), and also **the steady easy statistical negative correlation relationship is revealed** between the age (Age) and generalization (K_{15}), the age (Age) and classification (K_{17}), generalization (K_{15}) and analyticity (K_{16}), the generalization of concepts (K_{15}) and combinatorics (K_{19}), analyticity (K_{16}) and combinatorics (K_{19}), analyticity (K_{16}) and mnemonics (K_{20}), the classification of concepts (K_{17}) and spatial imagination (K_{22}), arithmetic abilities (K_{18}) and mnemonic abilities (K_{20}), the combinatorics of thinking (K_{19}) and mnemonic abilities (K_{20}), the mnemonics of thinking (K_{20}) and spatial imagination (K_{22}), planar thinking (K_{21}) and spatial imagination (K_{22}), which are directly linked with the properties of the psychodynamic consruct of the head brain and the calculation of the optimal way of displaying of the information fragments (text, table, the static or dynamic flat or volumetric scheme, the static or dynamic audio- or video-stream) are provided.

In tabl. A15.31-A15.35 the correlation tables of convergent abilities for 2008 y., and also the following designations are used directly: Age – the age, K_{14} – verbalization, K_{15} – generalization, K_{16} – analyticity, K_{17} – classification, K_{18} – arithmetic tasks, K_{19} – combinatorics, K_{20} – mnemonic abilities, K_{21} – the flat thinking and K_{22} – the spatial imagination.

Table A15.31

The correlations of the parameters of the convergent intellect abilities of the first group of examinees in 2008 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	0,050582	1								
K_{15}	-0,39867	0,381958	1							
K_{16}	-0,13332	0,367524	**0,459152**	1						
K_{17}	-0,04631	***0,619626***	0,351087	***0,549329***	1					
K_{18}	0,283935	**0,479698**	0,205829	***0,637201***	***0,616816***	1				
K_{19}	**0,412036**	**0,403873**	0,21087	0,314737	***0,601817***	***0,622363***	1			
K_{20}	0,344605	0,085162	-0,26183	0,153251	-0,00821	0,206962	0,38674	1		
K_{21}	0,151543	***0,591351***	0,224779	***0,5899***	***0,564307***	***0,725741***	***0,546903***	**0,418431**	1	
K_{22}	0,370013	0,351582	0,175384	***0,591097***	***0,523038***	***0,832597***	***0,588626***	0,186626	**0,567895**	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant statistical connection directly between the arithmetic tasks (K_{18}) and spatial imagination (K_{22}).

Table A15.32

The correlations of the parameters of the convergent intellectual ability of the second group of examinees in 2008 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	0	1								
K_{15}	0,013913	0,355418	1							
K_{16}	**-0,48204**	0,319063	***0,554979***	1						
K_{17}	0,050173	0,175919	0,185683	0,225227	1					
K_{18}	0,036694	0,349217	**0,428192**	**0,452654**	**0,395991**	1				
K_{19}	-0,07054	***0,555515***	**0,467923**	**0,482658**	0,3317	***0,785695***	1			
K_{20}	-0,11944	0,344005	-0,19	0,147536	0,145072	0,207781	***0,523694***	1		
K_{21}	-0,35798	**0,455168**	0,359365	***0,530953***	0,096711	**0,497682**	***0,617909***	0,326156	1	
K_{22}	0,234081	**0,425504**	**0,480217**	**0,396749**	0,140555	0,265011	**0,397917**	0,078389	0,283823	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the arithmetic tasks (K_{18}) and combinatorics (K_{19}).

Table A15.33

The correlations of the parameters of the convergent intellectual abilities of the third group of examinees in 2008 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	-0,21923	1								
K_{15}	0,366995	-0,08019	1							
K_{16}	0,243456	0,31431	**0,46344**	1						
K_{17}	0,329008	0,239921	**0,496686**	***0,714938***	1					
K_{18}	0,169267	**0,451067**	0,362962	***0,857367***	***0,796285***	1				
K_{19}	0,380109	0,004072	***0,50726***	**0,44204**	***0,763418***	***0,556847***	1			
K_{20}	0,026478	-0,17912	0,085926	-0,11321	-0,17976	-0,27472	-0,00134	1		
K_{21}	0,289133	***0,549897***	0,275771	***0,765428***	***0,742297***	***0,737865***	***0,545672***	-0,25342	1	
K_{22}	0,209561	0,116168	0,228932	***0,535699***	***0,770574***	***0,566138***	***0,641213***	0,094204	**0,458588**	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the analyticity (K_{16}) and arithmetic tasks (K_{18}).

Table A15.34

The correlations of the parameters of the convergent intellectual abilities of the fourth group of examinees in 2008 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	0,282671	1								
K_{15}	-0,0477	0,058956	1							
K_{16}	-0,08418	0,146392	0,252671	1						
K_{17}	-0,35135	-0,27281	0,027594	**0,340766**	1					
K_{18}	-0,12587	0,359482	0,034527	**0,497504**	0,267916	1				
K_{19}	-0,08818	***0,676832***	0,06754	0,183128	-0,1368	0,342327	1			
K_{20}	-0,04964	0,318286	0,16525	***0,589671***	0,287367	**0,421004**	0,101137	1		
K_{21}	-0,06767	-0,05488	0,360871	-0,1396	-0,06926	-0,22129	-0,1282	-0,36437	1	
K_{22}	-0,29481	0,176928	0,231005	0,276038	0,0734	0,06661	**0,499963**	0,337756	-0,25752	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the combinatorics (K_{19}) and verbalization (K_{14}).

Table A15.35

The correlations of the parameters of the convergent intellectual abilities of the fifth group of examinees in 2008 y.

	Age	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}
Age	1									
K_{14}	0,244887	1								
K_{15}	-0,39809	0,098386	1							
K_{16}	***-0,57736***	-0,00386	0,158189	1						
K_{17}	***-0,62957***	0,057703	***0,652176***	0,241643	1					
K_{18}	-0,36861	0,368771	**0,417787**	0,154773	***0,511604***	1				
K_{19}	-0,29428	-0,06473	***0,531195***	-0,20348	**0,437193**	0,103726	1			
K_{20}	0,236476	-0,14771	-0,1284	-0,21556	-0,23807	-0,34953	0,030878	1		
K_{21}	-0,08954	0,130613	0,302189	-0,12191	0,067471	0,233196	***0,603801***	-0,13615	1	
K_{22}	-0,22253	0,194238	***0,515204***	-0,04018	0,079417	0,12892	0,262602	0,09131	0,152705	1

The note: the underlined – the easy connection, the bold italic – the average connection. The most significant connection between the age (Age) and classification (K_{17}).

In 2008 y. the significant anomalies in the samples of a posteriori data were not revealed, at the analysis of the content of correlation tables, the regularities in the parameters of the convergent abilities of the psychological portrait of CM of the subject of training were revealed:

- in the three groups of day department **the steady average statistical correlation relationship is revealed** between the verbalization (K_{14}) and classification (K_{17}), the analyticity of thinking (K_{16}) and arithmetic abilities (K_{18}), the classification of concepts (K_{17}) and arithmetic abilities (K_{18}), the classification of concepts (K_{17}) and the combinatorics of thinking (K_{19}), arithmetic abilities (K_{18}) and combinatorics (K_{19}), arithmetic abilities (K_{18}) and planar thinking (K_{21}), arithmetic abilities (K_{18}) and spatial imagination (K_{22}), the combinatorics of thinking (K_{19}) and planar thinking (K_{21}), the analyticity of thinking (K_{16}) and the classification of concepts (K_{17}), the analyticity of thinking (K_{16}) and arithmetic abilities (K_{18}), the analyticity of thinking (K_{16}) and planar thinking (K_{21}), the classification of concepts (K_{17}) and planar thinking (K_{21}), the classification of concepts (K_{17}) and spatial imagination (K_{22}), arithmetic abilities (K_{18}) and planar thinking (K_{21}), the combinatorics of thinking (K_{19}) and spatial imagination (K_{22}), and also **the steady average statistical correlation relationship is revealed** between the age (Age) and analyticity (K_{16}), the age (Age) and combinatorics (K_{19}), the age (Age) and spatial imagination (K_{22}), the verbalization of concepts (K_{14}) and the analyticity of thinking (K_{16}), the verbalization of concepts (K_{14}) and arithmetic abilities (K_{18}), the verbalization (K_{14}) and combinatorics (K_{19}), verbalization (K_{14}) and planar thinking (K_{21}), the verbalization of concepts (K_{14}) and spatial imagination (K_{22}), generalization (K_{15}) and analyticity (K_{16}), generalization (K_{15}) and arithmetic abil. (K_{18}), generalization (K_{15}) and combinatorics (K_{19}), generalization (K_{15}) and mnemonics (K_{20}), the generalization of concepts (K_{15}) and planar thinking (K_{21}), the generalization of concepts (K_{15}) and spatial imagination (K_{22}), the analyticity of thinking (K_{16}) and the classification of concepts (K_{17}), the analyticity of thinking (K_{16}) and arithmetic abilities (K_{18}), the analyticity of thinking (K_{16}) and the combinatorics of thinking (K_{19}), the analyticity of thinking (K_{16}) and planar thinking (K_{21}), the analyticity of thinking (K_{16}) and spatial imagination (K_{22}), the classification of concepts (K_{17}) and planar thinking (K_{21}), the classification of concepts (K_{17}) and spatial imagination (K_{22}), combinatorics (K_{19}) and mnemonics (K_{20}), combinatorics (K_{19}) and planar thinking (K_{21}), the combinatorics of thinking (K_{19}) and spatial imagination (K_{22}), mnemonic abilities (K_{20}) and planar thinking (K_{21}), planar thinking (K_{21}) and spatial imagination (K_{22}), which are linked with the properties of the psychodynamic construct of the head brain and the calculation of the optimal way of displaying of the information fragments (text, table, the static or dynamic flat or volumetric graphical scheme, the static or dynamic audio- or video-stream);

- in the two groups of evening department **the steady easy statistical correlation relationship is revealed** between the age (Age) and classification (K_{17}), the age (Age) and arithmetic abilities (K_{18}), the age (Age) and spatial imagination (K_{22}), the verbalization of concepts (K_{14}) and the combinatorics of thinking (K_{19}), generalization (K_{15}) and classification (K_{17}), analyticity (K_{16}) and mnemonics (K_{20}), the combinatorics of thinking (K_{19}) and planar thinking (K_{21}), and also **the steady easy statistical negative correlation relationship is revealed** between the age (Age) and the verbalization of concepts (K_{14}), the verbalization of concepts (K_{14}) and arithmetic abilities (K_{18}), the verbalization of concepts (K_{14}) and spatial imagination (K_{22}), generalization (K_{15}) and analyticity (K_{16}), generalization (K_{15}) and planar thinking (K_{21}), the analyticity of thinking (K_{16}) and the classification of concepts (K_{17}), the analyticity of thinking (K_{16}) and arithmetic abilities (K_{18}), classification (K_{17}) and arithm. abil. (K_{18}), arithm. abil. (K_{18}) and combinatorics (K_{19}), combinatorics (K_{19}) and spat. imag. (K_{22}), mnemonic abil. (K_{20}) and planar think. (K_{21}), which are linked directly with the properties of the psychodynamic construct of the head brain and the calculation of the optimal way of displaying of the information fragments (text, table, the static or dynamic flat or volumetric scheme, the static or dynamic audio- or video-stream) are provided.

3. The correlation analysis of the parameters, characterizing the divergent abilities.

In tabl. A15.36-A15.40 the correlation tables of divergent abilities for 2006 y. is located, and also the following designations are used: verbal associativity (K_{23}), verbal originality (K_{24}), verbal selectivity (K_{25}); figurative associativity (K_{27}), figurative originality (K_{28}) and figurative selectivity (K_{29}).

In tabl. A15.36-A15.38 a posteriori data of research of the divergent intellectual abilities in the three groups of examinees of the day department are presented.

Table A15.36

The correlations of the parameters of the divergent intellectual abilities of the first group of examinees in 2006 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	-0,05432	1					
K_{24}	0,028219	***0,881592***	1				
K_{25}	0,10845	***0,770362***	***0,840829***	1			
K_{27}	-0,04506	0,312264	**0,490135**	***0,592501***	1		
K_{28}	-0,1672	0,151127	0,306089	0,305881	***0,726596***	1	
K_{29}	0,016292	0,290245	0,367287	**0,43142**	***0,80004***	***0,697398***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.37

The correlations of the parameters of the divergent intellectual abilities of the second group of examinees in 2006 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	0,053365	1					
K_{24}	-0,18401	***0,539144***	1				
K_{25}	-0,17703	**0,43915**	***0,844949***	1			
K_{27}	0,042195	***0,5646***	***0,540636***	0,379123	1		
K_{28}	-0,08337	0,065991	***0,61923***	***0,538593***	***0,562218***	1	
K_{29}	-0,10034	0,195117	***0,677023***	***0,506664***	***0,538514***	***0,865512***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.38

The correlations of the parameters of the divergent intellectual abilities of the third group of examinees in 2006 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	-0,18533	1					
K_{24}	-0,23314	***0,624112***	1				
K_{25}	-0,22803	***0,557671***	***0,821173***	1			
K_{27}	-0,38345	0,304065	0,38833	**0,444622**	1		
K_{28}	-0,10102	**0,41262**	0,38481	***0,538923***	0,27434	1	
K_{29}	-0,27276	0,14812	0,317965	**0,437981**	***0,606658***	***0,622349***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the three groups of day department **the steady statistical correlation relationship is revealed** between the verbal associativity (K_{23}) and verbal originality (K_{24}), verbal associativity (K_{23}) and verbal selectivity (K_{25}), verbal associativity (K_{25}) and figurative associativity (K_{27}), verbal originality (K_{24}) and verbal selectivity (K_{25}), verbal originality (K_{24}) and figurative associativity (K_{27}), verbal selectivity (K_{25}) and figurative associativity (K_{27}), verbal selectivity (K_{25}) and figurative originality (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative associativity (K_{27}) and figurative selectivity (K_{28}), figurative associativity (K_{27}) and figurative selectivity (K_{29}), figurative originality (K_{28}) and figurative selectivity (K_{29}), that caused by the properties of the psychodynamic construct of the head brain.

In tabl. A15.39-A15.40 a posteriori data of research of the divergent intellectual abilities in the two groups of examinees of the evening department are presented.

Table A15.39

The correlations of the parameters of the divergent intellectual abilities of the fourth group of examinees in 2006 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	-0,23053	1					
K_{24}	-0,05169	***0,829101***	1				
K_{25}	-0,1561	***0,690327***	***0,743989***	1			
K_{27}	-0,3677	***0,861132***	***0,578084***	***0,595511***	1		
K_{28}	-0,26615	0,265181	0,137883	**0,495674**	**0,497405**	1	
K_{29}	**-0,44808**	**0,426196**	0,109172	**0,433879**	***0,699577***	***0,780587***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.40

The correlations of the parameters of the divergent intellectual abilities of the fifth group of examinees in 2006 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	0,144663	1					
K_{24}	-0,04843	0,23991	1				
K_{25}	-0,12584	0,018413	***0,896829***	1			
K_{27}	0,031562	0,399749	***0,5499***	***0,589875***	1		
K_{28}	-0,20931	0,006397	***0,598052***	***0,643127***	***0,668469***	1	
K_{29}	-0,18069	-0,30243	***0,503952***	***0,663552***	***0,631441***	***0,782437***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In 2006 y. the significant anomalies in the samples with a posteriori data were not revealed, at the analysis of the content of correlation tables the regularities in the parameters of divergent abilities of the psychological portrait of CM of the subject of training are revealed.

In the two groups of evening department also **the steady statistical correlation relationship is revealed** between the verbal associativity (K_{23}) and verbal originality (K_{24}), verbal associativity (K_{23}) and verbal selectivity (K_{25}), verbal associativity (K_{23}) and figurative associativity (K_{27}), verbal originality (K_{24}) and verbal selectivity (K_{25}), verbal originality (K_{24}) and figurative associativity (K_{27}), verbal selectivity (K_{25}) and figurative associativity (K_{27}), verbal selectivity (K_{25}) and figurative originality (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative associativity (K_{27}) and figurative originality (K_{28}), figurative associativity (K_{27}) and figurative selectivity (K_{29}), figurative originality (K_{28}) and figurative selectivity (K_{29}), that is caused directly by the properties of the psychodynamic construct of the head brain.

In the course of diagnostics of the nominal values of various parameters of the psychological portrait of CM of the subject of training the applied DM was used directly, which contained a set of applied methods of research in DB (the divergent thinking of examinees: the verbal and figurative creativity, and also the implicit and explicit learning-ability and the bipolar cognitive styles).

In tabl. A15.41-A15.45 the correlation tables of divergent abilities for 2007 y. are located, and also the following designations are used: the verbal associativity (K_{23}), verbal originality (K_{24}), verbal selectivity (K_{25}); figurative associativity (K_{27}), figurative originality (K_{28}) and figurative selectivity (K_{29}).

In tabl. A15.41-A15.43 a posteriori data of research of the divergent intellectual abilities in the three groups of examinees of the day department are presented.

Table A15.41

The correlations of the parameters of the divergent intellectual abilities of the first group of examinees in 2007 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	0,05921	1					
K_{24}	-0,17912	***0,568466***	1				
K_{25}	-0,12505	***0,703941***	***0,769551***	1			
K_{27}	0,036809	***0,665917***	0,254796	***0,718739***	1		
K_{28}	0,008989	0,379886	0,336134	***0,516624***	0,39563	1	
K_{29}	-0,04917	0,325824	0,279681	***0,653627***	***0,576081***	***0,863227***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.42

The correlations of the parameters of the divergent intellectual abilities of the second group of examinees in 2007 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	0,26508	1					
K_{24}	-0,0833	**0,425109**	1				
K_{25}	-0,08165	0,304849	***0,956994***	1			
K_{27}	0,061977	***0,593045***	***0,623201***	***0,582135***	1		
K_{28}	0,020238	0,199729	***0,652058***	***0,691432***	***0,65801***	1	
K_{29}	0,060964	0,131011	***0,541985***	***0,621163***	***0,693747***	***0,89319***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.43

The correlations of the parameters of the divergent intellectual abilities of the third group of examinees in 2007 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	***0,56032***	1					
K_{24}	-0,30229	**-0,47079**	1				
K_{25}	-0,39748	***-0,55702***	***0,939128***	1			
K_{27}	0,323447	0,201239	**0,46571**	0,325325	1		
K_{28}	-0,28143	-0,2444	***0,647599***	***0,62921***	**0,463066**	1	
K_{29}	-0,3116	-0,33421	***0,733071***	***0,698029***	**0,47852**	***0,963164***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the three groups of day department **the steady statistical correlation relationship is revealed** between the verbal associativity (K_{23}) and verbal originality (K_{24}), verbal associativity (K_{23}) and verbal selectivity (K_{25}), verbal associativity (K_{23}) and figurative associativity (K_{27}), verbal originality (K_{24}) and verbal selectivity (K_{25}), verbal originality (K_{24}) and figurative associativity (K_{27}), verbal originality (K_{24}) and figurative originality (K_{28}), verbal originality (K_{24}) and figurative selectivity (K_{29}), verbal selectivity (K_{25}) and figurative associativity (K_{27}), verbal selectivity (K_{25}) and figurative originality (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative associativity (K_{27}) and figurative selectivity (K_{28}), figurative associativity (K_{27}) and figurative selectivity (K_{29}), figurative originality (K_{28}) and figurative selectivity (K_{29}), that is caused by the properties of the psychodynamic construct of the head brain.

In tabl. A15.44-A15.45 a posteriori data of research of the divergent intellectual abilities in the two groups of examinees of the evening separation are presented.

Table A15.44

The correlations of the parameters of the divergent intellectual abilities of the fourth group of examinees in 2007 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	0,145335	1					
K_{24}	***0,508316***	***0,538367***	1				
K_{25}	***0,637351***	0,397879	***0,8849***	1			
K_{27}	0,252565	***0,60565***	0,312539	0,351762	1		
K_{28}	**0,413173**	0,30048	***0,516549***	***0,715201***	0,154611	1	
K_{29}	0,354071	***0,512874***	***0,780299***	***0,870303***	***0,503756***	***0,739577364***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.45

The correlations of the parameters of the divergent intellectual abilities of the fifth group of examinees in 2007 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	-0,39673	1					
K_{24}	-0,26463	0,333762	1				
K_{25}	-0,16203	0,099327	***0,858525***	1			
K_{27}	**-0,42438**	**0,435524**	0,249458	0,114666	1		
K_{28}	-0,11798	0,059182	0,062901	0,387816	0,16775	1	
K_{29}	-0,11547	0,255951	**0,413454**	***0,502836***	0,31218	***0,661724***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the two groups of evening department **the steady statistical correlation relationship is revealed** between verbal associativity (K_{23}) and verbal originality (K_{24}), verbal associativity (K_{23}) and verbal selectivity (K_{25}), verbal associativity (K_{23}) and figurative associativity (K_{27}), verbal originality (K_{24}) and verbal selectivity (K_{25}), verbal originality (K_{24}) and figurative associativity (K_{27}), verbal originality (K_{24}) and figurative selectivity (K_{25}), verbal selectivity (K_{25}) and figurative associativity (K_{27}), verbal selectivity (K_{25}) and figurative originality (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative associativity (K_{27}) and figurative selectivity (K_{29}), figurative originality (K_{28}) and figurative selectivity (K_{29}), that is caused directly by the properties of the psychodynamic construct of the head brain.

All detected statistical dependencies are the scientifically-justified from the point of view of cognitive informatics and cognitive psychology, that allows to estimate directly the efficiency of functioning of the procedure of processing of the psychological parameters of CM of the subject of training and CM of the means of training based on the adaptive representation of information fragments processor.

In tabl. A15.46-A15.50 the correlation tables of divergent abilities for 2008 y. are located, and also the following designations are used: verbal associativity (K_{23}), verbal originality (K_{24}), verbal selectivity (K_{25}); figurative associativity (K_{27}), figurative originality (K_{28}) and figurative selectivity (K_{29}).

In tabl. A15.46-A15.48 a posteriori data of research of the divergent intellectual abilities in the three groups of examinees of the day department are presented.

Table A15.46

The correlations of the parameters of the divergent intellectual abilities of the first group of examinees in 2008 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	-0,15951	1					
K_{24}	**0,439543**	***0,634068***	1				
K_{25}	0,281296	***0,709112***	***0,781051***	1			
K_{27}	-0,02233	***0,596772***	0,288441	0,396655	1		
K_{28}	0,144722	0,222096	0,26955	0,306919	***0,686076***	1	
K_{29}	-0,12472	***0,651895***	0,287377	***0,57362***	***0,793305***	***0,664217***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.47

The correlations of the parameters of the divergent intellectual abilities of the second group of examinees in 2008 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	0,141104	1					
K_{24}	0,12691	***0,710766***	1				
K_{25}	-0,04128	0,191723	**0,485676**	1			
K_{27}	-0,0008	***0,788748***	***0,601013***	0,106135	1		
K_{28}	0,064009	0,314694	0,378807	0,284459	0,344959	1	
K_{29}	-0,04074	0,053435	0,232356	**0,485871**	0,085301	***0,814604***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.48

The correlations of the parameters of the divergent intellectual abilities of the third group of examinees in 2008 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	-0,3182	1					
K_{24}	***-0,58004***	**0,499928**	1				
K_{25}	***-0,57725***	0,101326	***0,688894***	1			
K_{27}	-0,31911	**0,485454**	0,217078	0,261787	1		
K_{28}	-0,18787	0,189418	0,272066	0,116609	**0,418821**	1	
K_{29}	-0,1711	0,003146	-0,09902	0,116327	***0,565364***	***0,526532***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the three groups of day department **the steady statistical correlation relationship is revealed** between the verbal associativity (K_{23}) and verbal originality (K_{24}), verbal associativity (K_{23}) and verbal selectivity (K_{25}), verbal associativity (K_{23}) and figurative associativity (K_{27}), verbal originality (K_{24}) and verbal selectivity (K_{25}), verbal originality (K_{24}) and figurative associativity (K_{27}), verbal originality (K_{24}) and figurative originality (K_{28}), verbal selectivity (K_{25}) and figurative associativity (K_{27}), verbal selectivity (K_{25}) and figurative originality (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative associativity (K_{27}) and figurative originality (K_{28}), figurative originality (K_{28}) and figurative selectivity (K_{29}), that is caused directly with the properties of the psychodynamic construct of the head brain.

In tabl. A15.49-A15.50 a posteriori data of research of the divergent intellectual abilities in the two groups of examinees of the evening department are presented.

Table A15.49

The correlations of the parameters of the divergent intellectual abilities of the fourth group of examinees in 2008 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	-0,3638	1					
K_{24}	-0,3663	***0,705397***	1				
K_{25}	-0,03019	0,373728	***0,853766***	1			
K_{27}	-0,28939	***0,623387***	***0,660431***	**0,407615**	1		
K_{28}	-0,23382	***0,717002***	***0,661649***	***0,547944***	***0,51357***	1	
K_{29}	-0,01509	0,112184	***0,541188***	***0,776713***	**0,426905**	**0,454222**	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.50

The correlations of the parameters of the divergent intellectual abilities of the fifth group of examinees in 2008 y.

	Age	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}
Age	1						
K_{23}	-0,19851	1					
K_{24}	0,060655	0,252924	1				
K_{25}	0,193377	0,042044	***0,908037***	1			
K_{27}	-0,12672	**0,452143**	**0,373366**	0,286356	1		
K_{28}	-0,23033	0,312821	0,223005	0,18983	0,224378	1	
K_{29}	-0,12509	0,355764	***0,524266***	**0,401133**	***0,560631***	***0,752373***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the two groups of evening department also **the steady statistical corr. relationship is revealed** between the verbal associativity (K_{23}) and verbal originality (K_{24}), verbal associativity (K_{23}) and verbal selectivity (K_{25}), verbal associativity (K_{23}) and figurative associativity (K_{27}), verbal associativity (K_{23}) and figurative originality (K_{28}), verbal originality (K_{24}) and verbal selectivity (K_{25}), verbal originality (K_{24}) and figurative associativity (K_{27}), verbal originality (K_{24}) and figurative originality (K_{28}), verbal originality (K_{24}) and figurative selectivity (K_{29}), verbal selectivity (K_{25}) and figurative associativity (K_{27}), verbal selectivity (K_{25}) and figurative originality (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative associativity (K_{27}) and figurative originality (K_{28}), figurative associativity (K_{27}) and figurative selectivity (K_{29}), figurative originality (K_{28}) and figurative selectivity (K_{29}), that is caused directly by the properties of the psychodynamic construct of the head brain.

The psychological parameters of the parametrical CM of the subject of training the calculation of optimal way of the displaying of information fragments: the kind of information, the way of displaying, the speed of displaying and the add. parameters are provided.

4. The correlation analysis of the parameters of displaying of the information fragments.

In tabl. A15.51-A15.55 the correlation tables of the parameters of displaying of the information fragments for 2006 y., and also a row of designations is used: the level of statement in the information fragment (L_{45}), the kind of information (L_{31N}), the color of background (L_{36N}), the size of point-size of symbol (x10) (L_{37}) and the color of font ($L_{3.8N}$).

In tabl. A15.51-A15.48 a posteriori data of research of the parameters of displaying of the information fragments in the three groups of examinees of the day department are presented.

Table A15.51

The correlations of the parameters of displaying of the information fragments of the first group of examinees in 2006 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	0	1				
$L_{3.1N}$	***0,3669***	0	1			
$L_{3.6N}$	0,15847	-0,24553	0,181965	1		
$L_{3.7}$	-0,28704	-0,24998	***-0,49878***	-0,30377	1	
$L_{3.8N}$	-0,07215	-0,20121	-0,11471	-0,39819	***0,64687***	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.52

The correlations of the parameters of displaying of the information fragments of the second group of examinees in 2006 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,28098	1				
$L_{3.1N}$	0,395285	-0,1777	1			
$L_{3.6N}$	0,150775	0,035675	0,050189	1		
$L_{3.7}$	***-0,65073***	0,135436	***-0,57923***	-0,16371	1	
$L_{3.8N}$	0,258199	***-0,4111***	0,204124	0,010245	-0,26966	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.53

The correlations of the parameters of displaying of the information fragments of the third group of examinees in 2006 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,20328	1				
$L_{3.1N}$	-0,05011	0,053376	1			
$L_{3.6N}$	-0,22658	0,218389	0,282597	1		
$L_{3.7}$	-0,09087	-0,25565	0,137973	0,209242	1	
$L_{3.8N}$	-0,19528	-0,29628	-0,10999	-0,18071	-0,14774	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the three groups of day department **the steady statistical correlation relationship is revealed** between the age (Age) and the kind of information ($L_{3.1N}$), the kind of information ($L_{3.1N}$) and the size of point-size of symbol ($L_{3.7}$), that is caused by the potential predisposition of person to the directly perception of the structurally-graphical information and symbols with a large point-size.

In tabl. A15.54-A15.55 a posteriori data of research of the parameters of displaying of the information fragments in the two groups of examinees of the evening department are presented.

Table A15.54

The correlations of the parameters of displaying of the information fragments of the fourth group of examinees in 2006 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,263	1				
$L_{3.1N}$	-0,37506	-0,16696	1			
$L_{3.6N}$	-0,26138	0,18941	0,115764	1		
$L_{3.7}$	-0,39173	-0,07535	***0,409864***	0,038811	1	
$L_{3.8N}$	0,011424	0,277587	0,148676	-0,12107	-0,19171	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.55

The correlations of the parameters of displaying of the information fragments of the fifth group of examinees in 2006 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,10656	1				
$L_{3.1N}$	0,170202	***0,447214***	1			
$L_{3.6N}$	-0,03285	***-0,43152***	0	1		
$L_{3.7}$	-0,13616	0	0	***0,643268***	1	
$L_{3.8N}$	-0,39544	0,176337	-0,12132	0,224375	0,151654	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the two groups of evening department **the steady statistical correlation relationship is revealed** between the age (Age) and the size of point-size of symbol ($L_{3.7}$), the level of statement in the information fragment (K_{45}) and the color of font ($L_{3.8N}$), the color of background ($L_{3.6N}$) and the size of point-size of symbol ($L_{3.7}$), which is caused the potential predisposition to the perception of information, which is displayed directly by the means of use of the contrast color schemes in the basis of the adaptive means of training (ET).

There are the several contrast color schemes of displaying information:

- the color schemes for trichromates – the displaying occurs in the usual spectrum;
- the color schemes for achromats – the displaying takes place in the half-tones of gray;
- the color schemes for dichromates – the displaying occurs with the complete or partial exclusion of one from the colors of polychromatic spectrum;
    - the color scheme for protanops – excludes the presence of red color;
    - the color scheme for deuteranops – excludes the presence of green color;
    - the color scheme for tritanops – excludes the presence of blue color.

By the type of contrast schemes with the complete or partial replacement are distinguished:

- the color scheme of compensation at the dichromatia of the first, second and third degree;
- the color scheme of replacement of colors at the complete dichromatia of the visual sensory system.

In tabl. A15.56-A15.60 the correlation tables of the parameters of displaying of the various information fragments for 2007 y., and also the designations are used: the level of statement in the information fragment (L_{45}), the kind of information ($L_{3.1N}$), the color of background ($L_{3.6N}$), the size of point-size of symbol (x10) ($L_{3.7}$) and the color of font ($L_{3.8N}$).

In tabl. A15.56-A15.58 a posteriori data of research of the parameters of displaying of the information fragments in the three groups of examinees of the day department are presented.

Table A15.56

The correlations of the parameters of displaying of the information fragments of the first group of examinees in 2007 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,06876	1				
$L_{3.1N}$	<u>-0,24058</u>	-0,10322	1			
$L_{3.6N}$	<u>-0,30904</u>	<u>-0,37418</u>	-0,01678	1		
$L_{3.7}$	0,144999	0,081859	0,176773	<u>-0,29007</u>	1	
$L_{3.8N}$	<u>0,370117</u>	-0,04129	<u>***0,4***</u>	<u>-0,3063</u>	<u>***0,642593***</u>	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.57

The correlations of the parameters of displaying of the information fragments of the second group of examinees in 2007 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,19181	1				
$L_{3.1N}$	0,144841	-0,04013	1			
$L_{3.6N}$	0,027046	-0,01349	<u>***-0,56019***</u>	1		
$L_{3.7}$	<u>0,354066</u>	<u>-0,3111</u>	-0,06984	0,039125	1	
$L_{3.8N}$	0,094821	0,078811	<u>-0,21822</u>	<u>-0,36673</u>	-0,04572	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.58

The correlations of the parameters of displaying of the information fragments of the third group of examinees in 2007 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,11775	1				
$L_{3.1N}$	0,079536	<u>0,213531</u>	1			
$L_{3.6N}$	-0,14784	0,050625	0,159576	1		
$L_{3.7}$	<u>-0,32139</u>	<u>***0,569514***</u>	0,081152	0,007346	1	
$L_{3.8N}$	0,075986	<u>-0,23873</u>	-0,05473	-0,16738	<u>-0,34141</u>	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the three groups of day department <u>**the steady statistical correlation relationship is revealed**</u> between the level of statement of the inf. fragments (L_{45}) and the size of point-size of symbol ($L_{3.7}$), the color of background ($L_{3.6N}$) and the color of font ($L_{3.8N}$), which is caused by the potential predisposition to the perception of symbols with a large point-size and the necessity to take into account the level of proficiency in the statement of the content of information fragments in a certain or several subjects of studying in the adaptive means of training.

In tabl. A15.59-A15.60 a posteriori data of research of the parameters of displaying of the information fragments in the two groups of examinees of the evening department are presented.

Table A15.59

The correlations of the parameters of displaying of the information fragments of the fourth group of examinees in 2007 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	<u>-0,26599</u>	1				
$L_{3.1N}$	<u>0,256008</u>	0	1			
$L_{3.6N}$	0,035917	-0,07332	<u>0,24891</u>	1		
$L_{3.7}$	-0,14344	0,157064	<u>0,260998</u>	<u>0,235055</u>	1	
$L_{3.8N}$	<u>0,278713</u>	-0,13001	0,109599	-0,14508	-0,00286	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.60

The correlations of the parameters of displaying of the information fragments of the fifth group of examinees in 2007 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,15121	1				
$L_{3.1N}$	0,059761	-0,01063	1			
$L_{3.6N}$	-0,06455	<u>0,206692</u>	0	1		
$L_{3.7}$	-0,08414	-0,05239	0,100567	<u>0,271563</u>	1	
$L_{3.8N}$	<u>-0,38423</u>	0,071555	-0,04664	0,127884	0,039148	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the two groups of evening department <u>**the steady statistical correlation relationship is revealed**</u> between the age (Age) and the level of statement of the information fragments (L_{45}), the level of statement of the information fragments (L_{45}) and the color of symbol ($L_{3.8N}$), the color of background ($L_{3.6N}$) and the size of point-size of symbol ($L_{3.7}$), that is caused by the potential possibility of application of the color schemes of replacement and compensation of colors at the dichromatia, and also the necessity of taking into account of the level of statement of the information fragments.

There are the various kinds of color schemes for the final environment of usage:

- the color scheme of replacement in the information fragments is applied at the complete dichromatia as the potential absence of sensitivity to the perception of one from the main colors in the composition of polychromatic spectrum;
  - the color scheme for the complete protanopes is applied for the purposes of replacement of the red and shades of red color in the composition of polychromatic spectrum;
  - the color scheme for the complete deuteranopes is applied for the purposes of replacement of the green and shades of green color in the composition of polychromatic spectrum;
  - the color scheme for the complete tritanopes is applied for the purposes of replacement of the blue and shades of blue in the composition of polychromatic spectrum;
- the color scheme of partial replacement is applied at the partial dichromatia as the partial absence of sensitivity to the perception of one from the main colors of polychromatic spectrum of the photon radiation (the increasing of the intensity of color).

In tabl. A15.61-A15.65 the correlation tables of the parameters of displaying of the various information fragments for 2008 y., and also the designations are used: the level of statement in the information fragment (L_{45}), the kind of information ($L_{3.1N}$), the color of background ($L_{3.6N}$), the size of point-size of symbol (x10) ($L_{3.7}$) and the color of font ($L_{3.8N}$).

In tabl. A15.61-A15.63 a posteriori data of research of the parameters of displaying of the information fragments in the three groups of examinees of the day department are presented.

Table A15.61

The correlations of the parameters of displaying of the information fragments of the first group of examinees in 2008 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	0,181305	1				
$L_{3.1N}$	***0,442405***	-0,31188	1			
$L_{3.6N}$	-0,27825	-0,34461	-0,1843	1		
$L_{3.7}$	-0,28489	-0,05146	0,103346	0,030597	1	
$L_{3.8N}$	0,208638	0,019201	-0,18232	-0,18993	0,215651	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.62

The correlations of the parameters of displaying of the information fragments of the second group of examinees in 2008 y.

	Age	K_{45}	L_{31N}	L_{36N}	L_{37}	L_{38N}
Age	1					
K_{45}	-0,336455	1				
L_{31N}	0,359262	0,013222	1			
L_{36N}	-0,050107	0,195070	0,283317	1		
L_{37}	-0,037999	0,017202	0,286639	0,036633	1	
L_{38N}	-0,140200	0,013222	0,136364	-0,309309	0,083774	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.63

The correlations of the parameters of displaying of the information fragments of the third group of examinees in 2008 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,19772	1				
$L_{3.1N}$	0,294174	0,348991	1			
$L_{3.6N}$	-0,16893	0,125256	-0,10215	1		
$L_{3.7}$	0,224745	-0,02114	0,038445	-0,13171	1	
$L_{3.8N}$	-0,02052	0,109521	0,108631	-0,30931	0,298335	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the three groups of day department **the steady statistical correlation relationship is revealed** between the age (Age) and the kind of information ($L_{3.1N}$), the age (Age) and the size of point-size of symbol ($L_{3.7}$), the color of background ($L_{3.6N}$) and the color of symbol ($L_{3.8N}$), the size of point-size of symbol ($L_{3.7}$) and the color of symbol ($L_{3.8N}$), that is caused by the features of photopic vision of the visual sensory system of human as the biological kind.

In tabl. A15.64-A15.65 a posteriori data of research of the parameters of displaying of the information fragments in the two groups of examinees of the evening department are presented.

Table A15.64

The correlations of the parameters of displaying of the information fragments of the fourth group of examinees in 2008 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	***-0,53118***	1				
$L_{3.1N}$	-0,03098	-0,05852	1			
$L_{3.6N}$	0,127204	0,044402	***-0,42401***	1		
$L_{3.7}$	0,193813	0,313316	0,030078	0,064438	1	
$L_{3.8N}$	***-0,42031***	0,304082	-6,4E-17	-0,28345	0,306794	1

The note: the underlined – the easy connection, the bold italic – the average connection.

Table A15.65

The correlations of the parameters of displaying of the information fragments of the fifth group of examinees in 2008 y.

	Age	K_{45}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	***-0,59684***	1				
$L_{3.1N}$	***-0,4022***	-0,07036	1			
$L_{3.6N}$	0,0828	-0,06373	-0,05661	1		
$L_{3.7}$	0,33269	-0,34328	0,258189	0,070565	1	
$L_{3.8N}$	-0,18857	0,192772	0,161165	-0,18248	0,312799	1

The note: the underlined – the easy connection, the bold italic – the average connection.

In the two groups of evening department **the statistical correlation relationship is revealed** between the age (Age) and the level of statement in the information fragment (L_{45}), the age (Age) and the size of point-size of symbol ($L_{3.7}$), the age (Age) and the color of font ($L_{3.8N}$), the color of background ($L_{3.6N}$) and the color of symbol ($L_{3.8N}$), the size of point-size of symbol ($L_{3.7}$) and the color of symbol ($L_{3.8N}$), that is caused by the potential necessity and the possibility of applying of the color scheme of replacement and compensation of colors at the dichromatia, and also the necessity of taking into account of the level of statement of the information fragments.

The adaptive representation of information fragments processor in the basis of the adaptive means of training (ET) provides the direct calculation of the optimal combination of the values of parameters of the displaying of information fragments.

In the mode of administrating of ET there is the potential possibility of adding and removing of the values of parameters of CM of the subject of training and CM of the means of training, and also directly the color schemes of displaying of the information to the subject of training.

In the mode of adaptive training of ET the adaptive representation of information fragments processor directly carries out the calculation of optimal combination of the parameters of displaying of the information fragments based on the individual features of the subjects of training (CM of the subject of training) and the potential technical capabilities of a certain means of training (CM of the means of training).

A15.6. The regression analysis

The regression analysis refers to the linear methods based on the method of least squares, allows to research the mutual influence of variables, the analysis of sensitivity of the dependent and independent variables, the prediction and analysis of residues.

The regression analysis as the statistical method of mathematical processing of a posteriori data allows to perform the several main functions and tasks:

- to estimate the degree of mutual influence of a set of independent variables in relation to the dependent variable – the coefficient of multiple correlation;
- to estimate the influence of the variation of a set of independent variables on the dispersion of the dependent quantitative variable – the coefficient of multiple determination;
- to realize the predicting of the nominal value of dependent variable by the means of substituting of a sequence of the nominal values of independent variables – the equation (model) of multiple regression;
- directly to estimate the paired correlation of independent variables and dependent variable – the coefficient of correlation between the two variables;
- to estimate the degree of importance of each independent variable in the equation (model) of multiple regression – β-coefficient and standardized β-coefficient;
    - the increasing of β-coefficient causes the greater degree of contribution of the variation of independent variable into the dispersion of dependent variable, and also the small mutual correlation between all independent variables;
    - the reducing of β-coefficient causes the small degree of contribution of the variation of independent variable into the dispersion of dependent variable, and also the large mutual correlation between all independent variables;
- the multiplication of the nominal value of β-coefficient on the coefficient of correlation between the independent variable and dependent variable – the share of dispersion of the dependent variable under the influence of variation of a set of independent variables;
- to provide the classification of the element in relation to the certain class: to correlate a certain object with the pattern of parameters to a certain class of objects with the pattern of parameters by the principle of greatest likelihood;
- to estimate the degree of non-binding of the predicted and factual nominal value of dependent variable at the substituting of a set of independent ones – the analysis of residues.

An alternative to the linear regression analysis is the discriminant analysis:

- in the regression analysis – the dependent variable in the quantitative scale;
- in the discriminant analysis – the dependent variable in the nominative scale.

A15.6.1. A set of independent variables included into the analysis

In the course of the regression analysis of a posteriori data was formed the table with the critical values of the measure of asymmetry and the measure of sharpness (table A15.66).

Table A15.66

The critical values of asymmetricity and excess

№	The name	The initial volume of sample	The experi-mental volume of sample	The critical value of the measure of asymmetricity (asymmetry)	The critical value of the measure of sharpness (excess)
1.	The reduced set of data	280	280	0,435263855	1,425262819
2.	The complete set of data	280	280	0,435263855	1,425262819

The interest is the reduced and complete set of independent variables.

In the course of carrying out of the regression analysis of a posteriori data is formed the reduced sample of initial data for the realization of research (tabl. A15.67).

Table A15.67

The reduced set of variables for the regression analysis

№	The identifier of variable	The name of variable	Average	Dispersion	Asymmetry	Excess
1.	Age	the age	18,2357	6,919	3,326	14,765
2.	K_7	protanopia	20,8750	6,683	-0,999	1,694
3.	K_8	deuteranopia	11,8000	11,515	-0,259	-0,656
4.	K_9	tritanopia	12,2857	12,771	-0,269	-0,991
5.	K_{14}	the verbal intellect	14,4393	5,186	-0,562	0,838
6.	K_{15}	generalization	12,9893	4,290	-0,137	-0,448
7.	K_{16}	associativity	10,7821	13,727	-0,266	-0,775
8.	K_{17}	classification	4,7357	7,321	1,059	2,090
9.	K_{18}	mathematical counting	8,6643	15,966	0,241	-0,737
10.	K_{19}	combinatorics	10,9393	14,975	-0,129	-0,560
11.	K_{20}	mnemonics	16,0107	12,462	-0,850	0,014
12.	K_{21}	planar thinking	10,6643	6,066	0,387	0,512
13.	K_{22}	volumetric thinking	11,1107	11,998	-0,039	-0,371

The completion of tabl. A15.67

14.	K_{23}	verbal originality	2,7358	3,807	2,492	8,359
15.	K_{24}	verbal associativity	6,1414	11,011	0,198	-0,384
16.	K_{25}	verbal selectivity	17,2535	69,237	0,294	0,488
17.	K_{27}	figurative originality	1,7154	0,872	1,318	1,178
18.	K_{28}	figurative associativity	2,0413	1,841	0,539	0,296
19.	K_{29}	figurative selectivity	4,8426	9,344	0,685	0,352
20.	K_{45}	the level of proficiency in the language of statement	3,7929	1,362	0,710	0,428
21.	L_{31N}	the kind of information	1,3214	0,219	0,769	-1,419
22.	L_{36N}	the color of background	5,4536	3,209	-0,397	-1,092
23.	L_{37}	the color of font	15,83	18,836	0,734	1,666
24.	L_{38N}	the size of font	4,4071	16,328	0,353	-1,865
25.	Y_1	the estimation of LRKT by the coarse scale with CMT after the studying of one section	4,1000	0,721	-0,688	-0,001
26.	Y_2	the estimation of LRKT by the exact scale with CMT after the studying of one section	4,2429	0,629	-0,940	0,773
27.	Y_3	the summary estimation of LRKT by the coarse scale	3,9536	0,890	-0,423	-0,873
28.	Y_4	the summary estimation of LRKT by the exact scale	4,1357	0,827	-0,531	-1,008

The complete and reduced samples of a posteriori data are directly suitable for the providing and realization of the statistical analysis of a posteriori data, which are obtained in the process of research of the parameters of PCMB based on the applied DM.

In the course of the primary statistical analysis of the nominal values in the reduced sample of a posteriori data and the comparison of factual and theoretical critical values of the measure of asymmetricity and the measure of sharpness of distribution did not reveal the significant heterogeneities, and all abnormal values were eliminated:

- Age – the artifacts are revealed, which does not appear possible to eliminate;
- K_7 – the insignificant emissions were detected and eliminated;
- K_8 – the complete compliance to the analytical criterion;
- K_9 – the complete compliance to the analytical criterion;
- K_{14} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{15} – the complete compliance to the analytical criterion;
- K_{16} – the complete compliance to the analytical criterion;
- K_{17} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{18} – the complete compliance to the analytical criterion;
- K_{19} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{20} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{21} – the complete compliance to the analytical criterion;
- K_{22} – the complete compliance to the analytical criterion;
- K_{23} – the insignificant emissions detected and eliminated;
- K_{24} – the complete compliance to the analytical criterion;
- K_{25} – the complete compliance to the analytical criterion;
- K_{27} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{28} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{29} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{45} – the partial compliance, the insignificant emissions were detected and eliminated;
- L_{31N} – the insignificant emissions detected and eliminated;
- L_{36N} – the complete compliance to the analytical criterion;
- L_{37} – the insignificant emissions detected and eliminated;
- L_{38N} – the partial compliance, the insignificant emissions were detected and eliminated;
- Y_1 – the partial compliance, the insignificant emissions were detected and eliminated;
- Y_2 – the partial compliance, the insignificant emissions were detected and eliminated;
- Y_3 – the partial compliance, the insignificant emissions were detected and eliminated;
- Y_4 – the partial compliance, the insignificant emissions were detected and eliminated.

There are no the significant heterogeneities in the actual set of indicators.

In the course of the regression analysis of a posteriori data of experiments the complete sample of initial data for the realization of research was formed (table A15.68).

Table A15.68

The complete set of variables for the regression analysis

№	The identifier of variable	The name of variable	Average	Dispersion	Asymmetry	Excess
1.	Age	Age	18,2357	6,919	3,326	14,765
2.	RU	the estimation in the Russian language	4,0929	0,400	-0,076	-0,510
3.	LIT	the estimation in literature	4,2214	0,445	-0,286	-0,787
4.	LG	the estimation in the foreign language	4,3286	0,422	-0,448	-0,707
5.	HIS	the estimation in history	4,3321	0,323	-0,139	-0,669
6.	GEO	the estimation in geography	4,4250	0,374	-0,562	-0,594
7.	BIO	the estimation in biology	4,3750	0,343	-0,312	-0,701
8.	ALG	the estimation in algebra	4,2714	0,471	-0,409	-0,850
9.	GEOM	the estimation in geometry	4,2929	0,495	-0,480	-0,890
10.	FIZ	the estimation in physics	4,2321	0,437	-0,293	-0,760
11.	CHE	the estimation in chemistry	4,1929	0,479	-0,276	-0,903
12.	SCH	the estimation in drawing	4,5643	0,290	-0,675	-0,721
13.	AST	the estimation in astronomy	4,6500	0,257	-0,962	-0,343
14.	K_7	protanopia	20,8750	6,683	-0,999	1,694
15.	K_8	deuteranopia	11,8000	11,515	-0,259	-0,656
16.	K_9	tritanopia	12,2857	12,771	-0,269	-0,991

The continuation of tabl. A15.68

17.	K_{14}	verbal intellect	14,4393	5,186	-0,562	,838
18.	K_{15}	generalization	12,9893	4,290	-0,137	-0,448
19.	K_{16}	associativity	10,7821	13,727	-0,266	-0,775
20.	K_{17}	classification	4,7357	7,321	1,059	2,090
21.	K_{18}	mathematical counting	8,6643	15,966	0,241	-0,737
22.	K_{19}	combinatorics	10,9393	14,975	-0,129	-0,560
23.	K_{20}	mnemonics	16,0107	12,462	-0,850	0,014
24.	K_{21}	planar thinking	10,6643	6,066	0,387	0,512
25.	K_{22}	volumetric thinking	11,1107	11,998	-0,039	-0,371
26.	K_{23}	verbal originality	2,7358	3,807	2,492	8,359
27.	K_{24}	verbal associativity	6,1414	11,011	0,198	-0,384
28.	K_{25}	verbal selectivity	17,2535	69,237	0,294	0,488
29.	K_{27}	figurative originality	1,7154	0,872	1,318	1,178
30.	K_{28}	figurative associativity	2,0413	1,841	0,539	0,296
31.	K_{29}	figurative selectivity	4,8426	9,344	0,685	0,352
32.	K_{45}	the level of proficiency in the language of statement	3,7929	1,362	0,710	0,428
33.	$L_{3.1N}$	the kind of information	1,3214	0,219	0,769	-1,419
34.	$L_{3.6N}$	the color of background	5,4536	3,209	-0,397	-1,092
35.	$L_{3.7}$	the color of font	15,83	18,836	0,734	1,666
36.	$L_{3.8N}$	the size of font	4,4071	16,328	0,353	-1,865

The completion of tabl. A15.68

37.	Y_1	the estimation of LRKT on the coarse scale with CMT after the studying of one section	4,1000	0,721	-0,688	-0,001
38.	Y_2	the estimation of LRKT on the exact scale with CMT after the studying of one section	4,2429	0,629	-0,940	0,773
39.	Y_3	the summary estimation of LRKT on the coarse scale	3,9536	0,890	-0,423	-0,873
40.	Y_4	the summary estimation of LRKT on the exact scale	4,1357	0,827	-0,531	-1,008

In the course of the primary statistical analysis of the nominal values in the complete sample of a posteriori data and the comparison of factual and theoretical critical values of the measure of asymmetricity and the measure of sharpness of distribution did not reveal the significant heterogeneities, and all abnormal values are eliminated:

- Age – the artifacts are found, which does not appear possible to eliminate;
- RU – the complete compliance to the analytical criterion;
- LIT – the complete compliance to the analytical criterion;
- LG – the complete compliance to the analytical criterion;
- HIS – the complete compliance to the analytical criterion;
- GEO – the partial compliance, the insignificant emissions were detected and eliminated;
- BIO – the complete compliance to the analytical criterion;
- ALG – the complete compliance to the analytical criterion;
- GEOM – the partial compliance, the insignificant emissions were detected and eliminated;
- FIZ – the complete compliance to the analytical criterion;
- CHE – the complete compliance to the analytical criterion;
- SCH – the partial compliance, the insignificant emissions were detected and eliminated;
- AST – the partial compliance, the insignificant emissions were detected and eliminated;

- K_7 – the insignificant emissions were detected and eliminated;
- K_8 – the complete compliance to the analytical criterion;
- K_9 – the complete compliance to the analytical criterion;
- K_{14} – the complete compliance to the analytical criterion;
- K_{15} – the complete compliance to the analytical criterion;
- K_{16} – the complete compliance to the analytical criterion;
- K_{17} – the insignificant emissions were detected and eliminated;
- K_{18} – the complete compliance to the analytical criterion;
- K_{19} – the complete compliance to the analytical criterion;
- K_{20} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{21} – the complete compliance to the analytical criterion;
- K_{22} – the complete compliance to the analytical criterion;
- K_{23} – the insignificant emissions were detected and eliminated;
- K_{24} – the complete compliance to the analytical criterion;
- K_{25} – the complete compliance to the analytical criterion;
- K_{27} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{28} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{29} – the partial compliance, the insignificant emissions were detected and eliminated;
- K_{45} – the partial compliance, the insignificant emissions were detected and eliminated;
- L_{31N} – the insignificant emissions were detected and eliminated;
- L_{36N} – the complete compliance to the analytical criterion;
- L_{37} – the complete compliance to the analytical criterion;
- L_{38N} – the partial compliance, the insignificant emissions were detected and eliminated;
- Y_1 – the partial compliance, the insignificant emissions were detected and eliminated;
- Y_2 – the partial compliance, the insignificant emissions were detected and eliminated;
- Y_3 – the complete compliance to the analytical criterion;
- Y_4 – the insignificant emissions were detected and eliminated;

In the actual set of indicators there are no the significant heterogeneities, which potentially prevent the carrying out of mathematical processing of a posteriori data by means of a set of statistical methods of the analysis, there is a necessity to select a set of statistical methods for the processing of a posteriori data with taking into account of the requirements, tasks and restrictions to the samples of data.

The regression or discriminant analysis is potentially possible to carry out.

A15.6.2. The (non)standardized coefficients and the equations of regression

The non-standardized and standardized coefficients directly determine the degree of contribution of a set of predictors (independent variables) into the variation of factor (dependent variable) and allow to formalize the linear regression.

A set of nominal values of the standardized coefficients is converted by the means of using of Z-transformation (the procedure of standardization).

The procedure of standardization and Z-transformation allow to reveal the significant anomalies in a sequence of following of the nominal values in the samples with a posteriori data, which are manifested in the presence of emissions and artifacts.

A reduced and complete set of independent variables is given, and also alternately the two vectors of dependent variables – the two vectors of estimations of LRKT, obtained by the means of use of the basic DM based on a set of different tests in DB:

- Y_2 – the vector of estimations of LRKT, measured by the means of use of the reconfigurable coarse scale based on the sum of correct answers to the questions;
- Y_4 – the vector of estimations of LRKT, measured by means of use of the developed reconfigurable exact scale based on the sum of scored points for each correct answer to the question (the scale and function of estimation are presented directly in my dissertation and my personal monography).

The standardized equation of multiple regression (the linear regression model) is formed by means of directly substituting of a set of the standardized coefficients of multiple regression of the different nominal.

The non-standardized equation of multiple regression (the linear regression model) is formed by means of directly substituting of a set of the non-standardized coefficients of multiple regression of the different nominal.

The statistical analysis by the means of use of the method of multiple linear regression potentially allows to obtain the several regression equations or models, which are subject to the quantitative and qualitative analysis.

Each regression equation is characterized by the various parameters:

- the informativity – the share of dispersion of the dependent variable (factor) under the influence of variation of a set of independent variables (predictors), is estimated by the analysis of the nominal of eigenvalues of the linear model;
- the descriptivity – the predictive ability of the linear model, which is determined by the accuracy of selection of a set of the nominal values of independent variables (factors) and directly by the analysis of residues, and also by the coefficient of multiple determination (the square of the coefficient of multiple correlation).

I.A. Consider the reduced set of independent variables K_i and factor Y_2.

The formation and processing of a reduced (abbreviated) set of independent variables K_i and factor Y_2 by the means of use of the regression analysis allow to obtain the basis of the linear regression model with the nominal values of non-standardized and standardized coefficients, given in tabl. A15.69.

Table A15.69

The non-standardized and standardized coefficients (Coefficients) of model Y_2

The model	The variable	The non-standardized coefficients		The stand. coeff.	t	The value	95% confidence interval for B		The correlations			The statistics of collinearity	
		B	The std. error	Beta			The lower boundary	The upper boundary	The zero order	Private	Partial	Tole-ran-ce	CRD
1	Constant	2,545	0,768		3,313	0,001	1,032	4,058					
	Age	-0,012	0,019	-0,041	-0,647	0,518	-0,050	0,025	-0,146	-0,040	-0,037	0,808	1,237
	K7	0,031	0,018	0,101	1,687	0,093	-0,005	0,067	0,099	0,104	0,097	0,923	1,083
	K8	0,020	0,042	0,084	0,467	0,641	-0,063	0,103	-0,030	0,029	0,027	0,101	9,922
	K9	-0,029	0,040	-0,129	-0,721	0,471	-0,107	0,049	-0,038	-0,045	-0,041	0,103	9,735
	K14	0,057	0,023	0,163	2,448	0,015	0,011	0,103	0,252	0,150	0,140	0,735	1,361
	K15	-0,017	0,025	-0,044	-0,680	0,497	-0,066	0,032	0,065	-0,042	-0,039	0,778	1,286
	K16	-0,019	0,017	-0,088	-1,135	0,257	-0,051	0,014	0,135	-0,070	-0,065	0,548	1,825
	K17	-0,017	0,021	-0,058	-0,799	0,425	-0,059	0,025	0,124	-0,050	-0,046	0,618	1,619
	K18	0,038	0,018	0,194	2,191	0,029	0,004	0,073	0,292	0,135	0,125	0,418	2,391
	K19	0,012	0,016	0,057	0,752	0,453	-0,019	0,043	0,216	0,047	0,043	0,562	1,778
	K20	0,015	0,014	0,067	1,071	0,285	-0,013	0,043	0,167	0,066	0,061	0,833	1,200
	K21	0,030	0,022	0,094	1,390	0,166	-0,013	0,073	0,170	0,086	0,080	0,717	1,394
	K22	-0,003	0,015	-0,013	-0,189	0,850	-0,033	0,027	0,126	-0,012	-0,011	0,726	1,377
	K23	-0,031	0,031	-0,075	-1,000	0,318	-0,091	0,030	0,009	-0,062	-0,057	0,581	1,721
	K24	0,004	0,029	0,018	0,146	0,884	-0,053	0,062	0,059	0,009	0,008	0,218	4,586
	K25	-0,005	0,012	-0,051	-0,408	0,684	-0,028	0,019	0,065	-0,025	-0,023	0,212	4,720
	K27	0,075	0,068	0,088	1,088	0,277	-0,060	0,209	0,149	0,067	0,062	0,504	1,984
	K28	-0,035	0,052	-0,059	-0,667	0,505	-0,137	0,068	0,033	-0,041	-0,038	0,412	2,425
	K29	0,006	0,027	0,022	0,212	0,832	-0,047	0,059	0,070	0,013	0,012	0,303	3,302
	K45	0,037	0,046	0,055	0,812	0,418	-0,053	0,128	0,171	0,050	0,046	0,709	1,411

a The dependent variable: Y2

The equation of multiple regression (the linear model Y_2) is obtained by the means of realization of the simple substitution of the non-standardized coefficients K_i:

$$Y_2=2,545-0,012Age+0,031K_7+0,020K_8-0,029K_9+0,057K_{14}-0,017K_{15}-0,019K_{16}-0,017K_{17}+0,038K_{18}+0,012K_{19}+$$
$$+0,015K_{20}+0,030K_{21}-0,003K_{22}-0,031K_{23}+0,004K_{24}-0,005K_{25}+0,075K_{27}-0,035K_{28}+0,006K_{29}+0,037K_{45}.$$

The structure of the linear equation of multiple regression Y_2 allows to speak about the high sensitivity to the variation of values of a set of independent variables.

All independent variables are the significant, but relatively high degree of contribution into the dispersion of dependent variable (factor Y_2) is made by some from the independent variables (the predictors of the linear regression equation): Age (-0,012), K_7 (0,031), K_8 (0,020), K_9 (-0,029), K_{14} (0,057), K_{15} (-0,017), K_{16} (-0,019), K_{17} (-0,017), K_{18} (0,038), K_{19} (0,012), K_{20} (0,015), K_{21} (0,030), K_{22} (-0,003), K_{23} (-0,031), K_{24} (0,004), K_{25} (-0,005), K_{27} (0,075), K_{28} (-0,035), K_{29} (0,006), K_{45} (0,037).

The practical interest the analysis of residues at the substituting of the nominal values of independent variables for the estimation of quality of the regression equation is presented.

I.B. Consider the reduced set of independent variables K_i and factor Y_4.

The formation and processing of reduced (abbreviated) set of the independent variables K_i and factor Y_4 by means of the apparatus of regression analysis allowed to obtain the basis of linear regression model with the nominal values of non-standardized and standardized coefficients, given in tabl. A15.70.

Table A15.70

The non-standardized and standardized coefficients (Coefficients) of model Y_4

The model	The variable	The non-standardized coefficients		The stand. coeff.	t	The value	95% confidence interval for B		The correlations			The statistics of collinearity	
		B	The std. error	Beta			The lower boundary	The upper boundary	The zero order	Private	Partial	Tole-ran-ce	CRD
		4,924	0,824		5,978	0,000	3,302	6,546					
	Age	-0,108	0,021	-0,311	-5,231	0,000	-0,148	-0,067	-0,385	-0,309	-0,280	0,808	1,237
	K7	0,028	0,020	0,079	1,419	0,157	-0,011	0,066	0,080	0,088	0,076	0,923	1,083
	K8	0,005	0,045	0,019	0,111	0,912	-0,084	0,094	-0,048	0,007	0,006	0,101	9,922
	K9	-0,025	0,042	-0,098	-0,588	0,557	-0,109	0,059	-0,052	-0,037	-0,031	0,103	9,735
	K14	0,016	0,025	0,040	0,646	0,519	-0,033	0,065	0,160	0,040	0,035	0,735	1,361
	K15	-0,038	0,027	-0,086	-1,412	0,159	-0,090	0,015	0,043	-0,087	-0,076	0,778	1,286
	K16	-0,016	0,018	-0,063	-0,876	0,382	-0,050	0,019	0,132	-0,054	-0,047	0,548	1,825
	K17	-0,003	0,023	-0,010	-0,150	0,881	-0,049	0,042	0,172	-0,009	-0,008	0,618	1,619
	K18	0,038	0,019	0,168	2,036	0,043	0,001	0,075	0,278	0,126	0,109	0,418	2,391
1	K19	-0,015	0,017	-0,065	-0,904	0,367	-0,048	0,018	0,170	-0,056	-0,048	0,562	1,778
	K20	0,021	0,015	0,081	1,376	0,170	-0,009	0,051	0,199	0,085	0,074	0,833	1,200
	K21	0,068	0,023	0,185	2,935	0,004	0,023	0,114	0,222	0,179	0,157	0,717	1,394
	K22	-0,019	0,016	-0,074	-1,178	0,240	-0,052	0,013	0,076	-0,073	-0,063	0,726	1,377
	K23	-0,040	0,033	-0,085	-1,217	0,225	-0,104	0,025	0,005	-0,075	-0,065	0,581	1,721
	K24	-0,015	0,031	-0,056	-0,492	0,623	-0,077	0,046	0,046	-0,031	-0,026	0,218	4,586
	K25	0,008	0,013	0,070	0,598	0,550	-0,017	0,033	0,079	0,037	0,032	0,212	4,720
	K27	0,090	0,073	0,093	1,228	0,221	-0,054	0,235	0,161	0,076	0,066	0,504	1,984
	K28	-0,096	0,056	-0,143	-1,714	0,088	-0,206	0,014	-0,011	-0,106	-0,092	0,412	2,425
	K29	0,020	0,029	0,067	0,687	0,493	-0,037	0,077	0,078	0,043	0,037	0,303	3,302
	K45	0,075	0,050	0,097	1,522	0,129	-0,022	0,173	0,249	0,094	0,081	0,709	1,411

a The dependent variable: Y4

The equation of multiple regression (the linear model Y_4) is obtained by the means of realization of the simple substitution of non-standardized coefficients K_i:

$$Y_4=4{,}924-0{,}108Age+0{,}028K_7+0{,}005K_8-0{,}025K_9+0{,}016K_{14}-0{,}038K_{15}-0{,}016K_{16}-0{,}003K_{17}+0{,}038K_{18}-0{,}015K_{19}+$$
$$+0{,}021K_{20}+0{,}068K_{21}-0{,}019K_{22}-0{,}040K_{23}-0{,}015K_{24}+0{,}008K_{25}+0{,}090K_{27}-0{,}096K_{28}+0{,}020K_{29}+0{,}075K_{45}.$$

The structure of the linear equation of multiple regression Y_4 allows to speak about the high sensitivity to the variation of values of a set of independent variables.

All independent variables are significant, but some from the independent variables (predictors) act the high degree of contribution into the dispersion of dependent variable (factor Y_4): Age (-0,108), K_7 (0,028), K_8 (0,005), K_9 (-0,025), K_{14} (0,016), K_{15} (-0,038), K_{16} (-0,016), K_{17} (-0,003), K_{18} (0,038), K_{19} (-0,015), K_{20} (0,021), K_{21} (0,068), K_{22} (-0,019), K_{23} (-0,040), K_{24} (-0,015), K_{25} (0,008), K_{27} (0,090), K_{28} (-0,096), K_{29} (0,020) and K_{45} (0,075).

The practical interest the analysis of residues at the substitution of the nominal values of independent variables for the estimation of quality of the regression equation is presented.

2.A. Consider the complete set of independent variables K_i and factor Y_2.

The formation and processing of a complete set of independent variables K_i and factor Y_2 by the means of use of the apparatus of regression analysis allow to obtain the basis of the linear regression model with the nominal values of non-standardized and standardized coefficients, given directly in tabl. A15.71.

Table A15.71

The non-standardized and standardized coefficients (Coefficients) of model Y_2

The model	The variable	The non-standardized coefficients		The stand. coeff.	t	The value	95% confidence interval for B		The correlations			The statistics of collinearity	
		B	The std. error	Beta			The lower boundary	The upper boundary	The zero order	Private	Partial	Tole-ran-ce	CRD
1		0,824	0,964		0,855	0,394	-1,075	2,723					
	Age	-0,008	0,019	-0,028	-0,440	0,661	-0,046	0,029	-0,146	-0,028	-0,025	0,767	1,304
	RU	-0,161	0,111	-0,129	-1,446	0,149	-0,381	0,058	0,126	-0,092	-0,081	0,395	2,531
	LIT	0,049	0,114	0,042	0,434	0,665	-0,175	0,273	0,155	0,028	0,024	0,341	2,933
	LG	0,147	0,102	0,121	1,440	0,151	-0,054	0,348	0,227	0,092	0,080	0,446	2,244
	HIS	0,244	0,122	0,175	2,009	0,046	0,005	0,484	0,242	0,128	0,112	0,411	2,431
	GEO	-0,128	0,098	-0,098	-1,304	0,193	-0,320	0,065	0,067	-0,083	-0,073	0,549	1,823
	BIO	-0,008	0,109	-0,006	-0,071	0,944	-0,223	0,207	0,158	-0,005	-0,004	0,481	2,079
	ALG	0,040	0,121	0,035	0,334	0,738	-0,198	0,279	0,221	0,021	0,019	0,285	3,507
	GEOM	0,120	0,123	0,106	0,971	0,333	-0,123	0,362	0,238	0,062	0,054	0,261	3,825
	FIZ	-0,100	0,114	-0,084	-0,879	0,380	-0,326	0,125	0,166	-0,056	-0,049	0,344	2,906
	CHE	-0,077	0,099	-0,067	-0,778	0,437	-0,271	0,118	0,169	-0,050	-0,043	0,421	2,375
	SCH	0,148	0,100	0,101	1,488	0,138	-0,048	0,344	0,165	0,095	0,083	0,684	1,463
	AST	0,041	0,101	0,027	0,409	0,683	-0,158	0,241	0,087	0,026	0,023	0,745	1,342
	K7	0,030	0,019	0,097	1,612	0,108	-0,007	0,066	0,099	0,103	0,090	0,858	1,165
	K8	0,021	0,042	0,091	0,502	0,616	-0,062	0,104	-0,030	0,032	0,028	0,096	10,443
	K9	-0,035	0,039	-0,158	-0,891	0,374	-0,113	0,042	-0,038	-0,057	-0,050	0,099	10,091
	K14	0,067	0,025	0,193	2,686	0,008	0,018	0,117	0,252	0,170	0,150	0,603	1,660
	K15	-0,005	0,025	-0,012	-0,194	0,847	-0,053	0,044	0,065	-0,012	-0,011	0,751	1,332
	K16	-0,034	0,017	-0,159	-2,016	0,045	-0,067	-0,001	0,135	-0,128	-0,113	0,502	1,992
	K17	-0,022	0,021	-0,075	-1,027	0,305	-0,064	0,020	0,124	-0,066	-0,057	0,591	1,693
	K18	0,040	0,017	0,203	2,312	0,022	0,006	0,074	0,292	0,147	0,129	0,407	2,459
	K19	0,006	0,016	0,030	0,395	0,693	-0,025	0,037	0,216	0,025	0,022	0,532	1,878
	K20	0,007	0,014	0,033	0,509	0,611	-0,021	0,036	0,167	0,033	0,028	0,751	1,331
	K21	0,027	0,022	0,084	1,208	0,228	-0,017	0,071	0,170	0,077	0,067	0,651	1,537
	K22	0,000	0,021	-0,001	-0,006	0,995	-0,041	0,040	0,126	0,000	0,000	0,386	2,588
	K23	-0,022	0,031	-0,055	-0,724	0,470	-0,082	0,038	0,009	-0,046	-0,040	0,550	1,817
	K24	-0,003	0,029	-0,012	-0,101	0,920	-0,061	0,055	0,059	-0,006	-0,006	0,207	4,838
	K25	-0,003	0,012	-0,032	-0,255	0,799	-0,027	0,020	0,065	-0,016	-0,014	0,199	5,035
	K27	0,062	0,069	0,072	0,891	0,374	-0,075	0,198	0,149	0,057	0,050	0,472	2,119
	K28	-0,046	0,053	-0,079	-0,873	0,384	-0,151	0,058	0,033	-0,056	-0,049	0,378	2,644
	K29	0,008	0,028	0,032	0,302	0,763	-0,046	0,062	0,070	0,019	0,017	0,278	3,600
	K45	0,028	0,048	0,041	0,577	0,565	-0,068	0,123	0,171	0,037	0,032	0,613	1,631
	L31N	0,087	0,138	0,051	0,625	0,533	-0,186	0,359	0,030	0,040	0,035	0,468	2,138
	L36N	-0,020	0,026	-0,045	-0,751	0,453	-0,072	0,032	-0,085	-0,048	-0,042	0,886	1,128
	L37	0,025	0,011	0,138	2,291	0,023	0,004	0,047	0,163	0,145	0,128	0,862	1,160
	L38N	-0,003	0,012	-0,016	-0,266	0,791	-0,026	0,020	-0,034	-0,017	-0,015	0,883	1,132

a The dependent variable: Y2

The equation of multiple regression (the linear model Y_2) is obtained by the means of realization of the simple substitution of a set of non-standardized coefficients:

Y_2=0,824-0,008Age -0,161RU+0,049LIT+0,147LG+0,244HIS-0,128GEO-0,008BIO+0,040ALG+ +0,120GEOM-0,100FIZ-0,077CHE+0,148SCH+0,041AST+0,030K_7+0,021K_8-0,035K_9+0,067K_{14}- -0,005K_{15}-0,034K_{16}-0,022K_{17}+0,040K_{18}+0,006K_{19}+0,007K_{20}+0,027K_{21}+0,000K_{22}-0,022K_{23}-0,003K_{24}- -0,003K_{25}+0,062K_{27}-0,046K_{28}+0,008K_{29}+0,028K_{45}+0,087L_{31N}-0,020L_{36N}+0,025L_{37}-0,003L_{38N}.

The structure of the linear equation of multiple regression Y_2 allows to speak about the high sensitivity to the variation of values of a set of independent variables.

All independent variables are significant, but some from the independent variables (predictors) act the high degree of contribution into the dispersion of dependent variable (factor Y_2): Age (-0,008), RU (-0,161), LIT (0,049), LG (0,147), HIS (0,244), GEO (-0,128), BIO (-0,008), ALG (0,040), GEOM (0,120), FIZ (-0,100), CHE (-0,077), SCH (0,148), AST (0,041), K_7 (0,030), K_8 (0,021), K_9 (-0,035), K_{14} (0,067), K_{15} (-0,005), K_{16} (-0,034), K_{17} (-0,022), K_{18} (0,040), K_{19} (0,006), K_{20} (0,007), K_{21} (0,027), K_{22} (0,000), K_{23} (-0,022), K_{24} (-0,003), K_{25} (-0,003), K_{27} (0,062), K_{28} (-0,046), K_{29} (0,008), K_{45} (0,028), L_{31N} (0,087), L_{36N} (-0,020), L_{37} (0,025) and L_{38N} (-0,003).

The analysis of residues at the substituting of nominal values of independent variables for the estimation of quality of the regression equation is presented the practical interest.

The nominal values of non-standardized and standardized coefficients directly characterize the degree of contribution of the variation of the existing set of independent variables K_i into the dispersion of the given dependent variable Y.

The multiplication of the available coefficients of correlation of the dependent variable Y with a set of given independent variables K_i on the corresponding non-standardized and standardized coefficients characterizes commonality as the potentially low correlation dependence of each independent variable with the other independent variables, and also the greatest contribution of variation of a set of independent variables into the dispersion of the given dependent variable (factor) Y:

- the nominal value of the coefficient of correlation between the individual independent variables – reflects the potential absence of correlation relationships between a set of independent variables (predictors) K_i;
- the nominal value of the non-standardized and standardized coefficient – reflects the potential increasing of the dispersion of the dependent variable (factor) Y under the influence of variation of a set of the independent variables (predictors) K_i.

2.B. <u>Consider the complete set of independent variables K_i and factor Y_4.</u>

The formation and processing of a complete set of independent variables K_i and factor Y_4 by the means of use of the apparatus of regression analysis directly allow to obtain the basis of the linear regression model with the nominal values of non-standardized and standardized coefficients, given in tabl. A15.72.

Table A15.72

The non-standardized and standardized coefficients (Coefficients) of model Y_4

The model	The variable	The non-standardized coefficients		The stand. coeff.	t	The value	95% confidence interval for B		The correlations			The statistics of collinearity	
		B	The std. error	Beta			The lower bound	The upper boundary	The zero order	Private	Partial	Tole-ran-ce	CRD
1		3,035	1,025		2,961	0,003	1,016	5,054					
	Age	-0,098	0,020	-0,284	-4,794	0,000	-0,138	-0,058	-,385	-0,294	-0,248	0,767	1,304
	RU	-0,106	0,119	-0,074	-0,898	0,370	-0,340	0,127	0,196	-0,057	-0,046	0,395	2,531
	LIT	0,034	0,121	0,025	0,279	0,781	-0,204	0,272	0,181	0,018	0,014	0,341	2,933
	LG	-0,015	0,109	-0,011	-0,142	0,888	-0,229	0,199	0,215	-0,009	-0,007	0,446	2,244
	HIS	-0,111	0,129	-0,069	-0,858	0,392	-0,366	0,144	0,148	-0,055	-0,044	0,411	2,431
	GEO	-0,077	0,104	-0,052	-0,740	0,460	-0,282	0,128	0,134	-0,047	-0,038	0,549	1,823
	BIO	-0,021	0,116	-0,013	-0,179	0,858	-0,249	0,208	0,173	-0,011	-0,009	0,481	2,079
	ALG	0,259	0,129	0,196	2,017	0,045	0,006	0,513	0,337	0,128	0,104	0,285	3,507
	GEOM	-0,142	0,131	-0,109	-1,081	0,281	-0,400	0,116	0,268	-0,069	-0,056	0,261	3,825
	FIZ	0,171	0,121	0,124	1,405	0,161	-0,069	0,410	0,281	0,090	0,073	0,344	2,906
	CHE	0,142	0,105	0,108	1,357	0,176	-0,064	0,349	0,243	0,087	0,070	0,421	2,375
	SCH	0,024	0,106	0,014	0,225	0,823	-0,185	0,232	0,121	0,014	0,012	0,684	1,463
	AST	0,332	0,108	0,185	3,086	0,002	0,120	0,544	0,220	0,194	0,160	0,745	1,342
	K7	0,015	0,020	0,043	0,763	0,446	-0,024	0,054	0,080	0,049	0,040	0,858	1,165
	K8	-0,002	0,045	-0,006	-0,034	0,973	-0,090	0,087	-0,048	-0,002	-0,002	0,096	10,443
	K9	-0,022	0,042	-0,086	-0,526	0,600	-0,104	0,060	-0,052	-0,034	-0,027	0,099	10,091
	K14	0,011	0,027	0,028	0,427	0,670	-0,041	0,064	0,160	0,027	0,022	0,603	1,660
	K15	-0,035	0,026	-0,079	-1,318	0,189	-0,086	0,017	0,043	-0,084	-0,068	0,751	1,332
	K16	-0,021	0,018	-0,084	-1,151	0,251	-0,056	0,015	0,132	-0,074	-0,060	0,502	1,992
	K17	0,003	0,023	0,008	0,124	0,902	-0,042	0,047	0,172	0,008	0,006	0,591	1,693
	K18	0,034	0,018	0,151	1,862	0,064	-0,002	0,071	0,278	0,119	0,096	0,407	2,459
	K19	-0,021	0,017	-0,089	-1,257	0,210	-0,054	0,012	0,170	-0,080	-0,065	0,532	1,878
	K20	0,007	0,015	0,028	0,471	0,638	-0,023	0,038	0,199	0,030	0,024	0,751	1,331
	K21	0,055	0,024	0,150	2,340	0,020	0,009	0,102	0,222	0,148	0,121	0,651	1,537
	K22	-0,013	0,022	-0,051	-0,611	0,542	-0,056	0,030	0,076	-0,039	-0,032	0,386	2,588
	K23	-0,050	0,033	-0,107	-1,532	0,127	-0,114	0,014	0,005	-0,098	-0,079	0,550	1,817
	K24	-0,023	0,031	-0,082	-0,721	0,472	-0,084	0,039	0,046	-0,046	-0,037	0,207	4,838
	K25	0,011	0,013	0,100	0,862	0,389	-0,014	0,036	0,079	0,055	0,045	0,199	5,035
	K27	0,136	0,073	0,140	1,854	0,065	-0,008	0,281	0,161	0,118	0,096	0,472	2,119
	K28	-0,089	0,056	-0,133	-1,574	0,117	-0,200	0,022	-0,011	-0,100	-0,082	0,378	2,644
	K29	0,001	0,029	0,003	0,035	0,972	-0,057	0,059	0,078	0,002	0,002	0,278	3,600
	K45	0,097	0,052	0,125	1,885	0,061	-0,004	0,199	0,249	0,120	0,098	0,613	1,631
	L31N	0,033	0,147	0,017	0,221	0,825	-0,257	0,323	-0,010	0,014	0,011	0,468	2,138
	L36N	-0,019	0,028	-0,037	-,679	0,498	-0,074	0,036	-0,058	-0,044	-0,035	0,886	1,128
	L37	0,014	0,012	0,068	1,225	0,222	-0,009	0,037	0,131	0,078	0,063	0,862	1,160
	L38N	0,005	0,012	0,023	0,425	0,671	-0,019	,030	-0,023	0,027	0,022	0,883	1,132

a The dependent variable: Y4

The equation of multiple regression (the linear model Y_4) is obtained by the means of realization of the simple substitution of non-standardized coefficients K_i:

Y_4=3,035-0,098Age-0,106RU+0,034LIT-0,015LG-0,111HIS-0,077GEO-0,021BIO+0,259ALG--0,142GEOM+0,171FIZ+0,142CHE+0,024SCH+0,332AST+0,015K_7-0,002K_8-0,022K_9+0,011K_{14}--0,035K_{15}-0,021K_{16}+0,003K_{17}+0,034K_{18}-0,021K_{19}+0,007K_{20}+0,055K_{21}-0,013K_{22}-0,050K_{23}-0,023K_{24}++0,011K_{25}+0,136K_{27}-0,089K_{28}+0,001K_{29}+0,097K_{45}+0,033L_{31N}-0,019L_{36N}+0,014L_{37}+0,005L_{38N}.

The structure of the linear equation of multiple regression Y_4 allows to speak about the high sensitivity to the variation of values of a set of independent variables.

All independent variables are essential, but some from the independent variables (predictors) act the high degree of contribution into the dispersion of the dependent variable (factor Y_4): Age (-0,098), RU (-0,106), LIT (0,034), LG (-0,015), HIS (-0,111), GEO (-0,077), BIO (-0,021), ALG (0,259), GEOM (-0,142), FIZ (0,171), CHE (0,142), SCH (0,024), AST (0,332), K_7 (0,015), K_8 (-0,002), K_9 (-0,022), K_{14} (0,011), K_{15} (-0,035), K_{16} (-0,021), K_{17} (0,003), K_{18} (0,034), K_{19} (-0,021), K_{20} (0,007), K_{21} (0,055), K_{22} (-0,013), K_{23} (-0,050), K_{24} (-0,023), K_{25} (0,011), K_{27} (0,136), K_{28} (-0,089), K_{29} (0,001), K_{45} (0,097), L_{31N} (0,033), L_{36N} (-0,019), L_{37} (0,014) and L_{38N} (0,005).

The analysis of residues at the substituting of nominal values of independent variables for the estimation of quality of the regression equation is presented the practical interest.

The obtained equations of multiple regression need to be verified by the means of substituting of all nominal values of independent variables (predictors), and then to carry out the analysis of residues for the estimation of their predictor ability: the comparison of the predicted and factual nominal values of estimates the level of residual knowledge of the examinees (is applied directly CMT and the adaptive means of training as ET of the innovative architecture).

The development and modernization of IEE of automated training with the properties of adaptation based on PCMB was carried out on the basis of the created apparatus of CMT, which includes a previously formed set of methods and algorithms.

The experimental researches allow to estimate the level of quality of IEE of automated training in a whole, and also directly to research the efficiency of information interaction between the subjects and means of training in particular.

In the result of the regression analysis there is the potential possibility of substituting of the nominal values of independent variables and the predicting of LRKT by the means of calculating of the nominal value of dependent variable, and also the analysis of residues.

A15.6.3. The research of consistent change and the interrelation of variables

The significant value has the consistent change and the system of relations of the independent variables K_i and the dependent variable Y_i, as this acts the significant influence on the quality of the obtained linear equation of multiple regression Y_i (K_i), in particular on its predictive (predictor) ability.

The various covariance tables are used for the realization of research of the consistent change of values of a set of considered variables.

The covariance table act as the matrix, consisting from a set of strings and columns, in which contain the coefficients of covariance for the tasks of analysis.

The coefficient of covariance reflects the consistency of changing of the nominal values of one variable under the influence of a consistent change of the other variable.

For the realization of research of the intercorrelation and interrelations between a set of considered variables the different correlation tables are applied.

The correlation table act as the matrix, consisting from a set of strings and columns, in which contain the coefficients of correlation for the tasks of analysis.

The coefficient of correlation reflects the directionality and the strength of dependence (relationships) between a set of values in one sample of a posteriori data in relation to the other.

The graph of two-dimensional of scattering is played the important value, which allows to estimate the form of relationship between one or several variables (predictors).

In dependence from the sign of the coefficient of correlation the various relationships are distinguished:

- the direct correlation relation (relationship) – the increasing (decreasing) of nominal values in one sample of data corresponds the consistent increasing (decreasing) of nominal values in the other sample of data;
- the inverse correlation relation (relationship) – the increasing (decreasing) of nominal values in one sample of data corresponds the consistent increasing (decreasing) of nominal values in the other sample of data.

In dependence from the nominal value of the coefficient of correlation is distinguished:

- the very easy correlation dependence – 0-0,19 (the very easy relationship);
- the easy correlation dependence – 0,2-0,39 (the easy relationship);
- the average correlation dependence – 0,4-0,59 (the average relationship);
- the strong correlation dependence – 0,6-0,79 (the strong relationship);
- the very strong correlation dependence – 0,8-1 (the very strong relationship).

There is the necessity of consideration of the reduced and complete set of independent variables for the formation of the linear equation of multiple regression.

1A. The reduced set of parameters of the linear regression model Y_2.

In quality of the dependent variable (factor) Y_2 is distinguished and the correlation analysis between the different considered independent variables (K_i) is carried out.

Table A15.73

The correlation table at the analysis of the reduced set of independent parameters and the dependent variable Y_2

	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	Y2
Age	1																				
K7	-0,09158	1																			
K8	-0,00875	0,120118	1																		
K9	0,002342	0,134622	**0,943714**	1																	
K14	-0,15915	0,020319	-0,04517	-0,0582	1																
K15	-0,15282	0,013136	0,121569	0,109364	0,219839	1															
K16	-0,21575	0,07199	0,122815	0,07429	0,387334	0,38222	1														
K17	-0,26014	0,003459	0,09533	0,079009	0,292306	0,3116	0,28743	1													
K18	-0,26492	0,05838	0,050013	0,047405	0,442847	0,349055	0,534957	0,494701	1												
K19	-0,29261	0,045815	0,050386	0,042728	0,309292	0,241839	0,34807	0,403094	0,567756	1											
K20	-0,21411	-0,02617	-0,06894	-0,08349	0,159912	0,110797	0,158301	0,103492	0,204297	0,283934	1										
K21	-0,10669	-0,10006	0,200357	0,18319	0,217453	0,261358	0,242556	0,378737	0,392775	0,256585	0,151292	1									
K22	-0,12364	0,055986	0,070194	0,067795	0,266886	0,262439	0,358816	0,361477	0,38622	0,294637	0,191012	0,312324	1								
K23	-0,12707	-0,03201	-0,02264	-0,03763	0,165327	0,026764	0,062178	0,099084	0,12089	0,148008	0,080164	0,012265	0,073414	1							
K24	-0,11515	0,041413	0,111878	0,095183	0,165822	0,064535	0,034441	0,099436	0,193547	0,296515	0,130246	0,075839	0,125443	0,540561	1						
K25	-0,11504	0,02642	0,129055	0,122988	0,191521	0,09014	0,105666	0,202891	0,271537	0,363587	0,114868	0,091992	0,125513	0,419471	**0,848608**	1					
K27	-0,17989	-0,00968	0,05938	0,04347	0,187368	0,066638	0,158265	0,166549	0,299883	0,258931	0,202195	0,134658	0,201621	0,407715	0,415426	0,40895	1				
K28	-0,04953	0,028289	0,121784	0,088057	0,063118	0,012426	-0,03381	0,064695	0,156604	0,181715	0,05212	0,071271	0,066442	0,186886	0,397043	0,447479	0,460743	1			
K29	-0,07117	0,075818	0,167158	0,155335	0,068893	0,050353	-0,0322	0,116024	0,1768	0,139277	0,040858	0,102217	0,132078	0,1021	0,396916	0,511631	0,555508	**0,7408**	1		
K45	-0,31446	0,044847	-0,00869	0,004788	0,194845	0,179977	0,325254	0,174435	0,393947	0,313081	0,243269	0,097924	0,18391	0,209534	0,238807	0,266706	0,24934	0,052503	0,131371	1	
Y2	-0,14609	0,098772	-0,02983	-0,03848	0,252286	0,064865	0,135174	0,123557	0,291617	0,216207	0,166774	0,170335	0,125867	0,008863	0,059319	0,065145	0,149048	0,033473	0,070153	0,170724	1

Table A15.74

The covariance table at the r analysis of the reduced set of independent parameters and the dependent variable Y_2

	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	Y2
Age	6,894439																				
K7	-0,620536	6,659375																			
K8	-0,077857	1,05	11,47429																		
K9	0,021939	1,239286	11,40357	12,72551																	
K14	-0,949975	0,119196	-0,347857	-0,471939	5,167742																
K15	-0,829617	0,070089	0,851429	0,806633	1,033278	4,274885															
K16	-2,095077	0,687054	1,538571	0,980102	3,256416	2,922666	13,67754														
K17	-1,844847	0,024107	0,872143	0,761225	1,794668	1,740026	2,870995	7,294439													
K18	-2,774439	0,600893	0,675714	0,67449	4,015332	2,878546	7,891148	5,329133	15,908725												
K19	-2,967832	0,456696	0,659286	0,588776	2,715957	1,931492	4,972487	4,205383	8,747475	14,921314											
K20	-1,981097	-0,237946	-0,822857	-1,049489	1,2810077	0,807258	2,063049	0,984975	2,871454	3,864936	12,41774										
K21	-0,688725	-0,634821	1,668571	1,606633	1,2153316	1,328546	2,205434	2,514847	3,851582	2,436760	1,310739	6,044439									
K22	-1,122526	0,499554	0,822143	0,836224	2,097793	1,876186	4,588406	3,375689	5,326454	3,935293	2,327385	2,655026	11,95559								
K23	-0,649828	-0,160884	-0,149343	-0,261439	0,731994	0,107776	0,447868	0,521208	0,939121	1,113529	0,550188	0,058728	0,494395	3,793364							
K24	-1,001507	0,353996	1,255314	1,124709	1,248638	0,441979	0,421911	0,889582	2,557110	3,793977	1,520307	0,617611	1,436739	3,487406	10,97212						
K25	-2,509039	0,566295	3,631021	3,644107	3,616248	1,548002	3,24587	4,551461	8,995782	11,66550	3,362105	1,878532	3,604684	6,785874	23,34773	68,98966					
K27	-0,440236	-0,023290	0,187472	0,144531	0,396988	0,128415	0,545532	0,419247	1,114811	0,932220	0,664085	0,308560	0,649760	0,740116	1,282538	3,165868	0,868684				
K28	-0,176169	0,098879	0,558764	0,425479	0,194348	0,034799	-0,169355	0,236671	0,846051	0,950759	0,248772	0,237336	0,311175	0,493021	1,781389	5,034317	0,581655	1,834644			
K29	-0,570230	0,597009	1,727743	1,690816	0,477875	0,317671	-0,363424	0,956163	2,151744	1,641625	0,439329	0,766816	1,393493	0,606773	4,011749	12,96696	1,579834	3,06173	9,310640		
K45	-0,961888	0,134821	-0,034286	0,019898	0,515995	0,433495	1,401301	0,548827	1,830459	1,408852	0,998648	0,280459	0,740791	0,475413	0,921503	2,580654	0,270724	0,082845	0,466976	1,357091	
Y2	-0,303673	0,201786	-0,08	-0,108674	0,454031	0,106173	0,395765	0,264184	0,920816	0,661174	0,465255	0,331531	0,344541	0,013666	0,155555	0,428364	0,109976	0,035893	0,169465	0,157449	0,626735

The note: the non-essential relationships are reduced; are highlighted by the bold – the small and average dependence; are highlighted by the bold italic – the strong dependence.

In tabl. A15.73 the certain quantity of relationships of different direction and strength:

- 67 relationships of small and average strength – relatively not accepted to the statistical correlation analysis due to the low level of materiality in separate;
  - the negatively defined relationships – 6;
  - the positively defined relationships – 61;
- 03 relationships of strong strength – directly accepted for the statistical analysis by the means of research of the covariance and the graphs of two-dimensional scattering;
  - the negatively defined relationships – 0;
  - the positively defined relationships – 3.

In the results of the analysis of the correlation table of the reduced set of independent parameters K_i and the dependent variable Y_2 relatively **the strong relationships** is revealed between deuteranopia (K_8) and tritanopia (K_9) [0,943714], verbal associativity (K_{24}) and verbal selectivity (K_{25}) [0,848608], figurative associativity (K_{28}) and figurative selectivity (K_{29}) [0,7408], and also relatively **the easy relationships** is revealed between verbal intellect (K_{14}) and the generalization of concepts (K_{15}) [0,219839], generalization (K_{15}) and associativity (K_{16}) [0,38222], verbal intellect (K_{14}) and associativity (K_{16}) [0,387334], the age (Age) and the associativity of thinking (K_{16}) [-0,21575], the associativity of thinking (K_{16}) and the classification of concepts (K_{17}) [0,28743], the generalization of concepts (K_{15}) and the classification of concepts (K_{17}) [0,3116], verbal intellect (K_{14}) and the classification of concepts (K_{17}) [0,292306], the age (Age) and the classification of concepts (K_{17}) [-0,26014], the associativity of thinking (K_{16}) and mathematical counting (K_{18}) [0,534,957], the classification of concepts (K_{17}) and mathematical counting (K_{18}) [0,494701], the generalization of concepts (K_{15}) and mathematical counting (K_{18}) [0,349055], verbal intellect (K_{14}) and mathematical counting (K_{18}) [0,442847], the age (Age) and mathematical counting (K_{18}) [-0,26492], mathematical counting (K_{18}) and combinatorial abilities (K_{19}) [0,567,756], the classification of concepts (K_{17}) and the combinatorics of thinking (K_{19}) [0,403094], the associativity of thinking (K_{16}) and the combinatorics of thinking (K_{19}) [0,34807], the generalization of concepts (K_{15}) and the combinatorics of thinking (K_{19}) [0,241839], the verbalization of concepts (K_{14}) and the combinatorics of thinking (K_{19}) [0,309292], the age (Age) and combinatorics (K_{19}) [-0,29261], combinatorics (K_{19}) and mnemonics (K_{20}) [0,283934], mathematical counting (K_{18}) and mnemonics (K_{20}) [0,204297], the age (Age) and mnemonics (K_{20}) [-0,21411], planar thinking (K_{21}) and combinatorics (K_{19}) [0,256585], planar thinking (K_{21}) and mathematical counting (K_{18}) [0,392775], planar thinking (K_{21}) and classification (K_{17}) [0,378737], planar thinking (K_{21}) and associativity (K_{16}) [0,242556], planar thinking (K_{21}) and generalization (K_{15}) [0,261358], planar thinking (K_{21}) and verbal intellect (K_{14}) [0,217453], planar thinking (K_{21}) and deuteranopia (K_8) [0,200357], volumetric thinking (K_{22}) and planar thinking (K_{21}) [0,312324], volumetric thinking (K_{22}) and combinatorial thinking (K_{19}) [0,294637], volumetric thinking (K_{22}) and mathematical counting (K_{18}) [0,38622], volume thinking (K_{22}) and the classification of concepts (K_{17}) [0,361477], volumetric thinking (K_{22}) and the associativity of thinking (K_{16}) [0,358816], volumetric thinking (K_{22}) and the generalization of concepts (K_{15}) [0,262439], volumetric thinking (K_{22}) and verbal intellect (K_{14}) [0,266886], verbal originality (K_{23}) and verbal associativity (K_{24}) [0,540561], combinatorial thinking (K_{19}) and verbal associativity (K_{24}) [0,296515], verbal selectivity (K_{25}) and verbal originality (K_{23}) [0,419471], verbal selectivity (K_{25}) and combinatorial thinking (K_{19}) [0,363587], verbal selectivity (K_{25}) and mathematical counting (K_{18}) [0,271537], verbal selectivity (K_{25}) and the classification of concepts (K_{17}) [0,202891], figurative originality (K_{27}) and mnemonic abilities (K_{20}) [0,202195], figurative originality (K_{27}) and combinatorial thinking (K_{19}) [0,258931], figurative originality (K_{27}) and mathematical counting (K_{18}) [0,299883], figurative originality (K_{27}) and figurative associativity (K_{28}) [0,460743], verbal selectivity (K_{25}) and figurative associativity (K_{28}) [0,447479], verbal associativity (K_{24}) and figurative associativity (K_{28}) [0,397043], figurative originality (K_{27}) and figurative selectivity (K_{29}) [0,555508], verbal selectivity (K_{25}) and figurative selectivity (K_{29}) [0,511631], verbal associativity (K_{24}) and figurative selectivity (K_{29}) [0,396,916], figurative originality (K_{27}) and the level of proficiency in the language of statement (K_{45}) [0,24934], verbal associativity (K_{24}) and the level of proficiency in the language of statement (K_{45}) [0,266706], verbal associativity (K_{24}) and the level of proficiency in the language of statement (K_{45}) [0,238807], verbal originality (K_{23}) and the level of proficiency in the language of statement (K_{45}) [0,209534], mnemonic ability (K_{20}) and the level of proficiency in the language of statement (K_{45}) [0,243269], combinatorial abilities (K_{19}) and the level of proficiency in the language of statement (K_{45}) [0,313081], mathematical counting (K_{18}) and the level of proficiency in the language of statement (K_{45}) [0,393947], the associativity of thinking (K_{16}) and the level of proficiency in the language of statement (K_{45}) [0,325254], the age (Age) and the level of proficiency in the language of statement (K_{45}) [-0,31446], combinatorics (K_{19}) and the level of residual knowledge of the trainees (Y_2) [0,216207], mathematical counting (K_{18}) and the level of residual knowledge of the trainees (Y_2) [0,291617], verbal intellect (K_{14}) and the level of residual knowledge of the trainees (Y_2) [0,252286].

For the analysis of the informativity and the degree of contribution of the existing set of independent variables K_i into the dispersion of the given dependent variable Y_2 tabl. A15.75 is formed.

Table A15.75

The eigenvalues of the linear model of multiple regression with the reduced set of parameters Y_2

The dimension	The eigenvalue	Epy commonality	The shares of variance																				
			(Constant)	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
1	18,790	1,000	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00
2	,588	5,654	,00	,00	,00	,00	,00	,00	,00	,00	,01	,00	,00	,00	,00	,00	,03	,01	,01	,02	,05	,03	,00
3	,359	7,239	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,27	,01	,00	,00	,06	,05	,00
4	,279	8,212	,00	,00	,00	,00	,00	,00	,00	,00	,22	,05	,01	,00	,00	,00	,01	,00	,00	,01	,00	,00	,00
5	,173	10,411	,00	,00	,00	,00	,00	,00	,00	,00	,03	,00	,00	,00	,00	,00	,11	,07	,06	,19	,01	,00	,00
6	,147	11,302	,00	,00	,00	,00	,00	,00	,00	,02	,36	,04	,02	,01	,00	,00	,14	,01	,01	,00	,01	,00	,03
7	,115	12,788	,00	,00	,00	,01	,01	,00	,00	,00	,00	,00	,01	,00	,00	,00	,07	,00	,00	,33	,34	,02	,00
8	,099	13,767	,00	,01	,00	,01	,01	,00	,00	,05	,10	,14	,01	,02	,00	,02	,05	,00	,00	,03	,10	,02	,00
9	,072	16,122	,00	,00	,00	,00	,00	,00	,00	,08	,00	,01	,26	,03	,00	,04	,06	,00	,00	,19	,06	,23	,08
10	,069	16,512	,00	,00	,00	,00	,00	,00	,00	,05	,04	,00	,02	,01	,01	,36	,01	,02	,00	,01	,01	,02	,36
11	,056	18,248	,00	,00	,00	,00	,00	,00	,00	,35	,12	,10	,10	,00	,01	,19	,09	,00	,02	,08	,10	,13	,00
12	,055	18,498	,00	,03	,00	,00	,00	,01	,00	,02	,01	,30	,05	,01	,04	,27	,01	,00	,00	,00	,08	,03	,20
13	,048	19,763	,00	,00	,00	,00	,00	,00	,00	,14	,00	,12	,38	,00	,04	,02	,09	,06	,01	,03	,15	,26	,14
14	,036	22,832	,00	,05	,03	,00	,00	,01	,00	,06	,01	,03	,00	,33	,33	,05	,02	,00	,00	,05	,01	,06	,02
15	,032	24,090	,00	,00	,00	,00	,00	,00	,00	,00	,02	,13	,09	,50	,43	,00	,00	,00	,00	,01	,00	,00	,09
16	,025	27,546	,00	,02	,02	,00	,00	,00	,04	,01	,02	,00	,01	,01	,01	,04	,02	,67	,73	,01	,01	,09	,00
17	,018	32,020	,00	,01	,02	,00	,00	,12	,81	,04	,02	,00	,00	,00	,02	,00	,00	,03	,04	,01	,00	,01	,00
18	,017	33,415	,00	,29	,00	,00	,00	,61	,04	,09	,04	,02	,01	,02	,00	,00	,00	,04	,04	,00	,00	,01	,00
19	,015	35,270	,00	,18	,57	,00	,00	,14	,00	,00	,01	,00	,01	,00	,07	,00	,00	,04	,07	,01	,00	,02	,02
20	,004	68,401	,00	,00	,00	,96	,96	,00	,00	,05	,00	,01	,00	,00	,00	,00	,00	,01	,01	,00	,01	,00	,00
21	,003	81,029	,99	,40	,34	,01	,00	,10	,09	,01	,00	,03	,01	,05	,03	,00	,00	,01	,00	,00	,00	,00	,05

a The dependent variable: Y2

The presented table allows to identify one-to-one the nominal values of eigenvalues in the basis of the linear model of multiple regression.

1.B. The reduced set of parameters of the linear regression model Y_4.

In quality of the dependent variable (factor) Y_4 is distinguished and the correlation analysis between the different considered independent variables (K_i) is carried out.

Table A15.76

The correlation table at the analysis of the reduced set of independent parameters K_i and the dependent variable Y_4

	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	Y4
Age	1																				
K7	-0,091579	1																			
K8	-0,008754	0,120119	1																		
K9	0,002342	0,134622	**0,943714**	1																	
K14	-0,159152	0,020319	-0,045174	-0,058197	1																
K15	-0,152815	0,013136	0,121569	0,109364	0,219839	1															
K16	-0,215748	0,071990	0,122815	0,074289	0,387334	0,382219	1														
K17	-0,260145	0,003459	0,095329	0,079009	0,292306	0,311599	0,287430	1													
K18	-0,264916	0,058379	0,050013	0,047405	0,442847	0,349055	0,534957	0,494701	1												
K19	-0,292608	0,045815	0,050386	0,042728	0,309292	0,241839	0,348069	0,403094	0,567756	1											
K20	-0,214109	-0,026166	-0,068935	-0,083487	0,159912	0,110797	0,158301	0,103492	0,204297	0,283934	1										
K21	-0,106689	-0,100059	0,200357	0,183189	0,217454	0,261358	0,242556	0,378737	0,392775	0,256585	0,151292	1									
K22	-0,123641	0,055986	0,070194	0,067795	0,266887	0,262439	0,358816	0,361477	0,386220	0,294637	0,191012	0,312324	1								
K23	-0,127068	-0,032009	-0,022637	-0,037629	0,165327	0,026764	0,062178	0,099084	0,120890	0,148008	0,080164	0,012265	0,073414	1							
K24	-0,115149	0,041413	0,111878	0,095183	0,165822	0,064535	0,034441	0,099436	0,193547	0,296515	0,130246	0,075839	0,125443	0,540561	1						
K25	-0,115045	0,026420	0,129055	0,122988	0,191521	0,090139	0,105666	0,202891	0,271537	0,363587	0,114868	0,091992	0,125513	0,419471	**0,848608**	1					
K27	-0,179889	-0,009683	0,059380	0,043470	0,187368	0,066638	0,158265	0,166549	0,299883	0,258931	0,202196	0,134658	0,201621	0,407715	0,415426	0,408950	1				
K28	-0,049534	0,028289	0,121784	0,088057	0,063118	0,012426	-0,033808	0,064695	0,156604	0,181715	0,052120	0,071271	0,066442	0,186886	0,397043	0,447479	0,460743	1			
K29	-0,071172	0,075818	0,167158	0,155335	0,068893	0,050353	-0,032205	0,116024	0,176800	0,139277	0,040858	0,102217	0,132078	0,102099	0,396916	0,511631	0,555508	**0,740800**	1		
K45	-0,314464	0,044847	-0,008689	0,004788	0,194846	0,179977	0,325254	0,174435	0,393947	0,313081	0,243269	0,097924	0,183910	0,209534	0,238807	0,266706	0,249339	0,052503	0,131371	1	
Y4	-0,384923	0,080402	-0,048073	-0,051666	0,159716	0,042627	0,132177	0,171912	0,277856	0,170362	0,199345	0,221993	0,075981	0,005231	0,046414	0,078580	0,160515	-0,011413	0,078207	0,249422	1

Table A15.77

The covariance table at the analysis of the reduced set of independent parameters K_i and the dependent variable Y_4

	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	Y4
Age	6,894439																				
K7	-0,620536	6,659375																			
K8	-0,077857	1,05	11,47429																		
K9	0,021939	1,239286	11,40357	12,72551																	
K14	-0,949975	0,119196	-0,347857	-0,471939	5,167742																
K15	-0,829617	0,070089	0,851429	0,806633	1,033278	4,274885															
K16	-2,095077	0,687054	1,538571	0,980102	3,256416	2,922666	13,67754														
K17	-1,844847	0,024107	0,872143	0,761224	1,794668	1,740026	2,870995	7,294439													
K18	-2,774439	0,600893	0,675714	0,674489	4,015332	2,878546	7,891148	5,329133	15,90873												
K19	-2,967832	0,456696	0,659286	0,588776	2,715957	1,931492	4,972487	4,205383	8,747475	14,92131											
K20	-1,981097	-0,237946	-0,822857	-1,049489	1,281008	0,807258	2,063049	0,984975	2,871454	3,864936	12,41774										
K21	-0,688725	-0,634821	1,668571	1,606633	1,215332	1,328546	2,205434	2,514847	3,851582	2,436760	1,310740	6,044439									
K22	-1,122526	0,499554	0,822143	0,836225	2,097793	1,876186	4,588406	3,375689	5,326454	3,935293	2,327385	2,655026	11,95560								
K23	-0,649828	-0,160884	-0,149343	-0,261439	0,731994	0,107776	0,447868	0,521208	0,939121	1,113530	0,550188	0,058728	0,494395	3,793364							
K24	-1,001507	0,353996	1,255314	1,124709	1,248638	0,441979	0,421911	0,889582	2,557111	3,793977	1,520307	0,617611	1,436739	3,487406	10,97212						
K25	-2,509039	0,566295	3,631021	3,644107	3,616248	1,548002	3,245870	4,551461	8,995782	11,66550	3,362105	1,878532	3,604684	6,785874	23,34773	68,98966					
K27	-0,440236	-0,023290	0,187471	0,144531	0,396988	0,128415	0,545532	0,419247	1,114811	0,932220	0,664085	0,308561	0,649760	0,740116	1,282538	3,165868	0,868684				
K28	-0,176169	0,098880	0,558764	0,425480	0,194348	0,034800	-0,169355	0,236671	0,846051	0,950759	0,248772	0,237337	0,311175	0,493021	1,781389	5,034317	0,581655	1,834644			
K29	-0,570230	0,597009	1,727743	1,690816	0,477875	0,317671	-0,363424	0,956163	2,151744	1,641625	0,439329	0,766816	1,393493	0,606773	4,011749	12,96696	1,579834	3,061730	9,310640		
K45	-0,961888	0,134821	-0,034286	0,019898	0,515995	0,433495	1,401301	0,548827	1,830459	1,408852	0,998648	0,280459	0,740791	0,475413	0,921503	2,580654	0,270724	0,082845	0,466976	1,357092	
Y4	-0,917704	0,188393	-0,147857	-0,167347	0,329668	0,080026	0,443852	0,421582	1,006276	0,597526	0,637832	0,495561	0,238546	0,009251	0,139597	0,592632	0,135840	-0,014037	0,216677	0,263827	0,824439

In tabl. A15.76 the certain quantity of relationships of the different directionality and strength:

- 67 relationships of small and average strength – relatively not accepted to the statistical correlation analysis due to the low level of materiality in separate;
  - the negatively defined relationships – 7;
  - the positively defined relationships – 60;
- 3 relationships of big strength – directly accepted to the statistical analysis by the means of research of the covariation and the graphs of two-dimensional scattering;
  - the negatively defined relationships – 0;
  - the positively defined relationships – 3.

In the result of the analysis of the correlation table of the reduced set of independent parameters K_i and the dependent variable Y_4, relatively **the strong relationships** are revealed between the deuteranopia of color vision (K_8) and tritanopia of color-perception (K_9) [0,943714], verbal associativity (K_{24}) and verbal selectivity (K_{25}) [0,848608], figurative associativity (K_{28}) and figurative selectivity (K_{29}) [0,740800], and also **the easy relationships** are revealed between verbal intellect (K_{14}) and generalization (K_{15}) [0.219839], the age (Age) and the associativity of thinking (K_{16}) [-0,215748], verbal intellect (K_{14}) and the associativity of thinking (K_{16}) [0,387334], the generalization of concepts (K_{15}) and the associativity of thinking (K_{16}) [0,382219], the age (Age) and the classification of concepts (K_{17}) [-0,260145], verbal intellect (K_{14}) and the classification of concepts (K_{17}) [0,292306], generalization (K_{15}) and the classification of concepts (K_{17}) [0,311599], associativity (K_{16}) and the classification of concepts (K_{17}) [0,287430], the age (Age) and mathematical counting (K_{18}) [-0,264916], verbal intellect (K_{14}) and mathematical counting (K_{18}) [0,442847], the generalization of concepts (K_{15}) and mathematical counting (K_{18}) [0,349055], the associativity of thinking (K_{16}) and mathematical counting (K_{18}) [0,534957], the classification of concepts (K_{17}) and mathematical counting (K_{18}) [0,494701], the age (Age) and mnemonic abilities (K_{20}) [-0,214109)], mathematical counting (K_{18}) and mnemonic abilities (K_{20}) [0,204297], the combinatorics of thinking (K_{19}) and mnemonic abilities (K_{20}) [0,283934], the deuteranopia of color-perception (K_8) and planar thinking (K_{21}) [0,200357], verbal intellect (K_{14}) and planar thinking (K_{21}) [0,217454], the generalization of concepts (K_{15}) and planar thinking (K_{21}) [0,261358], the associativity of thinking (K_{16}) and planar thinking (K_{21}) [0,242556], the classification of concepts (K_{17}) and planar thinking (K_{21}) [0,378737], mathematical counting (K_{18}) and planar thinking (K_{21}) [0,392775], the combinatorics of thinking (K_{19}) and planar thinking (K_{21}) [0,256585], verbal intellect (K_{14}) and volumetric thinking (K_{22}) [0,266887], the generalization of concepts (K_{15}) and volumetric thinking (K_{22}) [0,262439], the association of thinking (K_{16}) and volumetric thinking (K_{22}) [0,358816], the classification of concepts (K_{17}) and volumetric thinking (K_{22}) [0,361477], mathematical counting (K_{18}) and volumetric thinking (K_{22}) [0,386220], the combinatorics of thinking (K_{19}) and volumetric thinking (K_{22}) [0,294637], planar thinking (K_{21}) and volumetric thinking (K_{22}) [0,312324], mathematical counting (K_{18}) and figurative originality (K_{27}) [0,299883], the combinatorics of thinking (K_{19}) and figurative originality (K_{27}) [0,258931], mnemonic abilities (K_{20}) and figurative originality (K_{27}) [0,202196], volumetric thinking (K_{22}) and figurative originality (K_{27}) [0,201621], verbal originality (K_{23}) and figurative originality (K_{27}) [0,407715], verbal associativity (K_{24}) and figurative originality (K_{27}) [0,415426], verbal selectivity (K_{25}) and figurative originality (K_{27}) [0,408950], the combinatorics of thinking (K_{19}) and verbal associativity (K_{24}) [0,296515], verbal originality (K_{23}) and verbal associativity (K_{24}) [0,540561], the classification of concepts (K_{17}) and verbal selectivity (K_{25}) [0,202891], mathematical counting (K_{18}) and verbal selectivity (K_{25}) [0,271537], the combinatorics of thinking (K_{19}) and verbal selectivity (K_{25}) [0,363587], verbal originality (K_{23}) and verbal selectivity (K_{25}) [0,419471], verbal associativity (K_{24}) and figurative associativity (K_{28}) [0,397043], verbal selectivity (K_{25}) and figurative associativity (K_{28}) [0,447479], figurative originality (K_{27}) and figurative associativity (K_{28}) [0,460743], verbal associativity (K_{24}) and figurative selectivity (K_{29}) [0,396916], verbal selectivity (K_{25}) and figurative selectivity (K_{29}) [0,511631], figurative originality (K_{27}) and figurative selectivity (K_{29}) [0.555508], the age (Age) and the combinatorics of thinking (K_{19}) [-0,292608], verbal intellect (K_{14}) and the combinatorics of thinking (K_{19}) [0,309292], the generalization of concepts (K_{15}) and the combinatorics of thinking (K_{19}) [0,241839], the associativity of thinking (K_{16}) and combinatorics of thinking (K_{19}) [0,348069], the classification of concepts (K_{17}) and the combinatorics of thinking (K_{19}) [0,403094], mathematical counting (K_{18}) and the combinatorics of thinking (K_{19}) [0,567756], the age (Age) and the level of proficiency in the language of statement (K_{45}) [-0,314464], the associativity of thinking (K_{16}) and the level of proficiency in the language of statement (K_{45}) [0,325254], mathematical counting (K_{18}) and the level of proficiency in the language of statement (K_{45}) [0,393947], the combinatorics of thinking (K_{19}) and the level of proficiency in the language of statement (K_{45}) [0,313081], mnemonic abilities (K_{20}) and the level of proficiency in the language of statement (K_{45}) [0,243269], verbal originality (K_{23}) and the level of proficiency in the language of statement (K_{45}) [0,209534], verbal associativity (K_{24}) and the level of proficiency in the language of statement (K_{45}) [0,238807], verbal selectivity (K_{25}) and the level of proficiency in the language of statement (K_{45}) [0,266706], figurative originality (K_{27}) and the level of proficiency in the language of statement (K_{45}) [0,249339], the age (Age) and the level of residual knowledge of the trainees (Y_4) [-0,384,923], mathematical counting (K_{18}) and the level of residual knowledge of the trainees (Y_4) [0,277856], the level of proficiency in the language of statement (K_{45}) and the level of residual knowledge of the trainees (Y_4) [0,249422].

For the analysis of the informativity and the degree of contribution of the available independent variables K_i into the dispersion of the given dependent variable Y_4. the tabl. A15.78 is formed.

Table A15.78

The eigenvalues of the linear model of multiple regression with the reduced set of independent variables K_i and the dependent variable Y_4

The dimensionality	The eigenvalue	The indicator of conditionality	The shares of dispersion																				
			(Constant)	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
1	18,790	1,000	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00
2	,588	5,654	,00	,00	,00	,00	,00	,00	,00	,00	,01	,00	,00	,00	,00	,00	,03	,01	,01	,02	,05	,03	,00
3	,359	7,239	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,00	,27	,01	,00	,00	,06	,05	,00
4	,279	8,212	,00	,00	,00	,00	,00	,00	,00	,00	,22	,05	,01	,00	,00	,00	,01	,00	,00	,01	,00	,00	,00
5	,173	10,411	,00	,00	,00	,00	,00	,00	,00	,00	,03	,00	,00	,00	,00	,00	,11	,07	,06	,19	,01	,00	,00
6	,147	11,302	,00	,00	,00	,00	,00	,00	,00	,02	,36	,04	,02	,01	,00	,00	,14	,01	,01	,00	,01	,00	,03
7	,115	12,788	,00	,00	,00	,01	,01	,00	,00	,00	,00	,00	,01	,00	,00	,00	,07	,00	,00	,33	,34	,02	,00
8	,099	13,767	,00	,01	,00	,01	,01	,00	,00	,05	,10	,14	,01	,02	,00	,02	,05	,00	,00	,03	,10	,02	,00
9	,072	16,122	,00	,00	,00	,00	,00	,00	,00	,08	,00	,01	,26	,03	,00	,04	,06	,00	,00	,19	,06	,23	,08
10	,069	16,512	,00	,00	,00	,00	,00	,00	,00	,05	,04	,00	,02	,01	,01	,36	,01	,02	,00	,01	,01	,02	,36
11	,056	18,248	,00	,00	,00	,00	,00	,00	,00	,35	,12	,10	,10	,00	,01	,19	,09	,00	,02	,08	,10	,13	,00
12	,055	18,498	,00	,03	,00	,00	,00	,01	,00	,02	,01	,30	,05	,01	,04	,27	,01	,00	,00	,00	,08	,03	,20
13	,048	19,763	,00	,00	,00	,00	,00	,00	,00	,14	,00	,12	,38	,00	,04	,02	,09	,06	,01	,03	,15	,26	,14
14	,036	22,832	,00	,05	,03	,00	,00	,01	,00	,06	,01	,03	,00	,33	,33	,05	,02	,00	,00	,05	,01	,06	,02
15	,032	24,090	,00	,00	,00	,00	,00	,00	,00	,00	,02	,13	,09	,50	,43	,00	,00	,00	,00	,01	,00	,00	,09
16	,025	27,546	,00	,02	,02	,00	,00	,00	,04	,01	,02	,00	,01	,01	,01	,04	,02	,67	,73	,01	,01	,09	,00
17	,018	32,020	,00	,01	,02	,00	,00	,12	,81	,04	,02	,00	,00	,00	,02	,00	,00	,03	,04	,01	,00	,01	,00
18	,017	33,415	,00	,29	,00	,00	,00	,61	,04	,09	,04	,02	,01	,02	,00	,00	,00	,04	,04	,00	,00	,01	,00
19	,015	35,270	,00	,18	,57	,00	,00	,14	,00	,00	,01	,00	,01	,00	,07	,00	,00	,04	,07	,01	,00	,02	,02
20	,004	68,401	,00	,00	,00	,96	,96	,00	,00	,05	,00	,01	,00	,00	,00	,00	,00	,01	,01	,00	,01	,00	,00
21	,003	81,029	,99	,40	,34	,01	,00	,10	,09	,01	,00	,03	,01	,05	,03	,00	,00	,01	,00	,00	,00	,00	,05

a The dependent variable: Y4

The presented table allows to identify one-to-one the nominal values of eigenvalues in the basis of the linear model of multiple regression, and also to determine the optimal quantity of independent variables in the basis of equation.

2.A. The complete set of parameters of the linear regression model Y_2.

In quality of the dependent variable (factor) Y_4 is distinguished and the correlation analysis between the different considered independent variables (K_i) is carried out.

Table A15.79

The correlation table at the analysis of the complete set of independent variables K_i and the dependent variable Y_2

	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14
Age	1	-0,136	-0,089	-0,207	-0,110	-0,123	-0,127	-0,226	-0,196	-0,139	-0,124	-0,008	-0,056	-0,092	-0,009	0,002	-0,159
RU		1	0,664	0,527	0,472	0,398	0,516	0,611	0,559	0,557	0,557	0,309	0,135	0,029	-0,025	-0,040	0,173
LIT			1	0,567	0,618	0,506	0,567	0,549	0,579	0,606	0,582	0,329	0,166	0,037	-0,061	-0,063	0,056
LG				1	0,567	0,369	0,429	0,507	0,503	0,481	0,496	0,196	0,231	0,018	0,025	0,024	0,207
HIS					1	0,500	0,572	0,467	0,563	0,576	0,557	0,323	0,218	0,002	-0,049	-0,050	0,111
GEO						1	0,524	0,330	0,435	0,491	0,458	0,358	0,216	-0,012	-0,018	-0,036	0,056
BIO							1	0,460	0,516	0,543	0,555	0,384	0,178	0,064	-0,099	-0,111	0,134
ALG								1	0,785	0,682	0,584	0,321	0,192	0,021	-0,007	-0,005	0,176
GEOM									1	**0,717**	0,635	0,414	0,238	0,006	-0,020	-0,014	0,145
FIZ										1	0,599	0,346	0,265	0,053	-0,037	-0,030	0,146
CHE											1	0,352	0,183	0,076	-0,068	-0,067	0,194
SCH												1	0,122	0,110	-0,013	-0,019	-0,019
AST													1	0,117	0,101	0,073	0,022
K7														1	0,120	0,135	0,020
K8															1	**0,944**	-0,045
K9																1	-0,058
K14																	1
K15																	
K16																	
K17																	
K18																	
K19																	
K20																	
K21																	
K22																	
K23																	
K24																	
K25																	
K27																	
K28																	
K29																	
K45																	
L31N																	
L36N																	
L37																	
L38N																	
Y2																	

The completion of tabl. A15.79

Y2	L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16	K15
-0,146	0,017	-0,101	0,012	0,029	-0,315	-0,071	-0,050	-0,180	-0,115	-0,115	-0,127	-0,123	-0,107	-0,214	-0,293	-0,265	-0,260	-0,216	-0,153
0,126	-0,127	0,136	0,061	-0,029	0,216	0,032	0,054	0,072	0,162	0,100	0,050	0,012	0,098	0,232	0,137	0,217	0,061	0,182	0,108
0,155	-0,120	0,031	-0,006	-0,091	0,096	0,044	0,027	0,074	0,089	0,057	-0,021	-0,085	0,015	0,217	0,068	0,119	-0,045	0,125	0,017
0,227	-0,114	0,039	-0,067	-0,101	0,350	0,117	0,132	0,170	0,195	0,141	0,064	0,009	0,024	0,222	0,190	0,239	0,099	0,299	0,088
0,242	-0,103	0,126	-0,054	-0,066	0,131	0,022	0,054	0,148	0,143	0,125	0,081	-0,066	-0,002	0,193	0,169	0,191	0,062	0,225	0,064
0,067	-0,051	0,047	0,039	0,047	0,139	0,066	0,054	0,156	0,144	0,135	0,031	0,027	0,043	0,112	0,064	0,133	0,057	0,149	0,086
0,158	-0,066	0,042	0,001	0,016	0,109	0,028	0,037	0,121	0,107	0,094	0,071	0,061	0,050	0,172	0,129	0,163	0,067	0,130	0,057
0,221	-0,045	0,126	0,080	-0,005	0,191	0,137	0,132	0,096	0,111	0,052	0,002	0,061	0,164	0,231	0,220	0,249	0,108	0,176	0,100
0,238	-0,062	0,142	-0,046	0,029	0,192	0,065	0,088	0,123	0,096	0,047	-0,015	0,038	0,119	0,217	0,242	0,234	0,111	0,227	0,115
0,166	-0,128	0,100	-0,050	-0,034	0,100	0,038	0,087	0,058	0,083	0,044	-0,008	0,022	0,130	0,217	0,193	0,220	0,083	0,185	0,083
0,169	-0,123	0,118	-0,025	-0,004	0,161	0,067	0,115	0,133	0,126	0,094	0,040	-0,021	0,002	0,131	0,182	0,180	-0,011	0,151	0,062
0,165	-0,047	0,051	0,038	0,103	0,073	0,042	0,066	0,080	0,030	0,035	-0,034	0,066	0,146	0,035	0,032	0,060	-0,023	0,082	-0,049
0,087	-0,161	0,050	0,033	0,038	-0,014	0,060	-0,019	0,048	0,103	0,165	0,119	-0,031	0,046	0,128	0,044	0,052	0,029	0,114	0,075
0,099	0,014	0,023	0,040	0,066	0,045	0,076	0,028	-0,010	0,026	0,041	-0,032	0,056	-0,100	-0,026	0,046	0,058	0,004	0,072	0,013
-0,030	-0,058	0,181	-0,073	-0,014	-0,009	0,167	0,122	0,059	0,129	0,112	-0,023	0,070	0,200	-0,069	0,050	0,050	0,095	0,123	0,122
-0,039	-0,049	0,147	-0,061	-0,006	0,005	0,155	0,088	0,044	0,123	0,095	-0,038	0,068	0,183	-0,084	0,043	0,047	0,079	0,074	0,109
0,252	-0,025	0,018	-0,020	-0,147	0,195	0,069	0,063	0,187	0,192	0,166	0,165	0,267	0,218	0,160	0,309	0,443	0,292	0,387	0,220
0,065	-0,059	-0,002	-0,003	0,118	0,180	0,050	0,012	0,067	0,090	0,065	0,027	0,262	0,261	0,111	0,242	0,349	0,312	0,382	1
0,135	-0,075	0,047	-0,008	0,072	0,325	-0,032	-0,034	0,158	0,106	0,034	0,062	0,359	0,243	0,158	0,348	0,535	0,287	1	
0,124	0,021	0,089	-0,044	0,133	0,174	0,116	0,065	0,167	0,203	0,099	0,099	0,362	0,379	0,104	0,403	0,495	1		
0,292	-0,105	0,041	-0,036	0,096	0,394	0,177	0,157	0,300	0,272	0,194	0,121	0,386	0,393	0,204	0,568	1			
0,216	-0,098	0,062	-0,128	0,084	0,313	0,139	0,182	0,259	0,364	0,297	0,148	0,295	0,257	0,284	1				
0,167	-0,040	0,055	-0,102	0,015	0,243	0,041	0,052	0,202	0,115	0,130	0,080	0,191	0,151	1					
0,170	-0,024	0,139	0,027	0,110	0,098	0,102	0,071	0,135	0,092	0,076	0,012	0,312	1						
0,126	-0,011	0,008	-0,036	0,595	0,184	0,132	0,066	0,202	0,126	0,125	0,073	1							
0,009	0,02	-0,029	-0,038	0,013	0,210	0,102	0,187	0,408	0,420	0,541	1								
0,059	-0,080	0,030	-0,081	-0,003	0,239	0,397	0,397	0,415	**0,849**	1									
0,065	-0,089	0,060	-0,070	-0,082	0,267	0,512	0,448	0,409	1										
0,149	-0,006	-0,035	-0,079	0,074	0,249	0,556	0,461	1											
0,034	-0,008	0,012	-0,055	0,017	0,053	**0,741**	1												
0,070	0,007	-0,003	-0,028	-0,007	0,131	1													
0,171	-0,040	0,004	-0,078	-0,002	1														
0,030	0,048	-0,003	-0,012	1															
-0,085	-0,128	-0,077	1																
0,163	0,023	1																	
-0,034	1																		
1																			

Table A15.80

The covariance table at the analysis of the complete set of independent variables K_i and the dependent variable Y_2

	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N	Y2
Age	6,894																																				
RU	-0,226	0,399																																			
LIT	-0,156	0,279	0,444																																		
LG	-0,353	0,216	0,245	0,421																																	
HIS	-0,164	0,169	0,234	0,209	0,322																																
GEO	-0,197	0,153	0,206	0,146	0,173	0,373																															
BIO	-0,196	0,190	0,221	0,163	0,190	0,187	0,342																														
ALG	-0,407	0,264	0,251	0,225	0,181	0,138	0,184	0,469																													
GEOM	-0,362	0,248	0,271	0,229	0,224	0,186	0,212	0,378	0,493																												
FIZ	-0,240	0,232	0,267	0,206	0,216	0,198	0,209	0,308	0,332	0,435																											
CHE	-0,224	0,243	0,268	0,222	0,218	0,193	0,224	0,276	0,308	0,273	0,477																										
SCH	-0,012	0,105	0,118	0,068	0,098	0,117	0,121	0,118	0,156	0,123	0,131	0,289																									
AST	-0,075	0,043	0,056	0,076	0,063	0,067	0,053	0,066	0,085	0,088	0,064	0,033	0,256																								
K7	-0,621	0,047	0,063	0,030	0,002	-0,018	0,097	0,038	0,012	0,090	0,135	0,153	0,153	6,659																							
K8	-0,079	-0,053	-0,138	0,055	-0,094	-0,036	-0,196	-0,017	-0,049	-0,082	-0,158	-0,023	0,173	1,050	11,474																						
K9	0,022	-0,091	-0,149	0,056	-0,102	-0,079	-0,232	-0,013	-0,034	-0,070	-0,166	-0,036	0,132	1,239	11,404	12,726																					
K14	-0,950	0,249	0,085	0,306	0,143	0,076	0,178	0,274	0,232	0,220	0,305	-0,023	0,025	0,119	-0,348	-0,472	5,168																				
K15	-0,830	0,1403	0,024	0,118	0,075	0,108	0,068	0,142	0,167	0,113	0,088	-0,055	0,078	0,070	0,851	0,807	1,033	4,275																			

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Y2	L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16
-0,304	0,176	-1,153	0,054	0,035	-0,962	-0,570	-0,176	-0,440	-2,509	-1,002	-0,650	-1,123	-0,689	-1,981	-2,968	-2,774	-1,845	-2,095
0,063	-0,324	0,373	0,069	-0,009	0,159	0,061	0,047	0,043	0,848	0,209	0,061	0,025	0,153	0,517	0,334	0,546	0,103	0,424
0,082	-0,322	0,091	-0,008	-0,028	0,074	0,090	0,024	0,046	0,492	0,126	-0,028	-0,196	0,024	0,508	0,174	0,3172	-0,081	0,309
0,117	-0,298	0,109	-0,078	-0,031	0,265	0,232	0,116	0,103	1,048	0,302	0,081	0,021	0,039	0,507	0,477	0,618	0,173	0,718
0,109	-0,235	0,309	-0,054	-0,018	0,087	0,038	0,041	0,079	0,675	0,235	0,089	-0,130	-0,003	0,386	0,370	0,433	0,095	0,472
0,033	-0,127	0,125	0,043	0,013	0,099	0,123	0,045	0,089	0,730	0,280	0,036	0,057	0,064	0,242	0,151	0,325	0,095	0,336
0,073	-0,156	0,106	0,001	0,005	0,074	0,051	0,029	0,066	0,519	0,182	0,081	0,123	0,072	0,353	0,291	0,380	0,106	0,282
0,120	-0,125	0,374	-0,098	-0,002	0,153	0,286	0,123	0,061	0,632	0,118	0,003	0,145	0,277	0,558	0,581	0,680	0,200	0,445
0,133	-0,176	0,431	-0,058	0,009	0,157	0,138	0,084	0,081	0,557	0,109	-0,020	0,093	0,206	0,536	0,657	0,656	0,210	0,589
0,087	-0,341	0,285	-0,059	-0,010	0,077	0,076	0,077	0,036	0,453	0,096	-0,017	0,049	0,210	0,505	0,493	0,578	0,147	0,451
0,093	-0,343	0,354	-0,030	-0,001	0,129	0,142	0,108	0,086	0,723	0,215	0,0548	-0,050	0,004	0,319	0,487	0,497	-0,021	0,385
0,070	-0,101	0,120	0,037	0,026	0,046	0,069	0,048	0,040	0,132	0,061	-0,035	0,123	0,193	0,065	0,066	0,129	-0,033	0,162
0,035	-0,329	0,109	0,030	0,009	-0,008	0,092	-0,013	0,022	0,435	0,276	0,118	-0,054	0,058	0,229	0,086	0,104	0,040	0,213
0,202	0,1438	0,254	0,185	0,080	0,135	0,597	0,099	-0,023	0,566	0,354	-0,161	0,500	-0,635	-0,238	0,457	0,601	0,024	0,687
-0,080	**-0,790**	2,652	-0,441	-0,021	-0,034	1,728	0,559	0,188	3,631	1,255	-0,149	0,822	1,669	-0,823	0,659	0,676	0,872	1,539
-0,109	-0,699	2,277	-0,390	-0,010	0,020	1,691	0,426	0,145	3,644	1,125	-0,261	0,836	1,607	-1,050	0,589	0,675	0,761	0,980
0,454	-0,229	0,174	-0,081	-0,156	0,516	0,478	0,194	0,397	3,616	1,249	0,732	2,098	1,215	1,281	2,716	4,015	1,795	3,256
0,106	-0,492	-0,016	-0,009	0,114	0,434	0,318	0,035	0,128	1,548	0,442	0,108	1,876	1,329	0,807	1,932	2,879	1,740	2,923
0,396	-1,115	0,753	-0,051	0,124	1,401	-0,363	-0,169	0,546	3,246	0,422	0,448	4,588	2,205	2,063	4,973	7,891	2,871	13,678
0,264	0,226	1,038	-0,212	0,167	0,549	0,956	0,237	0,419	4,552	0,890	0,521	3,376	2,515	0,985	4,205	5,329	7,294	
0,921	-1,688	0,701	-0,255	0,179	1,831	2,152	0,846	1,115	8,996	2,557	0,939	5,327	3,852	2,872	8,748	15,909		
0,661	-1,532	1,036	-0,883	0,152	1,409	1,642	0,951	0,932	11,666	3,794	1,114	3,935	2,437	3,865	14,921			
0,465	-0,565	0,841	-0,641	0,025	0,999	0,439	0,249	0,664	3,362	1,520	0,550	2,327	1,311	12,418				
0,332	-0,235	1,479	0,117	0,126	0,281	0,767	0,237	0,309	1,879	0,618	0,059	2,655	6,044					
0,345	-0,159	0,122	-0,225	0,961	0,741	1,394	0,311	0,650	3,605	1,437	0,494	11,956						
0,014	0,188	-0,240	-0,134	0,012	0,475	0,607	0,493	0,740	6,786	3,487	3,793							
0,156	-1,072	0,428	-0,482	-0,005	0,922	4,012	1,781	1,283	23,348	10,972								
0,428	-2,990	2,152	-1,047	-0,319	2,581	12,967	5,034	3,166	68,990									
0,110	-0,023	-0,143	-0,131	0,032	0,271	1,580	0,582	0,869										
0,036	-0,042	0,071	-0,132	0,011	0,083	3,062	1,835											
0,170	0,088	-0,044	-0,151	-0,010	0,467	9,311												
0,158	-0,187	0,022	-0,163	-0,001	1,357													
0,011	0,091	-0,007	-0,011	0,218														
-0,121	-0,920	-0,599	3,198															
0,559	0,393	18,768																
-0,110	16,270																	
0,627																		

The correlation table directly contains a set of relationship, which reflect the revealed dependencies between the independent variables (predictors), and also the marks, which characterize the degree of their materiality and directionality.

In tabl. A15.79 the certain quantity of relationships of the different directionality and strength was revealed:

- 96 relationships of small and average strength – the relatively not accepted to the statistical correlation analysis due to the low level of materiality in separate;
  - the negatively defined relationships – 8;
  - the positively defined relationships – 84;
- 46 relationships of big strength – directly accepted to the statistical analysis by the means of research of the covariation and the graphs of two-dimensional scattering;
  - the negatively defined relationships – 0;
  - the positively defined relationships – 4.

In the result of the analysis of the correlation table of the complete set of independent parameters K_i and the dependent variable Y_2 relatively **the strong relationship** is revealed between the deuteranopia of color vision (K_8) and the tritanopia of color-perception (K_9) (0,944), verbal associativity (K_{24}) and verbal selectivity (K_{25}) (0,849), figurative originality (K_{28}) and figurative selectivity (K_{29}) (0,741), the value of the mark in algebra (ALG) and the value of the mark in GEOM (0,785), the value of the mark in geometry (GEOM) and the value of the mark in physics (FIZ) (0,717), the value of the mark in algebra (ALG) and the value of the mark in physics (FIZ) (0,682), the value of the mark in literature (LIT) and the value of the mark in the Russian language (RU) (0,664), the value of the mark in literature (LIT) and the value of the mark in physics (FIZ) (0,606), the value of the mark in literature (LIT) and the value of the mark in history (HIS) (0,618), the value of the mark in the Russian language (RU) and the value of the mark in algebra (ALG) (0,611), the value of the mark in geometry (GEOM) and the value of the mark in drawing (SCH) (0,635), and also **the easy relationships** are revealed between the age (Age) and the mark in foreign language (LG) (-0,207), the value of the mark in the Russian language (RU) and the value of the mark in foreign language (LG) (0,527), the value of the mark in literature (LIT) and the value of the mark in foreign language (LG) (0,567), the value of the mark in the Russian language (RU) and the value of the mark in history (HIS) (0,472), the value of the mark in foreign language (LG) and the value of the mark in history (HIS) (0,567), the value of the mark in Russian language (RU) and the value of the mark in geography (GEO) (0,398), the value of the mark in literature (LIT) and the value of the mark in geography (GEO) (0,506), the value of the mark in foreign language (LG) and the value of the mark in geography (GEO) (0,369), the value of the mark in history (HIS) and the value of the mark in geography (GEO) (0,500), the value of the mark in the Russian language (RU) and the value of the mark in biology (BIO) (0,516), the value of the mark in literature (LIT) and the value of the mark in biology (BIO) (0,567), the value of the mark in foreign language (LG) and the value of the mark in biology (BIO) (0,429), the value of the mark in history (HIS) and the value of the mark in biology (BIO) (0,572), the value of the mark in geography (GEO) and the value of the mark in biology (BIO) (0,524), the age (Age) and the value of the mark in algebra (ALG) (-0.226), the value of the mark in literature (LIT) and the value of the mark in algebra (ALG) (0,549), the value of the mark in foreign language (LG) and the value of the mark in algebra (ALG) (0,507), the value of the mark in history (HIS) and the value of the mark in algebra (ALG) (0,467), the value of the mark in geography (GEO) and the value of the mark in algebra (ALG) (0,330), the value of the mark in biology (BIO), and the value of the mark in algebra (ALG) (0,460), the value of the mark in the Russian language (RU) and the value of the mark in geometry (GEOM) (0,559), the value of the mark in literature (LIT) and the value of the mark in geometry (GEOM) (0,579), the value of the mark in foreign language (LG) and the value of the mark in geometry (GEOM) (0,503), the value of the mark in history (HIS) and the value of the mark in geometry (GEOM) (0,563), the value of the mark in geography (GEO) and the value of the mark in geometry (GEOM) (0,435), the value of the mark in biology (BIO) and the value of the mark in geometry (GEOM) (0,516), the value of the mark in the Russian language (RU) and the value of the mark in physics (FIZ) (0,557), the value of the mark in foreign language (LG) and the value of the mark in physics (FIZ) (0,481), the value of the mark in history (HIS) and the value of the mark in physics (FIZ) (0,576), the value of the mark in geography (GEO) and the value of the mark in physics (FIZ) (0,491), the value of the mark in biology (BIO) and the value of the mark in physics (FIZ) (0,543), the value of the mark in the Russian language (RU) and the value of the mark in chemistry (CHE) (0,557), the value of the mark in literature (LIT) and the value of the mark in chemistry (CHE) (0,582), the value of the mark in foreign language (LG) and the value of the mark in chemistry (CHE) (0,496), the value of the mark in history (HIS) and the value of the mark in chemistry (CHE) (0,557), the value of the mark in geography (GEO) and the value of the mark in drawing (SCH) (0,458), the value of the mark in biology (BIO) and the value of the mark in drawing (SCH) (0.555), the value of the mark in algebra (ALG) and the value of the mark in drawing (SCH) (0,584), the value of the mark in physics (FIZ) and the value of the mark in drawing (SCH) (0,599), the value of the mark in the Russian language (RU) and the value of the mark in drawing (SCH) (0,309), the value of the mark in literature (LIT) and the value of the mark in drawing (SCH) (0,329), the value of the mark in foreign language (LG) and the value of the mark in drawing (SCH) (0,196), the value of the mark in history (HIS) and the value of the mark in drawing (SCH) (0,323), the value of the mark in geography (GEO) and the value of the mark in drawing (SCH) (0,358), the value of the mark in biology (BIO) and the value of the mark in drawing (SCH) (0,384), the value of the mark in algebra (ALG) and the value of the mark in drawing (SCH) (0,321), the value of the mark in geometry (GEOM) and the value of the mark in drawing (SCH) (0,414), the value of the mark in physics (FIZ) and the value of the mark in drawing (SCH) (0,346), the value of the mark in chemistry (CHE) and the value of the mark in drawing (SCH) (0,352), the value of the mark in foreign language (LG) and the value of the mark in astronomy (AST) (0,231), the value of the mark in history (HIS) and the value of the mark in astronomy (AST) (0,218), the value of the mark in geography (GEO) and the value of the mark in astronomy (AST) (0,216), the value of the mark in geometry (GEOM) and the value of the mark in astronomy (AST) (0,238), the value of the mark in physics (FIZ) and the value of the mark in astronomy (AST) (0,265), the value of the mark in foreign language (LG) and the verbalization of concepts (K_{14}) (0,207), verbalization (K_{14}) and generalization (K_{15}) (0,220), the age (Age) and analyticity (K_{16}) (-0.216), the value of the mark in foreign language (LG) and the analyticity of thinking (K_{16}) (0,299), the value of the mark in history (HIS) and the analyticity of thinking (K_{16}) (0,225), the value of the mark in geometry (GEOM) and the analyticity of thinking (K_{16}) (0,227), verbalization (K_{14}) and analyticity (K_{16}) (0,387), generalization (K_{15}) and analyticity (K_{16}) (0,382), the age (Age) and the classification of concepts (K_{17}) (-0.260), verbalization (K_{14}) and classification (K_{17}) (0,292), generalization (K_{15}) and classification (K_{17}) (0,312), the analyticity of thinking (K_{16}) and the classification of concepts (K_{17}) (0,287), the age (Age) and arithmetic abilities (K_{18}) (-0.265), the value of the mark in the Russian language (RU) and arithmetic abilities (K_{18}) (0.217), the value of the mark in foreign language (LG) and arithmetic abilities (K_{18}) (0,239), the value of the mark in algebra (ALG) and arithmetic abilities (K_{18}) (0,249), the value of the mark in geometry (GEOM) and arithmetic abilities (K_{18}) (0,234), the value of the mark in physics (FIZ) and arithmetic abilities (K_{18}) (0,220), verbalization (K_{14}) and arithmetic abilities (K_{18}) (0,443), the generalization of concepts (K_{15}) and arithmetic abilities (K_{18}) (0,349), the analyticity of thinking (K_{16}) and arithmetic abilities (K_{18}) (0,535), the classification of concepts (K_{17}) and arithmetic abilities (K_{18}) (0,495), the age (Age) and combinatorial abilities (K_{19}) (-0.293), the value of the mark in algebra (ALG) and combinatorial abilities (K_{19}) (0,220), the value of the mark in geometry (GEOM) and combinatorial abilities (K_{19}) (0,242), the verbalization of concepts (K_{14}) and combinatorial abilities (K_{19}) (0,309), the generalization of concepts (K_{15}) and combinatorial abilities (K_{19}) (0,242), the analyticity of thinking (K_{16}) and combinatorial abilities (K_{19}) (0,348), the classification of concepts (K_{17}) and combinatorial abilities (K_{19}) (0,403), arithmetic abilities (K_{18}) and combinatorial abilities (K_{19}) (0,568), the age (Age) and mnemonic abilities (K_{20}) (-0,214), the value of the mark in the Russian language (RU) and mnemonic abilities (K_{20}) (0,232), the value of the mark in literature (LIT) and mnemonic abilities (K_{20}) (0,217), the value of the mark in foreign language (LG) and mnemonic abilities (K_{20}) (0,222), the value of the mark in algebra (ALG) and mnemonic abilities (K_{20}) (0,231), the value of the mark in geometry (GEOM) and mnemonic abilities (K_{20}) (0,217), the value of the mark in physics (FIZ) and mnemonic abilities (K_{20}) (0,217), arithmetic abilities (K_{18}) and mnemonic abilities (K_{20}) (0,204), combinatorial abilities (K_{19}) and mnemonic abilities (K_{20}) (0,284), the deuteranopia of color-perception (K_{8}) and planar thinking (K_{21}) (0,200), the verbalization of concepts (K_{14}) and planar thinking (K_{21}) (0,218), the generalization of concepts (K_{15}) and planar thinking (K_{21}) (0,261), the analyticity of thinking (K_{16}) and planar thinking (K_{21}) (0,243), the classification of concepts (K_{17}) and planar thinking (K_{21}) (0,379), arithmetic abilities (K_{18}) and planar thinking (K_{21}) (0,393), combinatorial abilities (K_{19}) and planar thinking (K_{21}) (0,257), the verbalization of concepts (K_{14}) and spatial imagination (K_{22}) (0,267), the generalization of concepts (K_{15}) and spatial imagination (K_{22}) (0,262), the analyticity of thinking (K_{16}) and spatial imagination (K_{22}) (0,359), the classification of concepts (K_{17}) and spatial imagination (K_{22}) (0,362), arithmetic abilities (K_{18}) and spatial imagination (K_{22}) (0,386), combinatorial abilities (K_{19}) and spatial imagination (K_{22}) (0,295), planar thinking (K_{21}) and spatial imagination (K_{22}) (0,312), combinatorial ability (K_{19}) and verbal originality (K_{24}) (0,297), verbal associativity (K_{23}) and verbal originality (K_{24}) (0,541), the classification of concepts (K_{17}) and verbal selectivity (K_{25}) (0,203), arithmetic abilities (K_{18}) and verbal selectivity (K_{25}) (0,272), combinatorial ability (K_{19}) and verbal selectivity (K_{25}) (0,364), verbal associativity (K_{23}) and verbal selectivity (K_{25}) (0,420), arithmetic abilities (K_{18}) and figurative associativity (K_{27}) (0,300), combinatorial abilities (K_{19}) and figurative associativity (K_{27}) (0,259), mnemonic abilities (K_{20}) and figurative associativity (K_{27}) (0,202), spatial imagination (K_{22}) and figurative associativity (K_{27}) (0,202), verbal associativity (K_{23}) and figurative associativity (K_{27}) (0,408), verbal originality (K_{24}) and figurative associativity (K_{27}) (0,415), verbal selectivity (K_{25}) and figurative associativity (K_{27}) (0,409), verbal originality (K_{24}) and figurative originality (K_{28}) (0,397), verbal selectivity (K_{25}) and figurative originality (K_{28}) (0,448), figurative associativity (K_{27}) and figurative originality (K_{28}) (0,461), verbal originality (K_{24}) and figurative selectivity (K_{29}) (0,397), verbal selectivity (K_{25}) and figurative selectivity (K_{29}) (0,512), figurative associativity (K_{27}) and figurative selectivity (K_{29}) (0,556), the age (Age) and the level of proficiency in the language of statement (K_{45}) (-0,315), the value of the mark in the Russian language (RU) and the level of proficiency in the language of statement (K_{45}) (0,216), the value of the mark in foreign language (LG) and the level of proficiency in the language of statement (K_{45}) (0,350), the analyticity of thinking (K_{16}) and the level of proficiency in the language of statement (K_{45}) (0,325), arithmetic abilities (K_{18}) and the level of proficiency in the language of statement (K_{45}) (0,394), combinatorial ability (K_{19}), and the level of proficiency in the language of statement (K_{45}) (0,313), mnemonic abilities (K_{20}), and the level of proficiency in the language of statement (K_{45}) (0,243), verbal associativity (K_{23}) and the level of proficiency in the language of statement (K_{45}) (0,210), verbal originality (K_{24}) and the level of proficiency in the language of statement (K_{45}) (0,239), verbal selectivity (K_{25}) and the level of proficiency in the language of statement (K_{45}) (0,267), figurative associativity (K_{27}) and the level of proficiency in the language of statement (K_{45}) (0,249), spatial imagination (K_{22}) and the kind of information (L_{31N}) (0,595).

The correlation analysis allows to speak about the potential possibility of formation of the linear equation of multiple regression for the reduced and complete set of independent variables K_i and factors Y_2 and Y_4.

2.B. The complete set of parameters of the linear regression model Y_4.

In quality of the dependent variable (factor) Y_4 is distinguished and the correlation analysis between the different considered independent variables (K_i) is carried out.

Table A15.81

The correlation table at the analysis of the complete set of independent variables K_i and the dependent variable Y_4

	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N	Y4
Age	1																																				
RU	-0,136	1																																			
LIT	-0,089	**0,664**	1																																		
LG	-0,207	0,527	0,567	1																																	
HIS	-0,110	0,472	**0,618**	0,567	1																																
GEO	-0,123	0,398	0,506	0,369	0,500	1																															
BIO	-0,127	0,516	0,567	0,429	0,572	0,524	1																														
ALG	-0,226	**0,611**	0,550	0,507	0,467	0,330	0,460	1																													
GEOM	-0,196	0,559	0,579	0,503	0,563	0,435	0,516	**0,785**	1																												
FIZ	-0,139	0,557	**0,606**	0,481	0,576	0,491	0,543	**0,682**	**0,717**	1																											
CHE	-0,124	0,557	0,582	0,496	0,557	0,458	0,555	0,584	**0,635**	0,599	1																										
SCH	-0,008	0,309	0,329	0,196	0,323	0,358	0,384	0,321	0,414	0,346	0,352	1																									
AST	-0,056	0,135	0,166	0,231	0,218	0,216	0,178	0,192	0,238	0,265	0,183	0,122	1																								
K7	-0,092	0,029	0,037	0,018	0,002	-0,012	0,064	0,021	0,006	0,053	0,076	0,110	0,117	1																							
K8	-0,009	-0,025	-0,061	0,025	-0,049	-0,018	-0,099	-0,007	-0,020	-0,037	-0,068	-0,013	0,101	0,120	1																						
K9	0,002	-0,040	-0,063	0,024	-0,050	-0,036	-0,111	-0,005	-0,014	-0,030	-0,067	-0,019	0,073	0,135	**0,944**	1																					
K14	-0,160	0,173	0,056	0,207	0,111	0,056	0,134	0,176	0,145	0,146	0,194	-0,019	0,022	0,020	-0,045	-0,058	1																				

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Y4	L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16	K15
-0,385	0,017	-0,101	0,012	0,029	-0,315	-0,071	-0,050	-0,180	-0,115	-0,115	-0,127	-0,124	-0,107	-0,214	-0,293	-0,265	-0,260	-0,216	-0,153
0,196	-0,127	0,136	0,061	-0,029	0,216	0,032	0,054	0,072	0,162	0,100	0,050	0,012	0,098	0,232	0,137	0,217	0,061	0,182	0,108
0,181	-0,120	0,031	-0,006	-0,091	0,096	0,044	0,027	0,074	0,089	0,057	-0,021	-0,085	0,015	0,217	0,068	0,119	-0,045	0,125	0,017
0,215	-0,114	0,039	-0,067	-0,101	0,350	0,117	0,132	0,170	0,195	0,141	0,064	0,009	0,024	0,222	0,190	0,239	0,099	0,299	0,088
0,148	-0,103	0,126	-0,054	-0,066	0,131	0,022	0,054	0,148	0,143	0,125	0,081	-0,066	-0,002	0,193	0,169	0,191	0,062	0,225	0,064
0,134	-0,052	0,047	0,039	0,047	0,139	0,066	0,054	0,156	0,144	0,139	0,031	0,027	0,043	0,112	0,064	0,133	0,057	0,149	0,086
0,173	-0,066	0,042	0,001	0,016	0,109	0,028	0,037	0,121	0,107	0,094	0,071	0,061	0,050	0,172	0,129	0,163	0,067	0,130	0,057
0,337	-0,045	0,126	-0,080	-0,005	0,191	0,137	0,132	0,096	0,111	0,052	0,002	0,061	0,164	0,231	0,220	0,249	0,108	0,176	0,100
0,268	-0,062	0,142	-0,046	0,029	0,192	0,065	0,088	0,123	0,096	0,047	-0,015	0,038	0,119	0,217	0,242	0,234	0,111	0,227	0,115
0,281	-0,128	0,100	-0,050	-0,034	0,100	0,038	0,087	0,058	0,083	0,044	-0,008	0,022	0,130	0,217	0,193	0,220	0,083	0,185	0,083
0,243	-0,123	0,118	-0,025	-0,004	0,161	0,067	0,115	0,133	0,126	0,094	0,040	-0,021	0,002	0,131	0,182	0,180	-0,011	0,151	0,062
0,121	-0,047	0,051	0,038	0,103	0,073	0,042	0,066	0,080	0,030	0,035	-0,034	0,066	0,146	0,035	0,032	0,060	-0,023	0,082	-0,049
0,220	-0,161	0,050	0,033	0,038	-0,014	0,060	-0,019	0,048	0,103	0,165	0,120	-0,031	0,046	0,128	0,044	0,052	0,029	0,114	0,075
0,080	0,014	0,023	0,040	0,066	0,045	0,076	0,028	-0,010	0,026	0,042	-0,032	0,056	-0,100	-0,026	0,046	0,058	0,004	0,072	0,013
-0,048	-0,058	0,181	-0,073	-0,014	-0,009	0,167	0,122	0,059	0,129	0,112	-0,023	0,070	0,200	-0,069	0,050	0,050	0,095	0,123	0,122
-0,052	-0,049	0,147	-0,061	-0,006	0,005	0,155	0,088	0,044	0,123	0,095	-0,038	0,068	0,183	-0,084	0,043	0,047	0,079	0,074	0,109
0,160	-0,025	0,018	-0,020	-0,147	0,195	0,069	0,063	0,187	0,192	0,166	0,165	0,267	0,218	0,160	0,309	0,443	0,292	0,387	0,220
0,043	-0,059	-0,002	-0,003	0,118	0,180	0,050	0,012	0,067	0,090	0,065	0,027	0,263	0,261	0,111	0,242	0,349	0,312	0,382	1
0,132	-0,075	0,047	-0,008	0,072	0,325	-0,032	-0,034	0,158	0,106	0,034	0,062	0,359	0,243	0,158	0,348	0,535	0,287	1	
0,172	0,021	0,089	-0,044	0,133	0,174	0,116	0,065	0,167	0,203	0,099	0,099	0,362	0,379	0,104	0,403	0,495	1		
0,278	-0,105	0,041	-0,036	0,096	0,394	0,177	0,157	0,300	0,272	0,194	0,121	0,386	0,393	0,204	0,568	1			
0,170	-0,098	0,062	-0,128	0,084	0,313	0,139	0,182	0,259	0,364	0,297	0,148	0,295	0,257	0,284	1				
0,199	-0,040	0,055	-0,102	0,015	0,243	0,041	0,052	0,202	0,115	0,130	0,080	0,191	0,151	1					
0,222	-0,024	0,139	0,027	0,110	0,098	0,102	0,071	0,135	0,092	0,076	0,012	0,312	1						
0,076	-0,011	0,008	-0,037	0,595	0,184	0,132	0,066	0,202	0,126	0,125	0,073	1							
0,005	0,024	-0,029	-0,039	0,013	0,209	0,102	0,187	0,408	0,420	0,541	1								
0,046	-0,080	0,030	-0,081	-0,004	0,239	0,397	0,397	0,415	**0,849**	1									
0,079	-0,090	0,060	-0,071	-0,082	0,267	0,512	0,448	0,409	1										
0,161	-0,006	-0,035	-0,079	0,074	0,249	0,556	0,461	1											
-0,011	-0,008	0,012	-0,055	0,017	0,053	**0,741**	1												
0,078	0,007	-0,003	-0,028	-0,007	0,131	1													
0,249	-0,040	0,004	-0,078	-0,002	1														
0,010	0,048	-0,003	-0,012	1															
-0,058	-0,128	-0,077	1																
0,131	0,023	1																	
-0,023	1																		
1																			

Table A15.82

The covariance table at the analysis of the complete set of independent variables K_i and the dependent variable Y_4

	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N	Y4
Age	6,894																																				
RU	-0,226	0,399																																			
LIT	-0,156	0,279	0,444																																		
LG	-0,353	0,216	0,245	0,421																																	
HIS	-0,164	0,169	0,234	0,209	0,322																																
GEO	-0,197	0,153	0,206	0,146	0,173	0,373																															
BIO	-0,196	0,190	0,221	0,163	0,190	0,187	0,342																														
ALG	-0,407	0,264	0,251	0,225	0,181	0,138	0,184	0,469																													
GEOM	-0,362	0,248	0,271	0,229	0,224	0,186	0,212	0,378	0,493																												
FIZ	-0,240	0,232	0,267	0,206	0,216	0,198	0,209	0,308	0,332	0,435																											
CHE	-0,224	0,243	0,268	0,222	0,218	0,193	0,224	0,276	0,308	0,273	0,477																										
SCH	-0,012	0,105	0,118	0,068	0,098	0,117	0,121	0,118	0,156	0,123	0,131	0,289																									
AST	-0,075	0,043	0,056	0,076	0,063	0,067	0,053	0,067	0,085	0,088	0,064	0,033	0,256																								
K7	-0,621	0,047	0,063	0,030	0,002	-0,018	0,097	0,038	0,012	0,090	0,135	0,153	0,153	6,659																							
K8	-0,078	-0,053	-0,138	0,056	-0,095	-0,036	-0,196	-0,017	-0,049	-0,082	-0,158	-0,023	0,173	1,050	11,474																						
K9	0,022	-0,091	-0,149	0,056	-0,102	-0,079	-0,232	-0,014	-0,034	-0,070	-0,166	-0,036	0,132	1,239	11,404	12,726																					
K14	-0,950	0,249	0,085	0,306	0,143	0,078	0,178	0,274	0,232	0,220	0,305	-0,023	0,025	0,119	-0,348	-0,472	5,168																				
K15	-0,830	0,140	0,024	0,118	0,075	0,108	0,068	0,142	0,167	0,113	0,088	-0,055	0,078	0,070	0,851	0,807	1,033	4,275																			
K16	-2,095	0,424	0,309	0,718	0,472	0,336	0,282	0,445	0,589	0,451	0,385	0,162	0,213	0,687	1,539	0,980	3,256	2,923	13,678																		

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Y4	L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17
-0,918	0,176	-1,153	0,054	0,035	-0,962	-0,570	-0,176	-0,440	-2,510	-1,002	-0,650	-1,123	-0,689	-1,981	-2,968	-2,774	-1,845
0,112	-0,324	0,373	0,069	-0,008	0,159	0,061	0,046	0,043	0,848	0,209	0,061	0,025	0,153	0,517	0,334	0,546	0,101
0,109	-0,322	0,091	-0,008	-0,028	0,074	0,090	0,024	0,046	0,492	0,126	-0,028	-0,196	0,024	0,508	0,174	0,317	-0,081
0,127	-0,298	0,109	-0,078	-0,031	0,265	0,232	0,116	0,103	1,048	0,302	0,081	0,021	0,039	0,507	0,477	0,618	0,173
0,076	-0,235	0,309	-0,054	-0,018	0,087	0,038	0,041	0,079	0,675	0,235	0,089	-0,130	-0,003	0,386	0,370	0,433	0,095
0,075	-0,127	0,125	0,043	0,013	0,099	0,123	0,045	0,089	0,730	0,280	0,036	0,057	0,064	0,242	0,151	0,325	0,095
0,092	-0,156	0,106	0,001	0,005	0,074	0,050	0,029	0,066	0,519	0,182	0,081	0,123	0,072	0,353	0,291	0,380	0,106
0,210	-0,125	0,374	-0,098	-0,002	0,153	0,286	0,123	0,061	0,632	0,118	0,003	0,145	0,277	0,558	0,581	0,680	0,200
0,171	-0,176	0,431	-0,058	0,009	0,157	0,138	0,084	0,081	0,557	0,109	-0,020	0,093	0,206	0,536	0,657	0,656	0,210
0,169	-0,341	0,285	-0,059	-0,010	0,077	0,076	0,078	0,036	0,453	0,096	-0,011	0,049	0,210	0,505	0,493	0,578	0,147
0,152	-0,343	0,354	-0,030	-0,001	0,129	0,142	0,108	0,086	0,723	0,215	0,054	-0,050	0,004	0,319	0,487	0,497	-0,021
0,059	-0,101	0,120	0,037	0,026	0,046	0,069	0,048	0,040	0,132	0,061	-0,035	0,123	0,193	0,065	0,066	0,129	-0,033
0,101	-0,329	0,109	0,030	0,009	-0,008	0,092	-0,013	0,022	0,435	0,276	0,118	-0,054	0,058	0,229	0,086	0,104	0,040
0,188	0,144	0,254	0,185	0,080	0,135	0,597	0,099	-0,023	0,566	0,354	-0,161	0,500	-0,635	-0,238	0,457	0,601	0,024
-0,148	-0,79	2,652	-0,441	-0,022	-0,034	1,728	0,559	0,188	3,631	1,255	-0,149	0,822	1,669	-0,823	0,660	0,676	0,872
-0,167	-0,699	2,277	-0,390	-0,001	0,020	1,691	0,426	0,145	3,644	1,125	-0,261	0,836	1,607	-1,050	0,589	0,675	0,761
0,330	-0,229	0,174	-0,081	-0,156	0,516	0,478	0,194	0,397	3,616	1,249	0,732	2,098	1,215	1,281	2,716	4,015	1,795
0,080	-0,493	-0,016	-0,009	0,114	0,434	0,318	0,035	0,128	1,548	0,442	0,108	1,876	1,329	0,807	1,932	2,879	1,740
0,444	-1,115	0,753	-0,051	0,124	1,401	-0,363	-0,169	0,546	3,246	0,422	0,448	4,588	2,205	2,063	4,973	7,891	2,871
0,422	0,226	1,038	-0,213	0,167	0,549	0,956	0,237	0,419	4,552	0,890	0,521	3,376	2,515	0,985	4,205	5,329	7,294
1,006	-1,688	0,701	-0,255	0,179	1,831	2,152	0,846	1,1148	8,996	2,557	0,939	5,327	3,852	2,872	8,748	15,909	
0,598	-1,532	1,036	-0,883	0,152	1,409	1,642	0,951	0,932	11,666	3,794	1,114	3,935	2,437	3,865	14,921		
0,638	-0,565	0,841	-0,641	0,025	0,999	0,439	0,249	0,664	3,362	1,520	0,550	2,327	1,311	12,418			
0,496	-0,235	1,479	0,117	0,126	0,281	0,767	0,237	0,309	1,879	0,618	0,059	2,655	6,044				
0,239	-0,159	0,122	-0,225	0,961	0,741	1,394	0,311	0,650	3,605	1,437	0,494	11,956					
0,009	0,188	-0,240	-0,134	0,012	0,475	0,607	0,493	0,740	6,786	3,487	3,793						
0,140	-1,072	0,428	-0,482	-0,005	0,922	4,012	1,781	1,283	23,348	10,972							
0,593	-2,991	2,152	-1,047	-0,319	2,581	12,967	5,034	3,166	68,990								
0,136	-0,023	-0,143	-0,131	0,032	0,271	1,580	0,582	0,869									
-0,014	-0,042	0,071	-0,132	0,011	0,083	3,062	1,835										
0,217	0,088	-0,044	-0,151	-0,010	0,467	9,311											
0,264	-0,187	0,022	-0,163	-0,001	1,357												
-0,004	0,091	-0,007	-0,010	0,218													
-0,094	-0,920	-0,599	3,198														
0,516	0,393	18,768															
-0,084	16,270																
0,824																	

a The dependent variable: Y4

The correlation table directly contains a set of relationships, which reflect the revealed dependencies between the independent variables (predictors), and also the marks, which characterize the degree of their materiality and directionality.

The correlation table allows to estimate the quality of the potential regression equation at the complete set of independent variables and dependent variable.

In tabl. A15.81 the certain quantity of relationships of the different directionality and strength was revealed:

- 200 relationships of small and average strength – the relatively not accepted to the statistical correlation analysis due to the low level of materiality in separate;
  - the negatively defined relationships – 129;
  - the positively defined relationships – 71;
- 46 relationships of big strength – directly accepted to the statistical analysis by the means of research of the covariation and the graphs of two-dimensional scattering;
  - the negatively defined relationships – 42;
  - the positively defined relationships – 4.

In the result of the analysis of the correlation table of the complete set of independent parameters K_i and the dependent variable Y_2, relatively **the strong relationships** were revealed between the deuteranopia of color-perception (K_8) and the tritanopia of color-vision (K_9) (0,944), verbal selectivity (K_{25}) and verbal originality (K_{24}) (0,849), figurative selectivity (K_{29}) and figurative originality (K_{28}) (0,741), the value of the mark in geometry (GEOM) and the value of the mark in algebra (ALG) (0,785), the value of the mark in physics (FIZ) and the value of the mark in geometry (GEOM) (0,717), the value of the mark in physics (FIZ) and the value of the mark in algebra (ALG) (0,682), the value of the mark in literature (LIT) and the value of the mark in the Russian language (RU) (0,664), the value of the mark in chemistry (CHE) and the value of the mark in geometry (GEOM) (0,635), the value of the mark in history (HIS) and the value of the mark in literature (LIT) (0,618), the value of the mark in history (HIS) and the value of the mark in the Russian language (RU) (0,472), the value of the mark in algebra (ALG) and the value of the mark in the Russian language (RU) (0,611), the value of the mark in physics (FIZ) and the value of the mark in literature (LIT) (0,606), and also directly **the strong relationships** are revealed between the value of the mark in foreign language (LG) and the age (Age) (-0,207), the value of the mark in foreign language (LG) and the value of the mark in the Russian language (RU) (0,527), the value of the mark in foreign language (LG) and the value of the mark in literature (LIT) (0,567), the value of the mark in history (HIS) and the value of the mark in astronomy (AST) (0,218), the value of the mark in history (HIS) and the value of the mark in the Russian language (RU) (0,472), the value of the mark in history (HIS) and the value of the mark in foreign language (LG) (0,567), the value of the mark in geography (GEO) and the value of the mark in astronomy (AST) (0,216), the value of the mark in geography (GEO) and the value of the mark in the Russian language (RU) (0,398), the value of the mark in geography (GEO) and the value of the mark in literature (LIT) (0,506), the value of the mark in geography (GEO) and the value of the mark in foreign language (LG) (0,369), the value of the mark in geography (GEO) and the value of the mark in history (HIS) (0,500), the value of the mark in biology (BIO) and the value of the mark in the Russian language (RU) (0,516), the value of the mark in biology (BIO) and the value of the mark in literature (LIT) (0,567), the value of the mark in biology (BIO) and the value of the mark in foreign language (LG) (0,429), the value of the mark in biology (BIO) and the value of the mark in history (HIS) (0,572), the value of the mark in biology (BIO) and the value of the mark in geography (GEO) (0,524), the value of the mark in algebra (ALG) and the age (Age) (-0,226), the value of the mark in algebra (ALG) and the value of the mark in literature (LIT) (0,550), the value of the mark in algebra (ALG), and the value of the mark in foreign language (LG) (0,507), the value of the mark in algebra (ALG) and the value of the mark in history (HIS) (0,467), the value of the mark in algebra (ALG) and the value of the mark in geography (GEO) (0,330), the value of the mark in algebra (ALG) and the value of the mark in biology (BIO) (0,460), the value of the mark in geometry (GEOM) and the value of the mark in astronomy (AST) (0,238), the value of the mark in geometry (GEOM) and the value of the mark in the Russian language (RU) (0,559), the value of the mark in geometry (GEOM) and the value of the mark in literature (LIT) (0,579), the value of the mark in geometry (GEOM) and the value of the mark in foreign language (LG) (0,503), the value of the mark in geometry (GEOM) and the value of the mark in history (HIS) (0,563), the value of the mark in geometry (GEOM) and the value of the mark in geography (GEO) (0,435), the value of the mark in geometry (GEOM) and the value of the mark in biology (BIO) (0,516), the value of the mark in physics (FIZ) and the value of the mark in astronomy (AST) (0,265), the value of the mark in physics (FIZ) and the value of the mark in the Russian language (RU) (0,557), the value of the mark in physics (FIZ) and the value of the mark in foreign language (LG) (0,481), the value of the mark in physics (FIZ) and the value of the mark in history (HIS) (0,576), the value of the mark in physics (FIZ) and the value of the mark in geography (GEO) (0,491), the value of the mark in physics (FIZ) and the value of the mark in biology (BIO) (0,543), the value of the mark in chemistry (CHE) and the value of the mark in the Russian language (RU) (0,557), the value of the mark in chemistry (CHE) the value of the mark in literature (LIT) (0,582), the value of the mark in chemistry (CHE) and the value of the mark in foreign language (LG) (0,496), the value of the mark in chemistry (CHE) and the value of the mark in history (HIS) (0,557), the value of the mark in chemistry (CHE) and the value of the mark in geography (GEO) (0,458), the value of the mark in chemistry (CHE) and the value of the mark in biology (BIO) (0,555), the value of the mark in chemistry (CHE) and the value of the mark in algebra (ALG) (0,584), the value of the mark in chemistry (CHE) and the value of the mark in physics (FIZ) (0,599), the value of the mark in the Russian language (RU) and the level of proficiency in the language of statement (K_{45}) (0,216), the value of the mark in foreign language (LG) and the level of proficiency in the language of statement (K_{45}) (0,350), the value of the mark in drawing (SCH) and the value of the mark in the Russian language (RU) (0,309), the value of the mark in drawing (SCH) and the value of the mark in literature (LIT) (0,329), the value of the mark in drawing (SCH) and the value of the mark in history (HIS) (0,323), the value of the mark in drawing (SCH) and the value of the mark in geography (GEO) (0,358), the value of the mark in drawing (SCH) and the value of the mark in biology (BIO) (0,384), the value of the mark in drawing (SCH) and the value of the mark in algebra (ALG) (0,321), the value of the mark in drawing (SCH) and the value of the mark in geometry (GEOM) (0,414), the value of the mark in drawing (SCH) and the value of the mark in physics (FIZ) (0,346), the value of the mark in drawing (SCH) and the value of the mark in chemistry (CHE) (0,352), the value of the mark in drawing (SCH) and the value of the mark in the Russian language (RU) (0,309), the value of the mark in drawing (SCH) and the value of the mark in literature (LIT) (0,329), the value of the mark in drawing (SCH) and the value of the mark in foreign language (LG) (0,231), the value of the mark in drawing (SCH) and the value of the mark in history (HIS) (0,218), the value of the mark in drawing (SCH) and the value of the mark in geography (GEO) (0,216), the value of the mark in drawing (SCH) and the value of the mark in biology (BIO) (0,384), the value of the mark in drawing (SCH) and the value of the mark in algebra (ALG) (0,321), the value of the mark in drawing (SCH) and the value of the mark in geometry (GEOM) (0,238), the value of the mark in drawing (SCH) and the value of the mark in physics (FIZ) (0,265), the value of the mark in drawing (SCH) and the value of the mark in chemistry (CHE) (0,352), verbal intellect (K_{14}) and the value of the mark in foreign language (LG) (0,207), the generalization of concepts (K_{15}) and the verbalization of concepts (K_{14}) (0,220), the associativity of thinking (K_{16}) and the age (Age) (-0,216), the associativity of thinking (K_{16}) and the value of the mark in foreign language (LG) (0,299), the associativity of thinking (K_{16}) and the value of the mark in history (HIS) (0,225), the associativity of thinking (K_{16}), and the value of the mark in geometry (GEOM) (0,227), the associativity of thinking (K_{16}) and verbal intellect (K_{14}) (0,387), the associativity of thinking (K_{16}) and the generalization of concepts (K_{15}) (0,382), classification (K_{17}) and the age (Age) (-0,260); classification (K_{17}) and verbalization (K_{14}) (0,292), the classification of concepts (K_{17}) and the generalization of concepts (K_{15}) (0,312), the classification of concepts (K_{17}) and the associativity of thinking (K_{16}) (0,287), combinatorial abilities (K_{19}) and the age (Age) (-0.293), combinatorial abilities (K_{19}) and the value of the mark in algebra (ALG) (0,220), combinatorial abilities (K_{19}) and the value of the mark in geometry (GEOM) (0,242), combinatorial abilities (K_{19}) and verbal intellect (K_{14}) (0,309), combinatorial abilities (K_{19}) and the generalization of concepts (K_{15}) (0,242), combinatorial abilities (K_{19}) and the associativity of thinking (K_{16}) (0,348), combinatorial abilities (K_{19}) and the classification of concepts (K_{17}) (0,403), combinatorial ability (K_{19}) and mathematical counting (K_{18}) (0,568), mathematical counting (K_{18}) and the age (Age) (-0,265), mathematical counting (K_{18}) and the value of the mark in the Russian language (RU) (0,217), mathematical counting (K_{18}) and the value of the mark in foreign language (LG) (0,239), mathematical counting (K_{18}) and the value of the mark in algebra (ALG) (0,249), mathematical counting (K_{18}) and the value of the mark in geometry (GEOM) (0,234), mathematical counting (K_{18}) and the value of the mark in physics (FIZ) (0,220), mathematical counting (K_{18}) and verbal intellect (K_{14}) (0,443), mathematical counting (K_{18}) and the generalization of concepts (K_{15}) (0,349), mathematical counting (K_{18}) and the associativity of thinking (K_{16}) (0,535), mathematical counting (K_{18}) and the classification of concepts (K_{17}) (0,495), mnemonic abilities (K_{20}) and the age (Age) (-0,214), mnemonic abilities (K_{20}) and the value of the mark in the Russian language (RU) (0,232), mnemonic abilities (K_{20}) and the value of the mark in literature (LIT) (0,217), mnemonic abilities (K_{20}) and the value of the mark in foreign language (LG) (0,222), mnemonic abilities (K_{20}) and the value of the mark in algebra (ALG) (0,231), mnemonic abilities (K_{20}) and the value of the mark in geometry (GEOM) (0,217), mnemonic abilities (K_{20}) and the value of the mark in physics (FIZ) (0,217), mnemonic abilities (K_{20}) and the mathematical counting (K_{18}) (0,204), mnemonic abilities (K_{20}) and combinatorial abilities (K_{19}) (0,284), planar thinking (K_{21}) and the deuteranopia of color-perception (K_8) (0,200), planar thinking (K_{21}) and verbal intellect (K_{14}) (0,218), planar thinking (K_{21}) and the generalization of concepts (K_{15}) (0,261), planar thinking (K_{21}) and the associativity of thinking (K_{16}) (0,243), planar thinking (K_{21}) and the classification of concepts (K_{17}) (0,379), planar thinking (K_{21}) and mathematical counting (K_{18}) (0,393), planar thinking (K_{21}) and combinatorial abilities (K_{19}) (0,257), volumetric imagination (K_{22}) and verbal intellect (K_{14}) (0,267), volumetric imagination (K_{22}) and the generalization of concepts (K_{15}) (0,263), volumetric imagination (K_{22}) and the associativity of thinking (K_{16}) (0,359), volumetric imagination (K_{22}) and the classification of concepts (K_{17}) (0,362), volumetric imagination (K_{22}) and mathematical abilities (K_{18}) (0,386), volumetric imagination (K_{22}) and combinatorial abilities (K_{19}) (0,295), volumetric imagination (K_{22}) and planar thinking (K_{21}) (0,312), spatial imagination (K_{22}) and the kind of information (L_{31N}) (0,595), verbal selectivity (K_{25}) and the classification of concepts (K_{17}) (0,203), verbal selectivity (K_{25}) and mathematical abilities (K_{18}) (0,272), verbal selectivity (K_{25}) and combinatorial abilities (K_{18}) (0,364); verbal selectivity (K_{25}) and verbal originality (K_{23}) (0,420), verbal selectivity (K_{25}) and the level of proficiency in the language of statement (K_{45}) (0,267), verbal associativity (K_{24}) and combinatorial abilities (K_{19}) (0,297), verbal associativity (K_{24}) and verbal originality (K_{23}) (0,541), figurative originality (K_{27}) and mathematical ability (K_{18}) (0,300), figurative originality (K_{27}) and combinatorial abilities (K_{19}) (0,259), figurative originality (K_{27}) and mnemonic abilities (K_{20}) (0,202), figurative originality (K_{27}) and volumetric imagination (K_{22}) (0,202), figurative originality (K_{27}) and verbal originality (K_{23}) (0,408), figurative originality (K_{27}) and verbal associativity (K_{24}) (0,415), figurative originality (K_{27}) and verbal selectivity (K_{25}) (0,409), figurative selectivity (K_{29}) and verbal associativity (K_{24}) (0,397), figurative selectivity (K_{29}) and verbal selectivity (K_{25}) (0,512), figurative selectivity (K_{29}) and figurative associativity (K_{27}) (0,556), figurative associativity (K_{28}) and verbal associativity (K_{24}) (0,397), figurative associativity (K_{28}) and verbal selectivity (K_{25}) (0,448), figurative associativity (K_{28}) and figurative originality (K_{27}) (0,461), the level of residual knowledge of the contingent of trainees (Y_4) and the age (Age) (-0.385), the level of residual knowledge of the trainees (Y_4) and the value of mark in geometry (GEOM) (0,268), the level of residual knowledge of the trainees (Y_4) and the value of mark in physics (FIZ) (0,281), the level of residual knowledge of the trainees (Y_4) and the value of mark in chemistry (CHE) (0,243), the level of residual knowledge of the trainees (Y_4) and the value of mark in astronomy (AST) (0,220), the level of residual knowledge of the trainees (Y_4) and mathematical abilities (K_{18}) (0,278), the level of residual knowledge of the trainees (Y_4) and planar thinking (K_{21}) (0,222), the level of residual knowledge (Y_4) and the level of proficiency in the language of statement (K_{45}) (0,249).

A15.6.4. The analysis of the revealed dependencies between the predictors

The significant value has the research of dependencies between the dependent variable (factor) Yi and the set of independent variables (predictors) K_i.

It is necessary to pay attention, that the variation of independent variables or predictors (X_i) causes the dispersion of dependent variable or factor (Y_i).

The analysis of dependences between the variables allows to determine the quality of the linear regression model and the predictor ability of the regression equation.

The complex research of the relative relationships between the independent variables (K_i) and dependent variable (Y_i) needs to be carried out:

- at-first,- the abbreviated set of variables (predictors) is being researched;
- at-second,- the complete set of variables (predictors) is being researched.

The abbreviated set of variables characterizes only the main factors, which act the significant influence on the efficiency (resultativity) of information exchange between the subject of training and the means of learning, and their measurement was carried out by the means of use of the developed applied DM and a set of tests in the psychophysiology of perception, cognitive psychology and cognitive linguistics.

The complete set of independent variables potentially characterizes the most comprehensive (complete) set of factors, which act the significant influence on the efficiency (resultativity) of information interaction in the automated environment of training based on PCMB, and their measurement was carried out not only by the means of using of the applied DM, but also at the help of the different questionnaires with the special fields for the entering of a priori known nominal values of the various parameters (the age, the gender and the estimations in the basic disciplines).

The potential possibility of development of the parametrical CM for the system analysis of the difficult objects, processes and phenomena in the environments of functioning is considered.

Some from the available nominal values of parameters directly do not relate to the technical sciences, but allow to characterize the efficiency of application of CMT for the realization of the system analysis of IEE and the increasing of efficiency of an automated training system with adaptation properties based on BPKM.

The detailed research of CMT allows to identify directly a set of techniques and algorithms for the financial analysis of the organizational structure of the information centre of the automated training system based on the primary registers of accounting and financial reporting-documentation, and also PCMB.

1.A. The analysis of influence of the reduced set of parameters of the linear regression model Y_2.

The mutual influence of the reduced set of independent variables K_i and the given dependent variable Y_2 of the linear model of multiple regression is presented in tabl. A15.83.

Table A15.83

The correlation table of the reduced set of independent variables of the linear regression model with the factor Y_2

		Y2	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
Pearson Correlation	Y2	1,000	-,146	,099	-,030	-,038	**,252**	,065	,135	,124	**,292**	**,216**	,167	,170	,126	,009	,059	,065	,149	,033	,070	,171
	Age	-,146	1,000	-,092	-,009	,002	-,159	-,153	-,216	-,260	-,265	-,293	-,214	-,107	-,124	-,127	-,115	-,115	-,180	-,050	-,071	**-,314**
	K7	,099	-,092	1,000	,120	,135	,020	,013	,072	,003	,058	,046	-,026	-,100	,056	-,032	,041	,026	-,010	,028	,076	,045
	K8	-,030	-,009	,120	1,000	**,944**	-,045	,122	,123	,095	,050	,050	-,069	**,200**	,070	-,023	,112	,129	,059	,122	,167	-,009
	K9	-,038	,002	,135	,944	1,000	-,058	,109	,074	,079	,047	,043	-,083	,183	,068	-,038	,095	,123	,043	,088	,155	,005
	K14	,252	-,159	,020	-,045	-,058	1,000	,220	,387	,292	,443	,309	,160	,217	,267	,165	,166	,192	,187	,063	,069	,195
	K15	,065	-,153	,013	,122	,109	,220	1,000	,382	,312	,349	,242	,111	,261	,262	,027	,065	,090	,067	,012	,050	,180
	K16	,135	-,216	,072	,123	,074	,387	,382	1,000	,287	,535	,348	,158	,243	,359	,062	,034	,106	,158	-,034	-,032	,325
	K17	,124	-,260	,003	,095	,079	,292	,312	,287	1,000	,495	,403	,103	,379	,361	,099	,099	,203	,167	,065	,116	,174
	K18	,292	-,265	,058	,050	,047	,443	,349	,535	,495	1,000	,568	,204	,393	,386	,121	,194	,272	,300	,157	,177	,394
	K19	,216	-,293	,046	,050	,043	,309	,242	,348	,403	,568	1,000	,284	,257	,295	,148	,297	,364	,259	,182	,139	,313
	K20	,167	-,214	-,026	-,069	-,083	,160	,111	,158	,103	,204	,284	1,000	,151	,191	,080	,130	,115	,202	,052	,041	,243
	K21	,170	-,107	-,100	,200	,183	,217	,261	,243	,379	,393	,257	,151	1,000	,312	,012	,076	,092	,135	,071	,102	,098
	K22	,126	-,124	,056	,070	,068	,267	,262	,359	,361	,386	,295	,191	,312	1,000	,073	,125	,126	,202	,066	,132	,184
	K23	,009	-,127	-,032	-,023	-,038	,165	,027	,062	,099	,121	,148	,080	,012	,073	1,000	,541	,419	,408	,187	,102	,210
	K24	,059	-,115	,041	,112	,095	,166	,065	,034	,099	,194	,297	,130	,076	,125	,541	1,000	,849	,415	,397	,397	,239
	K25	,065	-,115	,026	,129	,123	,192	,090	,106	,203	,272	,364	,115	,092	,126	,419	,849	1,000	,409	,447	,512	,267
	K27	,149	-,180	-,010	,059	,043	,187	,067	,158	,167	,300	,259	,202	,135	,202	,408	,415	,409	1,000	,461	,556	,249
	K28	,033	-,050	,028	,122	,088	,063	,012	-,034	,065	,157	,182	,052	,071	,066	,187	,397	,447	,461	1,000	,741	,053
	K29	,070	-,071	,076	,167	,155	,069	,050	-,032	,116	,177	,139	,041	,102	,132	,102	,397	,512	,556	,741	1,000	,131
	K45	,171	-,314	,045	-,009	,005	,195	,180	,325	,174	,394	,313	,243	,098	,184	,210	,239	,267	,249	,053	,131	1,000

The completion of tabl. A15.83

	Y2	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
Znch. (1-party)	.	,007	,050	,310	,261	,000	,140	,012	,019	,000	,000	,003	,002	,018	,441	,161	,139	,006	,289	,121	,002
	,007	.	,063	,442	,484	,004	,005	,000	,000	,000	,000	,000	,037	,019	,017	,027	,027	,001	,204	,118	,000
	,050	,063	.	,022	,012	,367	,413	,115	,477	,165	,223	,331	,047	,175	,297	,245	,330	,436	,319	,103	,227
	,310	,442	,022	.	,000	,226	,021	,020	,056	,202	,200	,125	,000	,121	,353	,031	,015	,161	,021	,003	,442
	,261	,484	,012	,000	.	,166	,034	,108	,094	,215	,238	,082	,001	,129	,265	,056	,020	,234	,071	,005	,468
	,000	,004	,367	,226	,166	.	,000	,000	,000	,000	,000	,004	,000	,000	,003	,003	,001	,001	,146	,125	,001
	,140	,005	,413	,021	,034	,000	.	,000	,000	,000	,000	,032	,000	,000	,328	,141	,066	,133	,418	,201	,001
	,012	,000	,115	,020	,108	,000	,000	.	,000	,000	,000	,004	,000	,000	,150	,283	,039	,004	,287	,296	,000
	,019	,000	,477	,056	,094	,000	,000	,000	.	,000	,000	,042	,000	,000	,049	,048	,000	,003	,140	,026	,002
	,000	,000	,165	,202	,215	,000	,000	,000	,000	.	,000	,000	,000	,000	,022	,001	,000	,000	,004	,001	,000
	,000	,000	,223	,200	,238	,000	,000	,000	,000	,000	.	,000	,000	,000	,007	,000	,000	,000	,001	,010	,000
	,003	,000	,331	,125	,082	,004	,032	,004	,042	,000	,000	.	,006	,001	,091	,015	,027	,000	,192	,248	,000
	,002	,037	,047	,000	,001	,000	,000	,000	,000	,000	,000	,006	.	,000	,419	,103	,062	,012	,117	,044	,051
	,018	,019	,175	,121	,129	,000	,000	,000	,000	,000	,000	,001	,000	.	,110	,018	,018	,000	,134	,014	,001
	,441	,017	,297	,353	,265	,003	,328	,150	,049	,022	,007	,091	,419	,110	.	,000	,000	,000	,001	,044	,000
	,161	,027	,245	,031	,056	,003	,141	,283	,048	,001	,000	,015	,103	,018	,000	.	,000	,000	,000	,000	,000
	,139	,027	,330	,015	,020	,001	,066	,039	,000	,000	,000	,027	,062	,018	,000	,000	.	,000	,000	,000	,000
	,006	,001	,436	,161	,234	,001	,133	,004	,003	,000	,000	,000	,012	,000	,000	,000	,000	.	,000	,000	,000
	,289	,204	,319	,021	,071	,146	,418	,287	,140	,004	,001	,192	,117	,134	,001	,000	,000	,000	.	,000	,191
	,121	,118	,103	,003	,005	,125	,201	,296	,026	,001	,010	,248	,044	,014	,044	,000	,000	,000	,000	.	,014
	,002	,000	,227	,442	,468	,001	,001	,000	,002	,000	,000	,000	,051	,001	,000	,000	,000	,000	,191	,014	.

In the result of the analysis of the presented correlation table there was a nessecity to form the graphs of two-dimensional scattering for the detailed analysis of the most significant relationships between the independent variables (predictors) K_i and dependent variable (factor) Y, and also the research of the form of distribution of the nominal values and relationships in the samples with a posteriori data of experiments.

1.B. The analysis of influence of the reduced set of parameters of the linear regression model Y_4.

The mutual influence of the reduced set of independent variables K_i and the given dependent variable Y_4 of the linear model of multiple regression is presented in tabl. A15.84.

Table A15.84

The correlation table of the reduced set of independent variables of the linear regression model with the factor Y_4

		Y4	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The correlation of Pearson	Y4	1,00	-,385	,080	-,048	-,052	,160	,043	,132	,172	,278	,170	,199	,222	,076	,005	,046	,079	,161	-,011	,078	,249
	Age	-,385	1,00	-,092	-,009	,002	-,159	-,153	-,216	-,260	-,265	-,293	-,214	-,107	-,124	-,127	-,115	-,115	-,180	-,050	-,071	-,314
	K7	,080	-,092	1,00	,120	,135	,020	,013	,072	,003	,058	,046	-,026	-,100	,056	-,032	,041	,026	-,010	,028	,076	,045
	K8	-,048	-,009	,120	1,00	,944	-,045	,122	,123	,095	,050	,050	-,069	,200	,070	-,023	,112	,129	,059	,122	,167	-,009
	K9	-,052	,002	,135	,944	1,00	-,058	,109	,074	,079	,047	,043	-,083	,183	,068	-,038	,095	,123	,043	,088	,155	,005
	K14	,160	-,159	,020	-,045	-,058	1,00	,220	,387	,292	,443	,309	,160	,217	,267	,165	,166	,192	,187	,063	,069	,195
	K15	,043	-,153	,013	,122	,109	,220	1,00	,382	,312	,349	,242	,111	,261	,262	,027	,065	,090	,067	,012	,050	,180
	K16	,132	-,216	,072	,123	,074	,387	,382	1,00	,287	,535	,348	,158	,243	,359	,062	,034	,106	,158	-,034	-,032	,325
	K17	,172	-,260	,003	,095	,079	,292	,312	,287	1,00	,495	,403	,103	,379	,361	,099	,099	,203	,167	,065	,116	,174
	K18	,278	-,265	,058	,050	,047	,443	,349	,535	,495	1,00	,568	,204	,393	,386	,121	,194	,272	,300	,157	,177	,394
	K19	,170	-,293	,046	,050	,043	,309	,242	,348	,403	,568	1,00	,284	,257	,295	,148	,297	,364	,259	,182	,139	,313
	K20	,199	-,214	-,026	-,069	-,083	,160	,111	,158	,103	,204	,284	1,00	,151	,191	,080	,130	,115	,202	,052	,041	,243
	K21	,222	-,107	-,100	,200	,183	,217	,261	,243	,379	,393	,257	,151	1,00	,312	,012	,076	,092	,135	,071	,102	,098
	K22	,076	-,124	,056	,070	,068	,267	,262	,359	,361	,386	,295	,191	,312	1,00	,073	,125	,126	,202	,066	,132	,184
	K23	,005	-,127	-,032	-,023	-,038	,165	,027	,062	,099	,121	,148	,080	,012	,073	1,00	,541	,419	,408	,187	,102	,210
	K24	,046	-,115	,041	,112	,095	,166	,065	,034	,099	,194	,297	,130	,076	,125	,541	1,00	,849	,415	,397	,397	,239
	K25	,079	-,115	,026	,129	,123	,192	,090	,106	,203	,272	,364	,115	,092	,126	,419	,849	1,00	,409	,447	,512	,267
	K27	,161	-,180	-,010	,059	,043	,187	,067	,158	,167	,300	,259	,202	,135	,202	,408	,415	,409	1,00	,461	,556	,249
	K28	-,011	-,050	,028	,122	,088	,063	,012	-,034	,065	,157	,182	,052	,071	,066	,187	,397	,447	,461	1,00	,741	,053
	K29	,078	-,071	,076	,167	,155	,069	,050	-,032	,116	,177	,139	,041	,102	,132	,102	,397	,512	,556	,741	1,00	,131
	K45	,249	-,314	,045	-,009	,005	,195	,180	,325	,174	,394	,313	,243	,098	,184	,210	,239	,267	,249	,053	,131	1,00

The completion of tabl. A15.84

	Y4	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The values (1-sided)	.	,000	,090	,211	,195	,004	,239	,013	,002	,000	,002	,000	,000	,102	,465	,220	,095	,004	,425	,096	,000
	,000	.	,063	,442	,484	,004	,005	,000	,000	,000	,000	,000	,037	,019	,017	,027	,027	,001	,204	,118	,000
	,090	,063	.	,022	,012	,367	,413	,115	,477	,165	,223	,331	,047	,175	,297	,245	,330	,436	,319	,103	,227
	,211	,442	,022	.	,000	,226	,021	,020	,056	,202	,200	,125	,000	,121	,353	,031	,015	,161	,021	,003	,442
	,195	,484	,012	,000	.	,166	,034	,108	,094	,215	,238	,082	,001	,129	,265	,056	,020	,234	,071	,005	,468
	,004	,004	,367	,226	,166	.	,000	,000	,000	,000	,000	,004	,000	,000	,003	,003	,001	,001	,146	,125	,001
	,239	,005	,413	,021	,034	,000	.	,000	,000	,000	,000	,032	,000	,000	,328	,141	,066	,133	,418	,201	,001
	,013	,000	,115	,020	,108	,000	,000	.	,000	,000	,000	,004	,000	,000	,150	,283	,039	,004	,287	,296	,000
	,002	,000	,477	,056	,094	,000	,000	,000	.	,000	,000	,042	,000	,000	,049	,048	,000	,003	,140	,026	,002
	,000	,000	,165	,202	,215	,000	,000	,000	,000	.	,000	,000	,000	,000	,022	,001	,000	,000	,004	,001	,000
	,002	,000	,223	,200	,238	,000	,000	,000	,000	,000	.	,000	,000	,000	,007	,000	,000	,000	,001	,010	,000
	,000	,000	,331	,125	,082	,004	,032	,004	,042	,000	,000	.	,006	,001	,091	,015	,027	,000	,192	,248	,000
	,000	,037	,047	,000	,001	,000	,000	,000	,000	,000	,000	,006	.	,000	,419	,103	,062	,012	,117	,044	,051
	,102	,019	,175	,121	,129	,000	,000	,000	,000	,000	,000	,001	,000	.	,110	,018	,018	,000	,134	,014	,001
	,465	,017	,297	,353	,265	,003	,328	,150	,049	,022	,007	,091	,419	,110	.	,000	,000	,000	,001	,044	,000
	,220	,027	,245	,031	,056	,003	,141	,283	,048	,001	,000	,015	,103	,018	,000	.	,000	,000	,000	,000	,000
	,095	,027	,330	,015	,020	,001	,066	,039	,000	,000	,000	,027	,062	,018	,000	,000	.	,000	,000	,000	,000
	,004	,001	,436	,161	,234	,001	,133	,004	,003	,000	,000	,000	,012	,000	,000	,000	,000	.	,000	,000	,000
	,425	,204	,319	,021	,071	,146	,418	,287	,140	,004	,001	,192	,117	,134	,001	,000	,000	,000	.	,000	,191
	,096	,118	,103	,003	,005	,125	,201	,296	,026	,001	,010	,248	,044	,014	,044	,000	,000	,000	,000	.	,014
	,000	,000	,227	,442	,468	,001	,001	,000	,002	,000	,000	,000	,051	,001	,000	,000	,000	,000	,191	,014	.

The normal distribution of a sequence of following of the nominal values of each independent variable is researched in the several various ways:

- the analytical-critical values of the measure of asymmetricity and the measure of sharpness of distribution (the nominal value is calculated on the basis of formulas);
- the graphical – the quartile and percentile graphs, the graphs of accumulated frequencies.

The graphs of two-dimensional scattering allow to form directly and to estimate the form of distribution of a sequence of nominal values in the samples.

The several basic forms of correlation dependencies (relationships) are distinguished:

- the linear correlation relationship – the direct or inverse correlation relationship at the analysis of a sequence of following of the nominal values;
  - the positive – the increasing (decreasing) of nominal values of one sign corresponds the interrelated increasing (decreasing) of values of the other sign;
  - the negative – the decreasing (increasing) of nominal values of one sign corresponds the interrelated decreasing (increasing) of values of the other sign;
- the horseshoe-like correlation dependence – causes the coordinated interrelated increasing (decreasing) of nominal values of one sign with the increasing (decreasing) of nominal values of the other sign, and then, at the second stage,- causes the consistent interrelated decreasing (increasing) of nominal values of one sign with the decreasing (increasing) of nominal values of the other sign in the given analytical sample (it becomes the necessity to divide the sample of data into the two subsets);
- the zigzag-like correlation dependence – at the first stage,- causes the coordinated interrelated increasing (decreasing) of nominal values of one sign with the increasing (decreasing) of nominal values of the other sign, and then, at the second stage,- causes the consistent interrelated decreasing (increasing) of nominal values of one sign with the decreasing (increasing) of nominal values of the other sign, after that, finally, it causes the consistent interrelated increasing (decreasing) of nominal values of one sign with the increasing (decreasing) of nominal values of the other sign in the given analytical sample (it becomes the necessary to divide the sample of data into the three subsets).

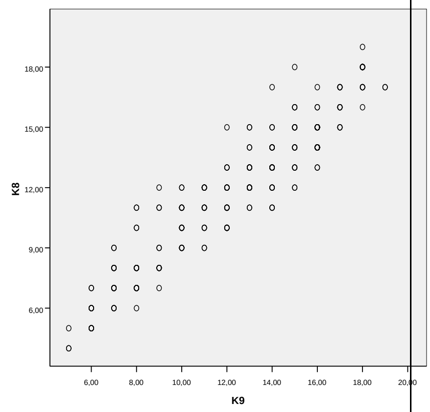
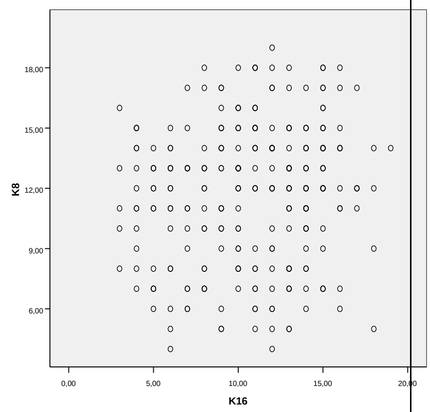
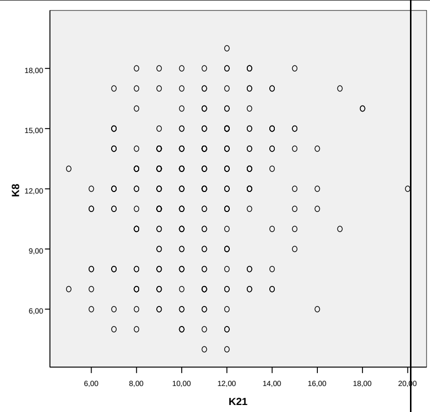
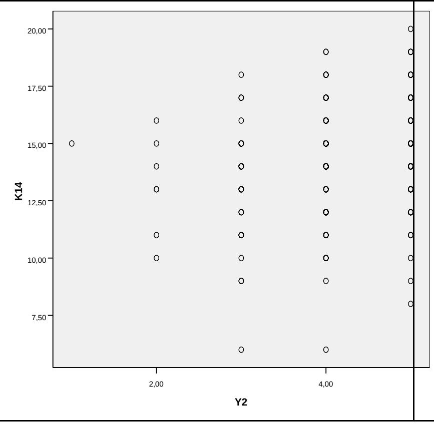
The further it is directly proposed to estimate the form of normal distribution of nominal values based on the construction of the graphs of two-dimensional scattering.

The absence of revealed significant relationships between the independent variables means the increasing of quality of the linear equation (model) of multiple regression.

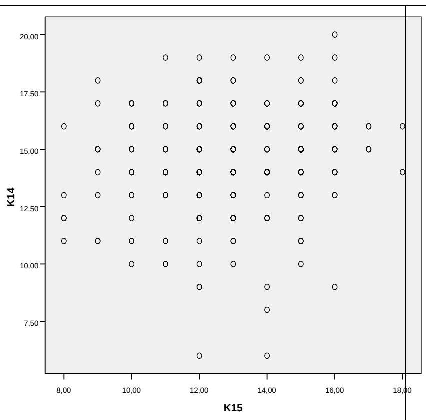
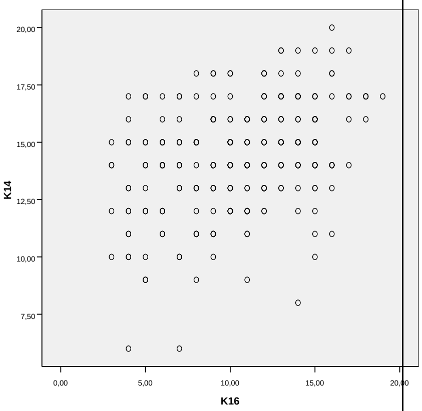
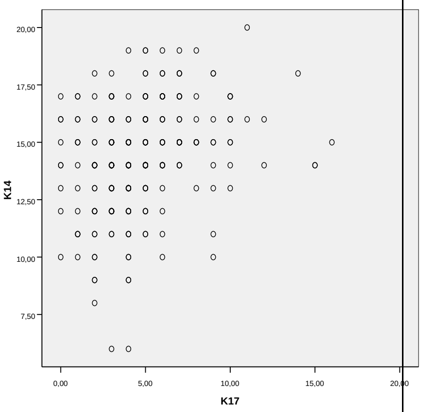
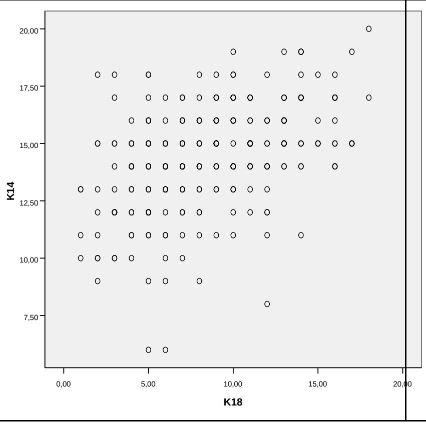
The graphs of two-dimensional scattering directly allow to build the scattering of nominal values of the pair of independent variables in the space of two coordinates.

Table A15.85

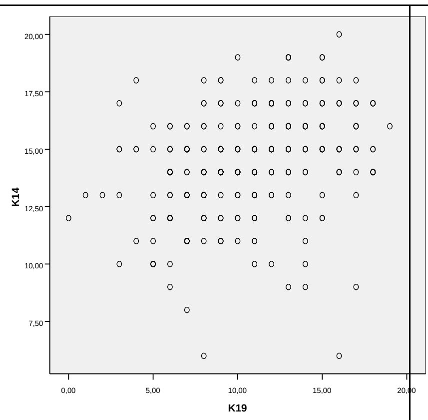
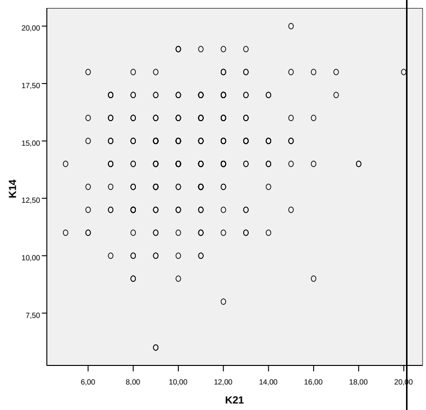
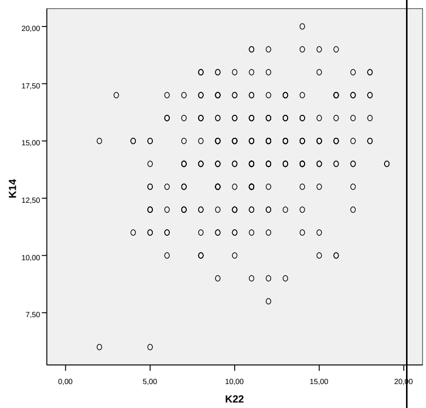
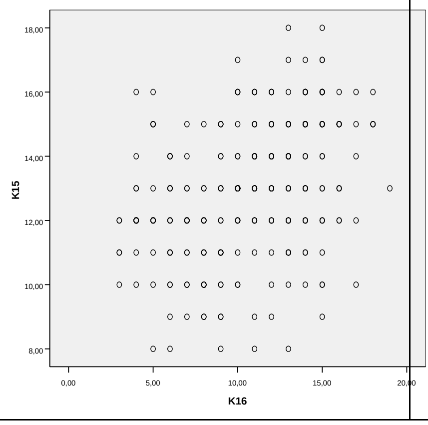
The identifier, directionality and the strength of relationship between the variables, the graph of two-dimensional scattering

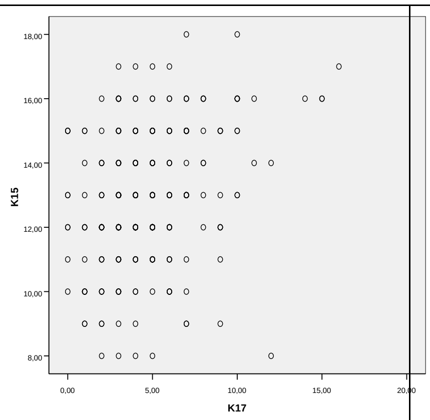
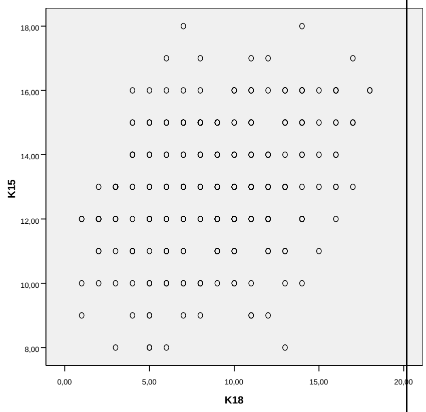
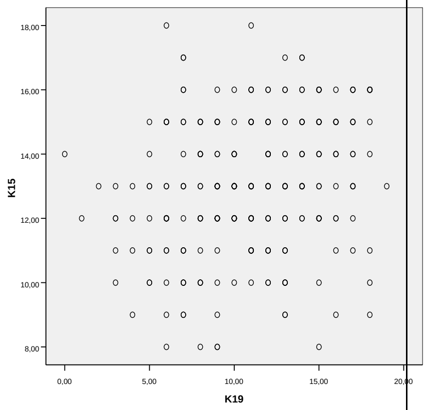
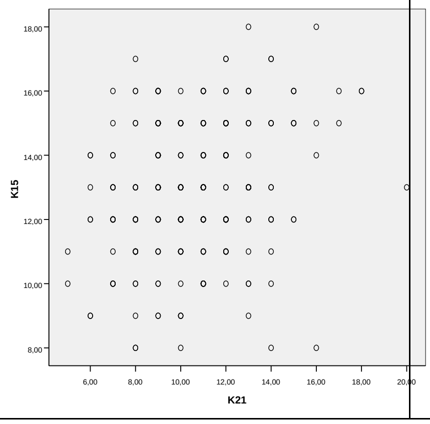
№ s.s.	The identifier of relationship	The directionality and strength of relationship	The graph of two-dimensional scattering	The commentaries
1.	K_8-K_9	0,944		The strong direct correlation dependence (the strong relationship) is observed
2.	K_8-K_{16}	0,123		The very easy correlation dependence (the false relationship) is observed
3.	K_8-K_{21}	0,200		The very easy correlation dependence (the false relationship) is observed
4.	K_{14}-Y_2	0,252		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed

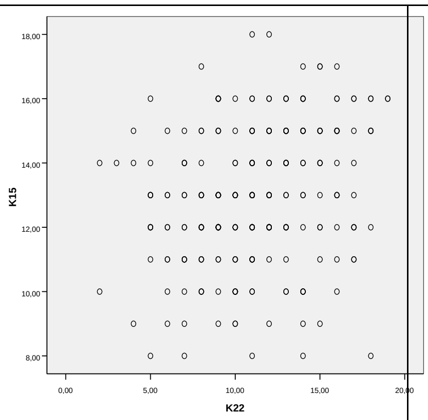
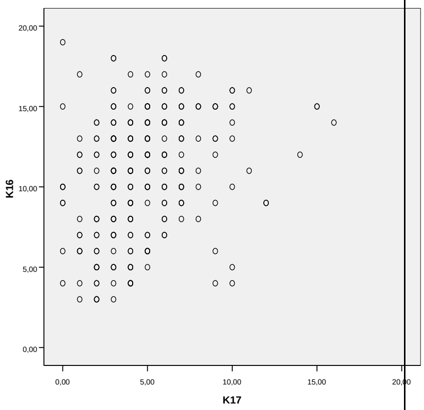
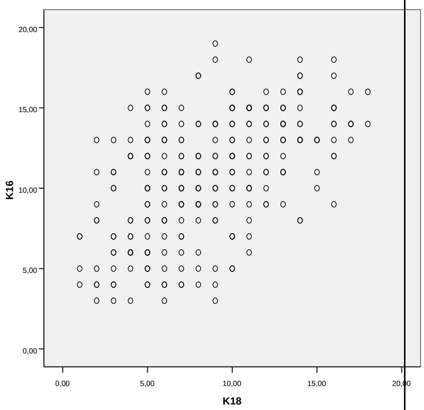
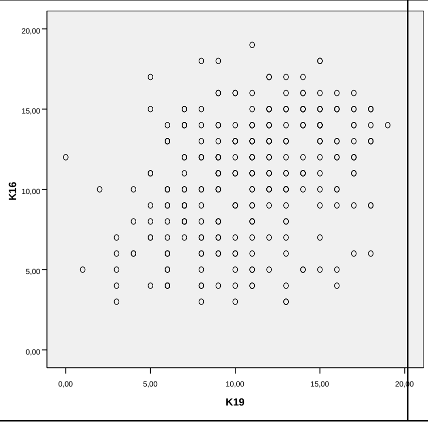
The continuation of tabl. A15.85

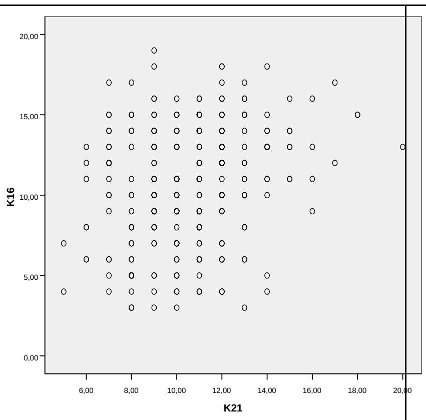
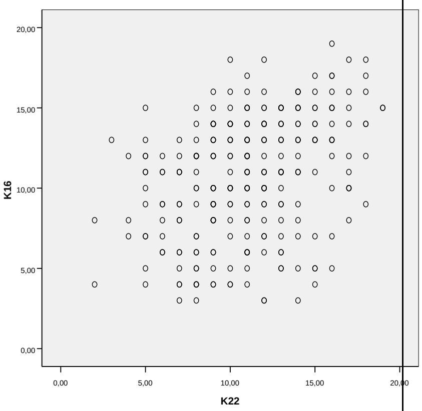
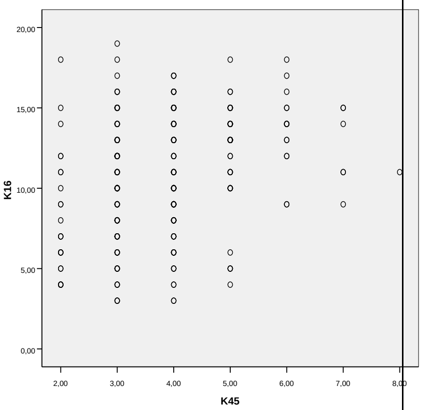
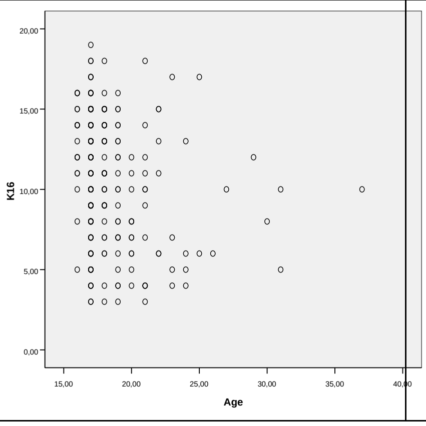
5.	K_{14}-K_{15}	0,220		The very easy correlation dependence (the false relationship) is observed
6.	K_{14}-K_{16}	0,387		The very easy correlation dependence (the false relationship) is observed
7.	K_{14}-K_{17}	0,292		The very easy correlation dependence (the false relationship) is observed
8.	K_{14}-K_{18}	0,443		The very easy correlation dependence (the very easy relationship) is observed

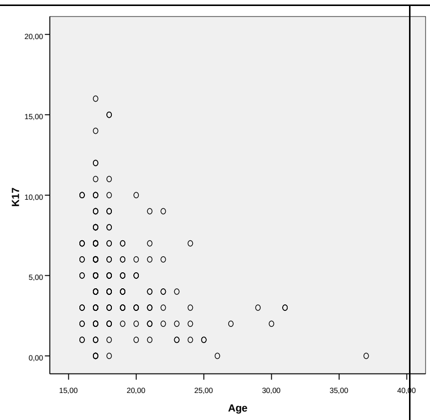
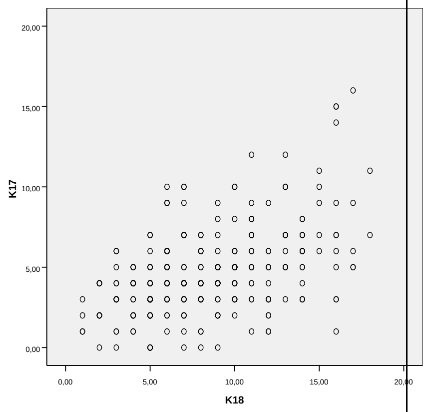
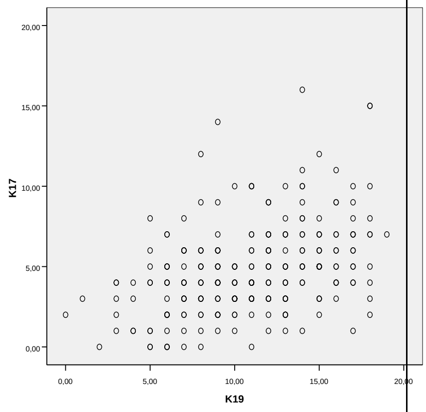
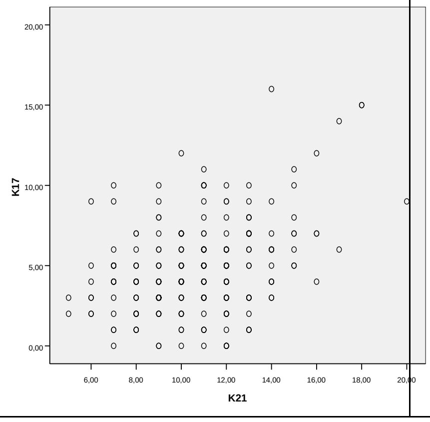
The continuation of tabl. A15.85

9.	K_{14}-K_{19}	0,309		The very easy correlation dependence (the false relationship) is observed
10.	K_{14}-K_{21}	0,218		The very easy correlation dependence (the false relationship) is observed
11.	K_{14}-K_{22}	0,267		The very easy correlation dependence (the false relationship) is observed
12.	K_{15}-K_{16}	0,382		The very easy correlation dependence (the false relationship) is observed

13.	K_{15}-K_{17}	0,312		The very easy correlation dependence (the false relationship) is observed
14.	K_{15}-K_{18}	0,349		The very easy correlation dependence (the false relationship) is observed
15.	K_{15}-K_{19}	0,242		The very easy correlation dependence (the false relationship) is observed
16.	K_{15}-K_{21}	0,261		The very easy correlation dependence (the false relationship) is observed

17.	K_{15}-K_{22}	0,262		The very easy correlation dependence (the false relationship) is observed
18.	K_{16}-K_{17}	0,287		The very easy correlation dependence (the false relationship) is observed
19.	K_{16}-K_{18}	0,535		The average direct correlation dependence (the average relationship) is observed
20.	K_{16}-K_{19}	0,348		The very easy correlation dependence (the false relationship) is observed

21.	K_{16}-K_{21}	0,243		The very easy correlation dependence (the false relationship) is observed
22.	K_{16}-K_{22}	0,359		The very easy correlation dependence (the false relationship) is observed
23.	K_{16}-K_{45}	0,325		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
24.	K_{16}-Age	-0,216		The very easy correlation dependence (the false relationship) is observed

25.	K_{17}-Age	-0,260		The very easy correlation dependence (the false relationship) is observed
26.	K_{17}-K_{18}	0,495		The very easy correlation dependence (the false relationship) is observed
27.	K_{17}-K_{19}	0,403		The very easy correlation dependence (the false relationship) is observed
28.	K_{17}-K_{21}	0,379		The very easy correlation dependence (the false relationship) is observed

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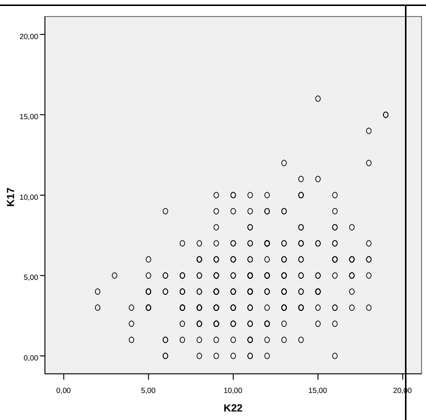
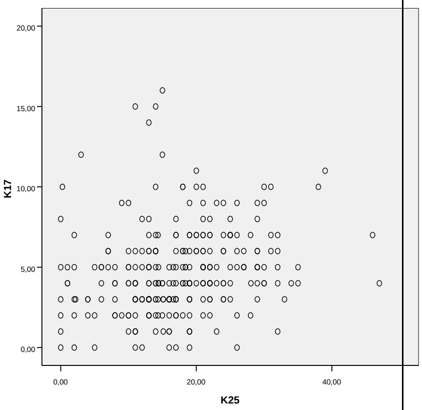
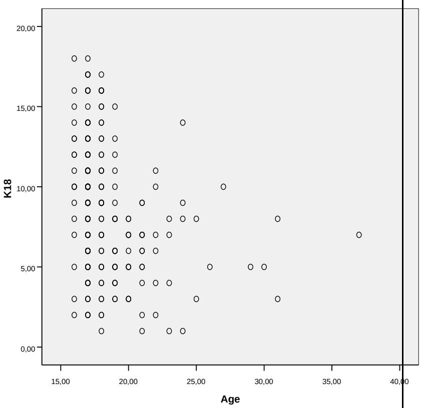
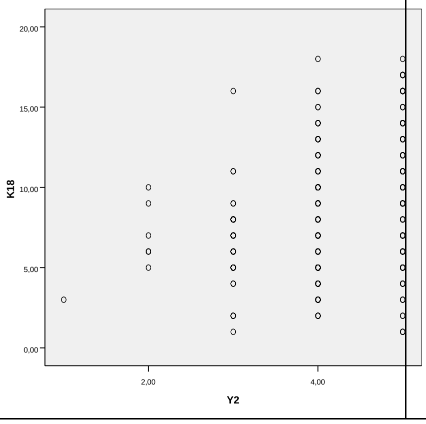
29.	K_{17}-K_{22}	0,362		The very easy correlation dependence (the false relationship) is observed
30.	K_{17}-K_{25}	0,203		The very easy correlation dependence (the false relationship) is observed
31.	K_{18}-Age	-0,265		The very easy correlation dependence (the false relationship) is observed
32.	K_{18}-Y_2	0,292		The very easy correlation dependence (the false relationship, it is possible the non-liner relationship) is observed

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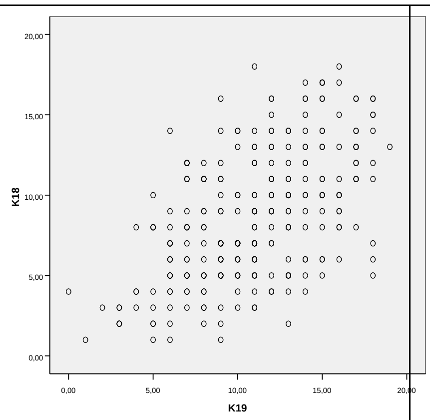
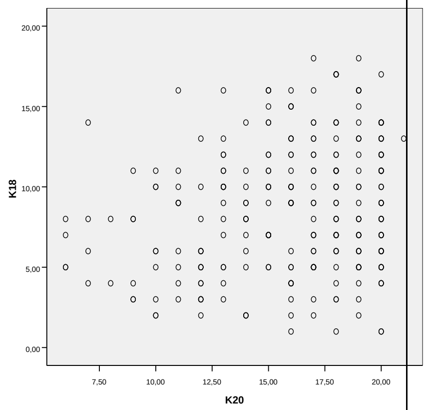
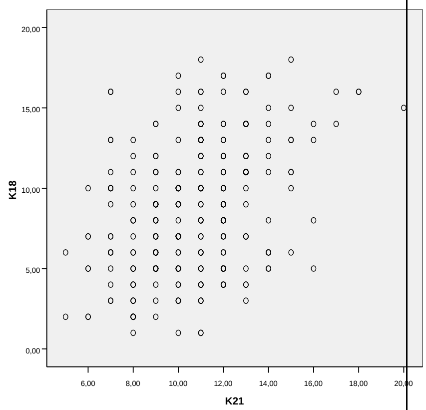
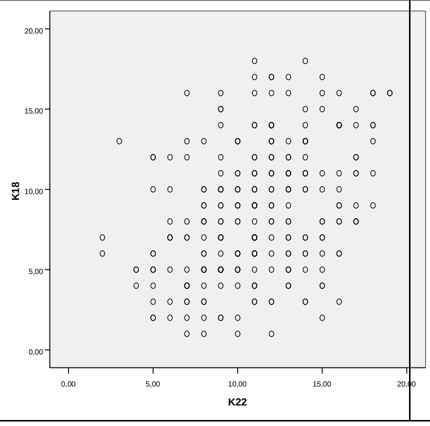
33.	K_{18}-K_{19}	0,568		The average correlation dependence (the average relationship) is observed
34.	K_{18}-K_{20}	0,204		The very easy correlation dependence (the false relationship) is observed
35.	K_{18}-K_{21}	0,393		The very easy correlation dependence (the false relationship) is observed
36.	K_{18}-K_{22}	0,386		The very easy correlation dependence (the false relationship) is observed

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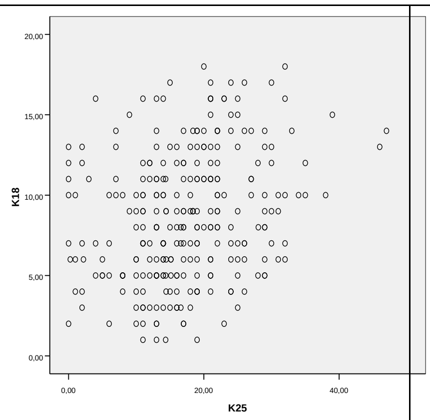
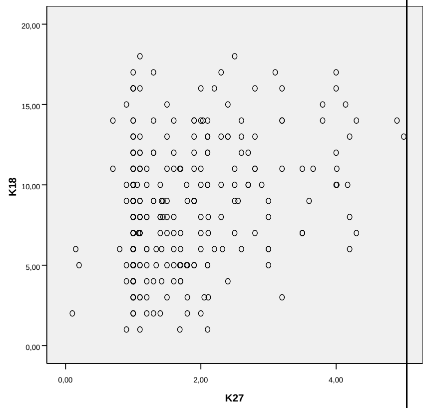
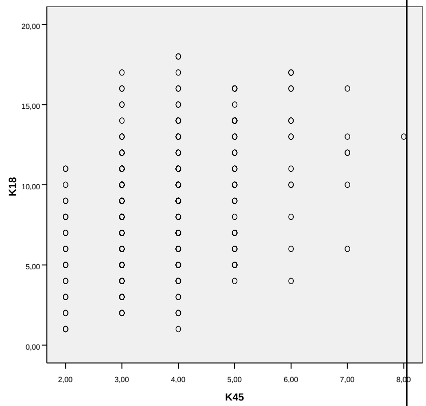
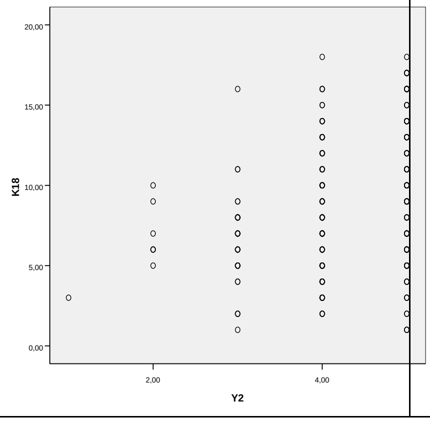
37.	K_{18}-K_{25}	0,272		The very easy correlation dependence (the false relationship) is observed
38.	K_{18}-K_{27}	0,300		The very easy correlation dependence (the false relationship) is observed
39.	K_{18}-K_{45}	0,394		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
40.	K_{18}-Y_2	0,292		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed

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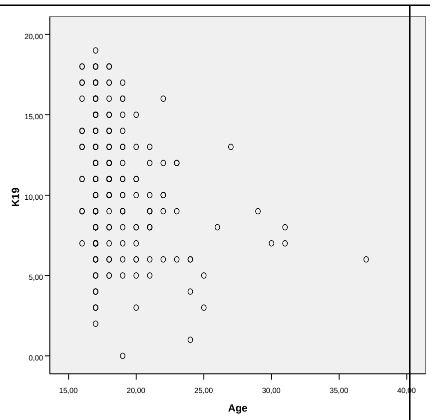
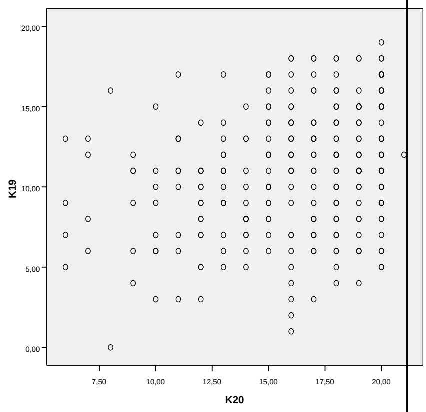
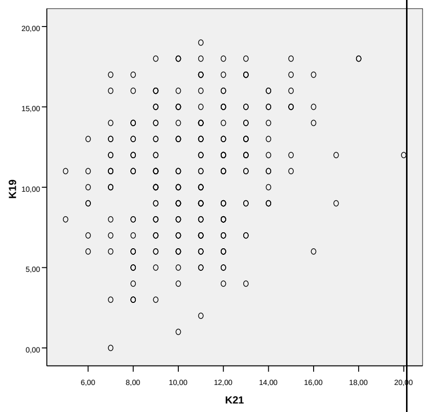
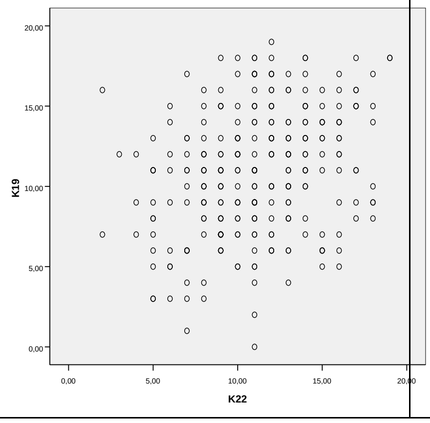
41.	K_{19}-Age	-0,293		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
42.	K_{19}-K_{20}	0,284		The very easy correlation dependence (the false relationship) is observed
43.	K_{19}-K_{21}	0,257		The very easy correlation dependence (the false relationship) is observed
44.	K_{19}-K_{22}	0,295		The very easy correlation dependence (the false relationship) is observed

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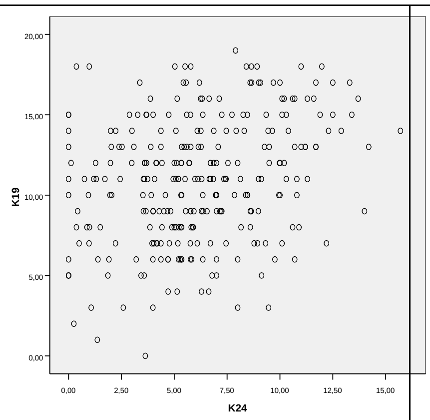
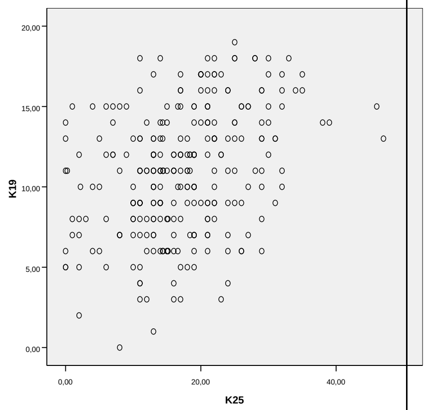
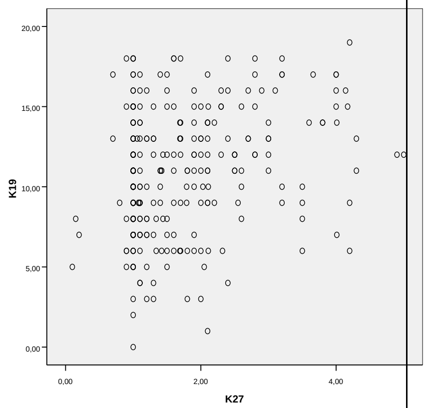
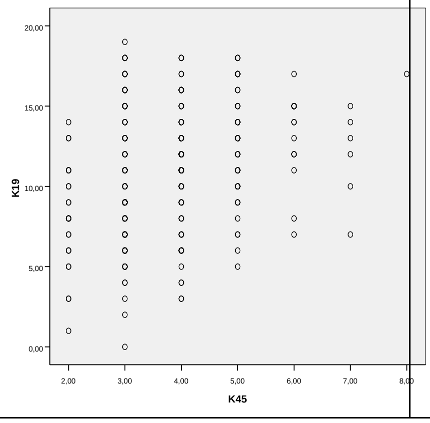
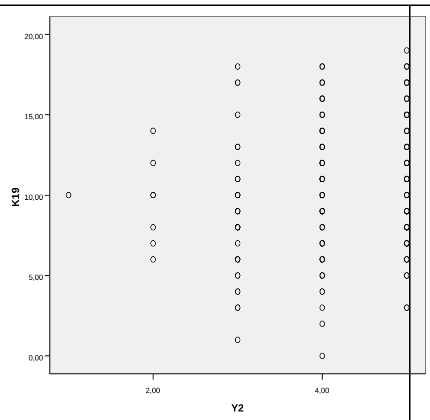
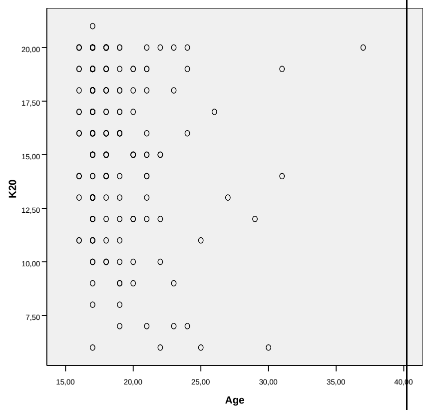
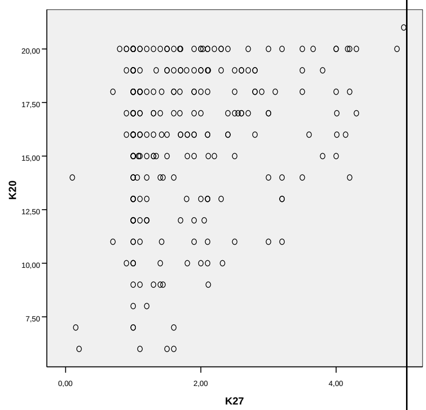
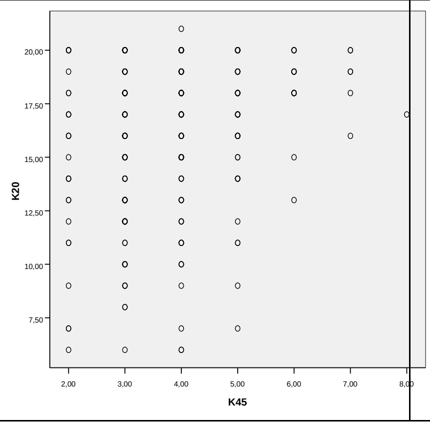
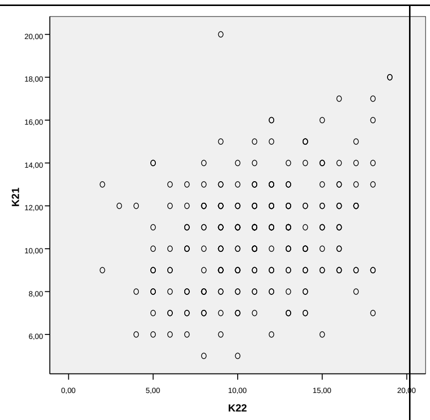
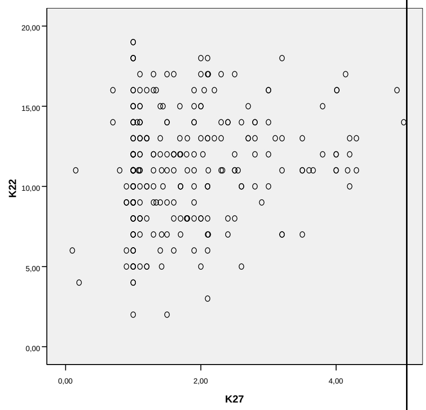
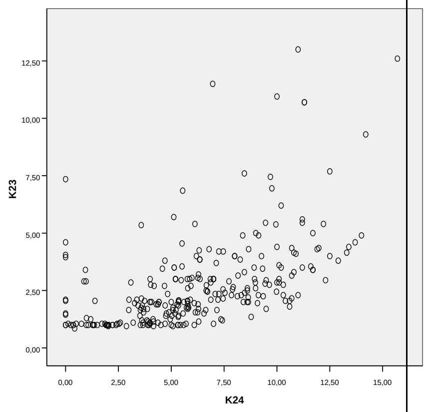
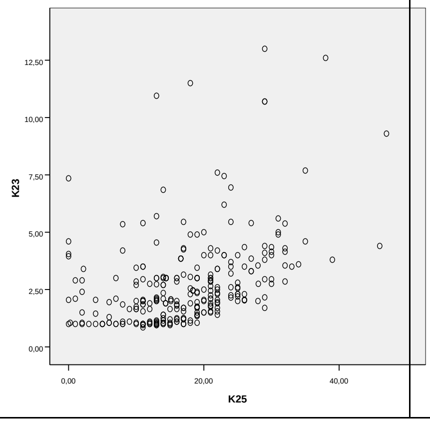
45.	K_{19}-K_{24}	0,297		The very easy correlation dependence (the false relationship) is observed
46.	K_{19}-K_{25}	0,364		The very easy correlation dependence (the false relationship) is observed
47.	K_{19}-K_{27}	0,259		The very easy correlation dependence (the false relationship) is observed
48.	K_{19}-K_{45}	0,313		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed

49.	K_{19}-Y_2	0,216		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
50.	K_{20}-Age	-0,214		The very easy correlation dependence (the false relationship) is observed
51.	K_{20}-K_{27}	0,202		The very easy correlation dependence (the false relationship) is observed
52.	K_{20}-K_{45}	0,243		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed

53.	K_{21}-K_{22}	0,312		The very easy correlation dependence (the false relationship) is observed
54.	K_{22}-K_{27}	0,202		The very easy correlation dependence (the false relationship) is observed
55.	K_{23}-K_{24}	0,541		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
56.	K_{23}-K_{25}	0,420		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed

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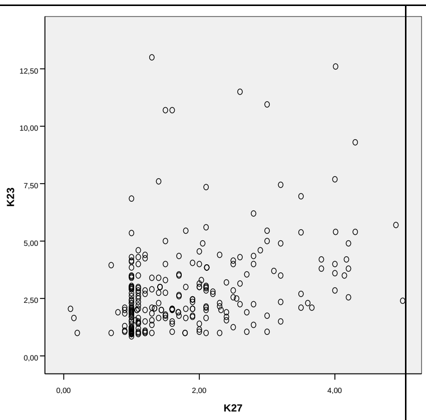
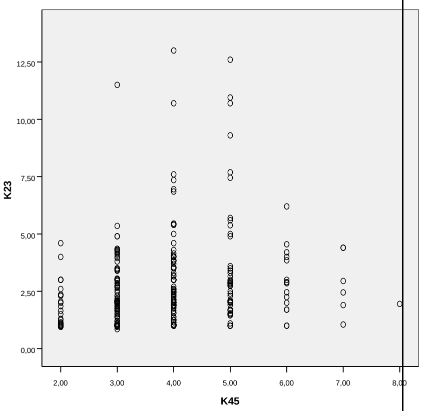
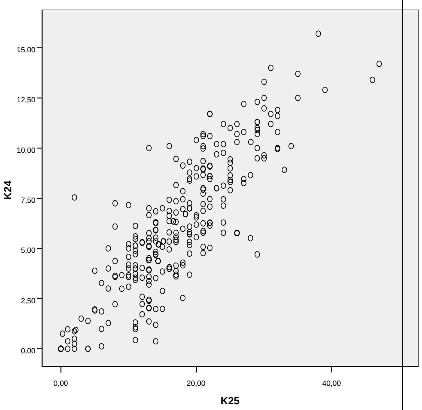
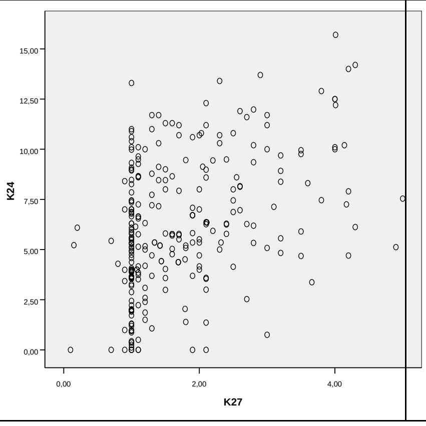
57.	K_{23}-K_{27}	0,408		The very easy correlation dependence (the false relationship) is observed
58.	K_{23}-K_{45}	0,210		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
59.	K_{24}-K_{25}	0,849		The strong correlation dependence (the false relationship) is observed
60.	K_{24}-K_{27}	0,415		The very easy correlation dependence (the false relationship) is observed

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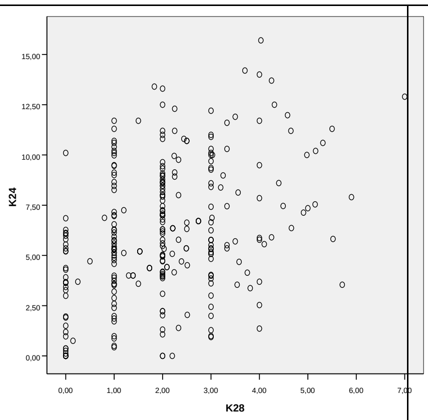
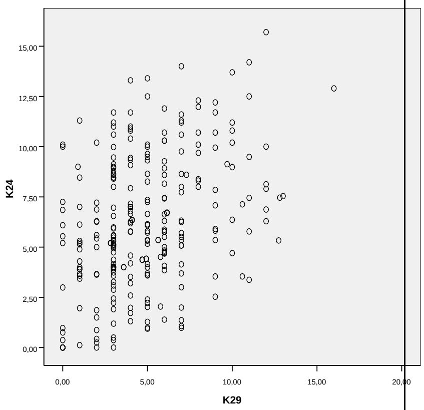
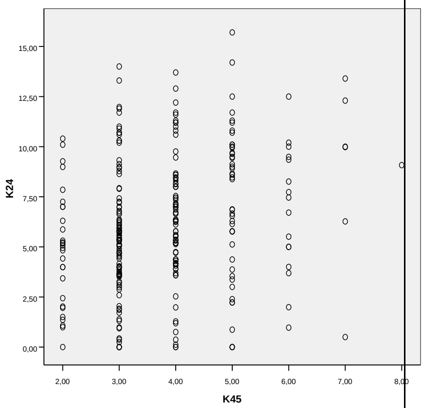
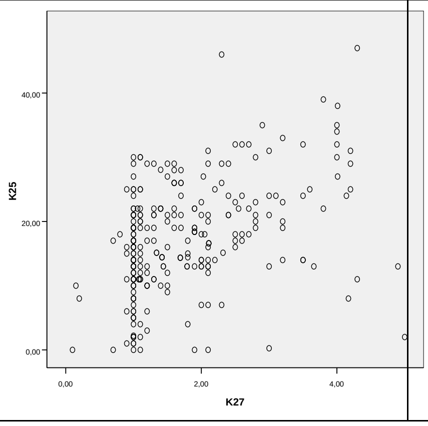
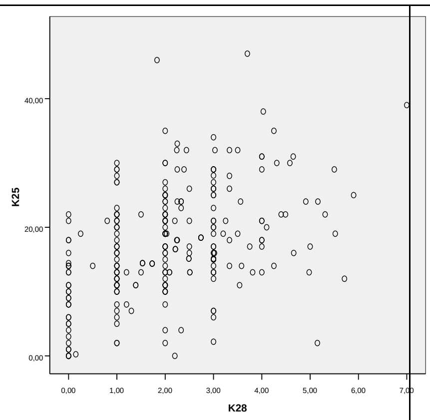
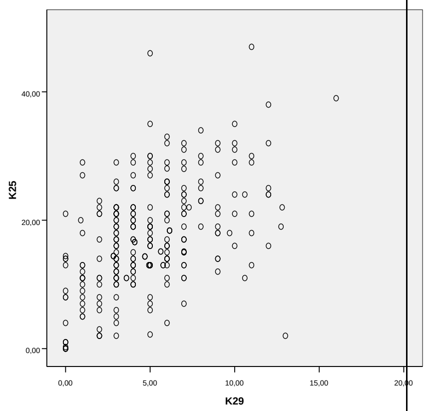
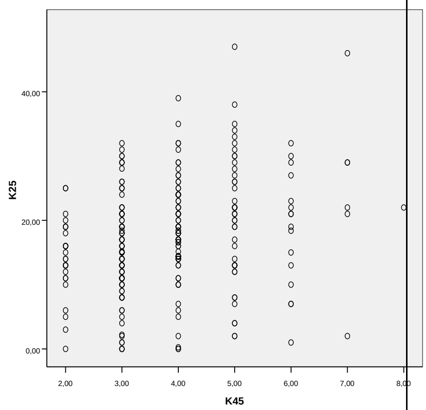
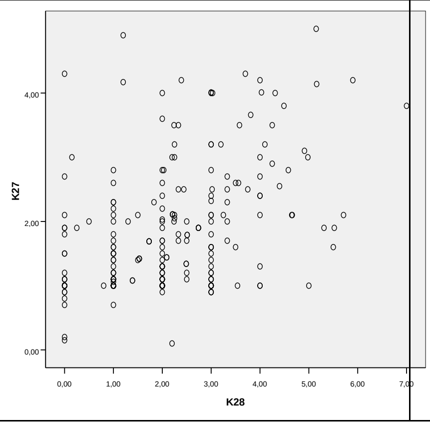
61.	K_{24}-K_{28}	0,397		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
62.	K_{24}-K_{29}	0,397		The very easy correlation dependence (the false relationship) is observed
63.	K_{24}-K_{45}	0,239		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
64.	K_{25}-K_{27}	0,409		The very easy correlation dependence (the false relationship) is observed

65.	K_{25}-K_{28}	0,448		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
66.	K_{25}-K_{29}	0,512		The easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
67.	K_{25}-K_{45}	0,267		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
68.	K_{27}-K_{28}	0,461		The very easy correlation dependence (the false relationship) is observed

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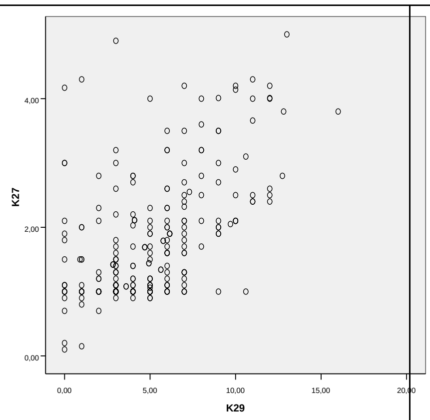
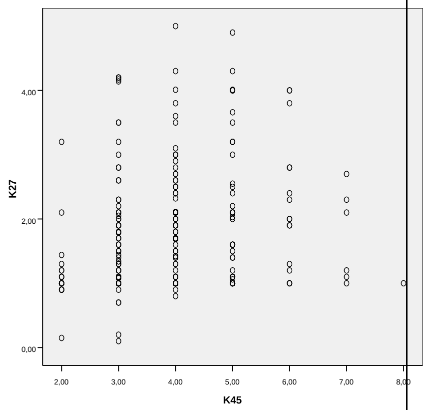
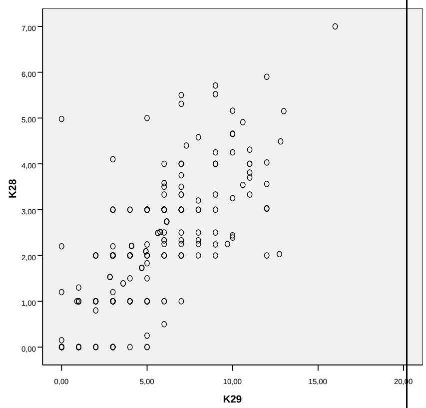
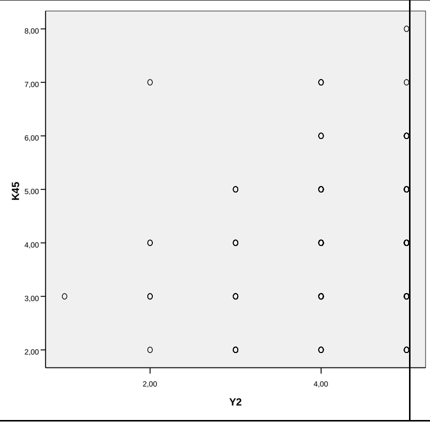
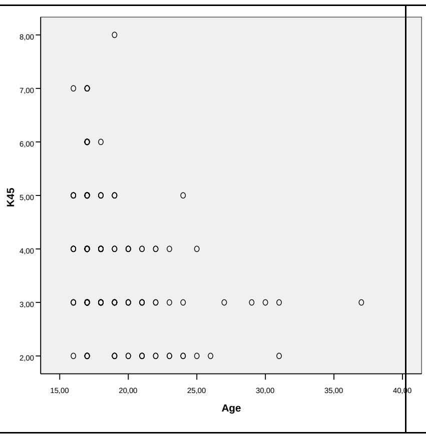
69.	K_{27}-K_{29}	0,556		The very easy correlation dependence (the false relationship) is observed
70.	K_{27}-K_{45}	0,249		The very easy correlation dependence (the false relationship, it is possible the nonlinear relationship) is observed
71.	K_{28}-K_{29}	0,741		The average correlation dependence (the average relationship) is observed
72.	K_{45}-Y_2	0,171		The very easy correlation dependence (the false relationship) is observed

The completion of tabl. A15.85

73.	K_{45}-Age	-0,315		The very easy correlation dependence (the false relationship) is observed

In the graphs of the two-dimensional scattering the significant correlation dependences were not revealed, that reflects the very high quality of the linear multiple regression:

- the very steady relationship between the deuteranopia (K_8) and tritanopia (K_9) was confirmed;
- the easy expressed small correlation relationship between the verbal intellect (K_{14}) and combinatorial abilities (K_{16});
- the easy expressed relationship of the verbal intellect (K_{14}) and analytical thinking (K_{18});
- the average correlation dependence between the combinatorial abilities (K_{16}) and analytical thinking (K_{18}) is easy expressed;
- the small correlation dependence between the combinatorial abilities (K_{16}) and inductive thinking (K_{19}) is easy expressed;
- the small correlation between the combinatorial abilities (K_{16}) and volumetric thinking (K_{22}) is easy expressed;
- the average correlation dependence between the analytical thinking (K_{18}) and inductive thinking (K_{19}) is easy expressed;
- the small correlation dependence between the analytical thinking (K_{18}) and planar thinking (K_{21}) is easy expressed;
- the small correlation dependence between the analytical thinking (K_{18}) and verbal uniqueness (K_{25}) is easy expressed;
- the small correlation dependence between the inductive thinking (K_{19}) and planar thinking (K_{21}) is easy expressed;
- the small relationship of the inductive thinking (K_{19}) and volumetric thinking (K_{22}) is easy expressed;
- the small correlation dependence between the inductive thinking (K_{19}) and verbal uniqueness (K_{25}) is easy expressed;
- the small correlation dependence between the verbal originality (K_{24}) and verbal uniqueness (K_{25}) is easy expressed;
- the average correlation dependence between the verbal uniqueness (K_{25}) and figurative uniqueness (K_{29}) is easy expressed;
- the small relationship of the figurative associativity (K_{27}) and figurative uniqueness (K_{29}) is easy expressed;
- the average correlation dependence between the figurative originality (K_{28}) and figurative uniqueness (K_{29}) is easy expressed.

2.A. The analysis of influence of the complete set of parameters of the linear regression model Y_2.

The mutual influence of the complete set of independent variables K_i and the given dependent variable Y_2 of the linear model of multiple regression is presented in table A15.86.

Table A15.86

The correlation table of the complete set of independent variables of the linear regression model with the factor Y_2

	The correlation of Pearson															
	Y2	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8
Y2	1,000	-,146	,126	,155	,227	,242	,067	,158	,221	,238	,166	,169	,165	,087	,099	-,030
Age	-,146	1,000	-,136	-,089	-,207	-,110	-,123	-,127	-,226	-,196	-,139	-,124	-,008	-,056	-,092	-,009
RU	,126	-,136	1,000	,664	,527	,472	,398	,516	,611	,559	,557	,557	,309	,135	,029	-,025
LIT	,155	-,089	**,664**	1,000	,567	,618	,506	,566	,549	,579	,606	,582	,329	,166	,037	-,061
LG	,227	-,207	,527	,567	1,000	,567	,369	,429	,507	,502	,481	,496	,196	,231	,018	,025
HIS	,242	-,110	,472	**,618**	,567	1,000	,500	,572	,467	,563	,576	,557	,322	,218	,002	-,049
GEO	,067	-,123	,398	,506	,369	,500	1,000	,524	,330	,434	,491	,458	,358	,216	-,012	-,018
BIO	,158	-,127	,516	,566	,429	,572	,524	1,000	,459	,516	,543	,555	,384	,178	,064	-,099
ALG	,221	-,226	,611	,549	,507	,467	,330	,459	1,000	,785	,682	,584	,321	,192	,021	-,007
GEOM	,238	-,196	,559	,579	,502	,563	,434	,516	**,785**	1,000	,717	,635	,414	,238	,006	-,020
FIZ	,166	-,139	,557	**,606**	,481	,576	,491	,543	**,682**	**,717**	1,000	,599	,346	,265	,053	-,037
CHE	,169	-,124	,557	,582	,496	,557	,458	,555	,584	**,635**	,599	1,000	,352	,183	,076	-,067
SCH	,165	-,008	,309	,329	,196	,322	,358	,384	,321	,414	,346	,352	1,000	,122	,110	-,013
AST	,087	-,056	,135	,166	,231	,218	,216	,178	,192	,238	,265	,183	,122	1,000	,117	,101
K7	,099	-,092	,029	,037	,018	,002	-,012	,064	,021	,006	,053	,076	,110	,117	1,000	,120
K8	-,030	-,009	-,025	-,061	,025	-,049	-,018	-,099	-,007	-,020	-,037	-,067	-,013	,101	,120	1,000
K9	-,038	,002	-,040	-,063	,024	-,050	-,036	-,111	-,005	-,013	-,030	-,067	-,019	,073	,135	**,944**
K14	,252	-,159	,173	,056	,207	,111	,056	,134	,176	,145	,146	,194	-,019	,022	,020	-,045
K15	,065	-,153	,107	,017	,088	,064	,086	,057	,100	,115	,083	,061	-,049	,075	,013	,122
K16	,135	-,216	,182	,125	,299	,225	,149	,130	,176	,227	,185	,151	,082	,114	,072	,123
K17	,124	-,260	,060	-,045	,099	,062	,057	,067	,108	,111	,083	-,011	-,023	,029	,003	,095
K18	,292	-,265	,217	,119	,239	,191	,133	,163	,249	,234	,220	,180	,060	,051	,058	,050
K19	,216	-,293	,137	,068	,190	,169	,064	,129	,219	,242	,193	,182	,032	,044	,046	,050
K20	,167	-,214	,232	,217	,222	,193	,112	,171	,231	,217	,217	,131	,035	,128	-,026	-,069
K21	,170	-,107	,098	,015	,024	-,002	,043	,050	,164	,119	,129	,002	,146	,046	-,100	,200
K22	,126	-,124	,012	-,085	,009	-,066	,027	,061	,061	,038	,022	-,021	,066	-,031	,056	,070
K23	,009	-,127	,050	-,021	,064	,081	,031	,071	,002	-,015	-,008	,040	-,034	,119	-,032	-,023
K24	,059	-,115	,100	,057	,140	,125	,138	,094	,052	,047	,044	,094	,035	,165	,041	,112
K25	,065	-,115	,162	,089	,195	,143	,144	,107	,111	,095	,083	,126	,029	,103	,026	,129
K27	,149	-,180	,072	,074	,170	,148	,156	,121	,095	,123	,058	,133	,080	,047	-,010	,059
K28	,033	-,050	,054	,027	,132	,054	,054	,037	,132	,088	,087	,115	,066	-,019	,028	,122
K29	,070	-,071	,031	,044	,117	,022	,066	,028	,137	,065	,038	,067	,042	,060	,076	,167
K45	,171	-,314	,216	,096	,350	,131	,139	,109	,191	,192	,100	,161	,073	-,014	,045	-,009
L31N	,030	,029	-,029	-,091	-,101	-,066	,047	,016	-,005	,029	-,034	-,004	,103	,038	,066	-,014
L36N	-,085	,011	,061	-,006	-,067	-,053	,039	,001	-,080	-,046	-,050	-,025	,038	,033	,040	-,073
L37	,163	-,101	,136	,031	,039	,126	,047	,042	,126	,142	,100	,118	,051	,050	,023	,181
L38N	-,034	,017	-,127	-,120	-,114	-,103	-,051	-,066	-,045	-,062	-,128	-,123	-,047	-,161	,014	-,058

The continuation of tabl. A15.86

L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16	K15	K14	K9
-,034	,163	-,085	,030	,171	,070	,033	,149	,065	,059	,009	,126	,170	,167	,216	,292	,124	,135	,065	,252	-,038
,017	-,101	,011	,029	-,314	-,071	-,050	-,180	-,115	-,115	-,127	-,124	-,107	-,214	-,293	-,265	-,260	-,216	-,153	-,159	,002
-,127	,136	,061	-,029	,216	,031	,054	,072	,162	,100	,050	,012	,098	,232	,137	,217	,060	,182	,107	,173	-,040
-,120	,031	-,006	-,091	,096	,044	,027	,074	,089	,057	-,021	-,085	,015	,217	,068	,119	-,045	,125	,017	,056	-,063
-,114	,039	-,067	-,101	,350	,117	,132	,170	,195	,140	,064	,009	,024	,222	,190	,239	,099	,299	,088	,207	,024
-,103	,126	-,053	-,066	,131	,022	,054	,148	,143	,125	,081	-,066	-,002	,193	,169	,191	,062	,225	,064	,111	-,050
-,051	,047	,039	,047	,139	,066	,054	,156	,144	,138	,031	,027	,043	,112	,064	,133	,057	,149	,086	,056	-,036
-,066	,042	,001	,016	,109	,028	,037	,121	,107	,094	,071	,061	,050	,171	,129	,163	,067	,130	,057	,134	-,111
-,045	,126	-,080	-,005	,191	,137	,132	,095	,111	,052	,002	,061	,164	,231	,219	,249	,108	,176	,100	,176	-,005
-,062	,142	-,046	,029	,192	,065	,088	,123	,095	,047	-,015	,038	,119	,217	,242	,234	,111	,227	,115	,145	-,013
-,128	,100	-,050	-,034	,100	,038	,087	,058	,083	,044	-,008	,022	,129	,217	,193	,220	,083	,185	,083	,146	-,030
-,123	,118	-,025	-,004	,161	,067	,115	,133	,126	,094	,040	-,021	,002	,131	,182	,180	-,011	,151	,061	,194	-,067
-,047	,051	,038	,103	,073	,042	,066	,080	,029	,035	-,034	,066	,146	,035	,032	,060	-,023	,082	-,049	-,019	-,019
-,161	,050	,033	,038	-,014	,060	-,019	,047	,103	,165	,119	-,031	,046	,128	,044	,051	,029	,114	,075	,022	,073
,014	,023	,040	,066	,045	,076	,028	-,010	,026	,041	-,032	,056	-,100	-,026	,046	,058	,003	,072	,013	,020	,135
-,058	,181	-,073	-,014	-,009	,167	,122	,059	,129	,112	-,023	,070	,200	-,069	,050	,050	,095	,123	,122	-,045	,944
-,049	,147	-,061	-,006	,005	,155	,088	,043	,123	,095	-,038	,068	,183	-,083	,043	,047	,079	,074	,109	-,058	1,000
-,025	,018	-,020	-,146	,195	,069	,063	,187	,192	,166	,165	,267	,217	,160	,309	,443	,292	,387	,220	1,000	-,058
-,059	-,002	-,003	,118	,180	,050	,012	,067	,090	,065	,027	,262	,261	,111	,242	,349	,312	,382	1,000	,220	,109
-,075	,047	-,008	,072	,325	-,032	-,034	,158	,106	,034	,062	,359	,243	,158	,348	,535	,287	1,000	,382	,387	,074
,021	,089	-,044	,132	,174	,116	,065	,167	,203	,099	,099	,361	,379	,103	,403	,495	1,000	,287	,312	,292	,079
-,105	,041	-,036	,096	,394	,177	,157	,300	,272	,194	,121	,386	,393	,204	,568	1,000	,495	,535	,349	,443	,047
-,098	,062	-,128	,084	,313	,139	,182	,259	,364	,297	,148	,295	,257	,284	1,000	,568	,403	,348	,242	,309	,043
-,040	,055	-,102	,015	,243	,041	,052	,202	,115	,130	,080	,191	,151	1,000	,284	,204	,103	,158	,111	,160	-,083
-,024	,139	,027	,110	,098	,102	,071	,135	,092	,076	,012	,312	1,000	,151	,257	,393	,379	,243	,261	,217	,183
-,011	,008	-,036	,595	,184	,132	,066	,202	,126	,125	,073	1,000	,312	,191	,295	,386	,361	,359	,262	,267	,068
,024	-,028	-,038	,013	,210	,102	,187	,408	,419	,541	1,000	,073	,012	,080	,148	,121	,099	,062	,027	,165	-,038
-,080	,030	-,081	-,003	,239	,397	,397	,415	,849	1,000	,541	,125	,076	,130	,297	,194	,099	,034	,065	,166	,095
-,089	,060	-,070	-,082	,267	,512	,447	,409	1,000	**,849**	,419	,126	,092	,115	,364	,272	,203	,106	,090	,192	,123
-,006	-,035	-,079	,074	,249	,556	,461	1,000	,409	,415	,408	,202	,135	,202	,259	,300	,167	,158	,067	,187	,043
-,008	,012	-,055	,017	,053	,741	1,000	,461	,447	,397	,187	,066	,071	,052	,182	,157	,065	-,034	,012	,063	,088
,007	-,003	-,028	-,007	,131	1,000	**,741**	,556	,512	,397	,102	,132	,102	,041	,139	,177	,116	-,032	,050	,069	,155
-,040	,004	-,078	-,002	1,000	,131	,053	,249	,267	,239	,210	,184	,098	,243	,313	,394	,174	,325	,180	,195	,005
,048	-,003	-,012	1,000	-,002	-,007	,017	,074	-,082	-,003	,013	,595	,110	,015	,084	,096	,132	,072	,118	-,146	-,006
-,128	-,077	1,000	-,012	-,078	-,028	-,055	-,079	-,070	-,081	-,038	-,036	,027	-,102	-,128	-,036	-,044	-,008	-,003	-,020	-,061
,023	1,000	-,077	-,003	,004	-,003	,012	-,035	,060	,030	-,028	,008	,139	,055	,062	,041	,089	,047	-,002	,018	,147
1,000	,023	-,128	,048	-,040	,007	-,008	-,006	-,089	-,080	,024	-,011	-,024	-,040	-,098	-,105	,021	-,075	-,059	-,025	-,049

The continuation of tabl. A15.86

The value (1-sided)																							
K20	K19	K18	K17	K16	K15	K14	K9	K8	K7	AST	SCH	CHE	FIZ	GEOM	ALG	BIO	GEO	HIS	LG	LIT	RU	Age	Y2
,003	,000	,000	,019	,012	,140	,000	,261	,310	,050	,072	,003	,002	,003	,000	,000	,004	,131	,000	,000	,005	,017	,007	.
,000	,000	,000	,000	,000	,005	,004	,484	,442	,063	,174	,446	,019	,010	,000	,000	,017	,020	,033	,000	,069	,011	.	,007
,000	,011	,000	,157	,001	,036	,002	,251	,340	,314	,012	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000	.	,011	,017
,000	,130	,023	,227	,018	,387	,175	,148	,154	,269	,003	,000	,000	,000	,000	,000	,000	,000	,000	,000	.	,000	,069	,005
,000	,001	,000	,050	,000	,071	,000	,343	,338	,381	,000	,001	,000	,000	,000	,000	,000	,000	,000	.	,000	,000	,000	,000
,001	,002	,001	,151	,000	,143	,032	,200	,207	,490	,000	,000	,000	,000	,000	,000	,000	,000	.	,000	,000	,000	,033	,000
,030	,143	,013	,170	,006	,076	,176	,274	,385	,423	,000	,000	,000	,000	,000	,000	,000	.	,000	,000	,000	,000	,020	,131
,002	,016	,003	,131	,015	,173	,012	,031	,049	,142	,001	,000	,000	,000	,000	,000	.	,000	,000	,000	,000	,000	,017	,004
,000	,000	,000	,035	,002	,047	,002	,464	,451	,362	,001	,000	,000	,000	,000	.	,000	,000	,000	,000	,000	,000	,000	,000
,000	,000	,000	,032	,000	,027	,007	,411	,367	,457	,000	,000	,000	,000	.	,000	,000	,000	,000	,000	,000	,000	,000	,000
,000	,001	,000	,084	,001	,083	,007	,310	,270	,190	,000	,000	,000	.	,000	,000	,000	,000	,000	,000	,000	,000	,010	,003
,014	,001	,001	,428	,006	,153	,001	,131	,130	,104	,001	,000	.	,000	,000	,000	,000	,000	,000	,000	,000	,000	,019	,002
,283	,297	,158	,352	,087	,206	,377	,376	,417	,033	,021	.	,000	,000	,000	,000	,000	,000	,000	,001	,000	,000	,446	,003
,016	,232	,195	,314	,029	,106	,358	,111	,046	,025	.	,021	,001	,000	,000	,001	,001	,000	,000	,000	,003	,012	,174	,072
,331	,223	,165	,477	,115	,413	,367	,012	,022	.	,025	,033	,104	,190	,457	,362	,142	,423	,490	,381	,269	,314	,063	,050
,125	,200	,202	,056	,020	,021	,226	,000	.	,022	,046	,417	,130	,270	,367	,451	,049	,385	,207	,338	,154	,340	,442	,310
,082	,238	,215	,094	,108	,034	,166	.	,000	,012	,111	,376	,131	,310	,411	,464	,031	,274	,200	,343	,148	,251	,484	,261
,004	,000	,000	,000	,000	,000	.	,166	,226	,367	,358	,377	,001	,007	,007	,002	,012	,176	,032	,000	,175	,002	,004	,000
,032	,000	,000	,000	,000	.	,000	,034	,021	,413	,106	,206	,153	,083	,027	,047	,173	,076	,143	,071	,387	,036	,005	,140
,004	,000	,000	,000	.	,000	,000	,108	,020	,115	,029	,087	,006	,001	,000	,002	,015	,006	,000	,000	,018	,001	,000	,012
,042	,000	,000	.	,000	,000	,000	,094	,056	,477	,314	,352	,428	,084	,032	,035	,131	,170	,151	,050	,227	,157	,000	,019
,000	,000	.	,000	,000	,000	,000	,215	,202	,165	,195	,158	,001	,000	,000	,000	,003	,013	,001	,000	,023	,000	,000	,000
,000	.	,000	,000	,000	,000	,000	,238	,200	,223	,232	,297	,001	,001	,000	,000	,016	,143	,002	,001	,130	,011	,000	,000
.	,000	,000	,042	,004	,032	,004	,082	,125	,331	,016	,283	,014	,000	,000	,000	,002	,030	,001	,000	,000	,000	,000	,003
,006	,000	,000	,000	,000	,000	,000	,001	,000	,047	,221	,007	,484	,015	,023	,003	,201	,238	,487	,342	,402	,050	,037	,002
,001	,000	,000	,000	,000	,000	,000	,129	,121	,175	,303	,134	,364	,359	,263	,154	,156	,328	,135	,439	,078	,423	,019	,018
,091	,007	,022	,049	,150	,328	,003	,265	,353	,297	,023	,286	,252	,445	,404	,486	,117	,305	,089	,142	,361	,204	,017	,441
,015	,000	,001	,048	,283	,141	,003	,056	,031	,245	,003	,283	,059	,233	,216	,192	,058	,010	,018	,009	,171	,048	,027	,161
,027	,000	,000	,000	,039	,066	,001	,020	,015	,330	,042	,312	,018	,084	,055	,032	,037	,008	,008	,001	,069	,003	,027	,139
,000	,000	,000	,003	,004	,133	,001	,234	,161	,436	,214	,091	,013	,167	,020	,055	,022	,005	,006	,002	,108	,114	,001	,006
,192	,001	,004	,140	,287	,418	,146	,071	,021	,319	,377	,135	,027	,074	,071	,014	,268	,183	,185	,013	,329	,184	,204	,289
,248	,010	,001	,026	,296	,201	,125	,005	,003	,103	,160	,242	,131	,264	,141	,011	,319	,136	,359	,025	,231	,300	,118	,121
,000	,000	,000	,002	,000	,001	,001	,468	,442	,227	,408	,113	,004	,048	,001	,001	,034	,010	,014	,000	,055	,000	,000	,002
,400	,080	,054	,013	,116	,024	,007	,461	,411	,136	,264	,043	,474	,288	,316	,468	,393	,217	,136	,046	,064	,317	,317	,306
,045	,016	,276	,232	,449	,483	,369	,154	,112	,252	,289	,261	,341	,203	,221	,091	,491	,256	,186	,132	,458	,155	,424	,077
,179	,151	,250	,069	,217	,488	,384	,007	,001	,353	,203	,196	,024	,048	,009	,017	,243	,216	,018	,260	,300	,011	,045	,003
,254	,050	,040	,365	,106	,163	,339	,209	,168	,409	,003	,218	,020	,016	,149	,226	,134	,196	,043	,028	,022	,017	,391	,284

The completion of tabl. A15.86

L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21
,284	,003	,077	,306	,002	,121	,289	,006	,139	,161	,441	,018	,002
,391	,045	,424	,317	,000	,118	,204	,001	,027	,027	,017	,019	,037
,017	,011	,155	,317	,000	,300	,184	,114	,003	,048	,204	,423	,050
,022	,300	,458	,064	,055	,231	,329	,108	,069	,171	,361	,078	,402
,028	,260	,132	,046	,000	,025	,013	,002	,001	,009	,142	,439	,342
,043	,018	,186	,136	,014	,359	,185	,006	,008	,018	,089	,135	,487
,196	,216	,256	,217	,010	,136	,183	,005	,008	,010	,305	,328	,238
,134	,243	,491	,393	,034	,319	,268	,022	,037	,058	,117	,156	,201
,226	,017	,091	,468	,001	,011	,014	,055	,032	,192	,486	,154	,003
,149	,009	,221	,316	,001	,141	,071	,020	,055	,216	,404	,263	,023
,016	,048	,203	,288	,048	,264	,074	,167	,084	,233	,445	,359	,015
,020	,024	,341	,474	,004	,131	,027	,013	,018	,059	,252	,364	,484
,218	,196	,261	,043	,113	,242	,135	,091	,312	,283	,286	,134	,007
,003	,203	,289	,264	,408	,160	,377	,214	,042	,003	,023	,303	,221
,409	,353	,252	,136	,227	,103	,319	,436	,330	,245	,297	,175	,047
,168	,001	,112	,411	,442	,003	,021	,161	,015	,031	,353	,121	,000
,209	,007	,154	,461	,468	,005	,071	,234	,020	,056	,265	,129	,001
,339	,384	,369	,007	,001	,125	,146	,001	,001	,003	,003	,000	,000
,163	,488	,483	,024	,001	,201	,418	,133	,066	,141	,328	,000	,000
,106	,217	,449	,116	,000	,296	,287	,004	,039	,283	,150	,000	,000
,365	,069	,232	,013	,002	,026	,140	,003	,000	,048	,049	,000	,000
,040	,250	,276	,054	,000	,001	,004	,000	,000	,001	,022	,000	,000
,050	,151	,016	,080	,000	,010	,001	,000	,000	,000	,007	,000	,000
,254	,179	,045	,400	,000	,248	,192	,000	,027	,015	,091	,001	,006
,347	,010	,329	,034	,051	,044	,117	,012	,062	,103	,419	,000	.
,425	,446	,272	,000	,001	,014	,134	,000	,018	,018	,110	.	,000
,345	,318	,261	,412	,000	,044	,001	,000	,000	,000	.	,110	,419
,090	,310	,087	,477	,000	,000	,000	,000	,000	.	,000	,018	,103
,068	,159	,120	,085	,000	,000	,000	,000	.	,000	,000	,018	,062
,460	,278	,094	,109	,000	,000	,000	.	,000	,000	,000	,000	,012
,449	,420	,181	,391	,191	,000	.	,000	,000	,000	,001	,134	,117
,453	,478	,322	,455	,014	.	,000	,000	,000	,000	,044	,014	,044
,253	,471	,096	,484	.	,014	,191	,000	,000	,000	,000	,001	,051
,211	,478	,420	.	,484	,455	,391	,109	,085	,477	,412	,000	,034
,016	,099	.	,420	,096	,322	,181	,094	,120	,087	,261	,272	,329
,354	.	,099	,478	,471	,478	,420	,278	,159	,310	,318	,446	,010
.	,354	,016	,211	,253	,453	,449	,460	,068	,090	,345	,425	,347

The presented table directly contains the nominal values of the correlation coefficients between the complete set of independent variables allows to analyze directly the strength (nominal) and directionality (sign) of the relationships.

All presented relationships do not act negative influence on the linear model of multiply regression, that can be verified directly at the checking of the formed linear equation of multiple regression and the analysis of residues.

The presented correlation table directly allows to estimate the potential quality of the linear equation (model) of multiple regression.

At a large quantity of correlation dependences and relationships arises the necessity of carrying out of the additional researches: the researching of the form of relationship, the determining of the direction of relationship, the determining of the truly and falsely of relationship.

The analysis of residues allows to estimate the degree of inconsistency between the theoretical predicted and practical experimental nominal values, and also directly to estimate the quality of the obtained equation of multiple regression.

2.B. The analysis of influence of the complete set of parameters of the linear regression model Y_4.

The mutual influence of the complete set of independent variables K_i and the given dependent variable Y_4 of the linear model of multiple regression is presented in table A15.87.

Table A15.87

The correlation table of the complete set of independent variables of the linear regression model with the factor Y_4

		Y4	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
The correlation of Pearson	Y4	1,000	-,385	,196	,181	,215	,148	,134	,173	,337	,268	,281	,243	,121	,220	,080	-,048	-,052	,160	,043	,132	,172	,278	,170	,199	,222	,076	,005	,046	,079	,161	-,011	,078	,249	-,010	-,058	,131	-,023
	Age	-,385	1,000	-,136	-,089	-,207	-,110	-,123	-,127	-,226	-,196	-,139	-,124	-,008	-,056	-,092	-,009	,002	-,159	-,153	-,216	-,260	-,265	-,293	-,214	-,107	-,124	-,127	-,115	-,115	-,180	-,050	-,071	-,314	,029	,011	-,101	,017
	RU	,196	-,136	1,000	,664	,527	,472	,398	,516	,611	,559	,557	,557	,309	,135	,029	-,025	-,040	,173	,107	,182	,060	,217	,137	,232	,098	,012	,050	,100	,162	,072	,054	,031	,216	-,029	,061	,136	-,127
	LIT	,181	-,089	,664	1,000	,567	,618	,506	,566	,549	,579	,606	,582	,329	,166	,037	-,061	-,063	,056	,017	,125	-,045	,119	,068	,217	,015	-,085	-,021	,057	,089	,074	,027	,044	,096	-,091	-,006	,031	-,120
	LG	,215	-,207	,527	,567	1,000	,567	,369	,429	,507	,502	,481	,496	,196	,231	,018	,025	,024	,207	,088	,299	,099	,239	,190	,222	,024	,009	,064	,140	,195	,170	,132	,117	,350	-,101	-,067	,039	-,114
	HIS	,148	-,110	,472	,618	,567	1,000	,500	,572	,467	,563	,576	,557	,322	,218	,002	-,049	-,050	,111	,064	,225	,062	,191	,169	,193	-,002	-,066	,081	,125	,143	,148	,054	,022	,131	-,066	-,053	,126	-,103
	GEO	,134	-,123	,398	,506	,369	,500	1,000	,524	,330	,434	,491	,458	,358	,216	-,012	-,018	-,036	,056	,086	,149	,057	,133	,064	,112	,043	,027	,031	,138	,144	,156	,054	,066	,139	,047	,039	,047	-,051
	BIO	,173	-,127	,516	,566	,429	,572	,524	1,000	,459	,516	,543	,555	,384	,178	,064	-,099	-,111	,134	,057	,130	,067	,163	,129	,171	,050	,061	,071	,094	,107	,121	,037	,028	,109	,016	,001	,042	-,066
	ALG	,337	-,226	,611	,549	,507	,467	,330	,459	1,000	,785	,682	,584	,321	,192	,021	-,007	-,005	,176	,100	,176	,108	,249	,219	,231	,164	,061	,002	,052	,111	,095	,132	,137	,191	-,005	-,080	,126	-,045
	GEOM	,268	-,196	,559	,579	,502	,563	,434	,516	,785	1,000	,717	,635	,414	,238	,006	-,020	-,013	,145	,115	,227	,111	,234	,242	,217	,119	,038	-,015	,047	,095	,123	,088	,065	,192	,029	-,046	,142	-,062
	FIZ	,281	-,139	,557	,606	,481	,576	,491	,543	,682	,717	1,000	,599	,346	,265	,053	-,037	-,030	,146	,083	,185	,083	,220	,193	,217	,129	,022	-,008	,044	,083	,058	,087	,038	,100	-,034	-,050	,100	-,128
	CHE	,243	-,124	,557	,582	,496	,557	,458	,555	,584	,635	,599	1,000	,352	,183	,076	-,067	-,067	,194	,061	,151	-,011	,180	,182	,131	,002	-,021	,040	,094	,126	,133	,115	,067	,161	-,004	-,025	,118	-,123
	SCH	,121	-,008	,309	,329	,196	,322	,358	,384	,321	,414	,346	,352	1,000	,122	,110	-,013	-,019	-,019	-,049	,082	-,023	,060	,032	,035	,146	,066	-,034	,035	,029	,080	,066	,042	,073	,103	,038	,051	-,047
	AST	,220	-,056	,135	,166	,231	,218	,216	,178	,192	,238	,265	,183	,122	1,000	,117	,101	,073	,022	,075	,114	,029	,051	,044	,128	,046	-,031	,119	,165	,103	,047	-,019	,060	-,014	,038	,033	,050	-,161
	K7	,080	-,092	,029	,037	,018	,002	-,012	,064	,021	,006	,053	,076	,110	,117	1,000	,120	,135	,020	,013	,072	,003	,058	,046	-,026	-,100	,056	-,032	,041	,026	-,010	,028	,076	,045	,066	,040	,023	,014
	K8	-,048	-,009	-,025	-,061	,025	-,049	-,018	-,099	-,007	-,020	-,037	-,067	-,013	,101	,120	1,000	,944	-,045	,122	,123	,095	,050	,050	-,069	,200	,070	-,023	,112	,129	,059	,122	,167	-,009	-,014	-,073	,181	-,058
	K9	-,052	,002	-,040	-,063	,024	-,050	-,036	-,111	-,005	-,013	-,030	-,067	-,019	,073	,135	,944	1,000	-,058	,109	,074	,079	,047	,043	-,083	,183	,068	-,038	,095	,123	,043	,088	,155	,005	-,006	-,061	,147	-,049

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L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16	K15	K14
-,023	,131	-,058	-,010	,249	,078	-,011	,161	,079	,046	,005	,076	,222	,199	,170	,278	,172	,132	,043	,160
,017	-,101	,011	,029	-,314	-,071	-,050	-,180	-,115	-,115	-,127	-,124	-,107	-,214	-,293	-,265	-,260	-,216	-,153	-,159
-,127	,136	,061	-,029	,216	,031	,054	,072	,162	,100	,050	,012	,098	,232	,137	,217	,060	,182	,107	,173
-,120	,031	-,006	-,091	,096	,044	,027	,074	,089	,057	-,021	-,085	,015	,217	,068	,119	-,045	,125	,017	,056
-,114	,039	-,067	-,101	,350	,117	,132	,170	,195	,140	,064	,009	,024	,222	,190	,239	,099	,299	,088	,207
-,103	,126	-,053	-,066	,131	,022	,054	,148	,143	,125	,081	-,066	-,002	,193	,169	,191	,062	,225	,064	,111
-,051	,047	,039	,047	,139	,066	,054	,156	,144	,138	,031	,027	,043	,112	,064	,133	,057	,149	,086	,056
-,066	,042	,001	,016	,109	,028	,037	,121	,107	,094	,071	,061	,050	,171	,129	,163	,067	,130	,057	,134
-,045	,126	-,080	-,005	,191	,137	,132	,095	,111	,052	,002	,061	,164	,231	,219	,249	,108	,176	,100	,176
-,062	,142	-,046	,029	,192	,065	,088	,123	,095	,047	-,015	,038	,119	,217	,242	,234	,111	,227	,115	,145
-,128	,100	-,050	-,034	,100	,038	,087	,058	,083	,044	-,008	,022	,129	,217	,193	,220	,083	,185	,083	,146
-,123	,118	-,025	-,004	,161	,067	,115	,133	,126	,094	,040	-,021	,002	,131	,182	,180	-,011	,151	,061	,194
-,047	,051	,038	,103	,073	,042	,066	,080	,029	,035	-,034	,066	,146	,035	,032	,060	-,023	,082	-,049	-,019
-,161	,050	,033	,038	-,014	,060	-,019	,047	,103	,165	,119	-,031	,046	,128	,044	,051	,029	,114	,075	,022
,014	,023	,040	,066	,045	,076	,028	-,010	,026	,041	-,032	,056	-,100	-,026	,046	,058	,003	,072	,013	,020
-,058	,181	-,073	-,014	-,009	,167	,122	,059	,129	,112	-,023	,070	,200	-,069	,050	,050	,095	,123	,122	-,045
-,049	,147	-,061	-,006	,005	,155	,088	,043	,123	,095	-,038	,068	,183	-,083	,043	,047	,079	,074	,109	-,058
-,025	,018	-,020	-,146	,195	,069	,063	,187	,192	,166	,165	,267	,217	,160	,309	,443	,292	,387	,220	1,000
-,059	-,002	-,003	,118	,180	,050	,012	,067	,090	,065	,027	,262	,261	,111	,242	,349	,312	,382	1,000	,220
-,075	,047	-,008	,072	,325	-,032	-,034	,158	,106	,034	,062	,359	,243	,158	,348	,535	,287	1,000	,382	,387
,021	,089	-,044	,132	,174	,116	,065	,167	,203	,099	,099	,361	,379	,103	,403	,495	1,000	,287	,312	,292
-,105	,041	-,036	,096	,394	,177	,157	,300	,272	,194	,121	,386	,393	,204	,568	1,000	,495	,535	,349	,443
-,098	,062	-,128	,084	,313	,139	,182	,259	,364	,297	,148	,295	,257	,284	1,000	,568	,403	,348	,242	,309
-,040	,055	-,102	,015	,243	,041	,052	,202	,115	,130	,080	,191	,151	1,000	,284	,204	,103	,158	,111	,160
-,024	,139	,027	,110	,098	,102	,071	,135	,092	,076	,012	,312	1,000	,151	,257	,393	,379	,243	,261	,217
-,011	,008	-,036	,595	,184	,132	,066	,202	,126	,125	,073	1,000	,312	,191	,295	,386	,361	,359	,262	,267
,024	-,028	-,038	,013	,210	,102	,187	,408	,419	,541	1,000	,073	,012	,080	,148	,121	,099	,062	,027	,165
-,080	,030	-,081	-,003	,239	,397	,397	,415	,849	1,000	,541	,125	,076	,130	,297	,194	,099	,034	,065	,166
-,089	,060	-,070	-,082	,267	,512	,447	,409	1,000	**,849**	,419	,126	,092	,115	,364	,272	,203	,106	,090	,192
-,006	-,035	-,079	,074	,249	,556	,461	1,000	,409	,415	,408	,202	,135	,202	,259	,300	,167	,158	,067	,187
-,008	,012	-,055	,017	,053	,741	1,000	,461	,447	,397	,187	,066	,071	,052	,182	,157	,065	-,034	,012	,063
,007	-,003	-,028	-,007	,131	1,000	**,741**	,556	,512	,397	,102	,132	,102	,041	,139	,177	,116	-,032	,050	,069
-,040	,004	-,078	-,002	1,000	,131	,053	,249	,267	,239	,210	,184	,098	,243	,313	,394	,174	,325	,180	,195
,048	-,003	-,012	1,000	-,002	-,007	,017	,074	-,082	-,003	,013	,595	,110	,015	,084	,096	,132	,072	,118	-,146
-,128	-,077	1,000	-,012	-,078	-,028	-,055	-,079	-,070	-,081	-,038	-,036	,027	-,102	-,128	-,036	-,044	-,008	-,003	-,020
,023	1,000	-,077	-,003	,004	-,003	,012	-,035	,060	,030	-,028	,008	,139	,055	,062	,041	,089	,047	-,002	,018
1,000	,023	-,128	,048	-,040	,007	-,008	-,006	-,089	-,080	,024	-,011	-,024	-,040	-,098	-,105	,021	-,075	-,059	-,025

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The value (1-sided)																							
K20	K19	K18	K17	K16	K15	K14	K9	K8	K7	AST	SCH	CHE	FIZ	GEOM	ALG	BIO	GEO	HIS	LG	LIT	RU	Age	Y4
,000	,002	,000	,002	,013	,239	,004	,195	,211	,090	,000	,021	,000	,000	,000	,000	,002	,012	,007	,000	,001	,000	,000	.
,000	,000	,000	,000	,000	,005	,004	,484	,442	,063	,174	,446	,019	,010	,000	,000	,017	,020	,033	,000	,069	,011	.	,000
,000	,011	,000	,157	,001	,036	,002	,251	,340	,314	,012	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000	.	,011	,000
,000	,130	,023	,227	,018	,387	,175	,148	,154	,269	,003	,000	,000	,000	,000	,000	,000	,000	,000	,000	.	,000	,069	,001
,000	,001	,000	,050	,000	,071	,000	,343	,338	,381	,000	,001	,000	,000	,000	,000	,000	,000	,000	.	,000	,000	,000	,000
,001	,002	,001	,151	,000	,143	,032	,200	,207	,490	,000	,000	,000	,000	,000	,000	,000	,000	.	,000	,000	,000	,033	,007
,030	,143	,013	,170	,006	,076	,176	,274	,385	,423	,000	,000	,000	,000	,000	,000	,000	.	,000	,000	,000	,000	,020	,012
,002	,016	,003	,131	,015	,173	,012	,031	,049	,142	,001	,000	,000	,000	,000	,000	.	,000	,000	,000	,000	,000	,017	,002
,000	,000	,000	,035	,002	,047	,002	,464	,451	,362	,001	,000	,000	,000	,000	.	,000	,000	,000	,000	,000	,000	,000	,000
,000	,000	,000	,032	,000	,027	,007	,411	,367	,457	,000	,000	,000	,000	.	,000	,000	,000	,000	,000	,000	,000	,000	,000
,000	,001	,000	,084	,001	,083	,007	,310	,270	,190	,000	,000	,000	.	,000	,000	,000	,000	,000	,000	,000	,000	,010	,000
,014	,001	,001	,428	,006	,153	,001	,131	,130	,104	,001	,000	.	,000	,000	,000	,000	,000	,000	,000	,000	,000	,019	,000
,283	,297	,158	,352	,087	,206	,377	,376	,417	,033	,021	.	,000	,000	,000	,000	,000	,000	,000	,001	,000	,000	,446	,021
,016	,232	,195	,314	,029	,106	,358	,111	,046	,025	.	,021	,001	,000	,000	,001	,001	,000	,000	,000	,003	,012	,174	,000
,331	,223	,165	,477	,115	,413	,367	,012	,022	.	,025	,033	,104	,190	,457	,362	,142	,423	,490	,381	,269	,314	,063	,090
,125	,200	,202	,056	,020	,021	,226	,000	.	,022	,046	,417	,130	,270	,367	,451	,049	,385	,207	,338	,154	,340	,442	,211
,082	,238	,215	,094	,108	,034	,166	.	,000	,012	,111	,376	,131	,310	,411	,464	,031	,274	,200	,343	,148	,251	,484	,195
,004	,000	,000	,000	,000	,000	.	,166	,226	,367	,358	,377	,001	,007	,007	,002	,012	,176	,032	,000	,175	,002	,004	,004
,032	,000	,000	,000	,000	.	,000	,034	,021	,413	,106	,206	,153	,083	,027	,047	,173	,076	,143	,071	,387	,036	,005	,239
,004	,000	,000	,000	.	,000	,000	,108	,020	,115	,029	,087	,006	,001	,000	,002	,015	,006	,000	,000	,018	,001	,000	,013
,042	,000	,000	.	,000	,000	,000	,094	,056	,477	,314	,352	,428	,084	,032	,035	,131	,170	,151	,050	,227	,157	,000	,002
,000	,000	.	,000	,000	,000	,000	,215	,202	,165	,195	,158	,001	,000	,000	,000	,003	,013	,001	,000	,023	,000	,000	,000
,000	.	,000	,000	,000	,000	,000	,238	,200	,223	,232	,297	,001	,001	,000	,000	,016	,143	,002	,001	,130	,011	,000	,002
.	,000	,000	,042	,004	,032	,004	,082	,125	,331	,016	,283	,014	,000	,000	,000	,002	,030	,001	,000	,000	,000	,000	,000
,006	,000	,000	,000	,000	,000	,000	,001	,000	,047	,221	,007	,484	,015	,023	,003	,201	,238	,487	,342	,402	,050	,037	,000
,001	,000	,000	,000	,000	,000	,000	,129	,121	,175	,303	,134	,364	,359	,263	,154	,156	,328	,135	,439	,078	,423	,019	,102
,091	,007	,022	,049	,150	,328	,003	,265	,353	,297	,023	,286	,252	,445	,404	,486	,117	,305	,089	,142	,361	,204	,017	,465
,015	,000	,001	,048	,283	,141	,003	,056	,031	,245	,003	,283	,059	,233	,216	,192	,058	,010	,018	,009	,171	,048	,027	,220
,027	,000	,000	,000	,039	,066	,001	,020	,015	,330	,042	,312	,018	,084	,055	,032	,037	,008	,008	,001	,069	,003	,027	,095
,000	,000	,000	,003	,004	,133	,001	,234	,161	,436	,214	,091	,013	,167	,020	,055	,022	,005	,006	,002	,108	,114	,001	,004
,192	,001	,004	,140	,287	,418	,146	,071	,021	,319	,377	,135	,027	,074	,071	,014	,268	,183	,185	,013	,329	,184	,204	,425
,248	,010	,001	,026	,296	,201	,125	,005	,003	,103	,160	,242	,131	,264	,141	,011	,319	,136	,359	,025	,231	,300	,118	,096
,000	,000	,000	,002	,000	,001	,001	,468	,442	,227	,408	,113	,004	,048	,001	,001	,034	,010	,014	,000	,055	,000	,000	,000
,400	,080	,054	,013	,116	,024	,007	,461	,411	,136	,264	,043	,474	,288	,316	,468	,393	,217	,136	,046	,064	,317	,317	,432
,045	,016	,276	,232	,449	,483	,369	,154	,112	,252	,289	,261	,341	,203	,221	,091	,491	,256	,186	,132	,458	,155	,424	,168
,179	,151	,250	,069	,217	,488	,384	,007	,001	,353	,203	,196	,024	,048	,009	,017	,243	,216	,018	,260	,300	,011	,045	,014
,254	,050	,040	,365	,106	,163	,339	,209	,168	,409	,003	,218	,020	,016	,149	,226	,134	,196	,043	,028	,022	,017	,391	,351

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K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
,000	,102	,465	,220	,095	,004	,425	,096	,000	,432	,168	,014	,351
,037	,019	,017	,027	,027	,001	,204	,118	,000	,317	,424	,045	,391
,050	,423	,204	,048	,003	,114	,184	,300	,000	,317	,155	,011	,017
,402	,078	,361	,171	,069	,108	,329	,231	,055	,064	,458	,300	,022
,342	,439	,142	,009	,001	,002	,013	,025	,000	,046	,132	,260	,028
,487	,135	,089	,018	,008	,006	,185	,359	,014	,136	,186	,018	,043
,238	,328	,305	,010	,008	,005	,183	,136	,010	,217	,256	,216	,196
,201	,156	,117	,058	,037	,022	,268	,319	,034	,393	,491	,243	,134
,003	,154	,486	,192	,032	,055	,014	,011	,001	,468	,091	,017	,226
,023	,263	,404	,216	,055	,020	,071	,141	,001	,316	,221	,009	,149
,015	,359	,445	,233	,084	,167	,074	,264	,048	,288	,203	,048	,016
,484	,364	,252	,059	,018	,013	,027	,131	,004	,474	,341	,024	,020
,007	,134	,286	,283	,312	,091	,135	,242	,113	,043	,261	,196	,218
,221	,303	,023	,003	,042	,214	,377	,160	,408	,264	,289	,203	,003
,047	,175	,297	,245	,330	,436	,319	,103	,227	,136	,252	,353	,409
,000	,121	,353	,031	,015	,161	,021	,003	,442	,411	,112	,001	,168
,001	,129	,265	,056	,020	,234	,071	,005	,468	,461	,154	,007	,209
,000	,000	,003	,003	,001	,001	,146	,125	,001	,007	,369	,384	,339
,000	,000	,328	,141	,066	,133	,418	,201	,001	,024	,483	,488	,163
,000	,000	,150	,283	,039	,004	,287	,296	,000	,116	,449	,217	,106
,000	,000	,049	,048	,000	,003	,140	,026	,002	,013	,232	,069	,365
,000	,000	,022	,001	,000	,000	,004	,001	,000	,054	,276	,250	,040
,000	,000	,007	,000	,000	,000	,001	,010	,000	,080	,016	,151	,050
,006	,001	,091	,015	,027	,000	,192	,248	,000	,400	,045	,179	,254
.	,000	,419	,103	,062	,012	,117	,044	,051	,034	,329	,010	,347
,000	.	,110	,018	,018	,000	,134	,014	,001	,000	,272	,446	,425
,419	,110	.	,000	,000	,000	,001	,044	,000	,412	,261	,318	,345
,103	,018	,000	.	,000	,000	,000	,000	,000	,477	,087	,310	,090
,062	,018	,000	,000	.	,000	,000	,000	,000	,085	,120	,159	,068
,012	,000	,000	,000	,000	.	,000	,000	,000	,109	,094	,278	,460
,117	,134	,001	,000	,000	,000	.	,000	,191	,391	,181	,420	,449
,044	,014	,044	,000	,000	,000	,000	.	,014	,455	,322	,478	,453
,051	,001	,000	,000	,000	,000	,191	,014	.	,484	,096	,471	,253
,034	,000	,412	,477	,085	,109	,391	,455	,484	.	,420	,478	,211
,329	,272	,261	,087	,120	,094	,181	,322	,096	,420	.	,099	,016
,010	,446	,318	,310	,159	,278	,420	,478	,471	,478	,099	.	,354
,347	,425	,345	,090	,068	,460	,449	,453	,253	,211	,016	,354	.

In the result of the correlation analysis of the complete and reduced set of independent variables the correlation dependences were revealed directly, which need to be additionally researched by means of the building of graphs of the two-dimensional scattering: the correct and false correlation dependences are possible.

At a large quantity of correlation dependences and relationships the necessity of carrying out of the additional researches is revealed: the researching of the form of relationship, the determination of the directionality of relationship, the determining of the truly and falsely of relationship.

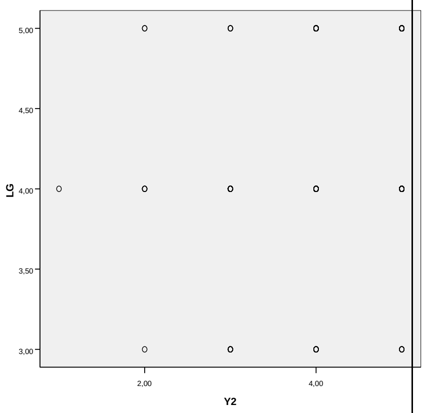
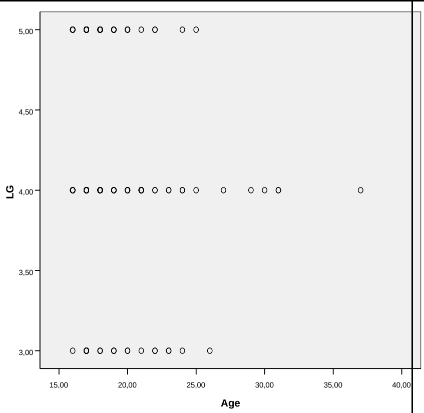
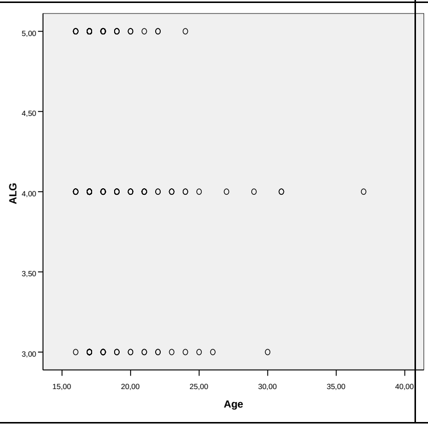
The analysis of residues allows to estimate the degree of inconsistency between the theoretical predicted and practical experimental nominal values, and also directly to estimate the quality of the obtained equation of multiple regression.

At the initial stage of the additional analysis it is proposed to consider directly the graphs of two-dimensional scattering of the given independent variables (K_i) and the dependent variable (Y_2, Y_4), that allows to identify practically the features of correlation dependences based on the building of their graphical interpretation.

In tabl. A15.88 the correlation dependences of some independent variables from the complete set is presented, and also their orientation and strength is characterized.

Table A15.88

The identifier, directionality and strength of the relationship between the variables, the graph of two-dimensional scattering

№ s.s.	The identifier of relationship	The directionality and strength of relationship	The graph of two-dimensional scattering	The commentaries
1.	LG-Y_2	0,215		The expressed correlation dependence (the false relationship) is absent
2.	Age-LG	-0,207		The expressed correlation dependence (the false relationship) is absent
3.	Age-ALG	-0,226		The expressed correlation dependence (the false relationship) is absent

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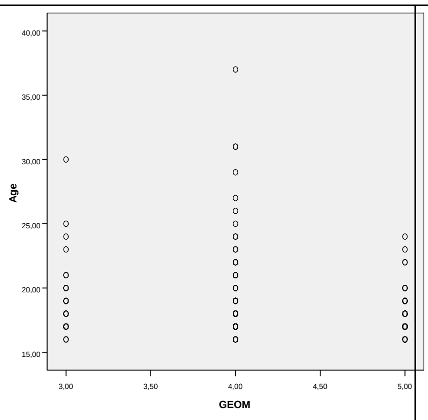
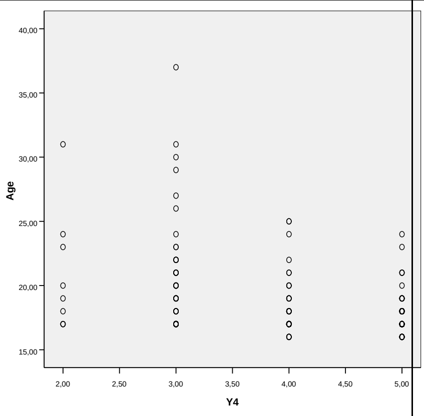
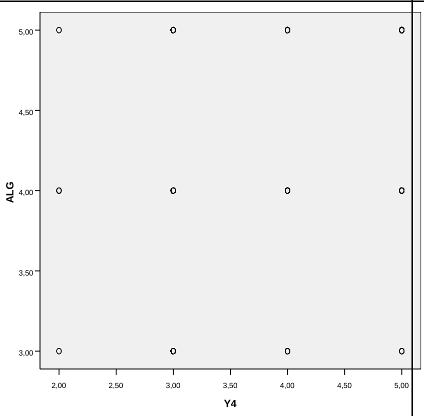
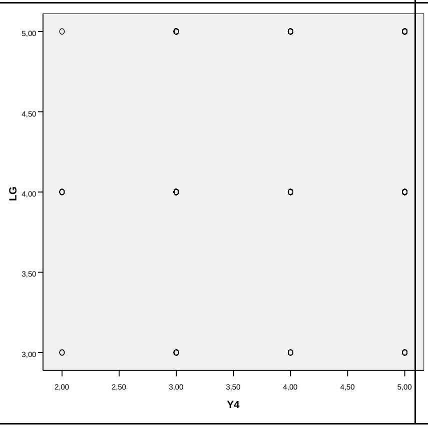
4.	Age-GEOM	-0,196		The expressed correlation dependence (the false relationship) is absent
5.	Age-Y_4	-0,385		The expressed correlation dependence (the false relationship) is absent
6.	ALG-Y_4	0,337		The expressed correlation dependence (the false relationship) is absent
7.	LG-Y_4	0,215		The expressed correlation dependence (the false relationship) is absent

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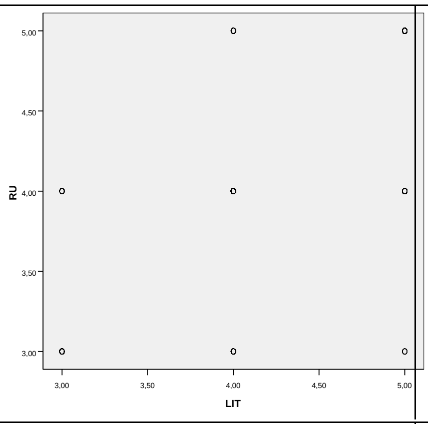
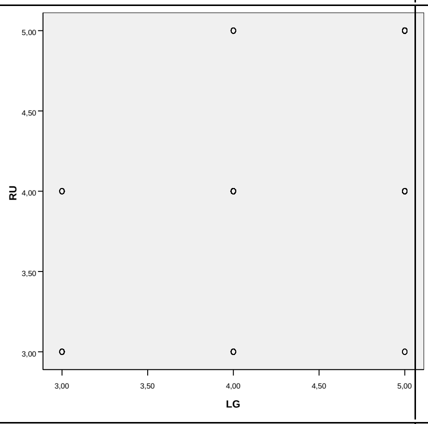
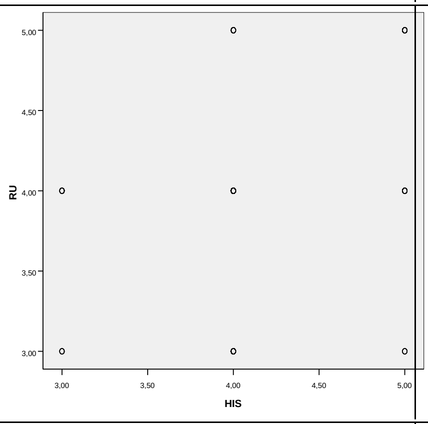
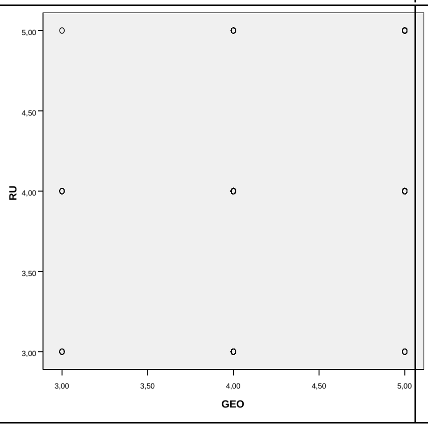
8.	RU-LIT	0,664		The expressed correlation dependence (the false relationship) is absent
9.	RU-LG	0,527		The expressed correlation dependence (the false relationship) is absent
10.	RU-HIS	0,472		The expressed correlation dependence (the false relationship) is absent
11.	RU-GEO	0,398		The expressed correlation dependence (the false relationship) is absent

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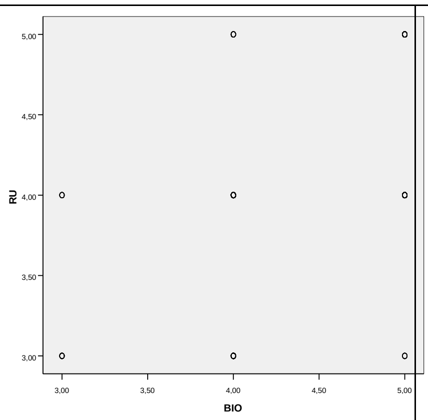
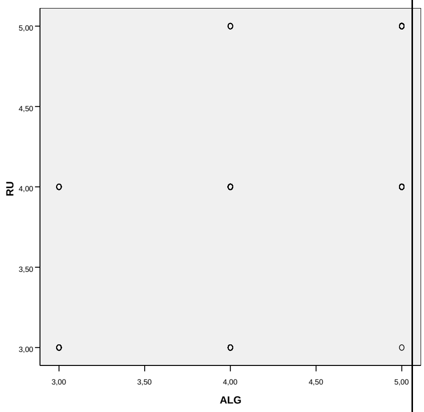
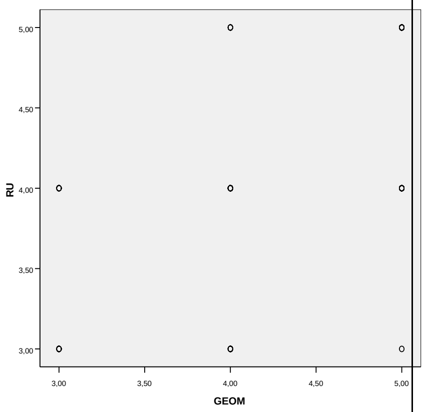
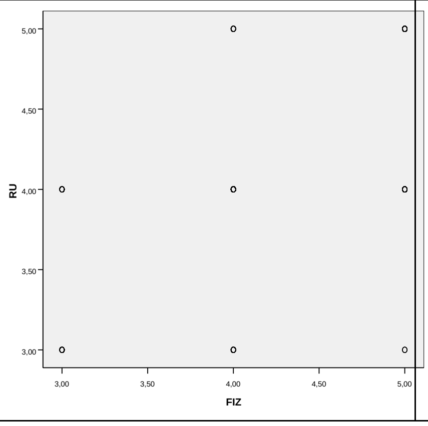
12.	RU-BIO	0,516		The expressed correlation dependence (the false relationship) is absent
13.	RU-ALG	0,611		The expressed correlation dependence (the false relationship) is absent
14.	RU-GEOM	0,559		The expressed correlation dependence (the false relationship) is absent
15.	RU-FIZ	0,557		The expressed correlation dependence (the false relationship) is absent

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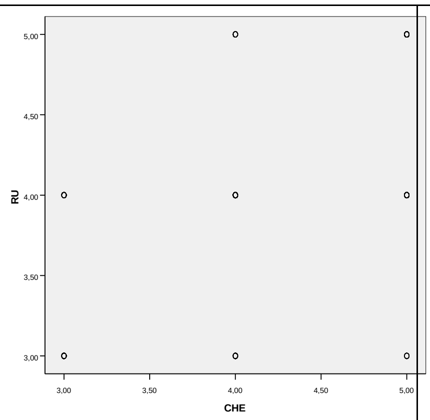
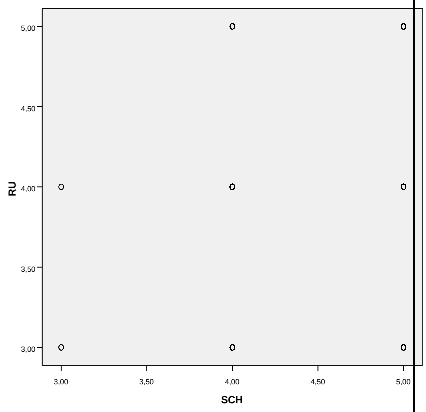
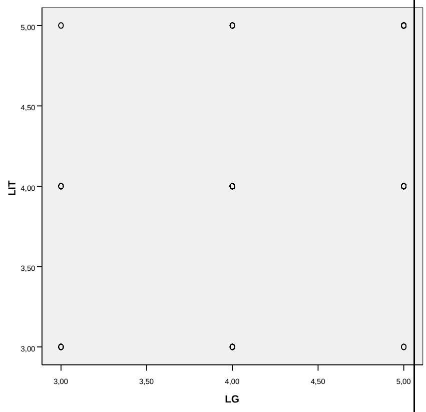
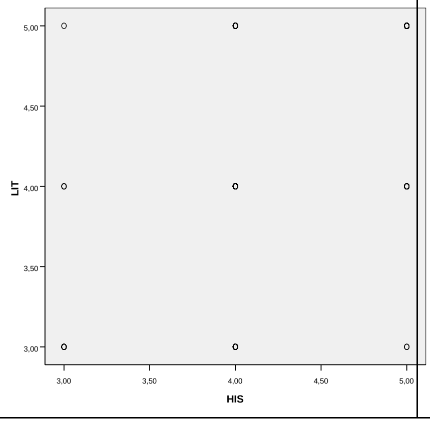
16.	RU-CHE	0,557		The expressed correlation dependence (the false relationship) is absent
17.	RU-SCH	0,309		The expressed correlation dependence (the false relationship) is absent
18.	LIT-LG	0,567		The expressed correlation dependence (the false relationship) is absent
19.	LIT-HIS	0,618		The expressed correlation dependence (the false relationship) is absent

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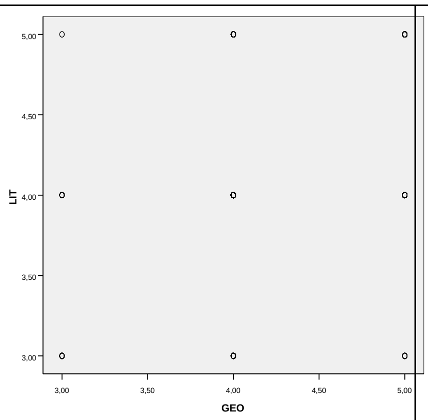
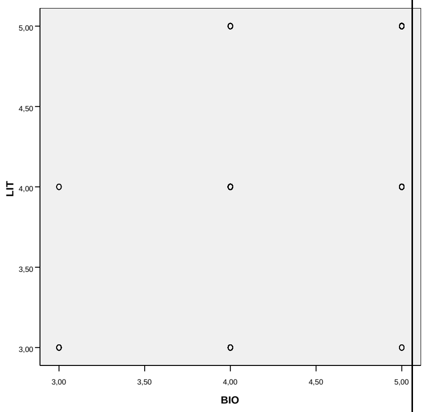
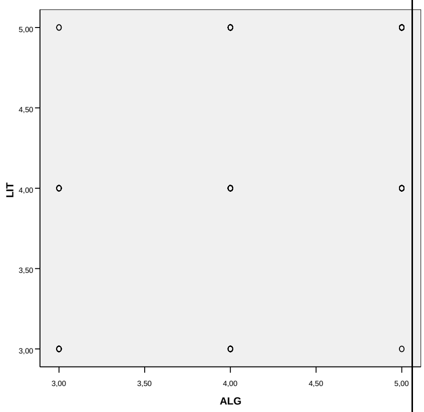
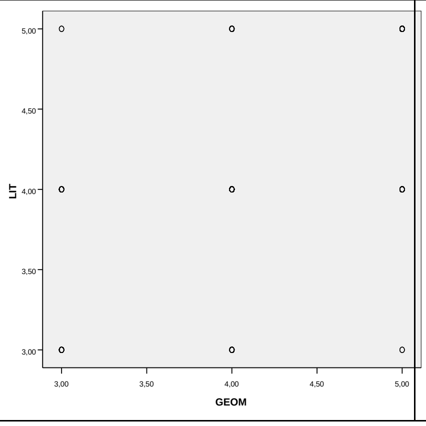
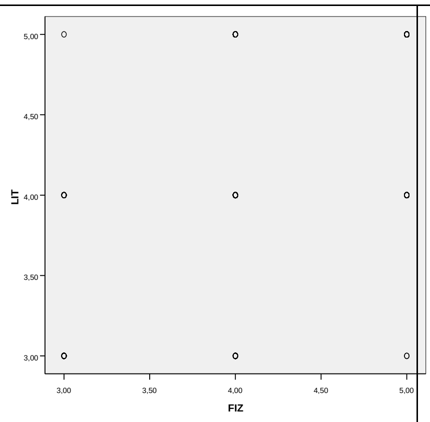
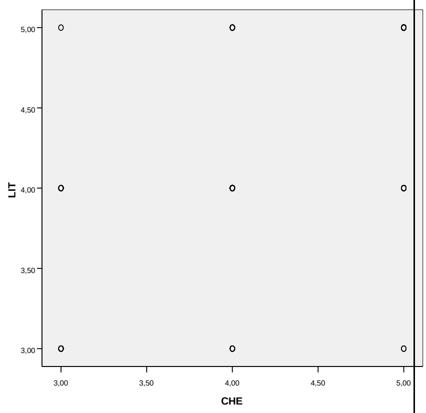
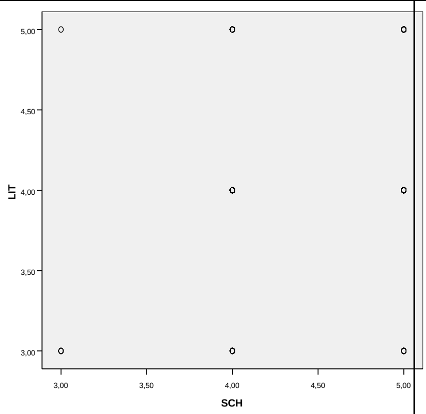
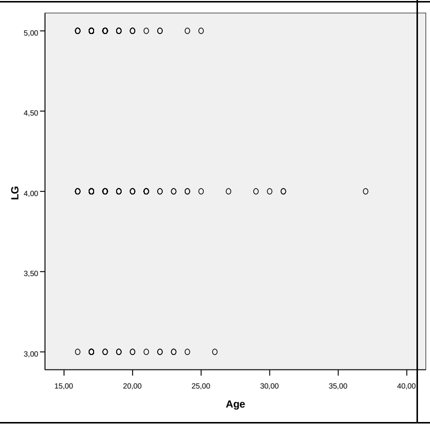
20.	LIT-GEO	0,506		The expressed correlation dependence (the false relationship) is absent
21.	LIT-BIO	0,567		The expressed correlation dependence (the false relationship) is absent
22.	LIT-ALG	0,550		The expressed correlation dependence (the false relationship) is absent
23.	LIT-GEOM	0,579		The expressed correlation dependence (the false relationship) is absent

24.	LIT-FIZ	0,606		The expressed correlation dependence (the false relationship) is absent
25.	LIT-CHE	0,582		The expressed correlation dependence (the false relationship) is absent
26.	LIT-SCH	0,329		The expressed correlation dependence (the false relationship) is absent
27.	LG-HIS	0,567		The expressed correlation dependence (the false relationship) is absent

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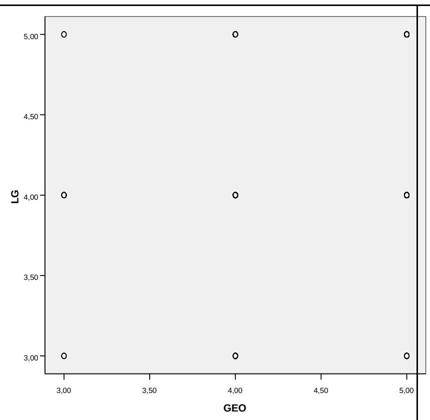
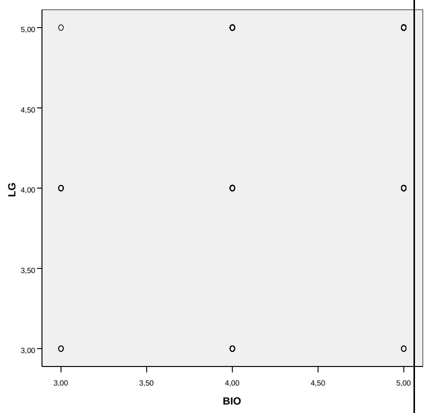
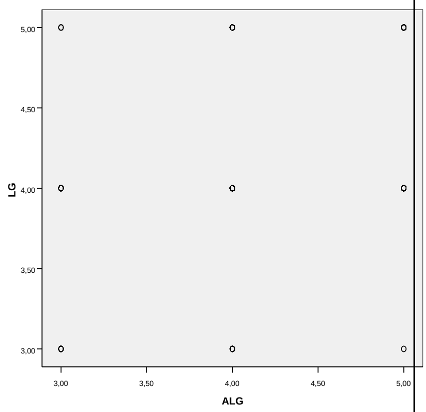
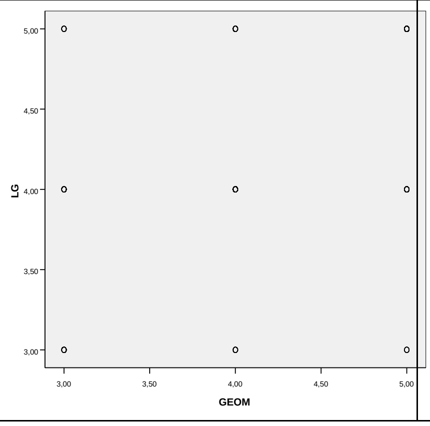
28.	LG-GEO	0,369		The expressed correlation dependence (the false relationship) is absent
29.	LG-BIO	0,429		The expressed correlation dependence (the false relationship) is absent
30.	LG-ALG	0,507		The expressed correlation dependence (the false relationship) is absent
31.	LG-GEOM	0,503		The expressed correlation dependence (the false relationship) is absent

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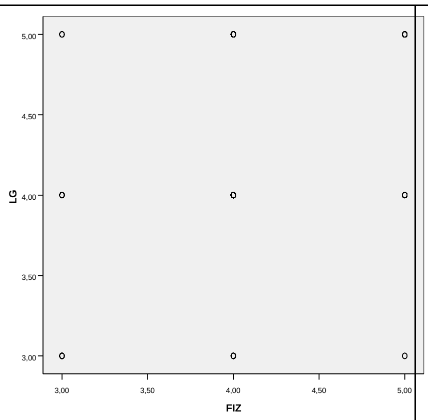
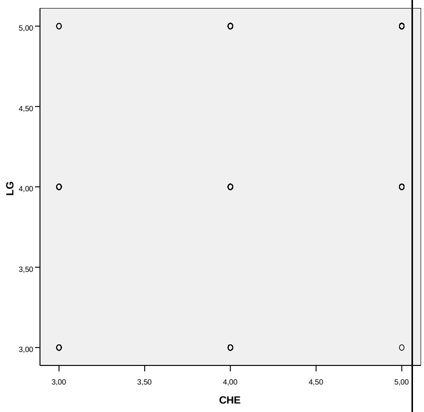
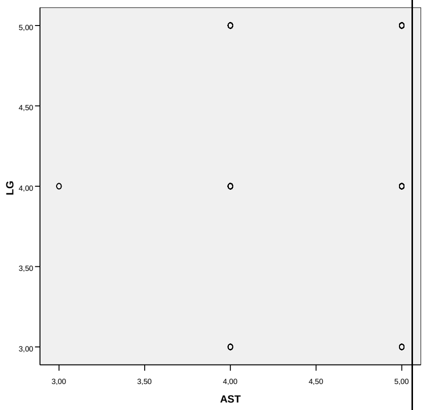
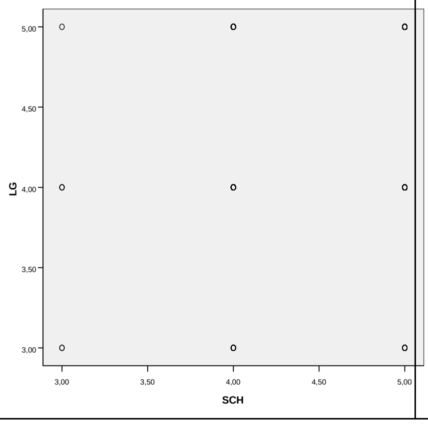
32.	LG-FIZ	0,481		The expressed correlation dependence (the false relationship) is absent
33.	LG-CHE	0,496		The expressed correlation dependence (the false relationship) is absent
34.	LG-AST	0,231		The expressed correlation dependence (the false relationship) is absent
35.	LG-SCH	0,196		The expressed correlation dependence (the false relationship) is absent

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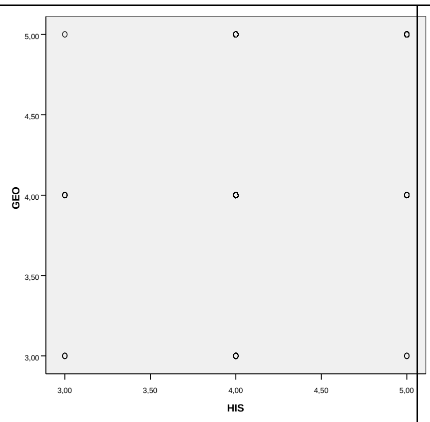
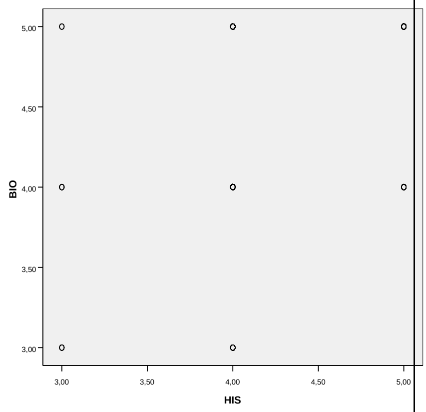
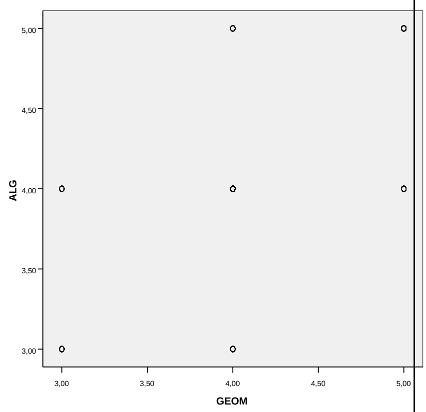
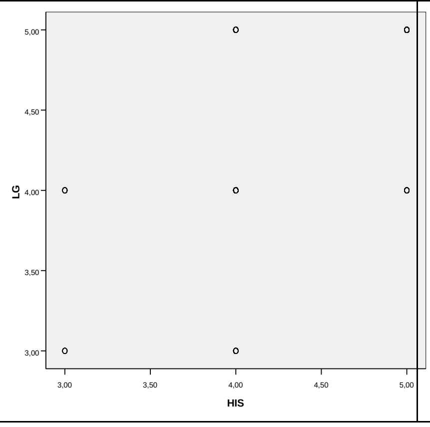
36.	GEO-HIS	0,500		The expressed correlation dependence (the false relationship) is absent
37.	BIO-HIS	0,572		The expressed correlation dependence (the false relationship) is absent
38.	ALG-GEOM	0,785		The expressed correlation dependence (the false relationship) is absent
39.	ALG-HIS	0,467		The expressed correlation dependence (the false relationship) is absent

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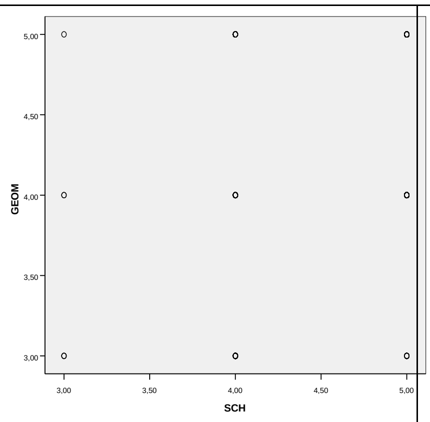
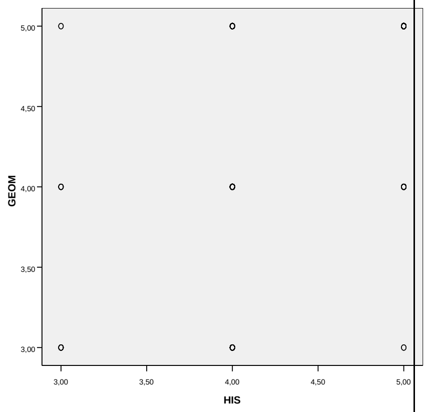
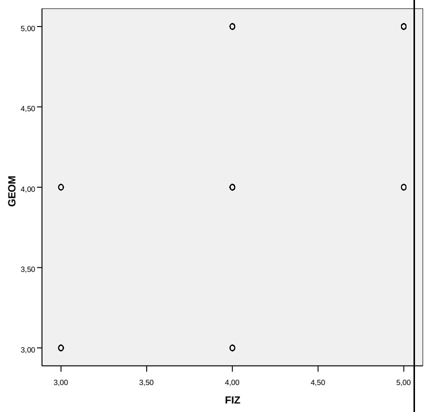
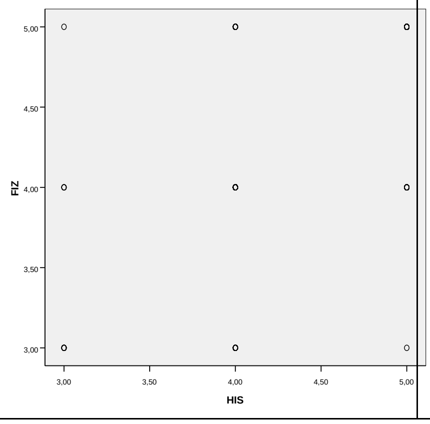
40.	GEOM-SCH	0,414		The expressed correlation dependence (the false relationship) is absent
41.	GEOM-HIS	0,563		The expressed correlation dependence (the false relationship) is absent
42.	GEOM-FIZ	0,717		The expressed correlation dependence (the false relationship) is absent
43.	FIZ-HIS	0,576		The expressed correlation dependence (the false relationship) is absent

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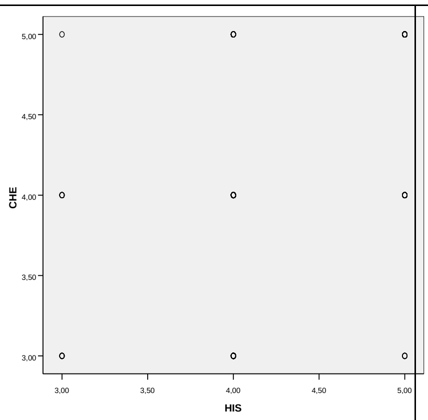
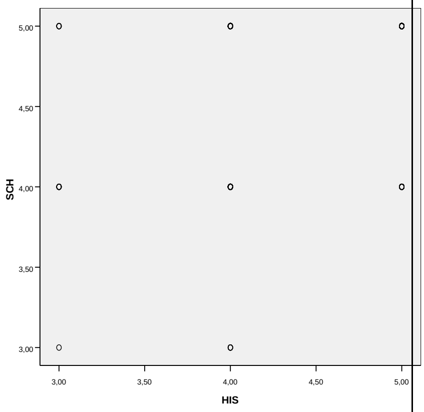
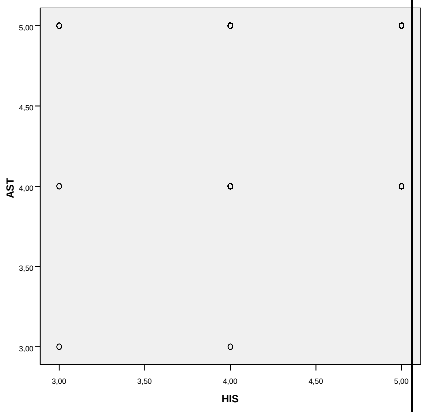
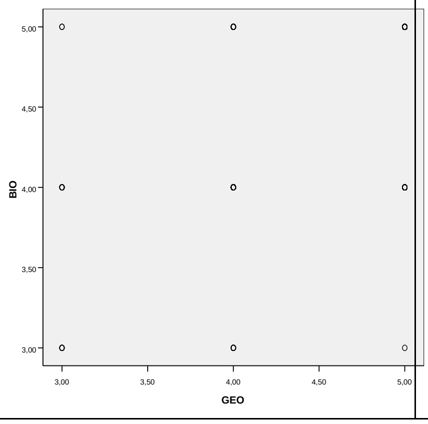
44.	CHE-HIS	0,557		The expressed correlation dependence (the false relationship) is absent
45.	SCH-HIS	0,323		The expressed correlation dependence (the false relationship) is absent
46.	AST-HIS	0,218		The expressed correlation dependence (the false relationship) is absent
47.	BIO-GEO	0,524		The expressed correlation dependence (the false relationship) is absent

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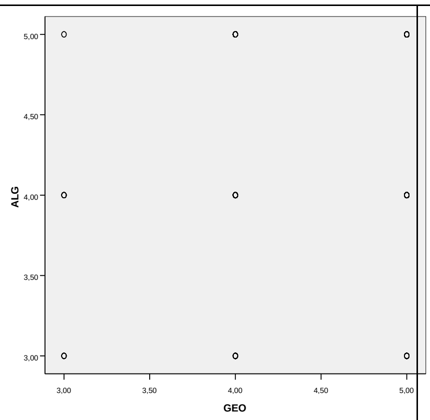
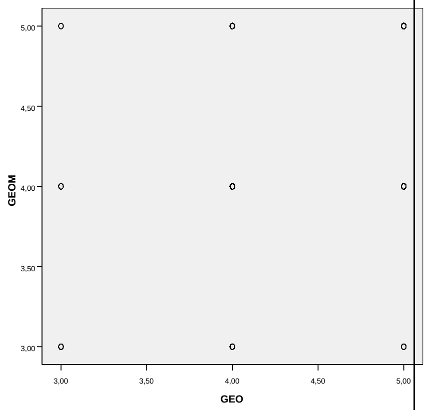
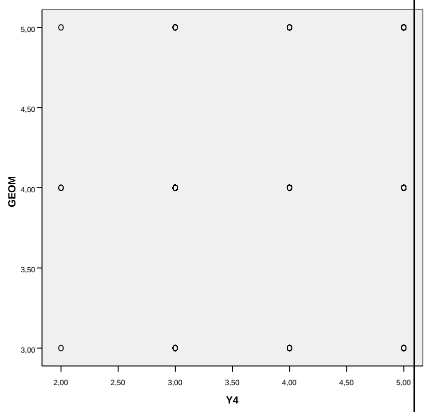
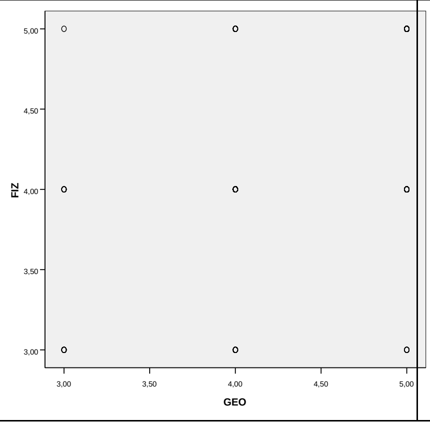
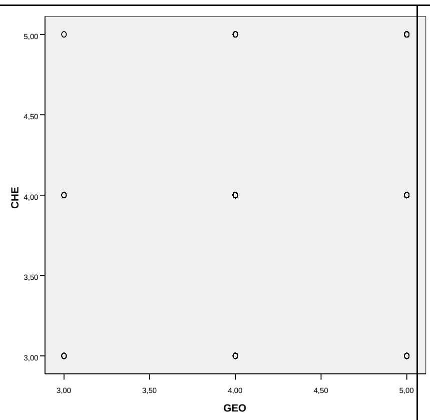
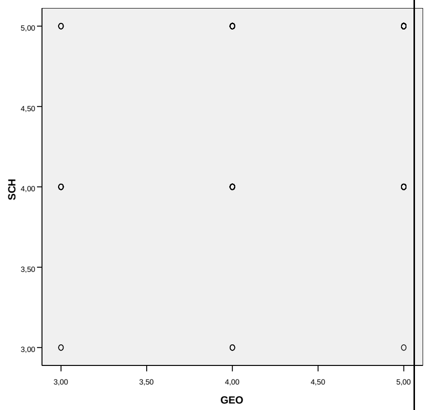
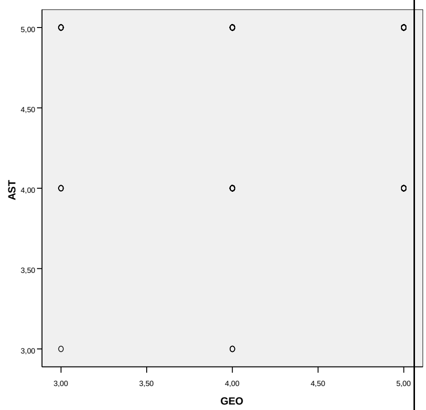
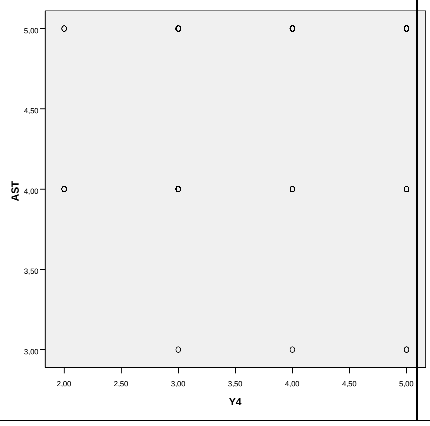
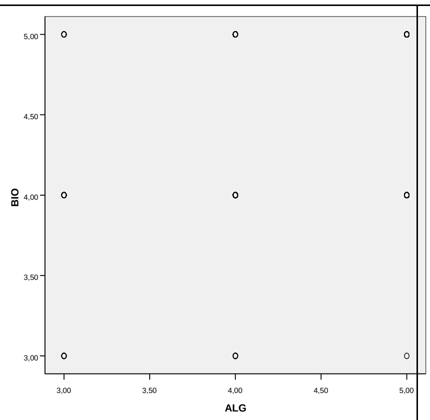
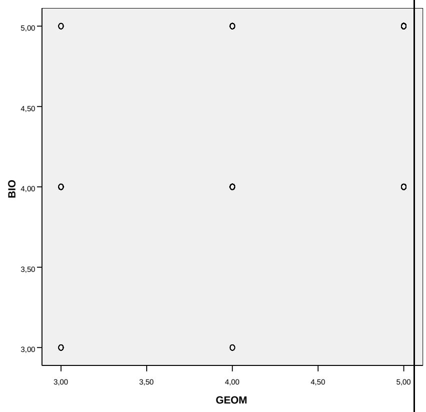
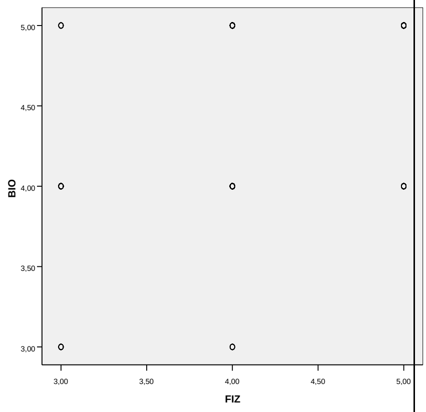
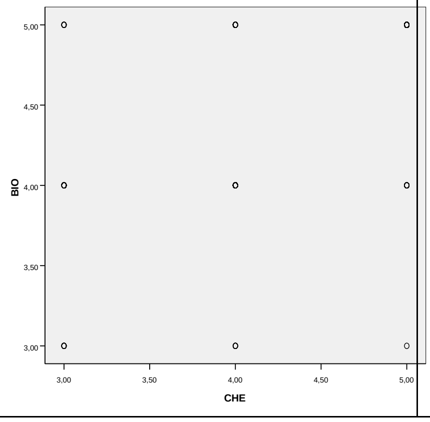
48.	ALG-GEO	0,330		The expressed correlation dependence (the false relationship) is absent
49.	GEOM-GEO	0,435		The expressed correlation dependence (the false relationship) is absent
50.	GEOM-Y_4	0,268		The expressed correlation dependence (the false relationship) is absent
51.	FIZ-GEO	0,491		The expressed correlation dependence (the false relationship) is absent

52.	CHE-GEO	0,458		The expressed correlation dependence (the false relationship) is absent
53.	SCH-GEO	0,358		The expressed correlation dependence (the false relationship) is absent
54.	AST-GEO	0,216		The expressed correlation dependence (the false relationship) is absent
55.	AST-Y_4	0,220		The expressed correlation dependence (the false relationship) is absent

56.	BIO-ALG	0,460		The expressed correlation dependence (the false relationship) is absent
57.	BIO-GEOM	0,516		The expressed correlation dependence (the false relationship) is absent
58.	BIO-FIZ	0,543		The expressed correlation dependence (the false relationship) is absent
59.	BIO-CHE	0,555		The expressed correlation dependence (the false relationship) is absent

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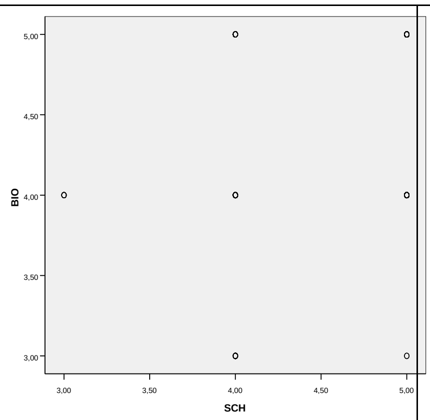
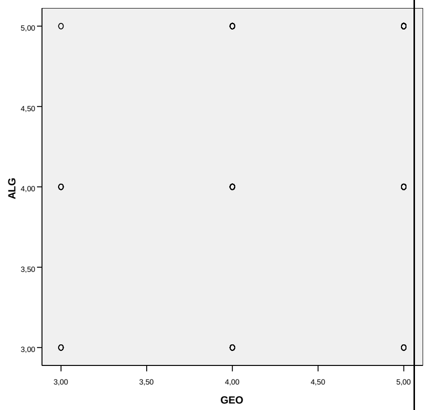
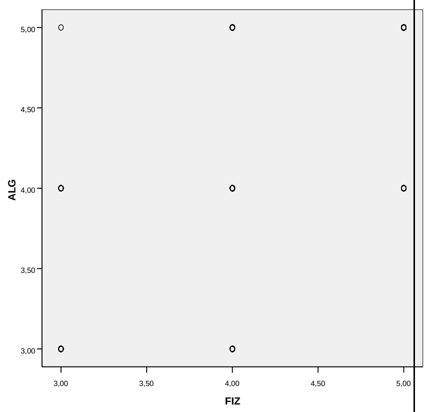
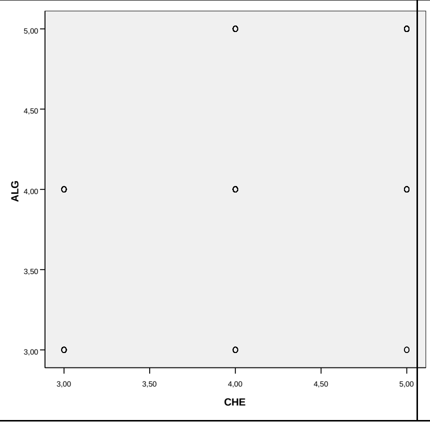
60.	BIO-SCH	0,384		The expressed correlation dependence (the false relationship) is absent
61.	ALG-GEO	0,330		The expressed correlation dependence (the false relationship) is absent
62.	ALG-FIZ	0,682		The expressed correlation dependence (the false relationship) is absent
63.	ALG-CHE	0,584		The expressed correlation dependence (the false relationship) is absent

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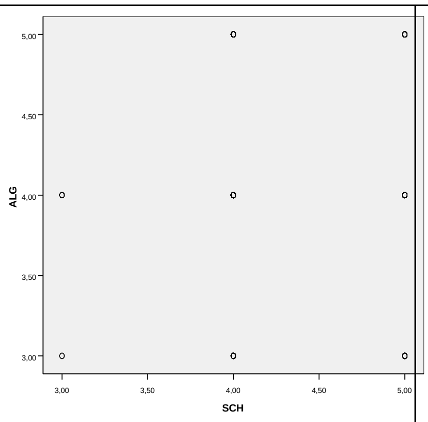
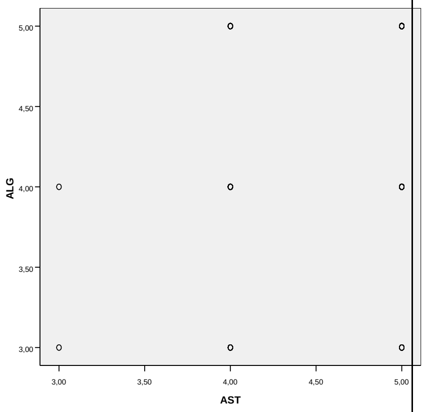
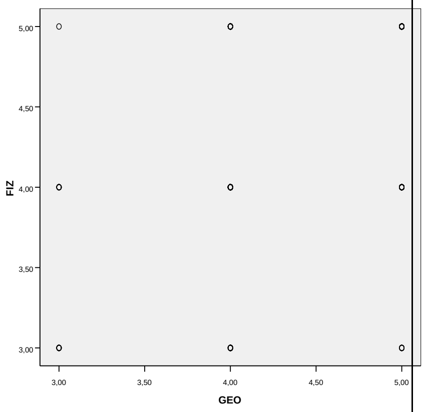
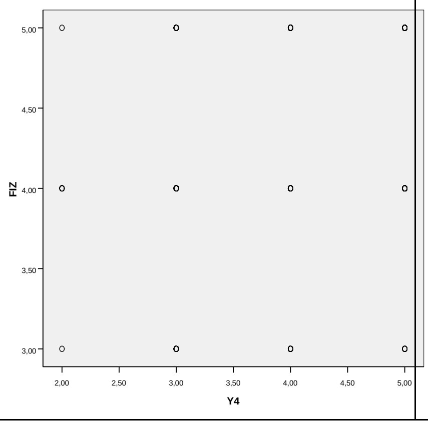
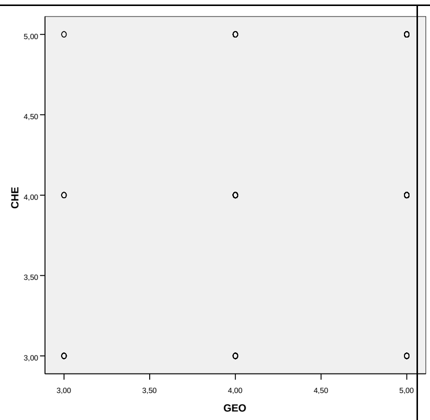
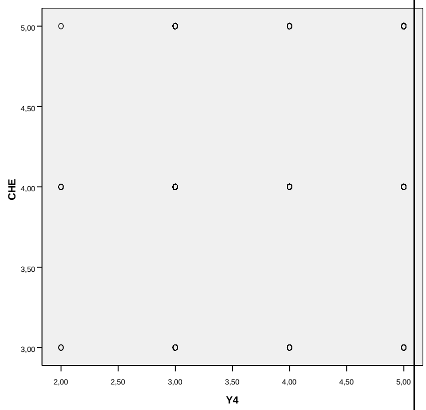
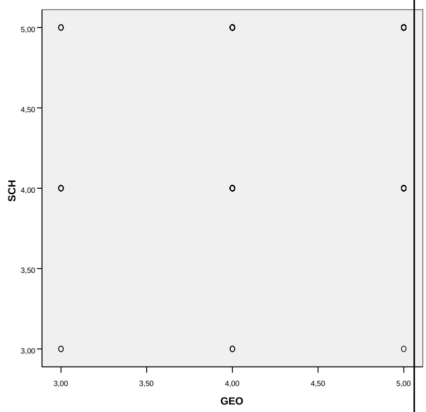
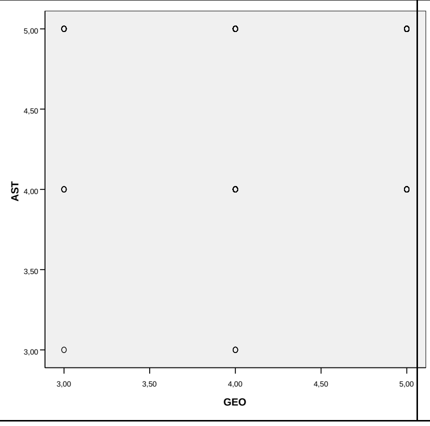
64.	ALG-SCH	0,321		The expressed correlation dependence (the false relationship) is absent
65.	ALG-AST	0,192		The expressed correlation dependence (the false relationship) is absent
66.	FIZ-GEO	0,491		The expressed correlation dependence (the false relationship) is absent
67.	FIZ-Y_4	0,281		The expressed correlation dependence (the false relationship) is absent

68.	CHE-GEO	0,458		The expressed correlation dependence (the false relationship) is absent
69.	CHE-Y_4	0,243		The expressed correlation dependence (the false relationship) is absent
70.	SCH-GEO	0,358		The expressed correlation dependence (the false relationship) is absent
71.	AST-GEO	0,216		The expressed correlation dependence (the false relationship) is absent

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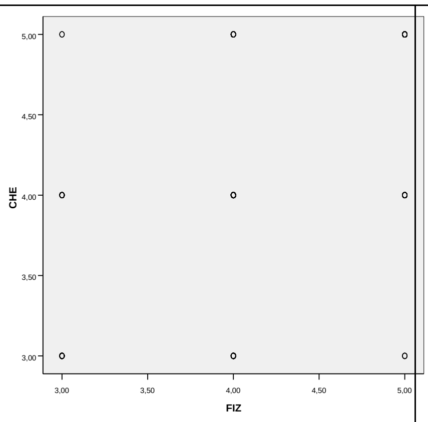
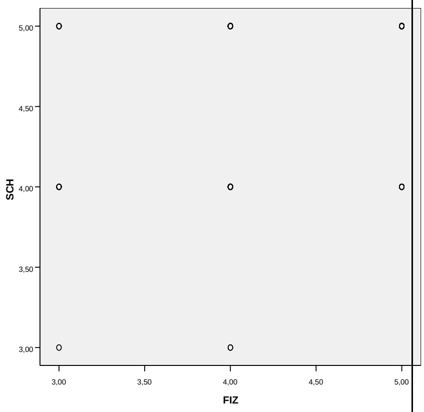
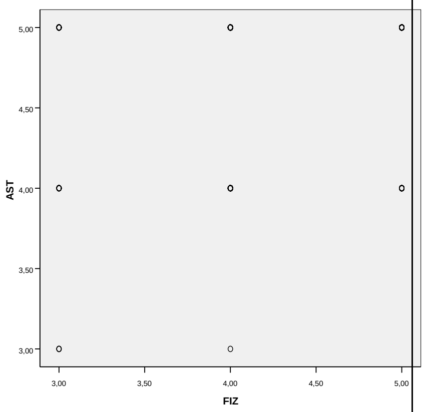
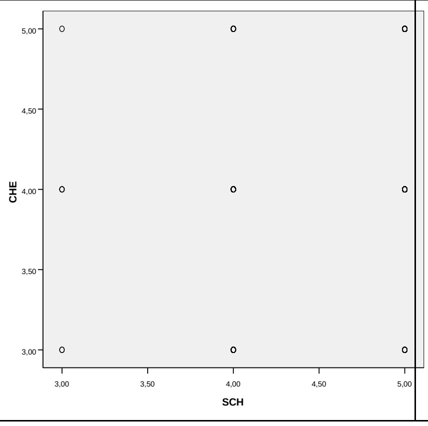
72.	CHE-FIZ	0,599		The expressed correlation dependence (the false relationship) is absent
73.	SCH-FIZ	0,346		The expressed correlation dependence (the false relationship) is absent
74.	AST-FIZ	0,265		The expressed correlation dependence (the false relationship) is absent
75.	SCH-CHE	0,352		The expressed correlation dependence (the false relationship) is absent

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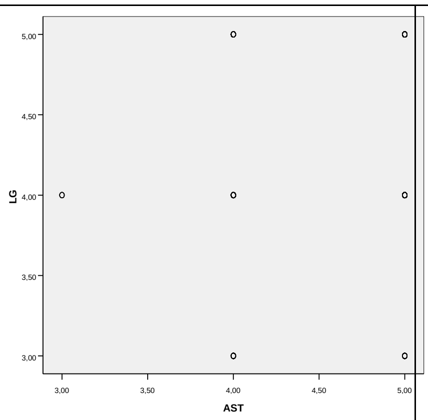
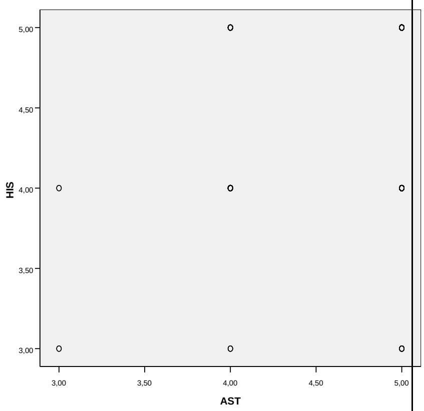
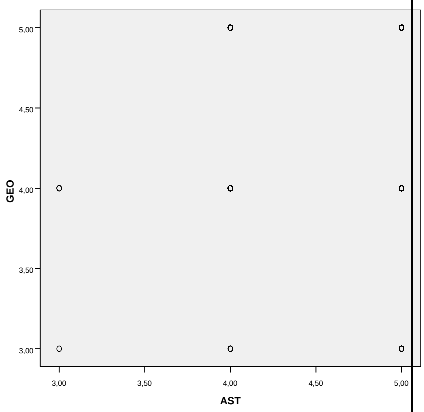
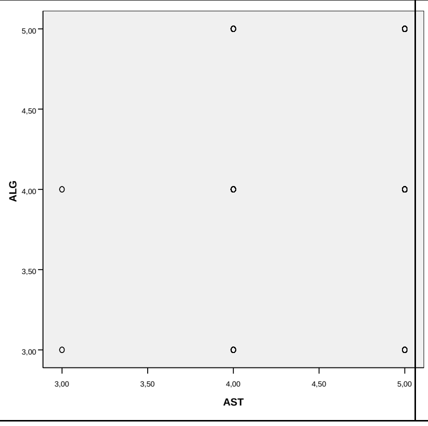
76.	LG-AST	0,231		The expressed correlation dependence (the false relationship) is absent
77.	HIS-AST	0,218		The expressed correlation dependence (the false relationship) is absent
78.	GEO-AST	0,216		The expressed correlation dependence (the false relationship) is absent
79.	ALG-AST	0,192		The expressed correlation dependence (the false relationship) is absent

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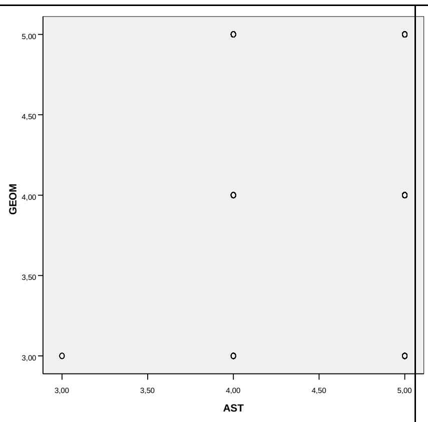
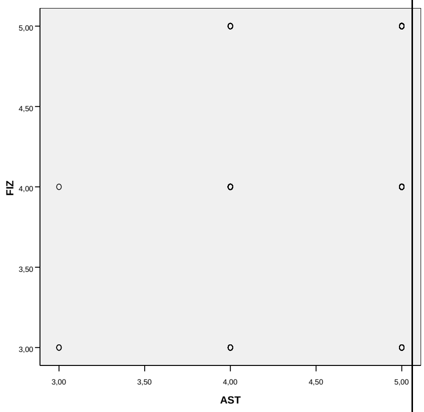
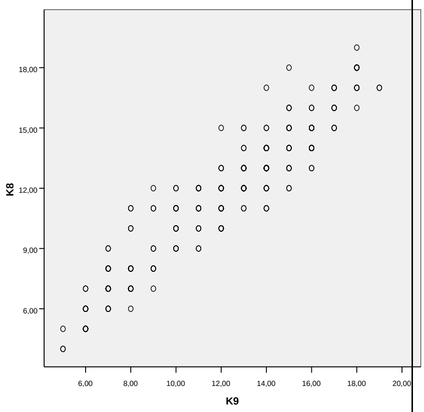
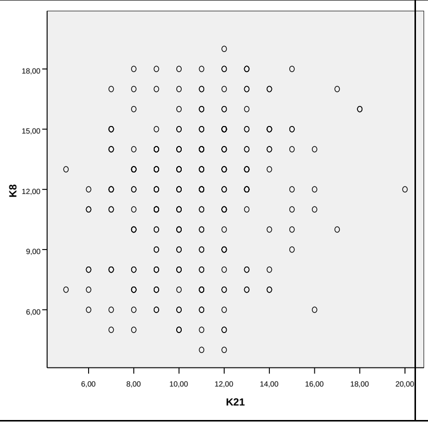
80.	GEOM-AST	0,238		The expressed correlation dependence (the false relationship) is absent
81.	FIZ-AST	0,265		The expressed correlation dependence (the false relationship) is absent
82.	K_8-K_9	0,944		There is the strong correlation dependence (the strong relationship)
83.	K_8-K_{21}	0,200		There is the easy correlation dependence (the easy relationship)

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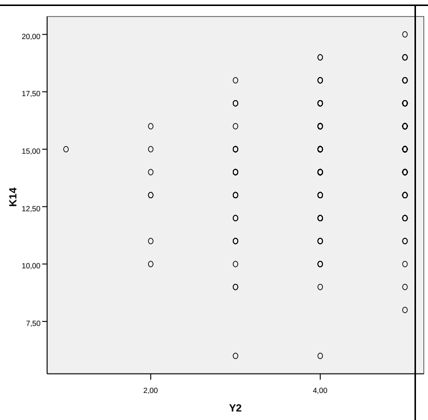
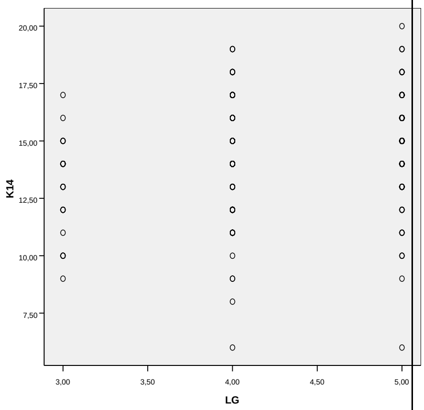
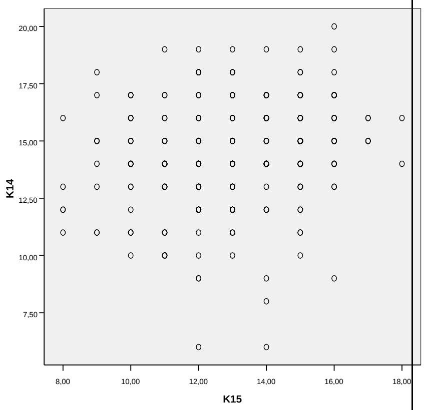
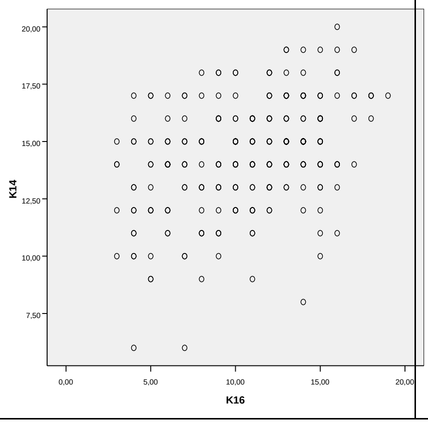
84.	K_{14}-Y_2	0,252		There is the easy correlation dependence (the easy relationship)
85.	K_{14}-LG	0,207		The expressed correlation dependence (the false relationship) is absent
86.	K_{14}-K_{15}	0,220		The expressed correlation dependence (the false relationship) is absent
87.	K_{14}-K_{16}	0,387		There is the easy correlation dependence (the easy relationship)

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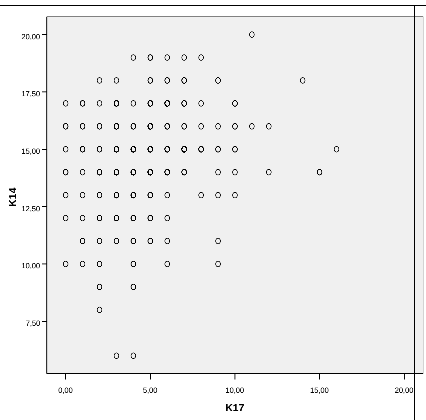
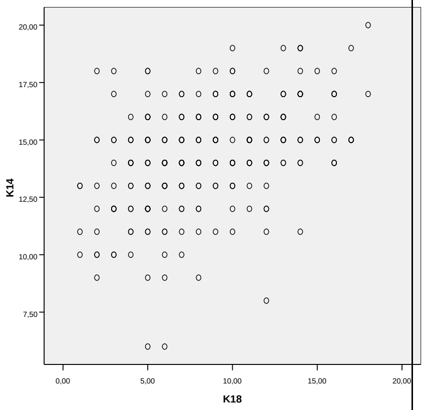
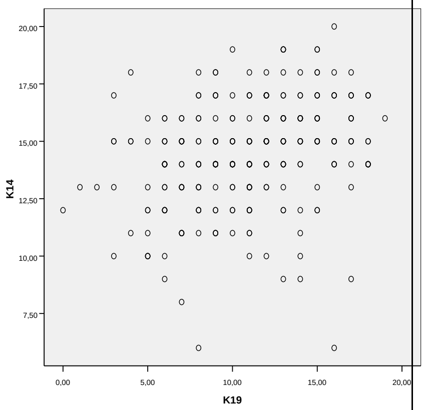
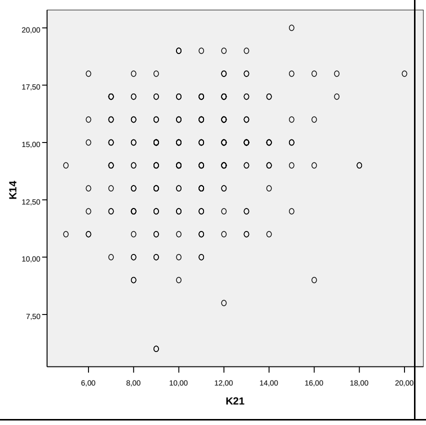
88.	K_{14}-K_{17}	0,292		The expressed correlation dependence (the false relationship) is absent
89.	K_{14}-K_{18}	0,443		There is the easy correlation dependence (the easy relationship)
90.	K_{14}-K_{19}	0,309		There is the easy correlation dependence (the easy relationship)
91.	K_{14}-K_{21}	0,218		The expressed correlation dependence (the false relationship) is absent

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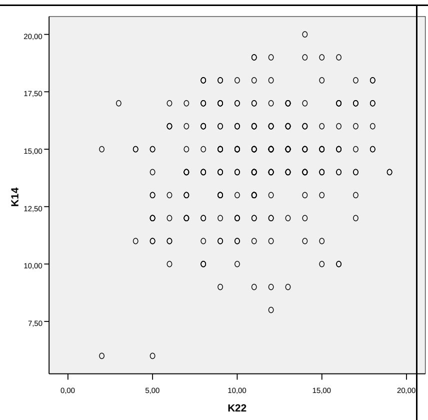
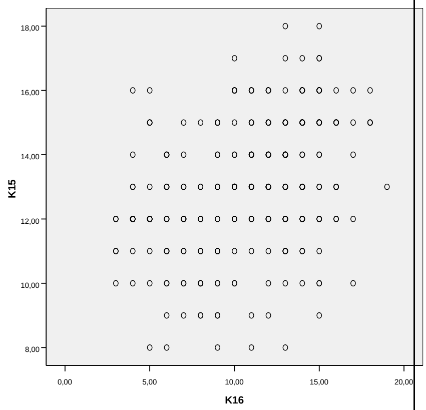
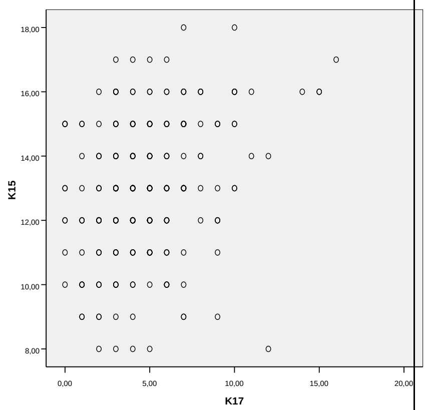
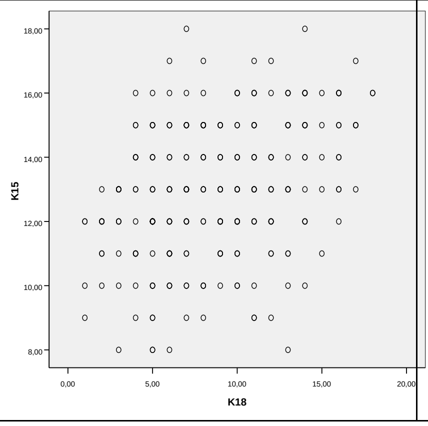
92.	K_{14}-K_{22}	0,267		The expressed correlation dependence (the false relationship) is absent
93.	K_{15}-K_{16}	0,382		The expressed correlation dependence (the false relationship) is absent
94.	K_{15}-K_{17}	0,312		The expressed correlation dependence (the false linear relationship, it possible the nonlinear relationship) is absent
95.	K_{15}-K_{18}	0,349		There is the easy correlation dependence (the easy linear relationship, it is possible nonlinear relationship)

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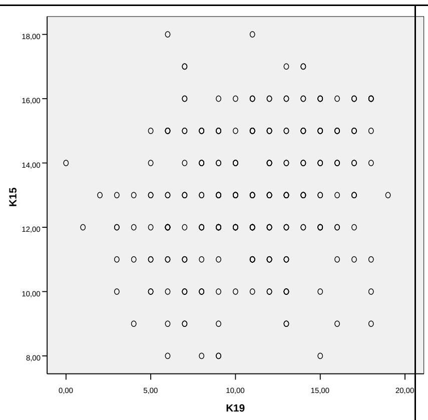
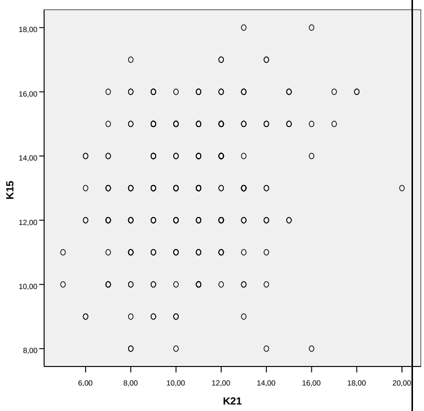
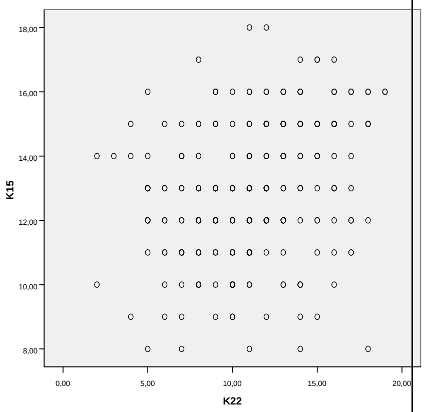
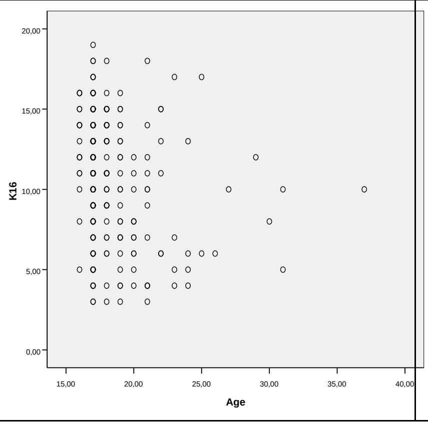
96.	K_{15}-K_{19}	0,242		The expressed correlation dependence (the false relationship) is absent
97.	K_{15}-K_{21}	0,261		The expressed correlation dependence (the false linear relationship, it is possible the nonlinear relationship) is absent
98.	K_{15}-K_{22}	0,263		The expressed correlation dependence (the false relationship) is absent
99.	K_{16}-Age	-0,216		The expressed correlation dependence (the false relationship) is absent

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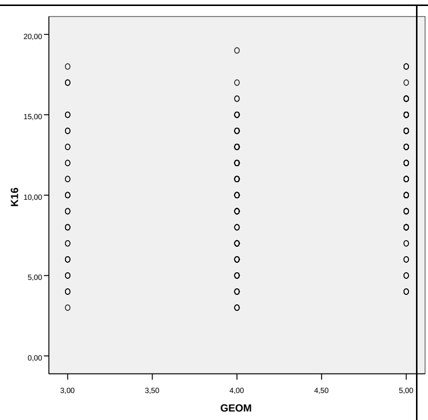
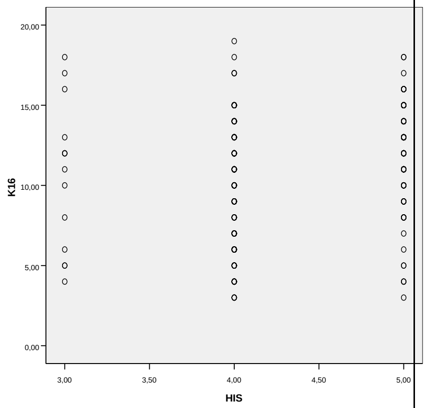
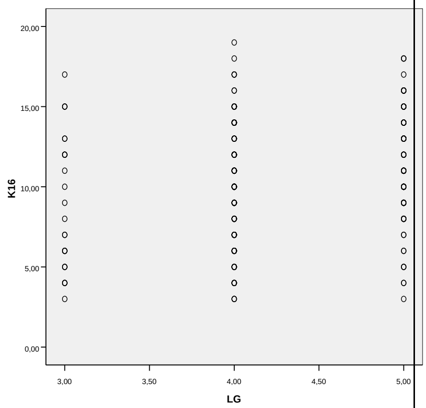
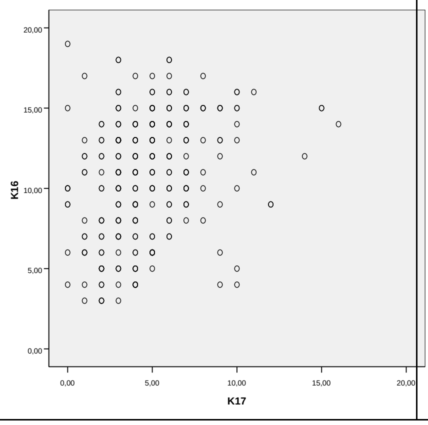
100.	K_{16}-GEOM	0,227		The expressed correlation dependence (the false relationship) is absent
101.	K_{16}-HIS	0,225		The expressed correlation dependence (the false relationship) is absent
102.	K_{16}-LG	0,299		The expressed correlation dependence (the false relationship) is absent
103.	K_{16}-K_{17}	0,287		The expressed correlation dependence (the false relationship) is absent

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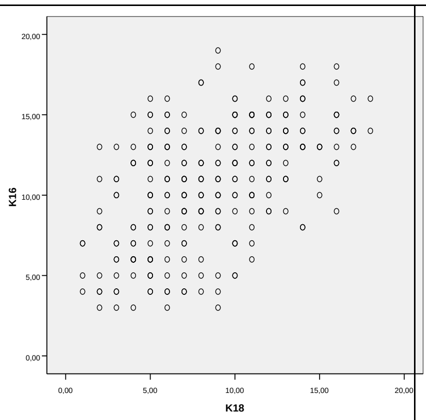
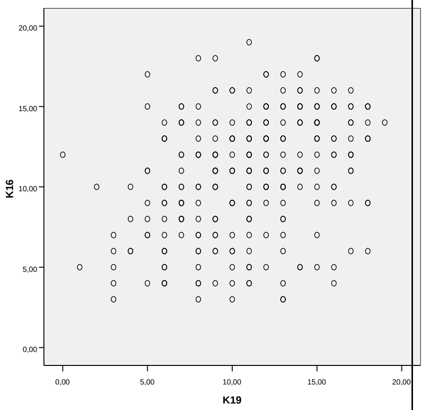
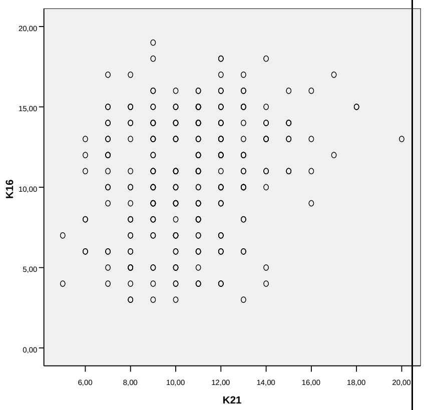
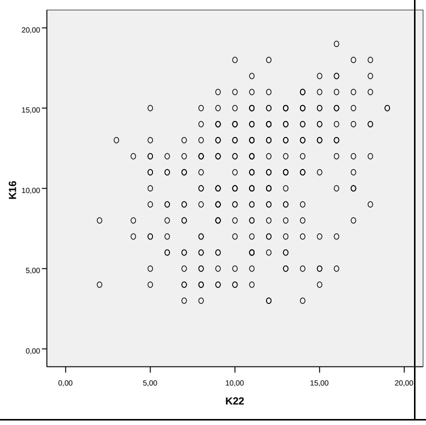
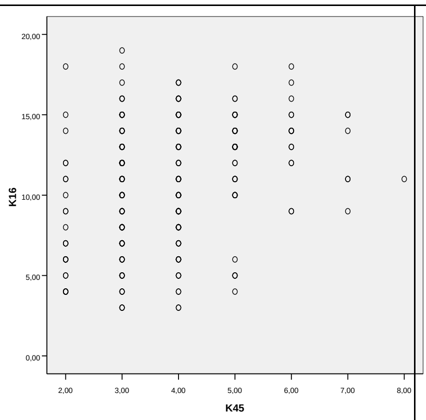
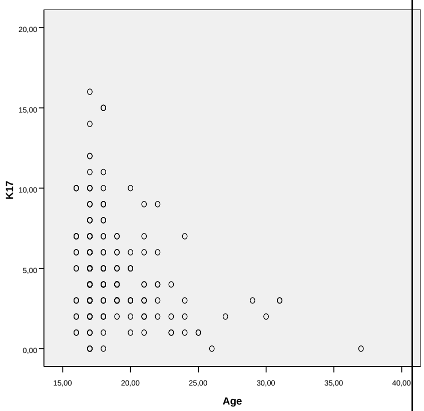
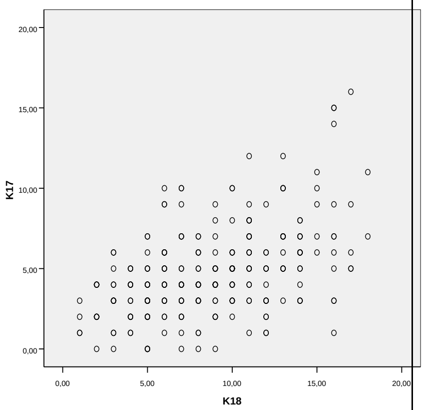
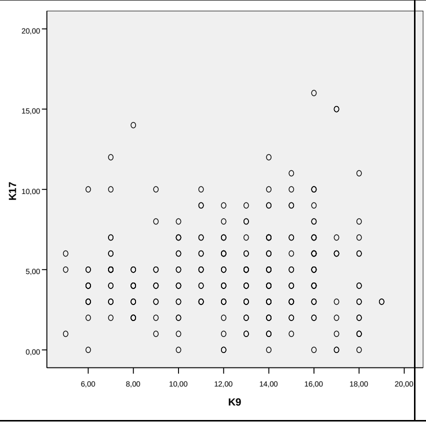
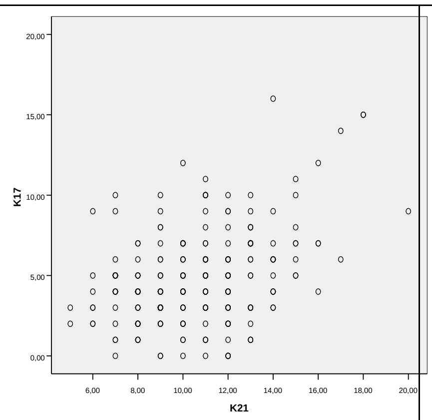
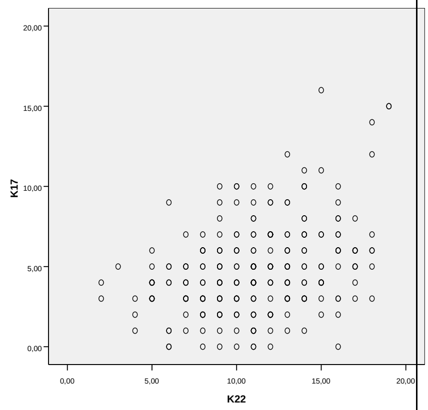
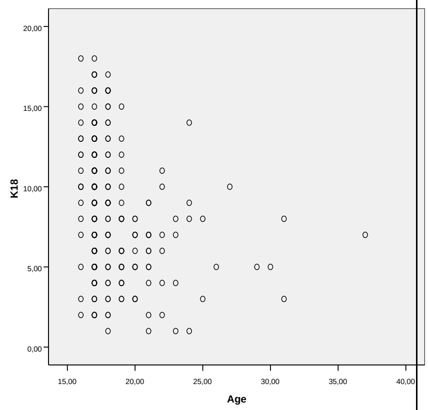
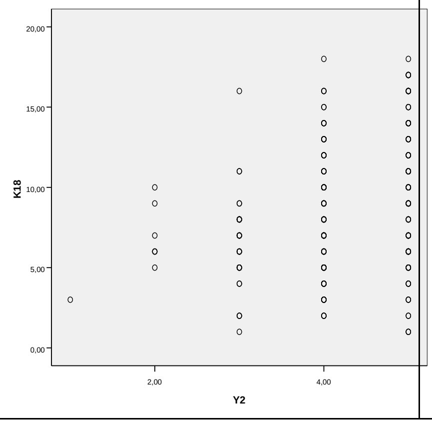
104.	K_{16}-K_{18}	0,535		There is the easy expressed correlation dependence (the easy relationship)
105.	K_{16}-K_{19}	0,348		The expressed correlation dependence (the false relationship) is absent
106.	K_{16}-K_{21}	0,243		The expressed correlation dependence (the false relationship) is absent
107.	K_{16}-K_{22}	0,359		The expressed correlation dependence (the false relationship) is absent

108.	K_{16}-K_{45}	0,325		The expressed correlation dependence (the false relationship) is absent
109.	K_{17}-Age	-0,260		The expressed correlation dependence (the false relationship) is absent
110.	K_{17}-K_{18}	0,495		There is the easy correlation dependence (the easy relationship)
111.	K_{17}-K_{9}	0,403		The expressed correlation dependence (the false relationship) is absent

112.	K_{17}-K_{21}	0,379		The expressed correlation dependence (the false relationship) is absent
113.	K_{17}-K_{22}	0,362		The expressed correlation dependence (the false relationship) is absent
114.	K_{18}-Age	-0,265		The expressed correlation dependence (the false relationship) is absent
115.	K_{18}-Y_2	0,292		The expressed correlation dependence (the false relationship) is absent

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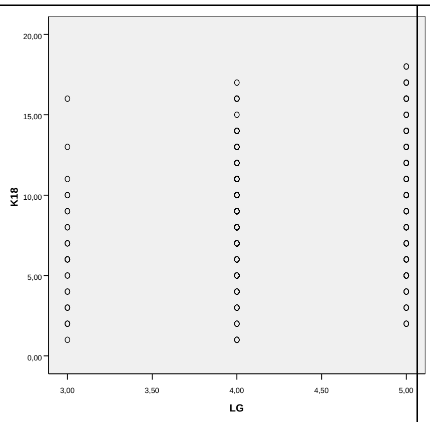
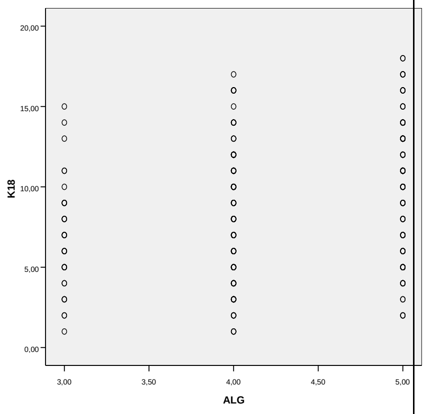
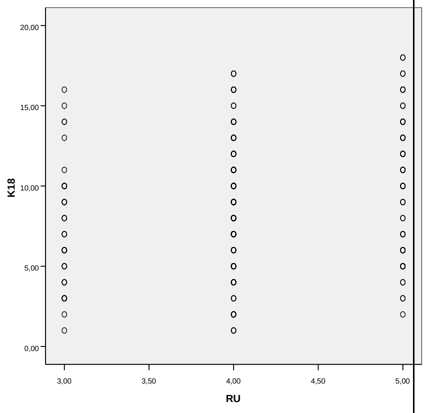
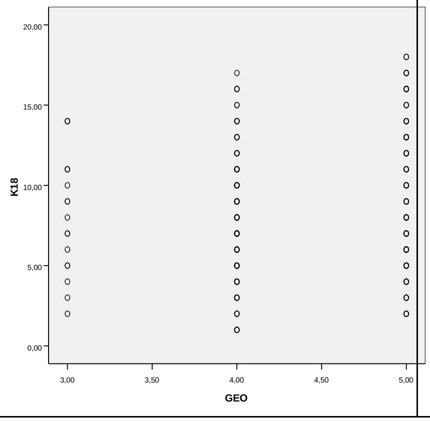
116.	K_{18}-LG	0,239		The expressed correlation dependence (the false relationship) is absent
117.	K_{18}-ALG	0,249		The expressed correlation dependence (the false relationship) is absent
118.	K_{18}-RU	0,217		The expressed correlation dependence (the false relationship) is absent
119.	K_{18}-GEO	0,234		The expressed correlation dependence (the false relationship) is absent

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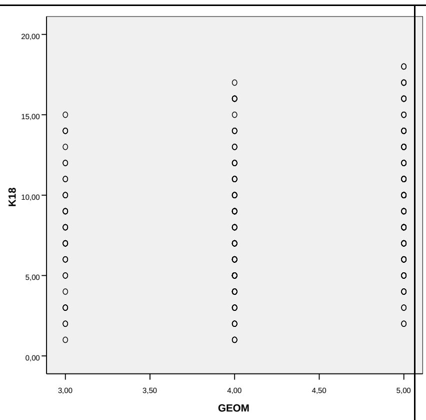
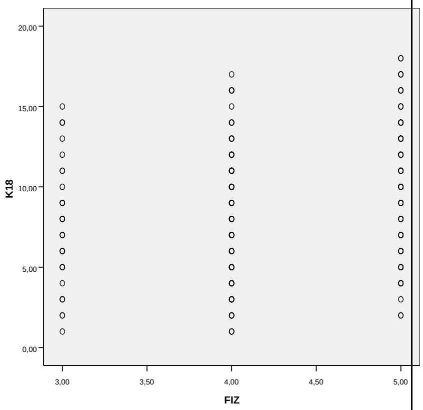
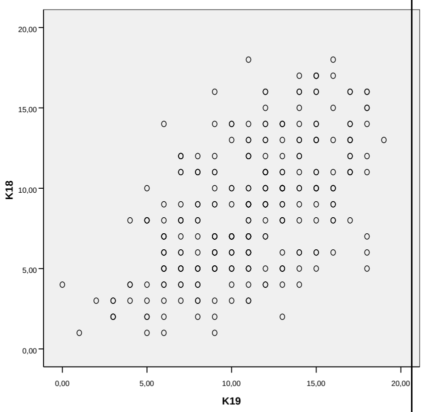
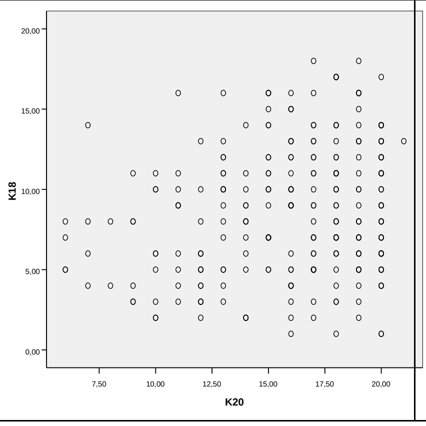
120.	K_{18}-GEOM	0,234		The expressed correlation dependence (the false relationship) is absent
121.	K_{18}-FIZ	0,220		The expressed correlation dependence (the false relationship) is absent
122.	K_{18}-K_{19}	0,568		There is the easy correlation dependence (the easy relationship)
123.	K_{18}-K_{20}	0,204		The expressed correlation dependence (the false relationship) is absent

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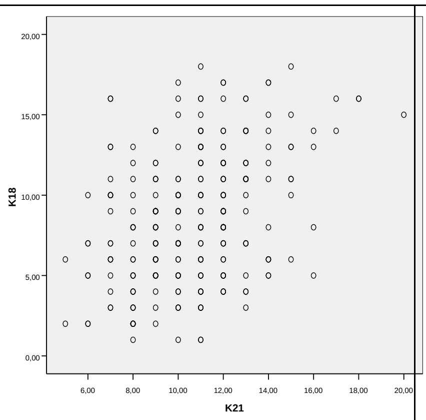
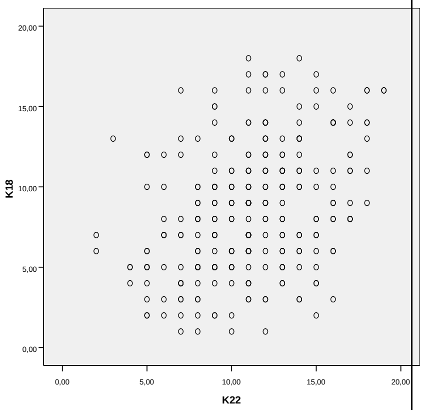
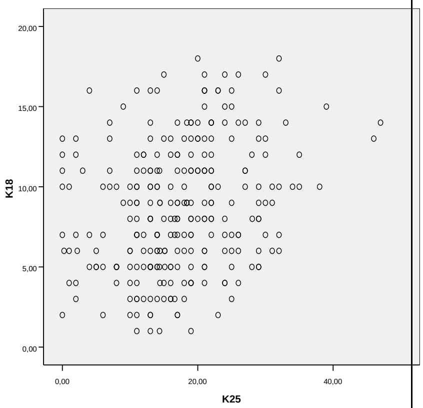
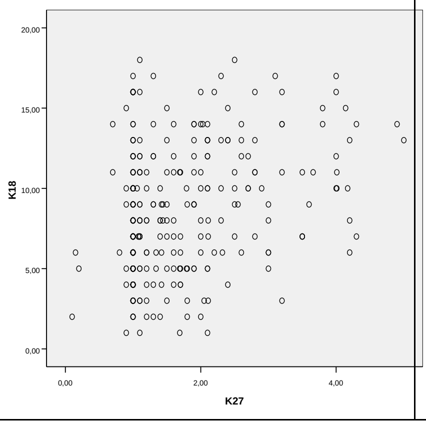
124.	K_{18}-K_{21}	0,393		The expressed correlation dependence (the false relationship) is absent
125.	K_{18}-K_{22}	0,386		The expressed correlation dependence (the false relationship) is absent
126.	K_{18}-K_{25}	0,272		The expressed correlation dependence (the false relationship) is absent
127.	K_{18}-K_{27}	0,300		The expressed correlation dependence (the false relationship) is absent

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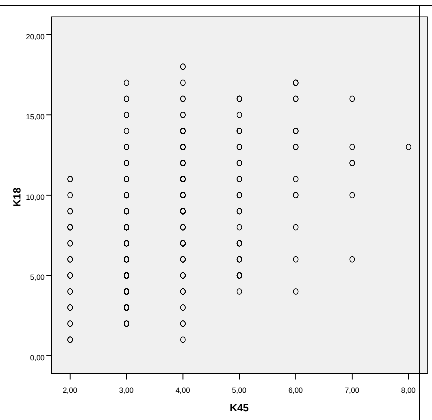
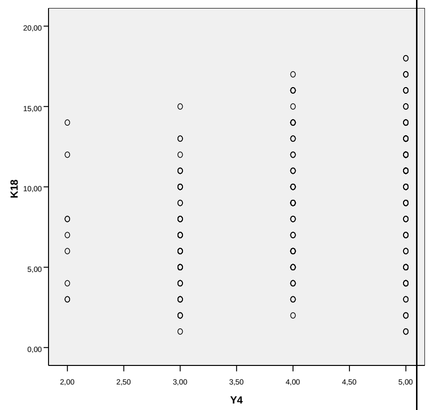
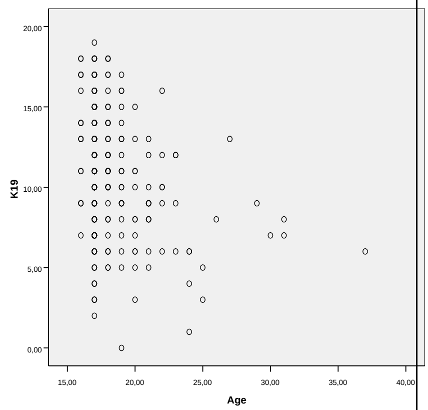
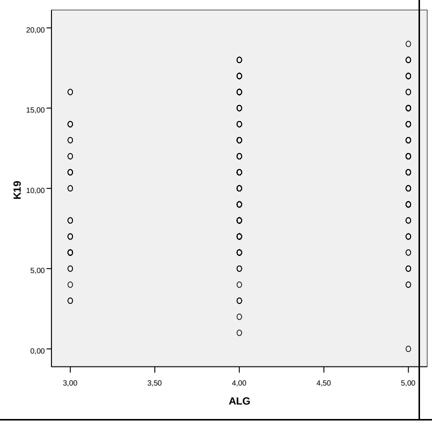
128.	K_{18}-K_{45}	0,394		The expressed correlation dependence (the false relationship) is absent
129.	K_{18}-Y_4	0,278		The expressed correlation dependence (the false relationship) is absent
130.	K_{19}-Age	0,293		The expressed correlation dependence (the false relationship) is absent
131.	K_{19}-ALG	0,220		The expressed correlation dependence (the false relationship) is absent

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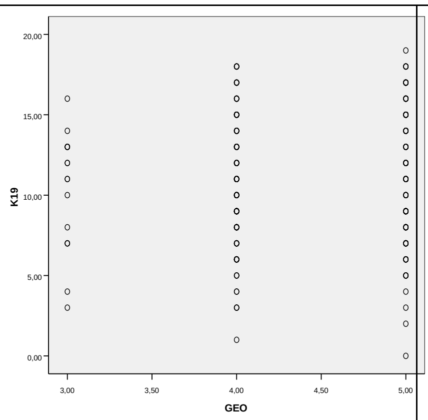
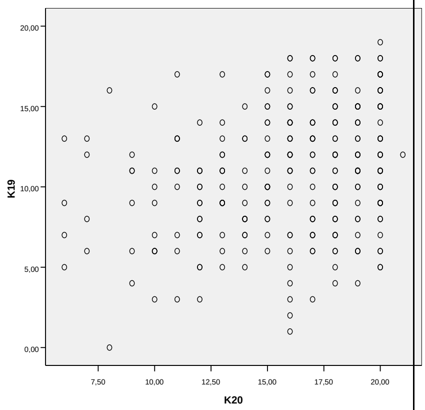
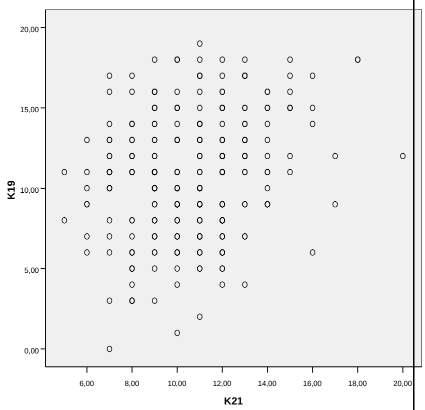
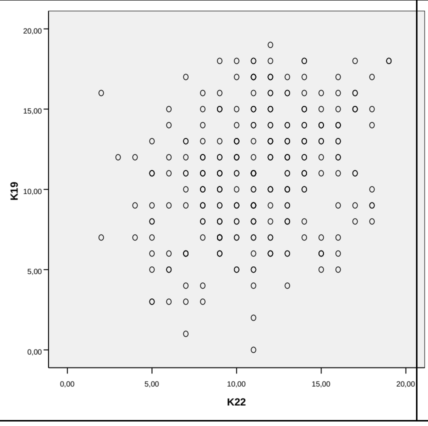
132.	K_{19}-GEO	0,064		The expressed correlation dependence (the false relationship) is absent
133.	K_{19}-K_{20}	0,284		The expressed correlation dependence (the false relationship) is absent
134.	K_{19}-K_{21}	0,257		The expressed correlation dependence (the false relationship) is absent
135.	K_{19}-K_{22}	0,295		The expressed correlation dependence (the false relationship) is absent

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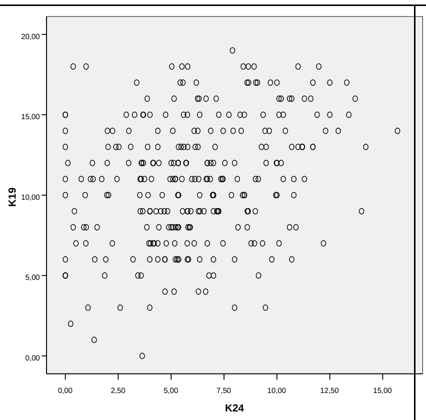
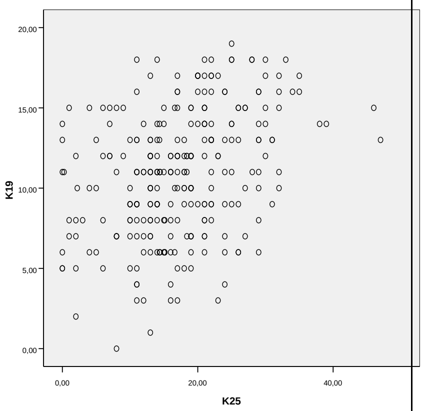
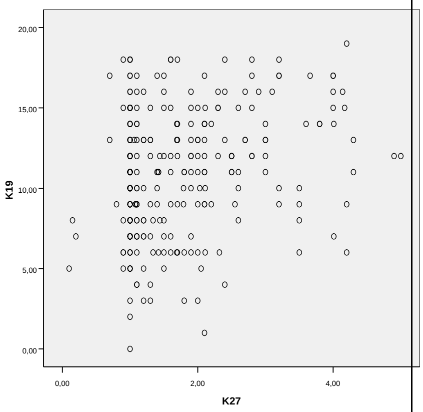
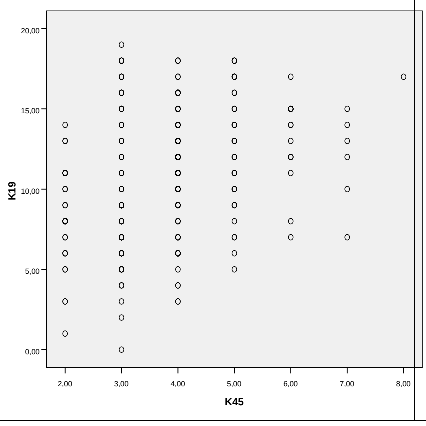
136.	K_{19}-K_{24}	0,297		The expressed correlation dependence (the false relationship) is absent
137.	K_{19}-K_{25}	0,364		The expressed correlation dependence (the false relationship) is absent
138.	K_{19}-K_{27}	0,259		The expressed correlation dependence (the false relationship) is absent
139.	K_{19}-K_{45}	0,313		The expressed correlation dependence (the false relationship) is absent

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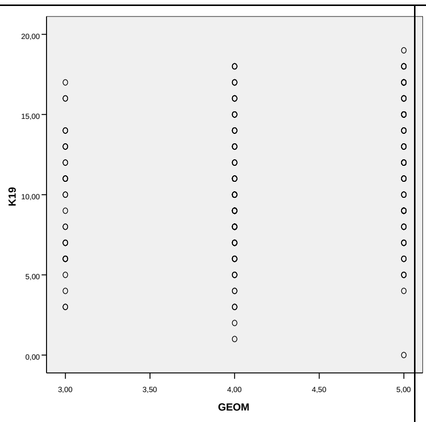
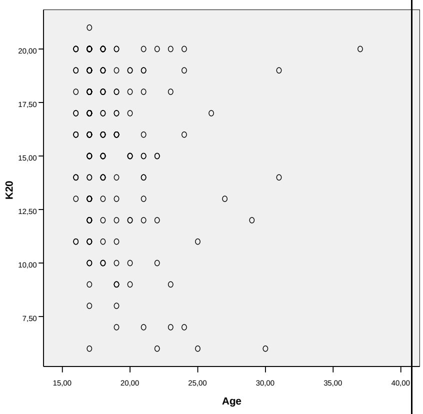
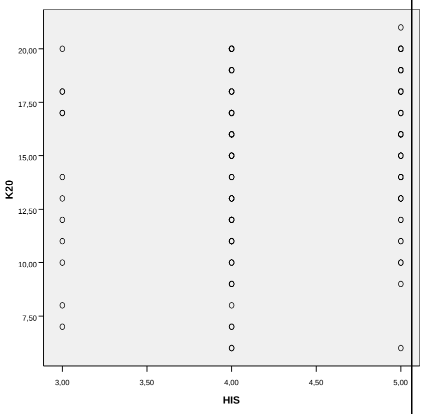
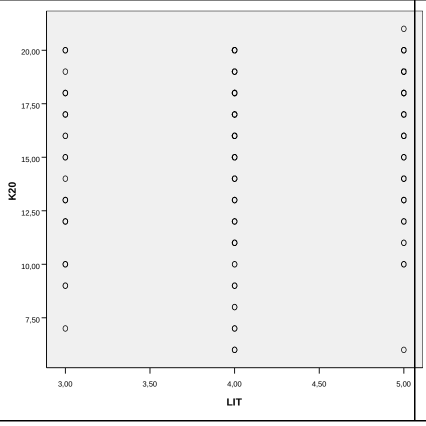
140.	K_{19}-GEOM	0,242		The expressed correlation dependence (the false relationship) is absent
141.	K_{20}-Age	-0,214		The expressed correlation dependence (the false relationship) is absent
142.	K_{20}-HIS	0,193		The expressed correlation dependence (the false relationship) is absent
143.	K_{20}-LIT	0,217		The expressed correlation dependence (the false relationship) is absent

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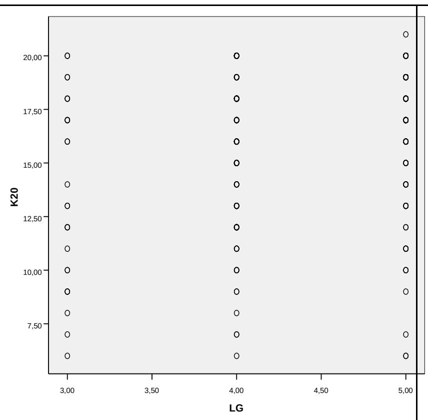
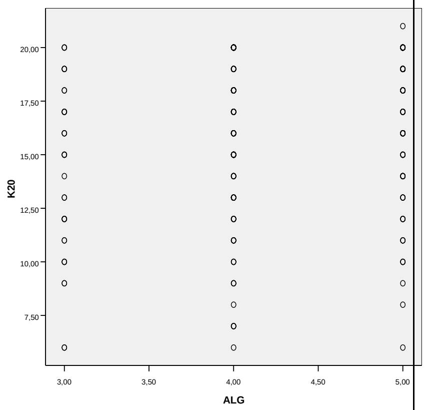
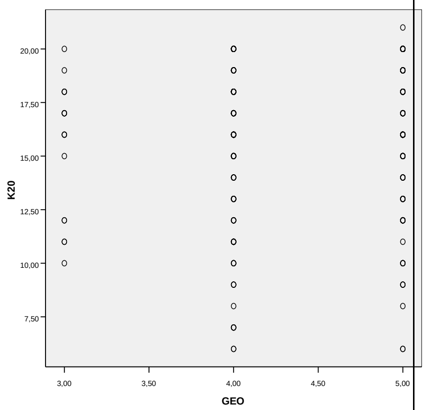
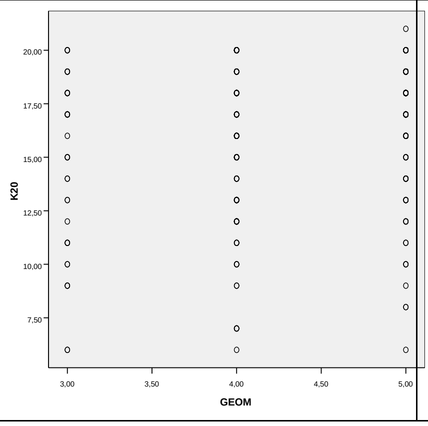
144.	K_{20}-LG	0,222		The expressed correlation dependence (the false relationship) is absent
145.	K_{20}-ALG	0,231		The expressed correlation dependence (the false relationship) is absent
146.	K_{20}-GEO	0,112		The expressed correlation dependence (the false relationship) is absent
147.	K_{20}-GEOM	0,217		The expressed correlation dependence (the false relationship) is absent

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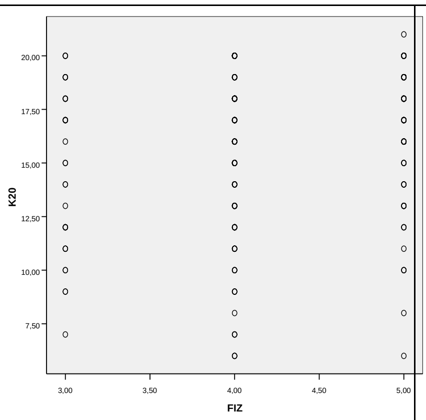
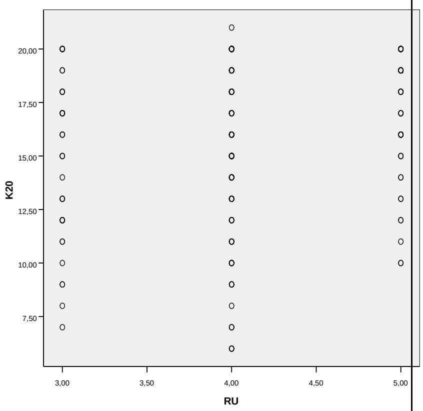
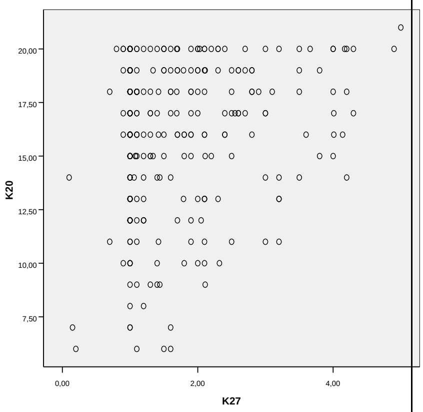
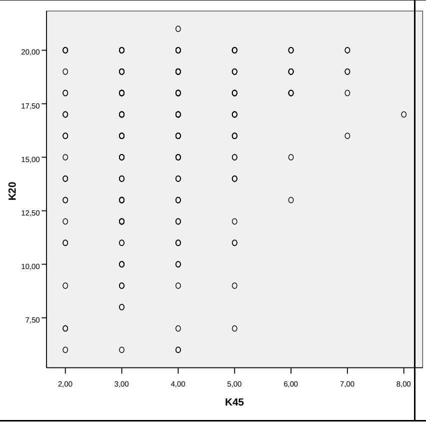
148.	K_{20}-FIZ	0,217		The expressed correlation dependence (the false relationship) is absent
149.	K_{20}-RU	0,232		The expressed correlation dependence (the false relationship) is absent
150.	K_{20}-K_{27}	0,202		The expressed correlation dependence (the false relationship) is absent
151.	K_{20}-K_{45}	0,243		The expressed correlation dependence (the false relationship) is absent

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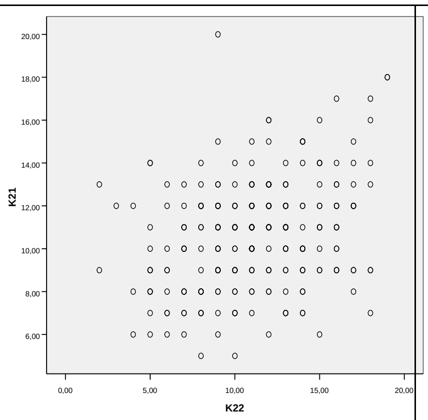
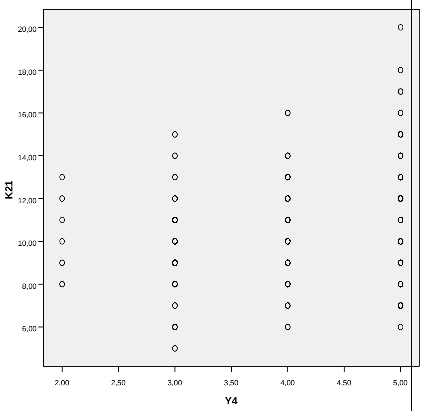
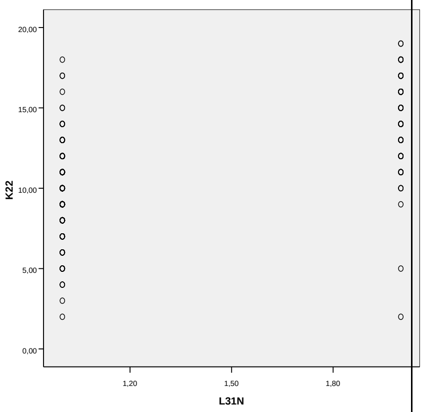
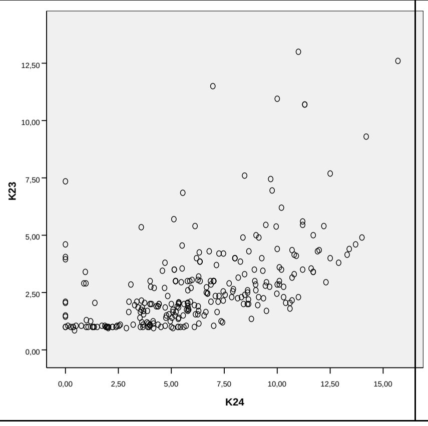
152.	K_{21}-K_{22}	0,312		The expressed correlation dependence (the false relationship) is absent
153.	K_{21}-Y_4	0,222		The expressed correlation dependence (the false relationship) is absent
154.	K_{22}-L_{31N}	0,595		The expressed correlation dependence (the false relationship) is absent
155.	K_{23}-K_{24}	0,541		The expressed correlation dependence (the false relationship) is absent

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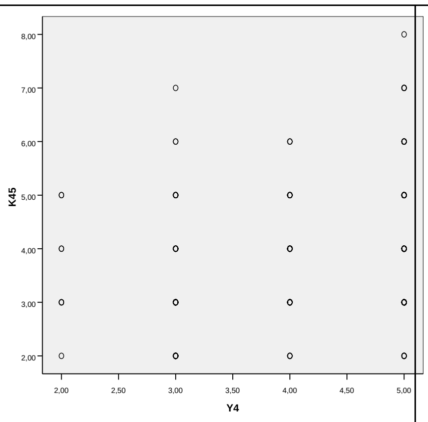
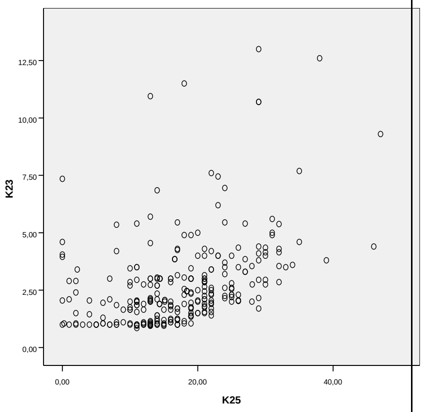
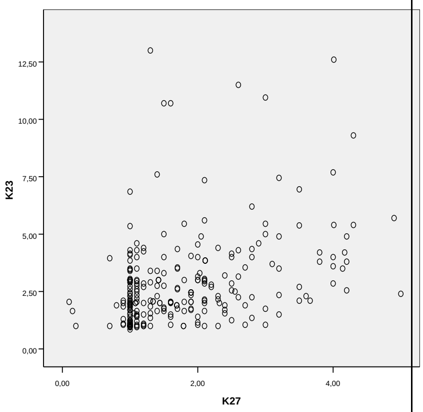
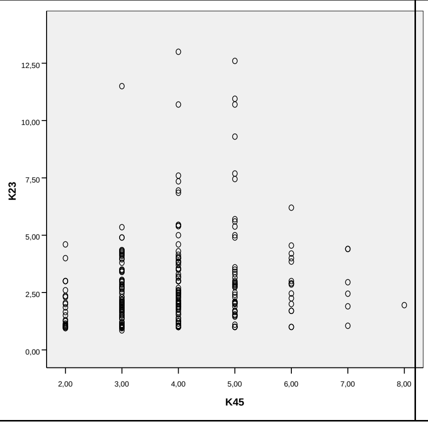
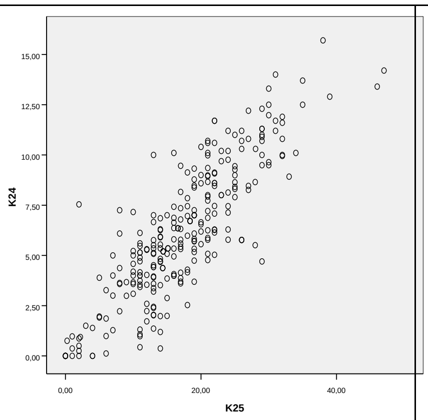
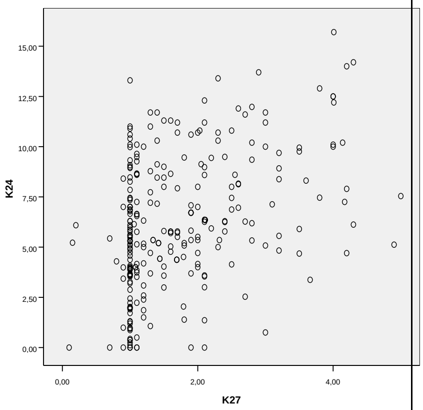
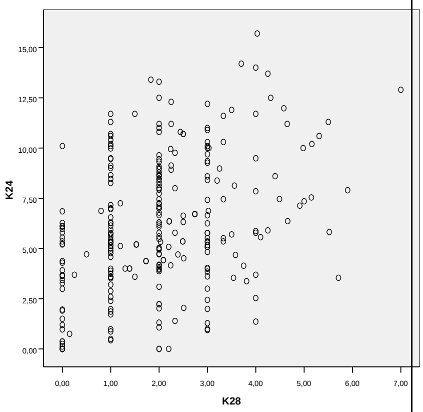
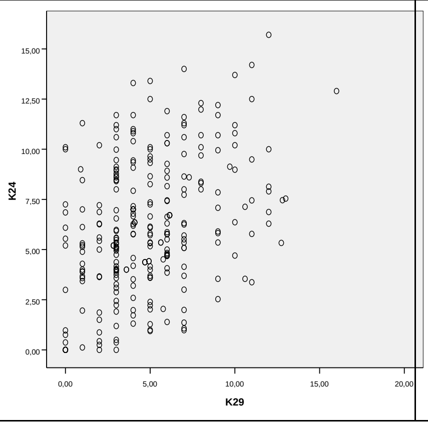
156.	K_{45}-Y_4	0,249		The expressed correlation dependence (the false relationship) is absent
157.	K_{23}-K_{25}	0,420		The expressed correlation dependence (the false relationship) is absent
158.	K_{23}-K_{27}	0,408		The expressed correlation dependence (the false relationship) is absent
159.	K_{23}-K_{45}	0,209		The expressed correlation dependence (the false relationship) is absent

160.	K_{24}-K_{25}	0,849		There is the strong correlation dependence (the strong relationship)
161.	K_{24}-K_{27}	0,415		The expressed correlation dependence (the false relationship) is absent
162.	K_{24}-K_{28}	0,397		The expressed correlation dependence (the false relationship) is absent
163.	K_{24}-K_{29}	0,397		The expressed correlation dependence (the false relationship) is absent

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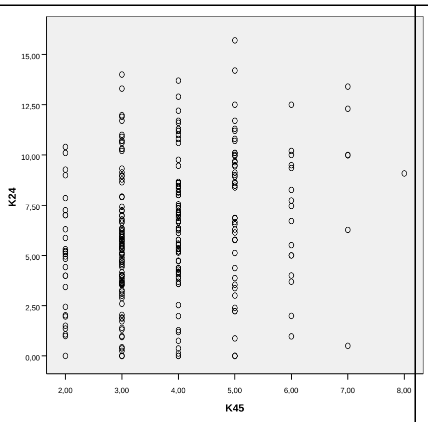
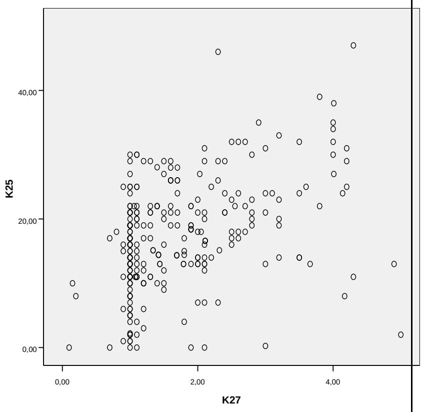
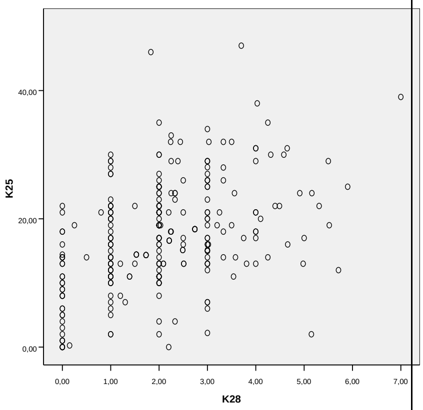
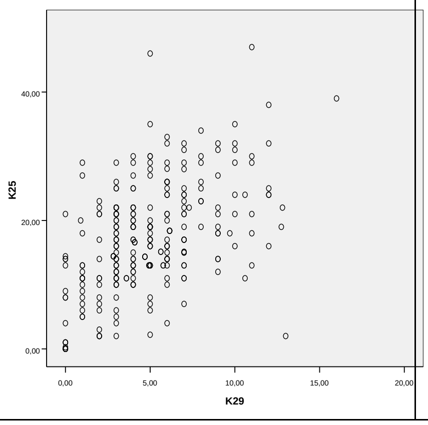
164.	K_{24}-K_{45}	0,239		The expressed correlation dependence (the false relationship) is absent
165.	K_{25}-K_{27}	0,409		The expressed correlation dependence (the false relationship) is absent
166.	K_{25}-K_{28}	0,448		The expressed correlation dependence (the false relationship) is absent
167.	K_{25}-K_{29}	0,512		The expressed correlation dependence (the false relationship) is absent

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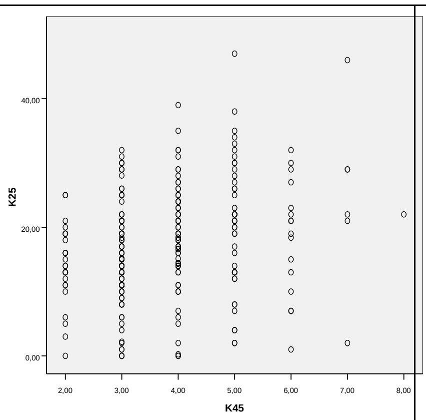
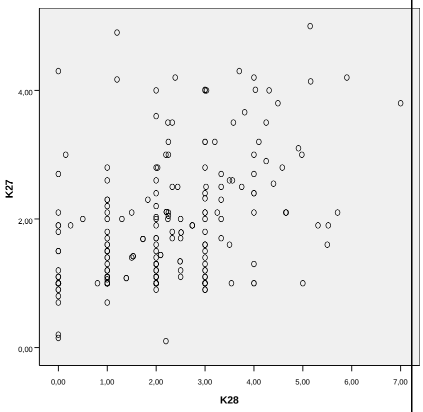
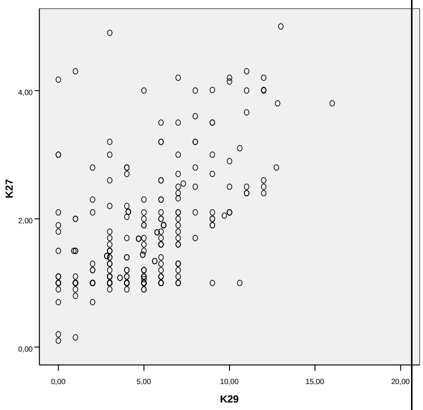
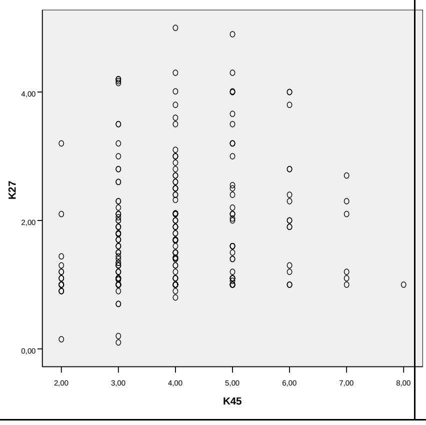
168.	K_{25}-K_{45}	0,267		The expressed correlation dependence (the false relationship) is absent
169.	K_{27}-K_{28}	0,461		The expressed correlation dependence (the false relationship) is absent
170.	K_{27}-K_{29}	0,556		The expressed correlation dependence (the false relationship) is absent
171.	K_{27}-K_{45}	0,249		The expressed correlation dependence (the false relationship) is absent

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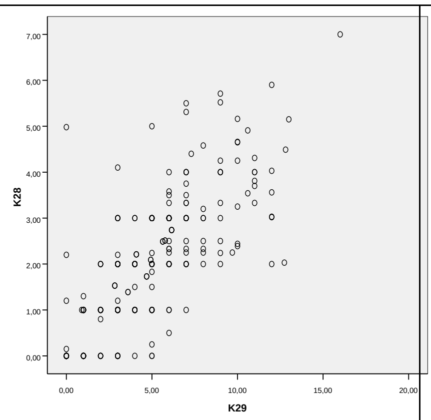
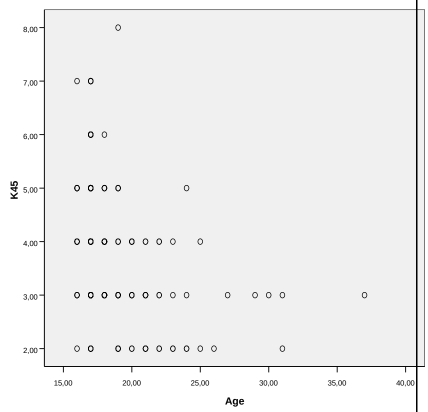
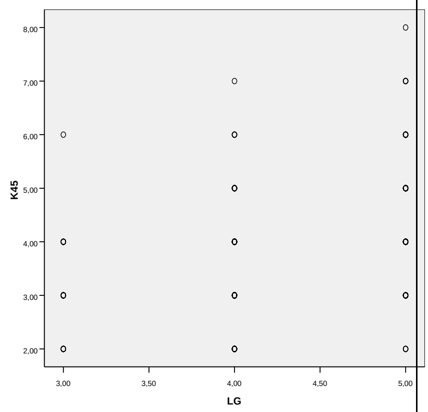
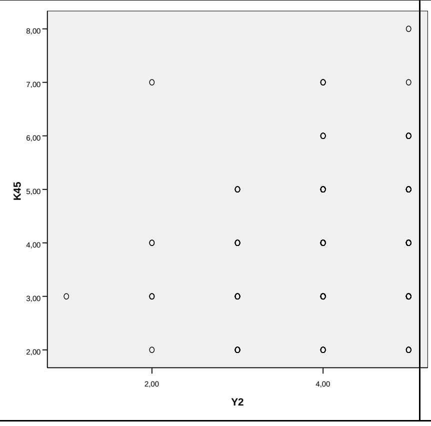
172.	K_{28}-K_{29}	0,741		There is the average correlation dependence (the average relationship)
173.	K_{45}-Age	-0,315		The expressed correlation dependence (the false relationship) is absent
174.	K_{45}-LG	0,350		The expressed correlation dependence (the false relationship) is absent
175.	K_{45}-Y_2	0,171		The expressed correlation dependence (the false relationship) is absent

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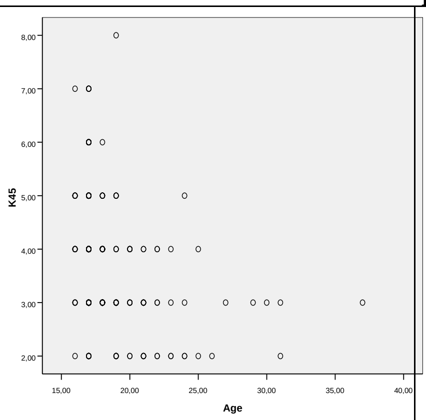
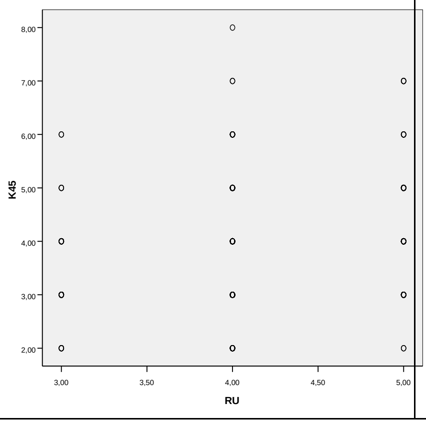
176.	K_{45}-Age	-0,315		The expressed correlation dependence (the false relationship) is absent
177.	K_{45}-RU	0,216		The expressed correlation dependence (the false relationship) is absent

The significant correlation dependences were not revealed on the graphs of bivariate scattering, that reflect the very high quality of the linear model of multiple regression:

- the very steady relationship of deuteranopia (K_8) and tritanopia (K_9) was confirmed;
- the very steady correlation dependence between the divergent figurative originality (K_{28}) and divergent figurative selectively (K_{29}) was confirmed;
- the easy expressed small correlation dependence between the divergent figurative associativity (K_{27}) and divergent figurative selectivity (K_{29});
- the easy expressed small correlation dependence between the divergent verbal selectivity (K_{25}) and divergent figurative selectivity (K_{29});
- the easy expressed small correlation dependence between the divergent verbal selectivity (K_{25}) and divergent figurative associativity (K_{27});
- the very steady correlation dependence between the divergent verbal originality (K_{24}) and divergent verbal selectivity (K_{25}) was confirmed;
- the easy expressed small correlation dependence between the convergent arithmetic abilities (K_{18}) and convergent planar thinking (K_{21});
- the easy expressed small correlation dependence between the convergent arithmetic abilities (K_{18}) and convergent combinatorics (K_{19});
- the easy expressed small correlation dependence between the convergent analyticity (K_{16}) and convergent combinatorics (K_{19});
- the easy expressed small correlation dependence between the convergent analyticity (K_{16}) and convergent arithmetic capabilities (K_{18}).

The revealed relationship between a set of different independent variables are not represent the significant practical interest, but influence on the quality of the equation of regression.

The graphs of two-dimensional scattering reflect the relative arrangement of nominal values of a pair from the complete set of independent variables (K_i) and the dependent variable (Y_2, Y_4) in the space of two coordinates, corresponding to the variables.

The several kinds of relationships are distinguished by the spatial location of measurements:

- the linear relationship (the positive or negative);
- the nonlinear coupling (the positive or negative);
    - the zigzag (the double dissection of set is needed);
    - the horseshoe (the splitting of set on the two intervals is required);
    - the hyperbolic (the necessity of use of the nonlinear methods of the analysis of relationships and dependencies is caused).

The positive relationship allows to speak about the correlation relationship between the variables – to the increasing of nominal values of one row of data corresponds the interconnected consistent increasing of the nominal values of other row of data.

The negative relationship allows to speak about the inverse correlation relationship between the variables – the increasing of nominal values of one row of data corresponds the interconnected consistent decreasing of nominal values of the other row of data.

At the horseshoe relationship for the exclude of false low nominal value of the coefficient of correlation a set need to be divided on two subsets, and then to apply the methods of statistical analysis in relation to each from them.

At the zigzag relationship for the exclude of false nominal value of the coefficient of correlation a set need to be broke on the three subsets, and then to apply the methods of statistical analysis in relation to each from them.

In the course of carrying out of the statistical analysis of the graphs of two-dimensional scattering is not revealed a large quantity of significant relationships between a set of independent variables, therefore in the linear equation of multiple regression the dispersion of the dependent variable is caused by the variation of a set of independent variables only.

The several linear equations of multiple regression, which allow to predict the nominal value of the dependent variable (factor) Y under the influence of variation of a given set of independent variables (predictors) Ki. The practical interest is presented the analysis of residues, which allows to estimate the predictor properties of the linear equation of multiple regression as the degree of inconsistency between the factual and predicted value of the dependent variable.

A15.6.5. The features and comparative characteristics of the obtained models

The linear model of multiple regression is presented directly the linear equation, which provides the reflection of mutual relationship between the dependent variable (factor) and a set of independent variables (predictors).

The linear equation of multiple regression and the linear regression model are presented the operator of converting the initial set of values of the independent variables K_i into the finite set of values of the dependent variable Y.

The practical value have the coefficient of multiple correlation and the coefficient of multiple determination, characterizing the quality of the regression model.

The coefficient of multiple correlation (CMC) reflects the relative variation of one independent variable under the influence of the variation of another variable.

The coefficient of multiple determination characterizes the share of dispersion of dependent variable, caused by the influence of a set of independent variables.

At the analysis of the various indicators of quality of the obtained linear model of multiple regression the necessity of interpretation and compare is arose:

- the reduced set of independent variables in the basis of the various linear models of multiple regression with the given factors Y_2 and Y_4;
- the complete set of independent variables in the basis of the available linear models of multiple regression with the given factors Y_2 and Y_4.

The presented dependent variables (factors) Y_2 and Y_4 in the considered equations of multiple regression have the different features of calculation and analysis:

- the factor Y_2 – the estimation of the level of residual knowledge, which is measured by means of using of the rough scale based on the sum of correct answers to the question;
- the factor Y_4 – the estimation of the level of residual knowledge, which is measured by means of the exact scale based on the sum of points for each correct variant of answer.

The listed analytical-numerical algorithms, the functions of estimation and the interval scales of estimation are presented in the basis of the developed complex of programs for the automation of the tasks of research: the basic DM and the applied DM.

The basic DM realizes the automation of the process of estimation of LRKT by the various subject areas by the means of use of the various tests in DB.

The applied DM provides the automation of the complex estimation of the individual features of the contingent examinees by the means of tests, located in DB.

1.A. The indicators of quality of the model of multiple regression with the reduced set of predictors K_i and factor Y_2.

The formed model of multiple regression directly includes the reduced set of independent variables K_i and the dependent variable Y_2.

The generalized indicators of the linear model of multiple regression with the independent variables K_i and dependent variable Y_2 are presented in tabl. A15.89.

Table A15.89

The generalized indicators of the reduced model of multiple regression Y_2

The model	R	R square	The corrected R square	The standard error of estimation	The changes of statistics					Durbin-Watson
					The changing of R square	The change of F	The degrees of freedom 1	The degrees of freedom 2	The value of change F	
1	,389(a)	,151	,086	,75825	,151	2,311	20	259	,002	1,709

a The predictors: (constant) K45, K9, K28, K7, K17, K20, K23, K15, K14, Age, K22, K21, K19, K16, K27, K25, K18, K29, K24, K8
b The variable: Y2

The nominal values of the coefficient of multiple correlation and the coefficient of multiple determination allow to speak about the relatively nonhigh influence of a set of independent variables on the dispersion of dependent variable Y_2.

The coarse scale based on the sum of correct answers to the questions has a very low accuracy of measurement of the nominal value, which characterizes the estimation of LRKT.

Table A15.90

The dispersion analysis (ANOVA)

The model	The indicator	The sum of squares	The degrees of freedom	The average square	The indicator F	The value
1	The regression	26,574	20	1,329	2,311	,002(a)
	The residue	148,911	259	,575		
	The sum	175,486	279			

a The predictors: (constant) K45, K9, K28, K7, K17, K20, K23, K15, K14, Age, K22, K21, K19, K16, K27, K25, K18, K29, K24, K8
b. The variable: Y2

There is the very high probability of error at the predicting of LRKT.

The initial samples of data act as the very difficult, so the obtained linear model of regression analysis is the very difficult and sensitive.

The density of distribution of the nominal values of the measurements of parameter has the uneven basis, so it is very difficult to estimate the initial standardized sample of data, and it has sense to recombine a set of independent variables.

At the consideration of the main measure of central tendency (the line of regression), a large quantity of independent variables causes the significant increasing of error in the obtained model, on which should not be accented the significant attention and it arises the necessity of carrying out of the analysis of residues.

1.B. The indicators of quality of the model of multiple regression with the reduced set of predictors K_i and factor Y_4.

The formed model of multiple regression directly includes the reduced set of independent variables K_i and dependent variable Y_4.

The generalized indicators of the linear model of multiple regression with the independent variables K_i and dependent variable Y_4 are presented in tabl. A15.91.

Table A15.91

The generalized indicators of the reduced model of multiple regression Y_4

The model	R	R square	The corrected R square	The standard error of estimation	The changes of statistics					Durbin-Watson
					The changing of R square	The change of F	The degrees of freedom 1	The degrees of freedom 2	The value of change of F	
1	,509(a)	,259	,201	,81287	,259	4,518	20	259	,000	1,411

a The predictors: (constant) K45, K9, K28, K7, K17, K20, K23, K15, K14, Age, K22, K21, K19, K16, K27, K25, K18, K29, K24, K8

b The dependent variable: Y4

The nominal values of the coefficient of multiple correlation and the coefficient of multiple determination allow to speak about the relatively average influence of a set of independent variables on the dispersion of dependent variable Y_4.

The exact scale based on the sum of the scored points for each correct variant of answer to the question has the significantly greater accuracy of measurement of LRKT.

Table A15.92

The dispersion analysis (ANOVA)

The model	The indicator	The sum of squares	The degrees of freedom	The average of square	The indicator F	The value
1	The regression	59,707	20	2,985	4,518	,000(a)
	The residue	171,136	259	,661		
	The sum	230,843	279			

a The predictors: (constant) K45, K9, K28, K7, K17, K20, K23, K15, K14, Age, K22, K21, K19, K16, K27, K25, K18, K29, K24, K8

b The dependent variable: Y4

The initial samples of data act as the very difficult, so the obtained linear model of regression analysis is the very difficult and sensitive.

The density of distribution of the nominal values of the measurements of parameter has the uneven basis, so it is very difficult to estimate the initial standardized sample of data, and it has the sense to recombine a set of independent variables.

At the consideration of the main measure of central tendency (the line of regression) a large quantity of independent variables causes the significant increasing of error in the obtained model, on which should not be accented the significant attention and it arises the necessity of carrying out of the analysis of residues.

2.A. The indicators of quality of the model of multiple regression with the complete set of predictors K_i and factor Y_2.

The formed model of multiple regression directly includes the complete set of independent variables K_i and dependent variable Y_2.

The generalized indicators of the linear model of multiple regression with the independent variables K_i and dependent variable Y_2 are presented in tabl. A15.93.

Table A15.93

The generalized indicators of the complete model of multiple regression Y_2

The model	R	R square	The corrected R square	The standard error of estimation	The changes of statistics					Durbin-Watson
					The change of R square	The change of F	The degree of freedom 1	The degree of freedom 2	The value of changes of F	
1	,491(a)	,241	,129	,74024	,241	2,146	36	243	,000	1,786

a. The variable: (constant) L38N, K27, K7, L37, K15, LIT, L36N, L31N, K9, AST, Age, K14, K20, SCH, K45, K21, K23, K28, K17, K19, K16, GEO, ALG, K25, BIO, LG, CHE, HIS, K18, RU, K22, FIZ, K29, GEOM, K24, K8

b The dependence variable: Y2

The nominal values of the coefficient of multiple correlation and the coefficient multiple determination allow to speak about the relatively average influence of a set of independent variables on the dispersion of dependent variable Y_2.

The coarse scale based on the sum of correct answers to the questions has the very low accuracy of measurement of the nominal value, which characterizes the estimation of LRKT.

Table A15.94

The dispersion analysis (ANOVA)

The model	The indicator	The sum of squares	The degrees of freedom	The average square	The indicator F	The value
1	The regression	42,333	36	1,176	2,146	,000(a)
	The residue	133,153	243	,548		
	The sum	175,486	279			

a The indicators: (constant) L38N, K27, K7, L37, K15, LIT, L36N, L31N, K9, AST, Age, K14, K20, SCH, K45, K21, K23, K28, K17, K19, K16, GEO, ALG, K25, BIO, LG, CHE, HIS, K18, RU, K22, FIZ, K29, GEOM, K24, K8

b The dependent variable: Y2

The initial samples of data act the very difficult, so the obtained the linear model of regression analysis is the very difficult and sensitive.

The density of distribution of the nominal values of the measurements of parameter has the uneven basis, so it is very difficult to estimate the initial standardized sample of data, and it has the sense to recombine a set of independent variables.

At the considering of the main measure of central tendency (the line of regression) a large quantity of independent variables causes the significant increasing of error in the obtained model, on which should not be accented the significant attention and arise the significant necessity of carrying out of the analysis of residues.

2.B. The indicators of quality of the model of multiple regression with the complete set of predictors K_i and factor Y_4.

The formed model of multiple regression directly includes the complete set of independent variables K_i and dependent variable Y_4.

The generalized indicators of the linear model of multiple regression with the independent variables K_i and dependent variable Y_4 are presented in tabl. A15.95.

Table A15.95

The generalized indicators of the complete model of multiple regression Y_4

The model	The indicator R	R square	The corrected R square	The standard error of estimation	The changes of statistics					Durbin-Watson
					The change of R square	The change F	The degree of freedom 1	The degree of freedom 2	The value of change of F	
1	,590(a)	,348	,252	,78687	,348	3,606	36	243	,000	1,439

a The predictors: (constant) L38N, K27, K7, L37, K15, LIT, L36N, L31N, K9, AST, Age, K14, K20, SCH, K45, K21, K23, K28, K17, K19, K16, GEO, ALG, K25, BIO, LG, CHE, HIS, K18, RU, K22, FIZ, K29, GEOM, K24, K8

b The dependent variable: Y4

The nominal values of the coefficient of multiple correlation and the coefficient multiple determination allow to speak about the relatively high influence of a set of independent variables on the dispersion of dependent variable Y4.

The accurate scale based on the sum of scored points for each correct variant of answer to the question has the significantly higher accuracy of measurement of LRKT.

Table A15.96

The dispersion analysis (ANOVA)

The model	The indicator	The sum of squares	The degree of freedom	The average square	The indicator F	The value
1	The regression	80,387	36	2,233	3,606	,000(a)
	The residue	150,456	243	,619		
	The sum	230,843	279			

a The predictors: (constant) L38N, K27, K7, L37, K15, LIT, L36N, L31N, K9, AST, Age, K14, K20, SCH, K45, K21, K23, K28, K17, K19, K16, GEO, ALG, K25, BIO, LG, CHE, HIS, K18, RU, K22, FIZ, K29, GEOM, K24, K8

b The dependent variable: Y4

The initial samples of data are the very difficult, so the obtained linear model of regression analysis is the very difficult and sensitive.

The density of distribution of the nominal values of the measurements of parameter has the uneven basis, so it is very difficult to estimate the initial standardized sample of data, and it has the sense to recombine a set of independent variables.

At the considering of the main measure of central tendency (the line of regression) a large quantity of independent variables causes the significant increasing of error in the obtained model, on which should not be accented the significant attention and it appears the necessity of carrying out of the analysis of residues (the degree of compliance of the predicted nominal value and the factual nominal value, which directly characterize LRKT in IEE of ART system).

A15.6.6. The analysis of residues of the linear model of multiple regression

The analysis of residues in the process of carrying out of the regression analysis allows to estimate the degree of inconsistency of the theoretical (predicted) and practical (experimental) nominal values of the dependent variable at the substituting of a set of nominal values of the available set of independent variables.

The results of the analysis o residues of the model of multiple regression with the reduced set of independent variables K_i and dependent variable Y_2 are presented in tabl. A15.97.

1.A. The indicators of quality of the model of multiple regression with the reduced set of predictors K_i and factor Y_2.

Table A15.97

The analysis of residues of the linear model of multiple regression Y_2 with the reduced set of independent variables K_i

№	Y_2	Y	EQU	Age	K_7	K_8	K_9	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}	K_{45}
1	4	4,55	+	17	23	12	10	17	16	15	8	11	18	17	13	17	1,4	5,03	22	1,6	2	3	3
2	4	4,01	+	17	24	12	11	12	13	12	4	4	14	12	11	10	2,65	7,93	21	1,7	2	4	3
3	4	4,42	+	18	23	10	12	15	13	10	8	9	14	16	9	11	2,3	8,31	25	3,6	2	8	4
4	5	4,82	+	17	22	11	11	19	13	16	6	17	15	20	10	11	2,3	10,3	26	2,3	3,33	6	3
5	5	4,30	-	17	24	10	10	13	11	8	4	9	11	11	8	17	2,55	7,45	18	2,5	3,33	11	4
6	5	4,68	+	17	21	9	10	15	15	14	5	17	15	18	12	12	2,9	7,73	21	1,3	2	7	6
7	4	4,48	+	17	22	13	14	17	15	15	7	13	16	17	8	8	1,55	6,25	21	2,4	3	7	4
8	5	4,71	+	17	23	10	10	19	11	14	5	10	13	17	10	15	1,05	2,53	18	2,7	4	9	4
9	3	4,19	-	17	22	12	11	15	14	10	5	6	15	19	9	10	4,3	11,9	32	2,6	3,5	6	3
10	5	4,55	+	17	22	12	12	17	12	17	5	16	14	19	7	18	2,1	6,87	21	1	0,8	2	4
11	5	4,96	+	17	24	17	17	16	13	9	6	16	17	15	11	11	2,85	10	32	4	3,03	12	6
12	5	4,18	-	17	22	11	13	15	12	8	8	11	7	10	9	9	1	3,95	13	1	2	3	3
13	5	4,79	+	17	23	7	7	15	13	8	7	14	13	18	13	12	2,35	7,08	22	1,9	2	9	4
14	5	3,99	-	17	15	6	7	14	16	12	4	10	11	13	12	9	1,25	4,95	16	1	2	3	2
15	5	4,55	+	17	24	8	8	11	10	8	3	14	11	17	9	14	2,25	8,13	24	2,6	3,56	12	4
16	5	4,18	-	17	23	9	10	13	10	9	6	8	7	18	11	9	3	8,94	21	1	2	3	3
17	5	4,04	-	19	24	7	8	13	13	7	4	4	7	13	11	15	2,15	7,45	24	1	2	6	4
18	4	4,40	+	17	22	9	9	16	16	15	5	10	15	19	10	9	3,85	8,26	27	1	1	5	6
19	5	4,66	+	17	16	7	7	15	15	14	5	17	15	18	12	12	4	12,5	30	4	4,31	11	6
20	5	4,57	+	17	22	12	11	17	16	14	6	14	15	15	11	9	1,4	4,74	19	1	2	3	4
21	4	4,80	-	17	23	9	7	17	14	12	6	10	12	13	12	13	1	5	7	2,3	1	2	6
22	4	4,44	+	17	19	6	6	16	11	11	5	7	12	20	9	6	1,05	0,12	6	1	0	1	4
23	5	4,40	-	17	26	10	11	14	12	13	3	7	12	17	8	8	2,85	6,87	16	2,5	3,02	12	5
24	5	4,43	+	17	21	10	12	17	11	8	6	6	9	20	11	13	2,7	5,93	14	2,2	1	3	3
25	5	4,63	+	17	25	8	8	17	13	10	2	7	8	19	10	9	2,9	0,87	2	1	1	2	5
26	5	4,79	+	17	24	9	10	17	15	18	6	14	15	20	12	17	3	4	7	2	1,3	1	6
27	5	4,83	+	18	23	5	6	17	16	18	3	16	15	19	12	12	1	0	4	1	2	3	5
28	4	4,61	-	17	18	5	6	14	11	9	3	12	7	18	11	11	1,05	0,5	2	1,1	1	3	7
29	5	4,63	+	17	20	11	10	16	13	14	7	13	19	20	11	12	2,55	7,9	25	4,2	5,9	12	3
30	5	4,31	-	17	18	8	7	17	13	13	5	10	16	18	7	9	4,6	13,7	35	2,9	4,25	10	4
31	4	4,37	+	17	22	7	7	17	16	15	7	11	17	13	8	13	1,5	5,56	20	3,2	4,1	3	3
32	5	4,32	-	18	22	8	9	15	15	14	4	7	11	20	7	13	5,4	6,12	11	4,3	0	1	4
33	5	4,42	-	17	24	8	9	15	17	13	4	6	13	19	14	15	3,15	10,7	21	2	2,5	9	5
34	5	4,25	-	17	20	11	8	15	13	14	4	6	7	20	7	10	2,9	0,97	1	1	0	0	6
35	5	4,73	+	17	18	7	8	17	14	13	3	14	18	20	11	11	3,5	8,92	33	3,2	2,25	6	5
36	5	4,81	+	17	20	9	11	15	16	11	7	13	12	21	15	14	2,4	7,54	2	5	5,15	13	4
37	5	4,31	-	18	23	5	6	14	14	6	4	4	8	20	10	11	1	0,37	1	1	0	0	3
38	5	4,91	+	17	18	7	7	17	12	13	6	14	12	20	14	16	5,7	5,12	13	4,9	1,2	3	5
39	3	4,45	-	17	21	12	13	17	10	5	5	9	10	17	7	8	2,4	8,47	19	1	2	3	5
40	5	4,42	-	18	20	12	9	15	16	14	3	14	10	14	9	18	4,9	8,38	19	3,2	3,2	8	5
41	5	4,79	+	18	24	7	8	17	10	7	4	11	8	14	12	13	2,1	5,9	14	3,5	4,25	9	3
42	4	4,25	+	18	25	6	7	13	12	14	5	9	12	15	11	10	1,55	3,69	17	1,3	4	7	4
43	5	4,28	-	17	23	12	13	16	14	13	5	4	8	18	12	13	2	5	10	1,2	2	6	6

The continuation of tabl. A15.97

44	5	4,72	+	17	24	10	10	19	15	15	7	13	15	19	10	14	4,4	13,4	46	2,3	1,83	5	7
45	5	4,27	-	17	18	12	14	15	15	12	5	11	17	20	13	11	4,3	8,66	21	1,1	2	3	4
46	5	4,49	+	17	25	7	8	15	15	8	4	9	9	18	9	11	1	3,66	10	1	0	2	3
47	4	4,24	+	17	22	11	9	19	16	17	8	14	13	15	13	16	13	11	29	1,3	3	3	4
48	4	4,28	+	17	22	15	15	15	17	15	6	11	7	17	12	16	5,4	12,2	27	4,01	3	9	4
49	2	3,74	-	17	22	13	15	10	15	15	9	6	14	17	9	16	1,75	5,08	21	3	2,2	3	3
50	4	4,66	-	17	19	10	8	18	16	12	14	16	9	13	17	18	3	7	13	2	1	1	3
51	4	4,85	-	17	24	8	8	17	14	13	5	13	12	19	12	3	2,15	3,59	13	2,1	1,5	5	4
52	4	4,36	+	17	22	10	11	18	12	9	9	9	16	20	12	12	10,7	11,3	29	1,5	1	1	4
53	4	4,46	+	17	24	10	10	17	9	9	7	5	18	19	10	10	3,55	5,51	28	1,7	3,33	7	4
54	4	4,74	-	16	25	12	14	17	16	14	7	18	11	19	11	11	4,15	10,8	32	2,5	2,44	10	4
55	4	4,40	+	16	21	13	16	17	16	14	10	13	17	20	11	14	5	9	20	1,5	1	0,9	5
56	5	4,00	-	18	21	15	16	16	12	9	4	10	10	10	7	13	7,6	8,46	22	1,4	2	3	4
57	5	3,94	-	17	12	4	5	18	12	12	6	5	8	20	12	8	4,1	10,9	29	1	3	4	3
58	5	3,80	-	17	23	9	10	13	12	10	4	5	11	19	9	9	10,7	11,3	29	1,6	5,5	7	5
59	3	4,06	-	18	18	12	14	9	14	11	4	8	17	20	16	12	3,4	11,7	22	1,4	1,5	4	5
60	5	4,65	+	18	25	10	10	15	11	3	2	9	13	20	9	12	3,4	11,7	22	1,3	1	3	3
61	5	4,20	-	16	18	7	7	18	12	8	2	2	9	14	6	9	1,65	7,16	10	1,4	1	4	4
62	4	4,29	+	16	19	8	9	17	13	5	10	10	14	16	11	16	12,6	15,7	38	4,01	4,03	12	5
63	3	4,25	-	17	22	9	10	10	12	4	4	7	6	17	11	15	1,05	4,71	14	2	0,5	6	4
64	5	4,66	+	18	19	8	7	18	13	12	5	10	15	16	13	8	1,95	3,27	6	1	0	3	3
65	4	4,10	+	17	21	7	7	14	13	16	10	13	10	19	11	10	11,5	6,96	18	2,6	1	3	3
66	4	4,07	+	17	20	16	17	13	15	11	3	8	13	17	11	7	2	5,6	11	1	2	2	3
67	4	3,96	+	17	20	6	8	10	11	5	2	4	12	20	8	8	1,05	5,7	19	1,6	3,5	7	3
68	5	3,88	-	17	21	7	7	9	16	5	4	6	14	17	8	11	1,95	6,09	19	1	2	5	3
69	5	4,36	-	21	21	8	8	14	10	3	2	4	13	16	13	7	3,5	11,2	26	1,7	2	3	4
70	5	4,40	-	18	25	8	7	14	11	13	5	13	11	12	7	7	2	4,07	16	1	2	6	4
71	5	4,20	-	17	24	8	8	15	11	14	4	5	7	14	8	9	1	2,22	8	1	2	5	5
72	4	4,15	+	17	13	5	5	16	15	13	1	7	10	18	10	11	5,38	9,95	32	3,5	2,24	9	5
73	4	4,08	+	19	14	15	15	16	10	15	3	5	13	16	11	13	1	2,39	13	1,2	1	5	5
74	4	4,72	-	17	23	7	8	16	16	11	5	13	14	18	11	13	2,1	3	7	2,1	3	7	5
75	4	4,11	+	17	18	8	7	13	16	10	3	5	7	19	9	9	1,1	4,37	8	1	0	3	5
76	5	3,98	-	25	21	12	13	16	10	17	1	8	5	6	8	11	1,75	3,58	10	1,5	1	3	4
77	5	3,55	-	22	19	11	14	11	9	6	9	7	9	6	6	6	2,05	5,77	26	1,6	3	6	4
78	5	4,41	-	17	22	8	7	14	10	10	3	8	13	14	11	16	5,45	11,2	24	3	2,25	7	4
79	4	4,34	+	17	22	11	9	12	12	5	3	5	15	20	9	9	1	5,59	17	1	1	3	4
80	2	3,66	-	30	21	8	8	11	9	8	2	5	7	6	6	4	1	6,09	8	0,2	0	0	3
81	5	4,38	-	17	20	10	8	12	12	14	5	11	15	20	15	17	3,3	8,46	27	1,5	1	1	4
82	5	4,08	-	19	21	14	14	13	12	15	5	6	15	14	14	11	2,05	5,77	26	1,6	3	6	5
83	5	4,01	-	24	19	11	14	14	18	13	7	14	6	7	16	12	2,03	5,77	26	1,6	3	6	5
84	5	4,38	-	20	24	8	7	16	14	6	5	5	13	17	6	12	1	3,89	5	1	1	1	4
85	3	3,78	-	24	20	11	11	13	12	5	3	1	1	16	10	7	1	1,36	13	2,1	4	7	2
86	2	4,08	-	21	21	12	10	16	15	18	3	9	8	14	9	10	2	4,42	13	1,44	2,09	4,93	2
87	3	3,78	-	21	23	7	8	11	10	4	2	2	8	14	5	10	0,95	5,08	13	1	3	7	2
88	4	3,81	+	31	15	7	7	12	8	5	3	3	8	19	8	14	1,8	5,8	16	1,5	0	5	3
89	3	3,92	-	17	22	10	12	13	12	4	4	2	3	17	8	7	1	1,07	11	1,3	2	7	2
90	4	3,58	+	19	22	15	16	12	14	12	2	4	0	8	7	11	1,85	3,63	8	1	0	2	3
91	3	3,94	-	23	20	12	11	14	14	17	4	8	12	9	12	15	2	4,42	13	1,44	2,09	4,93	3
92	5	3,85	-	20	19	11	14	15	13	7	3	3	3	12	9	5	1,1	2,59	12	1,2	1	4	3
93	5	4,25	-	18	22	15	15	14	10	9	4	7	18	18	10	14	4,35	11,98	30	2,8	4,58	8	3
94	3	3,81	-	20	19	12	13	9	12	5	2	5	6	15	10	13	2,05	1,39	4	1,8	2,33	6	3
95	3	3,98	-	17	23	11	12	14	14	13	3	5	10	11	9	13	1,4	3,52	14	1,1	1	4	3
96	5	4,00	-	27	21	11	12	12	10	10	2	10	13	13	8	10	2,85	3,09	10	1,2	2	3	3
97	4	4,40	+	22	26	7	8	15	9	15	3	11	16	15	9	15	2,05	10,6	22	1,9	5,31	7	3
98	4	3,72	+	22	23	11	12	15	12	13	4	2	6	10	6	15	1,1	3,2	13	1	1	4	3
99	3	3,99	-	17	14	6	6	14	14	7	3	7	10	13	10	14	1	5,32	17	1	3	5	4
100	3	4,00	-	23	19	7	9	14	15	5	2	7	6	18	9	15	4,6	0	0	1,1	0	0	2
101	3	4,31	-	17	22	14	16	14	11	6	5	6	18	20	12	11	2,3	11	25	1	2	4	3
102	5	4,03	-	18	22	15	16	15	15	14	6	9	8	14	9	18	1,8	10,6	21	1	1	3	4

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103	4	4,90	-	17	24	12	15	17	13	14	3	16	12	19	13	9	2,45	9,98	21	1	1	3	7
104	4	4,50	+	17	22	14	16	16	13	12	5	13	13	20	7	14	1,7	9,49	29	2,4	4	11	6
105	4	4,65	-	17	22	14	16	15	13	15	5	12	13	20	11	13	1,9	6,27	22	2,7	0	4	7
106	4	3,69	+	18	22	14	16	10	13	4	4	3	11	10	7	8	1,65	5,08	15	1,8	3	7	3
107	3	3,87	-	17	20	13	15	11	11	6	1	4	4	9	13	11	1,85	4,71	11	1,3	2	6	3
108	4	4,19	+	17	22	14	16	17	13	19	0	9	11	13	9	16	2,05	3,74	11	1,1	1	3	3
109	4	4,40	+	16	22	14	16	14	14	11	5	10	14	16	11	13	2,95	12,3	29	2,1	2,25	8	7
110	4	4,08	+	18	22	14	16	15	15	14	5	8	6	14	10	13	3,8	4,7	29	4,2	2,39	10	3
111	5	4,43	-	16	22	14	16	15	13	14	6	13	17	16	11	10	4	6,19	20	2,8	2	4	3
112	4	4,00	+	17	22	14	16	11	13	16	3	10	10	15	9	9	1,15	3,91	13	1	0	1	4
113	4	4,21	+	17	18	18	18	11	13	11	1	12	14	13	13	6	3,05	6,26	14	2,1	1	2	3
114	4	4,36	+	18	18	12	12	14	15	15	9	16	12	19	11	13	6,2	10,2	23	2,8	1	2	6
115	4	4,64	-	17	23	15	16	15	16	13	10	15	18	16	15	14	1,9	5,78	21	2,4	4	11	5
116	4	4,01	+	17	23	15	16	16	16	10	10	10	13	11	7	10	5,6	11,2	31	2,1	4,65	10	5
117	4	4,09	+	17	22	15	17	14	12	6	2	4	6	16	12	9	1,05	7	15	0,9	2	4	2
118	4	4,48	+	17	24	12	15	14	12	15	4	10	16	20	11	12	3,6	10,1	34	4	3	8	5
119	4	4,02	+	17	22	14	16	11	15	9	4	8	7	18	11	12	1,5	4,77	21	1,6	1	6	3
120	5	4,38	-	16	22	14	16	17	14	12	6	8	16	20	9	17	2,16	10,7	29	2,3	1	6	3
121	5	4,67	+	17	23	15	16	19	14	13	4	14	13	17	12	11	9,3	14,2	47	4,3	3,7	11	5
122	5	4,43	-	16	21	14	14	15	15	13	7	15	18	19	10	9	2	8,41	25	0,9	3	3	4
123	5	4,34	-	17	18	15	16	13	11	13	4	12	17	20	12	11	7,69	12,5	35	4	2	5	5
124	2	3,98	-	18	13	18	15	13	11	15	5	10	12	15	11	11	4	8	23	2,5	2,33	8	4
125	3	4,60	-	16	23	17	18	17	14	12	1	16	17	11	7	7	7,45	9,69	23	3,2	3	8	5
126	4	4,24	+	16	17	13	15	14	16	14	2	12	18	18	9	12	2	8,65	28	1,6	1	5	5
127	4	4,45	+	17	20	13	13	15	15	5	4	10	16	19	10	13	3,55	11,6	32	2,7	3,33	7	4
128	5	4,27	-	17	23	15	14	14	14	9	12	11	8	15	10	13	1	1,5	3	1,2	0	2	2
129	5	4,60	+	17	20	13	12	15	14	13	7	16	15	15	13	15	2,85	10,1	21	1,1	0	0	5
130	3	3,84	-	17	19	14	14	15	12	5	4	2	3	10	8	5	4	8	23	2	2	7	4
131	4	4,09	+	17	17	14	15	15	15	15	10	13	14	16	11	12	2,75	9,64	30	1,1	2	5	5
132	3	4,20	-	17	18	12	12	15	12	4	0	8	5	13	12	10	4,3	6,79	17	1	2	4	3
133	5	3,83	-	19	13	4	5	15	13	6	5	5	9	12	11	9	6,85	5,54	14	1	0	0	4
134	4	4,25	+	17	23	15	13	15	15	11	7	7	9	18	13	13	2,2	8,64	25	1,1	2	7	3
135	5	4,25	-	18	17	14	15	16	14	11	11	15	14	15	11	15	3,8	12,9	39	3,8	7	16	4
136	4	4,15	+	17	19	14	14	14	12	10	0	5	6	13	12	9	1	1,91	5	1	0	3	3
137	5	4,40	-	17	21	16	15	16	14	11	4	9	12	16	12	8	2,95	9,49	30	1,1	1	5	5
138	5	4,41	-	17	23	9	7	14	14	10	5	9	16	20	9	11	3,5	5,14	11	1	1	3	3
139	5	4,57	+	18	23	5	6	15	11	13	3	13	11	13	12	10	7,35	0	0	2,1	0	0	4
140	5	4,61	+	18	26	10	11	15	15	14	7	16	14	15	10	16	2,8	9,44	25	2,2	2	4	5
141	3	3,97	-	17	21	10	12	12	8	6	5	5	6	19	8	7	4	8	21	1,5	2	3	4
142	3	4,47	-	17	25	8	8	15	12	11	4	9	11	16	10	11	3	5,2	14,42	1,42	1,53	2,83	4
143	5	4,46	+	18	23	5	6	15	12	11	4	9	11	16	10	11	3	5,2	14,42	1,8	0	0	4
144	3	3,96	-	17	18	5	6	11	11	9	4	6	11	18	8	5	3	5,2	14,42	1,42	1,53	2,83	4
145	4	4,54	-	16	19	6	6	17	15	16	5	14	9	20	11	16	1,7	6,29	22	1	1	2	5
146	4	4,37	+	18	22	8	9	14	9	11	1	11	13	11	10	14	3,95	0	0	0,7	0	0	3
147	5	4,19	-	17	23	5	6	13	12	12	4	7	11	17	7	6	2,3	9,12	22	1,4	1	3	5
148	3	4,30	-	17	24	7	8	13	8	13	2	6	9	20	10	11	1,9	4,29	18	0,8	0	1	4
149	4	4,08	+	17	24	8	9	14	11	6	5	4	6	11	8	7	3	5,2	14,42	1,42	1,53	2,83	4
150	4	4,29	+	17	20	11	8	14	12	14	4	9	9	17	10	11	2,5	8,6	22	2,55	4,4	7,3	5
151	4	4,08	+	17	18	7	8	18	13	10	3	3	4	18	8	8	3,5	5,14	11	1,1	1	1	4
152	4	4,41	+	17	20	9	11	16	12	7	5	10	15	10	10	6	2,1	0	1	0,9	0	0	3
153	3	3,96	-	17	18	7	7	13	15	12	5	11	8	18	11	11	3	5,87	21	1	4	6	2
154	4	4,71	-	17	21	12	12	18	15	16	7	14	17	20	13	18	2	8,59	20	2,1	3	6	4
155	3	3,93	-	31	20	13	14	16	17	10	3	8	7	14	12	8	1,5	5,17	19	1,2	3	5	2
156	3	3,87	-	21	21	15	16	13	11	4	9	6	8	7	12	11	1,65	5,22	10	0,15	0	1	2
157	5	3,96	-	22	17	6	6	14	13	11	2	6	10	12	9	12	1	1,96	5	1	0	1	2
158	5	4,33	-	19	20	13	14	17	11	13	3	10	13	16	10	10	2,95	5,47	11	1	2	3	3
159	4	4,01	+	17	22	16	17	13	13	10	0	3	2	16	11	11	1	0,25	2	1	0	2	3
160	4	3,74	+	37	21	15	17	12	15	10	0	7	6	20	12	12	4,35	10,7	26	1,7	2,5	8	3
161	4	4,03	+	26	18	6	6	14	10	6	0	5	8	17	7	8	1	5,31	12	1	1	1	2

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162	4	3,60	+	20	22	17	18	10	11	7	6	3	5	12	10	16	4,9	9,13	18	2,05	2,25	9,7	3
163	4	4,00	+	17	18	6	6	13	13	12	3	10	11	12	6	5	1	1,31	11	1	2	4	3
164	4	3,64	+	18	19	11	10	10	11	9	0	2	5	14	9	6	2,05	0	0	0,1	2,2	0	3
165	4	4,02	+	21	20	13	14	14	13	10	4	7	9	15	10	11	2	4	11	1,08	1,39	3,6	3
166	5	4,03	-	17	22	18	18	16	15	15	0	5	7	16	10	11	3	10,1	16	1	1	5	2
167	3	4,39	-	20	22	11	11	17	16	4	10	7	11	19	12	9	1,15	6,3	14	1	2	6	2
168	3	4,02	-	21	20	13	14	14	13	10	4	7	9	15	10	11	2	4	11	1,08	1,39	3,6	3
169	3	4,25	-	24	20	13	14	15	12	6	1	8	4	19	12	13	1,65	6,63	16	1,1	2,5	6	3
170	4	4,28	+	18	19	12	14	16	17	15	5	12	14	19	8	14	4,05	0	0	1,9	0	0	4
171	4	4,03	+	17	20	12	13	12	14	11	3	7	10	18	6	7	1,45	0	4	1,1	0	0	5
172	4	4,18	+	17	22	15	16	13	14	11	8	10	5	18	11	11	1	0	0	1	0	0	3
173	4	3,93	+	17	22	17	18	14	15	12	7	8	16	8	12	16	4,25	6,32	17	1,2	2,5	7	3
174	3	4,23	-	19	22	14	16	18	9	9	7	8	13	7	9	10	0,95	2,02	13	1	2	5	2
175	3	3,99	-	18	21	13	14	13	13	9	4	7	10	15	9	9	3	7	19	1	2	4	4
176	4	3,87	+	19	21	13	14	14	11	7	3	6	11	11	5	8	1,05	2,44	13	1	3	3	2
177	3	4,04	-	19	20	11	13	14	14	14	4	11	9	9	9	10	1,5	6,55	20	1,1	1	3	5
178	4	4,11	+	20	21	13	14	14	13	10	5	8	8	18	12	17	2,6	8,6	22	1,1	2	3	4
179	2	4,14	-	17	24	15	15	14	12	11	3	6	10	20	7	13	4,4	10	29	1,2	3	5	7
180	3	3,80	-	17	23	14	16	12	12	4	4	5	13	6	10	5	4	9,27	25	1,1	3	6	2
181	4	3,89	+	17	22	16	18	12	12	3	1	3	8	12	8	12	1,55	4,89	11	1	1	1	3
182	4	3,74	+	19	16	8	8	6	14	4	4	6	16	18	9	2	1,7	3,87	17	1	2	3	5
183	4	3,94	+	18	21	13	14	15	15	13	4	5	11	20	9	14	5,35	3,58	8	1	1	1	3
184	4	4,74	-	17	21	13	14	19	12	13	5	14	10	20	11	12	3,3	10,8	27	2,03	2	4	5
185	4	3,87	+	23	21	13	14	15	15	7	1	4	12	7	8	4	3	7	19	1	2	4	4
186	4	4,17	+	17	24	17	19	12	15	9	3	8	11	19	9	8	4,55	5,51	13	2	3	6	6
187	2	3,99	+	18	21	13	14	13	13	9	4	7	10	15	9	9	3	7	19	1	2	4	4
188	4	4,12	+	19	20	13	14	16	13	14	6	8	14	20	8	8	2,05	10,4	20	1	1	4	2
189	1	3,89	-	19	17	12	12	15	12	13	5	3	10	18	11	12	3,45	4,58	10	1	1	4	3
190	5	4,33	-	17	21	13	14	16	12	12	9	12	17	15	13	12	4,15	13,3	30	1	2	4	3
191	4	3,99	+	19	23	13	13	12	13	8	4	8	5	20	8	6	3	7	19	1	2	4	2
192	4	3,70	+	17	21	13	16	10	11	3	2	2	3	16	8	8	5,45	9,46	17	1,8	1	3	4
193	4	4,03	+	17	21	14	13	11	11	9	5	9	7	11	10	9	2,46	6,71	18,39	1,9	2,74	6,15	4
194	5	4,79	+	17	24	17	17	17	15	17	6	14	12	18	17	16	2,46	6,71	18,39	1,9	2,74	6,15	6
195	4	4,22	+	17	21	12	12	15	9	8	4	4	4	16	10	7	3,2	6,29	24	2,4	2	12	4
196	4	3,97	+	16	22	16	15	12	13	11	3	3	9	13	11	7	2,35	4,83	14	3,2	3	6	2
197	5	4,64	+	17	22	17	16	14	12	16	6	14	14	19	13	12	4,2	7,46	22	3,8	4,49	12,81	6
198	5	4,66	+	19	20	15	16	16	15	11	7	13	17	17	15	12	1,95	9,08	22	1	2	4	8
199	5	4,04	-	17	23	15	14	8	14	14	2	12	7	16	12	12	0,95	4,16	11	1,1	2	3	3
200	4	4,29	+	17	21	14	13	14	13	12	5	9	11	16	12	11	2,46	6,71	18,39	1,9	2,74	6,15	4
201	5	4,66	+	17	18	18	18	20	16	16	11	18	16	17	15	14	2,5	6,65	20	1,1	3	5	4
202	4	4,17	+	19	20	11	11	14	12	16	5	12	9	16	12	17	2,1	7,21	21	1,3	2	2	3
203	4	4,74	-	19	23	10	12	15	11	10	6	15	16	16	14	17	3,5	10,2	24	4,14	5,16	10	3
204	4	3,76	+	17	21	12	11	13	16	12	3	4	7	12	9	5	3,45	9,32	19	1	2	5	3
205	4	4,26	+	18	22	7	6	11	8	11	4	5	9	20	14	5	1,05	4	10	1	2	3	3
206	5	4,07	-	17	17	11	12	16	15	9	0	5	6	17	12	6	1,75	5,82	19	1,9	5,52	9	3
207	4	3,70	+	18	18	17	14	9	12	8	2	2	13	19	8	9	1,7	5,78	17	1	2	4	3
208	5	4,33	-	19	20	19	18	16	11	12	4	9	12	16	12	10	2,46	6,71	18,39	1,9	2,74	6,15	3
209	4	4,01	+	16	17	7	6	16	18	15	10	7	11	14	13	11	3,05	5,98	18	1	0	3	3
210	5	3,65	-	17	20	18	18	12	13	11	4	2	5	12	8	5	1,05	1,86	6	1,2	1	2	3
211	5	4,69	+	17	21	15	13	17	12	7	6	10	13	18	12	8	1,4	5,35	14	2	3,33	9	3
212	5	4,34	-	17	23	14	14	17	15	18	6	11	9	13	14	18	1	3,54	11	1	3,54	10,6	3
213	5	4,78	+	17	22	17	17	15	10	14	7	13	15	20	14	14	1,7	3,69	19	1,9	0,25	5	6
214	4	4,31	+	16	20	14	16	18	15	16	7	5	14	17	16	15	1,9	4,37	14,35	1,69	1,73	4,69	4
215	5	4,25	-	16	22	15	16	14	15	16	3	10	13	14	12	14	1,55	6,14	22	1,06	1	5	5
216	4	4,24	+	17	17	17	19	14	13	13	3	12	11	15	14	5	1,05	1,72	12	1	1	4	3
217	5	4,31	-	17	24	12	11	15	12	15	9	11	12	16	7	10	1,75	5,72	19	1,7	1	5	3
218	5	4,62	+	16	23	14	15	16	13	15	3	11	13	20	13	13	1,9	4,37	14,35	1,69	1,73	4,69	4
219	5	4,32	-	17	23	14	14	16	10	12	6	6	9	19	11	8	2,6	5,78	24	1,7	2,33	6	4
220	4	4,05	+	17	24	12	12	11	10	8	6	6	7	12	11	10	2,7	4,19	10	1,2	2	4	4

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221	5	3,86	-	18	20	13	13	14	13	11	6	3	7	17	10	14	3	5,76	13	1,1	1	4	3
222	4	4,30	+	17	18	15	16	16	14	15	8	11	14	18	12	14	1	2,23	12	1,1	2	3	5
223	5	4,60	+	18	21	15	15	15	15	13	9	17	16	18	14	13	3,7	7,13	24	3,1	4,91	10,6	4
224	4	4,42	+	18	23	17	18	15	16	15	8	14	17	18	13	16	1	5,43	17	0,7	1	2	3
225	5	3,97	-	18	21	13	14	13	9	7	2	1	6	18	8	12	1,9	4,37	14,35	1,69	1,73	4,69	4
226	5	4,47	+	18	22	18	18	16	14	13	2	9	15	18	12	16	1,1	3,67	9	1	0	1	3
227	5	4,89	+	17	23	14	15	18	12	14	5	10	15	20	15	11	4,2	7,25	8	4,17	1,2	0	3
228	5	4,28	-	17	21	12	12	15	13	11	7	7	11	19	10	11	1,25	1,19	14	1	0	3	4
229	5	4,91	+	18	21	12	13	18	13	13	9	15	12	16	20	9	1,65	2,99	9	1,5	0	0	3
230	5	4,51	+	17	22	18	18	15	16	10	6	11	12	20	13	13	1,15	4,16	18	2	2,24	5	4
231	4	4,42	+	17	11	6	7	16	8	9	12	13	15	16	16	18	0,95	2,88	15	1	1	3	3
232	5	4,38	-	16	17	12	14	15	9	12	1	12	7	17	13	9	1,35	8,78	19	1,3	2	3	3
233	5	4,55	+	17	17	16	16	18	12	10	6	12	11	20	12	17	1,65	3,54	12	2,1	5,71	9	5
234	5	4,34	-	18	18	13	14	15	13	10	7	11	12	18	13	12	1	1,28	7	1	3	5	4
235	4	4,01	+	18	17	12	13	12	13	6	2	5	10	19	10	8	1	2,04	13	1,79	2,51	5,77	3
236	5	4,52	+	17	19	12	13	15	15	13	8	11	15	19	15	14	2,25	9,35	21	2,8	3	4	6
237	5	4,36	-	17	17	13	14	15	12	7	2	7	9	20	12	11	2,7	4,68	14	3,5	3,58	6	3
238	4	4,50	+	17	21	16	16	15	13	10	7	11	12	18	13	12	1,25	4,14	17	2,5	3,75	7	4
239	5	4,48	+	17	22	15	16	15	17	14	16	17	14	18	14	15	1	1,99	15	1	3	7	6
240	5	4,51	+	17	18	13	14	15	13	10	7	11	12	18	13	12	1,35	5,33	19	2,8	2,03	12,74	4
241	5	4,48	+	18	21	16	17	14	16	15	15	16	18	16	18	19	1	0,37	14	1	0	3	4
242	5	4,06	-	17	21	13	15	12	12	5	2	5	11	18	8	10	2,73	6,66	13	1	2	4	5
243	5	4,47	+	18	21	16	17	14	16	15	15	16	18	17	18	19	1	0,98	11	1	1	7	3
244	5	4,60	+	17	22	11	11	16	14	9	3	12	12	13	12	7	1,85	5,34	16	1	1	3	4
245	4	4,04	+	17	11	6	7	14	12	7	5	10	9	13	10	12	1	4,51	13	1,79	2,51	5,77	3
246	5	4,67	+	17	19	12	13	14	13	6	5	11	17	20	11	11	2,1	3,37	13	3,66	3,81	11	5
247	5	4,14	-	18	21	18	18	12	12	11	3	12	11	20	9	13	1,25	7,35	17	1	5	5	4
248	4	3,91	+	29	19	14	14	15	14	12	3	5	9	12	12	4	0,85	0,43	11	1	1	2	3
249	4	3,99	+	22	20	14	16	14	10	15	6	10	12	15	7	14	1	1,98	14	1	1	4	4
250	4	4,05	+	20	20	14	14	14	13	12	5	7	10	15	11	11	3,85	6,35	16,6	2,11	2,21	4,09	4
251	5	4,34	-	21	22	11	12	17	15	14	3	9	12	19	12	13	1,2	3,61	17	1	3	5	3
252	4	4,06	+	18	20	14	14	13	15	16	10	6	11	20	9	14	1,05	0,75	0,25	3	0,15	0	4
253	4	3,87	+	17	17	13	12	15	10	13	3	5	12	17	9	10	10,95	10	13	3	4,98	0	5
254	4	4,24	+	20	20	14	14	16	16	11	3	8	15	19	9	17	3,85	6,35	16,6	2,11	2,21	4,09	4
255	3	3,78	-	18	21	13	13	11	15	15	5	4	5	16	12	15	1,5	0	2	1	2	2	5
256	4	3,88	+	19	21	13	12	12	13	4	4	3	6	9	10	7	3,85	6,35	16,6	2,11	2,21	4,09	4
257	4	4,08	+	21	16	15	12	14	13	11	6	6	9	18	14	10	4,9	14	31	4,2	4	7	3
258	5	4,30	-	17	25	17	17	12	14	15	6	12	8	17	11	5	3,15	8,16	17	2,6	2	6	4
259	4	4,20	+	16	20	15	15	15	13	10	7	9	13	11	13	12	5	11,7	31	3	4	9	4
260	4	4,13	+	17	21	11	12	14	15	14	6	6	11	12	15	9	3	6,85	14	1	0	0	5
261	4	3,90	+	20	24	14	14	12	12	6	3	3	11	9	13	11	2,6	8,99	25	1	2	3	2
262	4	4,03	+	21	18	16	15	14	11	9	7	7	6	19	10	7	6,95	9,76	24	3,5	2,33	7	4
263	3	3,68	-	19	22	11	10	6	12	7	3	5	8	17	9	5	1,3	0,99	6	0,9	3	5	2
264	5	3,76	-	21	20	10	12	10	10	7	1	1	5	20	11	10	1,85	3,43	11	0,9	0	1	2
265	5	4,04	-	25	21	11	10	17	10	6	1	3	3	11	7	6	1,1	3,99	16	1	1	3	2
266	5	3,76	-	18	21	12	13	12	12	10	5	6	6	10	7	5	1,9	5,28	12	1	1	3	3
267	3	4,25	-	17	24	9	9	15	15	12	4	8	8	12	12	9	1,2	3,85	15	1,1	3	6	3
268	4	4,08	+	22	22	13	13	15	14	6	4	4	10	20	11	13	2,3	7,85	18	1	4	9	2
269	4	4,19	+	19	23	14	15	14	11	8	3	4	11	19	11	7	1,2	7,42	16	1	3	6	3
270	5	4,06	-	20	22	13	13	13	12	8	3	5	8	15	11	9	2,07	5,35	15,13	1,34	2,49	5,63	3
271	5	4,17	-	19	21	11	12	14	12	3	3	6	10	16	10	14	3,4	0,94	2,2	1	3	5	3
272	2	4,09	-	17	22	13	13	15	13	13	3	6	6	19	9	16	2,07	5,35	15,13	1,34	2,49	5,63	3
273	4	4,30	+	21	19	15	16	15	12	4	3	5	10	12	14	8	2,05	5,35	13	1,9	0	5	3
274	4	4,09	+	21	24	18	18	14	12	12	2	5	9	13	12	8	2,85	8,98	21	2,1	3,25	10	3
275	5	4,17	-	19	23	13	14	14	15	5	4	8	11	9	14	15	2,75	10,3	28,05	1,4	3	6	3
276	5	3,82	-	23	22	15	17	11	12	4	1	1	9	20	11	8	2,35	7,25	19	1,1	2	5	2
277	5	4,42	-	24	21	11	10	16	12	4	2	9	6	20	11	9	1,1	3,99	16	0,9	3	5	2
278	4	4,16	+	20	22	13	13	13	10	8	1	6	6	10	11	11	2	5,35	15,13	2,32	3	7	4
279	3	3,85	-	19	20	12	13	12	13	10	3	5	9	10	13	10	3	6,36	16	2,1	4,66	10	3
280	4	4,30	+	20	23	18	18	15	10	8	3	7	7	15	13	2	2,75	4,03	12	1,5	3	3	3

The analysis of residues reflects the relative coincidence of nominal values of Y_{2T} and Y_{2E}.

1.B. The analysis of residues of the model of multiple regression with the reduced set of predictors K_i and factor Y_4.

The results of the analysis of residues of the model of multiple regression with the reduced set of independent variables K_i and dependent variable Y_4 are presented in tabl. A15.98.

Table A15.98

The analysis of residues of the linear model of multiple regression Y_4 with the reduced set of independent variables K_i

№	Y_2	Y	EQU	Age	K_7	K_8	K_9	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}	K_{45}
1	3	4,29	-	17	23	12	10	17	16	15	8	11	18	17	13	17	1,4	5,03	22	1,6	2	3	3
2	3	4,00	-	17	24	12	11	12	13	12	4	4	14	12	11	10	2,65	7,93	21	1,7	2	4	3
3	4	4,38	+	18	23	10	12	15	13	10	8	9	14	16	9	11	2,3	8,31	25	3,6	2	8	4
4	5	4,53	+	17	22	11	11	19	13	16	6	17	15	20	10	11	2,3	10,3	26	2,3	3,33	6	3
5	4	4,20	+	17	24	10	10	13	11	8	4	9	11	11	8	17	2,55	7,45	18	2,5	3,33	11	4
6	5	4,74	+	17	21	9	10	15	15	14	5	17	15	18	12	12	2,9	7,73	21	1,3	2	7	6
7	4	4,24	+	17	22	13	14	17	15	15	7	13	16	17	8	8	1,55	6,25	21	2,4	3	7	4
8	4	4,52	+	17	23	10	10	19	11	14	5	10	13	17	10	15	1,05	2,53	18	2,7	4	9	4
9	3	4,00	-	17	22	12	11	15	14	10	5	6	15	19	9	10	4,3	11,9	32	2,6	3,5	6	3
10	4	4,26	+	17	22	12	12	17	12	17	5	16	14	19	7	18	2,1	6,87	21	1	0,8	2	4
11	4	4,98	-	17	24	17	17	16	13	9	6	16	17	15	11	11	2,85	10	32	4	3,03	12	6
12	4	4,22	+	17	22	11	13	15	12	8	8	11	7	10	9	9	1	3,95	13	1	2	3	3
13	5	5,00	+	17	23	7	7	15	13	8	7	14	13	18	13	12	2,35	7,08	22	1,9	2	9	4
14	5	4,02	-	17	15	6	7	14	16	12	4	10	11	13	12	9	1,25	4,95	16	1	2	3	2
15	4	4,74	-	17	24	8	8	11	10	8	3	14	11	17	9	14	2,25	8,13	24	2,6	3,56	12	4
16	4	4,44	+	17	23	9	10	13	10	9	6	8	7	18	11	9	3	8,94	21	1	2	3	3
17	4	4,06	+	19	24	7	8	13	13	7	4	4	7	13	11	15	2,15	7,45	24	1	2	6	4
18	3	4,46	-	17	22	9	9	16	16	15	5	10	15	19	10	9	3,85	8,26	27	1	1	5	6
19	4	4,72	-	17	16	7	7	15	15	14	5	17	15	18	12	12	4	12,5	30	4	4,31	11	6
20	4	4,39	+	17	22	12	11	17	16	14	6	14	15	15	11	9	1,4	4,74	19	1	2	3	4
21	5	4,72	+	17	23	9	7	17	14	12	6	10	12	13	12	13	1	5	7	2,3	1	2	6
22	5	4,57	+	17	19	6	6	16	11	11	5	7	12	20	9	6	1,05	0,12	6	1	0	1	4
23	5	4,44	-	17	26	10	11	14	12	13	3	7	12	17	8	8	2,85	6,87	16	2,5	3,02	12	5
24	4	4,45	+	17	21	10	12	17	11	8	6	6	9	20	11	13	2,7	5,93	14	2,2	1	3	3
25	5	4,59	+	17	25	8	8	17	13	10	2	7	8	19	10	9	2,9	0,87	2	1	1	2	5
26	5	4,57	+	17	24	9	10	17	15	18	6	14	15	20	12	17	3	4	7	2	1,3	1	6
27	4	4,56	+	18	23	5	6	17	16	18	3	16	15	19	12	12	1	0	4	1	2	3	5
28	5	4,94	+	17	18	5	6	14	11	9	3	12	7	18	11	11	1,05	0,5	2	1,1	1	3	7
29	5	4,38	-	17	20	11	10	16	13	14	7	13	19	20	11	12	2,55	7,9	25	4,2	5,9	12	3
30	5	4,08	-	17	18	8	7	17	13	13	5	10	16	18	7	9	4,6	13,7	35	2,9	4,25	10	4
31	5	3,90	-	17	22	7	7	17	16	15	7	11	17	13	8	13	1,5	5,56	20	3,2	4,1	3	3
32	4	4,08	+	18	22	8	9	15	15	14	4	7	11	20	7	13	5,4	6,12	11	4,3	0	1	4
33	4	4,43	+	17	24	8	9	15	17	13	4	6	13	19	14	15	3,15	10,7	21	2	2,5	9	5
34	5	4,26	-	17	20	11	8	15	13	14	4	6	7	20	7	10	2,9	0,97	1	1	0	0	6
35	5	4,73	+	17	18	7	8	17	14	13	3	14	18	20	11	11	3,5	8,92	33	3,2	2,25	6	5
36	5	4,69	+	17	20	9	11	15	16	11	7	13	12	21	15	14	2,4	7,54	2	5	5,15	13	4
37	4	4,28	+	18	23	5	6	14	14	6	4	4	8	20	10	11	1	0,37	1	1	0	0	3
38	5	5,02	+	17	18	7	7	17	12	13	6	14	12	20	14	16	5,7	5,12	13	4,9	1,2	3	5
39	5	4,34	-	17	21	12	13	17	10	5	5	9	10	17	7	8	2,4	8,47	19	1	2	3	5
40	4	4,07	+	18	20	12	9	15	16	14	3	14	10	14	9	18	4,9	8,38	19	3,2	3,2	8	5
41	4	4,67	-	18	24	7	8	17	10	7	4	11	8	14	12	13	2,1	5,9	14	3,5	4,25	9	3
42	5	4,28	-	18	25	6	7	13	12	14	5	9	12	15	11	10	1,55	3,69	17	1,3	4	7	4
43	5	4,36	-	17	23	12	13	16	14	13	5	4	8	18	12	13	2	5	10	1,2	2	6	6
44	5	4,76	+	17	24	10	10	19	15	15	7	13	15	19	10	14	4,4	13,4	46	2,3	1,83	5	7
45	5	4,16	-	17	18	12	14	15	15	12	5	11	17	20	13	11	4,3	8,66	21	1,1	2	3	4
46	5	4,48	+	17	25	7	8	15	15	8	4	9	9	18	9	11	1	3,66	10	1	0	2	3
47	4	3,90	+	17	22	11	9	19	16	17	8	14	13	15	13	16	13	11	29	1,3	3	3	4

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48	5	4,29	-	17	22	15	15	15	17	15	6	11	7	17	12	16	5,4	12,2	27	4,01	3	9	4
49	3	3,77	-	17	22	13	15	10	15	15	9	6	14	17	9	16	1,75	5,08	21	3	2,2	3	3
50	5	4,68	+	17	19	10	8	18	16	12	14	16	9	13	17	18	3	7	13	2	1	1	3
51	5	5,00	+	17	24	8	8	17	14	13	5	13	12	19	12	3	2,15	3,59	13	2,1	1,5	5	4
52	4	4,24	+	17	22	10	11	18	12	9	9	9	16	20	12	12	10,7	11,3	29	1,5	1	1	4
53	5	4,41	-	17	24	10	10	17	9	9	7	5	18	19	10	10	3,55	5,51	28	1,7	3,33	7	4
54	5	4,90	+	16	25	12	14	17	16	14	7	18	11	19	11	11	4,15	10,8	32	2,5	2,44	10	4
55	4	4,26	+	16	21	13	16	17	16	14	10	13	17	20	11	14	5	9	20	1,5	1	0,9	5
56	5	3,60	-	18	21	15	16	16	12	9	4	10	10	10	7	13	7,6	8,46	22	1,4	2	3	4
57	5	4,11	-	17	12	4	5	18	12	12	6	5	8	20	12	8	4,1	10,9	29	1	3	4	3
58	5	3,74	-	17	23	9	10	13	12	10	4	5	11	19	9	9	10,7	11,3	29	1,6	5,5	7	5
59	4	4,25	+	18	18	12	14	9	14	11	4	8	17	20	16	12	3,4	11,7	22	1,4	1,5	4	5
60	5	4,37	-	18	25	10	10	15	11	3	2	9	13	20	9	12	3,4	11,7	22	1,3	1	3	3
61	5	4,05	-	16	18	7	7	18	12	8	2	2	9	14	6	9	1,65	7,16	10	1,4	1	4	4
62	4	4,32	+	16	19	8	9	17	13	5	10	10	14	16	11	16	12,6	15,7	38	4,01	4,03	12	5
63	5	4,67	+	17	22	9	10	10	12	4	4	7	6	17	11	15	1,05	4,71	14	2	0,5	6	4
64	5	4,48	+	18	19	8	7	18	13	12	5	10	15	16	13	8	1,95	3,27	6	1	0	3	3
65	5	4,28	-	17	21	7	7	14	13	16	10	13	10	19	11	10	11,5	6,96	18	2,6	1	3	3
66	3	3,92	-	17	20	16	17	13	15	11	3	8	13	17	11	7	2	5,6	11	1	2	2	3
67	5	4,12	-	17	20	6	8	10	11	5	2	4	12	20	8	8	1,05	5,7	19	1,6	3,5	7	3
68	4	3,90	+	17	21	7	7	9	16	5	4	6	14	17	8	11	1,95	6,09	19	1	2	5	3
69	5	4,14	-	21	21	8	8	14	10	3	2	4	13	16	13	7	3,5	11,2	26	1,7	2	3	4
70	3	4,36	-	18	25	8	7	14	11	13	5	13	11	12	7	7	2	4,07	16	1	2	6	4
71	5	4,30	-	17	24	8	8	15	11	14	4	5	7	14	8	9	1	2,22	8	1	2	5	5
72	3	4,34	-	17	13	5	5	16	15	13	1	7	10	18	10	11	5,38	9,95	32	3,5	2,24	9	5
73	3	3,94	-	19	14	15	15	16	10	15	3	5	13	16	11	13	1	2,39	13	1,2	1	5	5
74	3	4,53	-	17	23	7	8	16	16	11	5	13	14	18	11	13	2,1	3	7	2,1	3	7	5
75	5	4,29	-	17	18	8	7	13	16	10	3	5	7	19	9	9	1,1	4,37	8	1	0	3	5
76	4	3,19	-	25	21	12	13	16	10	17	1	8	5	6	8	11	1,75	3,58	10	1,5	1	3	4
77	4	3,36	-	22	19	11	14	11	9	6	9	7	9	6	6	6	2,05	5,77	26	1,6	3	6	4
78	5	4,39	-	17	22	8	7	14	10	10	3	8	13	14	11	16	5,45	11,2	24	3	2,25	7	4
79	5	4,37	-	17	22	11	9	12	12	5	3	5	15	20	9	9	1	5,59	17	1	1	3	4
80	3	2,53	+	30	21	8	8	11	9	8	2	5	7	6	6	4	1	6,09	8	0,2	0	0	3
81	3	4,62	-	17	20	10	8	12	12	14	5	11	15	20	15	17	3,3	8,46	27	1,5	1	1	4
82	3	4,11	-	19	21	14	14	13	12	15	5	6	15	14	14	11	2,05	5,77	26	1,6	3	6	5
83	5	3,72	-	24	19	11	14	14	18	13	7	14	6	7	16	12	2,03	5,77	26	1,6	3	6	5
84	4	3,70	+	20	24	8	7	16	14	6	5	5	13	17	6	12	1	3,89	5	1	1	1	4
85	3	3,38	+	24	20	11	11	13	12	5	3	1	1	16	10	7	1	1,36	13	2,1	4	7	2
86	3	3,52	+	21	21	12	10	16	15	18	3	9	8	14	9	10	2	4,42	13	1,44	2,09	4,93	2
87	3	3,34	+	21	23	7	8	11	10	4	2	2	8	14	5	10	0,95	5,08	13	1	3	7	2
88	3	2,76	+	31	15	7	7	12	8	5	3	3	8	19	8	14	1,8	5,8	16	1,5	0	5	3
89	3	4,18	-	17	22	10	12	13	12	4	4	2	3	17	8	7	1	1,07	11	1,3	2	7	2
90	5	3,50	-	19	22	15	16	12	14	12	2	4	0	8	7	11	1,85	3,63	8	1	0	2	3
91	3	3,25	+	23	20	12	11	14	14	17	4	8	12	9	12	15	2	4,42	13	1,44	2,09	4,93	3
92	3	3,79	-	20	19	11	14	15	13	7	3	3	3	12	9	5	1,1	2,59	12	1,2	1	4	3
93	5	3,86	-	18	22	15	15	14	10	9	4	7	18	18	10	14	4,35	11,98	30	2,8	4,58	8	3
94	3	3,69	-	20	19	12	13	9	12	5	2	5	6	15	10	13	2,05	1,39	4	1,8	2,33	6	3
95	3	3,90	-	17	23	11	12	14	14	13	3	5	10	11	9	13	1,4	3,52	14	1,1	1	4	3
96	3	2,93	+	27	21	11	12	12	10	10	2	10	13	13	8	10	2,85	3,09	10	1,2	2	3	3
97	3	3,54	-	22	26	7	8	15	9	15	3	11	16	15	9	15	2,05	10,6	22	1,9	5,31	7	3
98	3	3,14	+	22	23	11	12	15	12	13	4	2	6	10	6	15	1,1	3,2	13	1	1	4	3
99	3	3,95	-	17	14	6	6	14	14	7	3	7	10	13	10	14	1	5,32	17	1	3	5	4
100	3	3,30	+	23	19	7	9	14	15	5	2	7	6	18	9	15	4,6	0	0	1,1	0	0	2
101	4	4,20	+	17	22	14	16	14	11	6	5	6	18	20	12	11	2,3	11	25	1	2	4	3
102	5	3,78	-	18	22	15	16	15	15	14	6	9	8	14	9	18	1,8	10,6	21	1	1	3	4
103	5	5,03	+	17	24	12	15	17	13	14	3	16	12	19	13	9	2,45	9,98	21	1	1	3	7
104	5	4,38	-	17	22	14	16	16	13	12	5	13	13	20	7	14	1,7	9,49	29	2,4	4	11	6
105	5	4,90	+	17	22	14	16	15	13	15	5	12	13	20	11	13	1,9	6,27	22	2,7	0	4	7
106	5	3,56	-	18	22	14	16	10	13	4	4	3	11	10	7	8	1,65	5,08	15	1,8	3	7	3

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107	5	4,17	-	17	20	13	15	11	11	6	1	4	4	9	13	11	1,85	4,71	11	1,3	2	6	3
108	3	3,84	-	17	22	14	16	17	13	19	0	9	11	13	9	16	2,05	3,74	11	1,1	1	3	3
109	5	4,58	+	16	22	14	16	14	14	11	5	10	14	16	11	13	2,95	12,3	29	2,1	2,25	8	7
110	5	4,22	-	18	22	14	16	15	15	14	5	8	6	14	10	13	3,8	4,7	29	4,2	2,39	10	3
111	5	4,39	-	16	22	14	16	15	13	14	6	13	17	16	11	10	4	6,19	20	2,8	2	4	3
112	5	4,19	-	17	22	14	16	11	13	16	3	10	10	15	9	9	1,15	3,91	13	1	0	1	4
113	5	4,28	-	17	18	18	18	11	13	11	1	12	14	13	13	6	3,05	6,26	14	2,1	1	2	3
114	4	4,39	+	18	18	12	12	14	15	15	9	16	12	19	11	13	6,2	10,2	23	2,8	1	2	6
115	5	4,62	+	17	23	15	16	15	16	13	10	15	18	16	15	14	1,9	5,78	21	2,4	4	11	5
116	4	3,74	+	17	23	15	16	16	16	10	10	10	13	11	7	10	5,6	11,2	31	2,1	4,65	10	5
117	3	4,16	-	17	22	15	17	14	12	6	2	4	6	16	12	9	1,05	7	15	0,9	2	4	2
118	5	4,63	+	17	24	12	15	14	12	15	4	10	16	20	11	12	3,6	10,1	34	4	3	8	5
119	5	4,35	-	17	22	14	16	11	15	9	4	8	7	18	11	12	1,5	4,77	21	1,6	1	6	3
120	5	4,23	-	16	22	14	16	17	14	12	6	8	16	20	9	17	2,16	10,7	29	2,3	1	6	3
121	4	4,68	-	17	23	15	16	19	14	13	4	14	13	17	12	11	9,3	14,2	47	4,3	3,7	11	5
122	5	4,30	-	16	21	14	14	15	15	13	7	15	18	19	10	9	2	8,41	25	0,9	3	3	4
123	5	4,49	+	17	18	15	16	13	11	13	4	12	17	20	12	11	7,69	12,5	35	4	2	5	5
124	3	4,01	-	18	13	18	15	13	11	15	5	10	12	15	11	11	4	8	23	2,5	2,33	8	4
125	4	4,22	+	16	23	17	18	17	14	12	1	16	17	11	7	7	7,45	9,69	23	3,2	3	8	5
126	4	4,23	+	16	17	13	15	14	16	14	2	12	18	18	9	12	2	8,65	28	1,6	1	5	5
127	4	4,24	+	17	20	13	13	15	15	5	4	10	16	19	10	13	3,55	11,6	32	2,7	3,33	7	4
128	3	4,28	-	17	23	15	14	14	14	9	12	11	8	15	10	13	1	1,5	3	1,2	0	2	2
129	5	4,57	+	17	20	13	12	15	14	13	7	16	15	15	13	15	2,85	10,1	21	1,1	0	0	5
130	5	4,05	-	17	19	14	14	15	12	5	4	2	3	10	8	5	4	8	23	2	2	7	4
131	5	4,17	-	17	17	14	15	15	15	15	10	13	14	16	11	12	2,75	9,64	30	1,1	2	5	5
132	5	4,27	-	17	18	12	12	15	12	4	0	8	5	13	12	10	4,3	6,79	17	1	2	4	3
133	5	3,80	-	19	13	4	5	15	13	6	5	5	9	12	11	9	6,85	5,54	14	1	0	0	4
134	4	4,36	+	17	23	15	13	15	15	11	7	7	9	18	13	13	2,2	8,64	25	1,1	2	7	3
135	3	4,06	-	18	17	14	15	16	14	11	11	15	14	15	11	15	3,8	12,9	39	3,8	7	16	4
136	4	4,31	+	17	19	14	14	14	12	10	0	5	6	13	12	9	1	1,91	5	1	0	3	3
137	5	4,54	+	17	21	16	15	16	14	11	4	9	12	16	12	8	2,95	9,49	30	1,1	1	5	5
138	5	4,19	-	17	23	9	7	14	14	10	5	9	16	20	9	11	3,5	5,14	11	1	1	3	3
139	5	4,53	+	18	23	5	6	15	11	13	3	13	11	13	12	10	7,35	0	0	2,1	0	0	4
140	5	4,40	-	18	26	10	11	15	15	14	7	16	14	15	10	16	2,8	9,44	25	2,2	2	4	5
141	4	4,30	+	17	21	10	12	12	8	6	5	5	6	19	8	7	4	8	21	1,5	2	3	4
142	4	4,46	+	17	25	8	8	15	12	11	4	9	11	16	10	11	3	5,2	14,42	1,42	1,53	2,83	4
143	5	4,46	+	18	23	5	6	15	12	11	4	9	11	16	10	11	3	5,2	14,42	1,8	0	0	4
144	4	4,21	+	17	18	5	6	11	11	9	4	6	11	18	8	5	3	5,2	14,42	1,42	1,53	2,83	4
145	5	4,72	+	16	19	6	6	17	15	16	5	14	9	20	11	16	1,7	6,29	22	1	1	2	5
146	5	4,11	+	18	22	8	9	14	9	11	1	11	13	11	10	14	3,95	0	0	0,7	0	0	3
147	5	4,39	-	17	23	5	6	13	12	12	4	7	11	17	7	6	2,3	9,12	22	1,4	1	3	5
148	4	4,67	-	17	24	7	8	13	8	13	2	6	9	20	10	11	1,9	4,29	18	0,8	0	1	4
149	4	4,23	+	17	24	8	9	14	11	6	5	4	6	11	8	7	3	5,2	14,42	1,42	1,53	2,83	4
150	5	4,35	-	17	20	11	8	14	12	14	4	9	9	17	10	11	2,5	8,6	22	2,55	4,4	7,3	5
151	4	4,07	+	17	18	7	8	18	13	10	3	3	4	18	8	8	3,5	5,14	11	1,1	1	1	4
152	4	4,25	+	17	20	9	11	16	12	7	5	10	15	10	10	6	2,1	0	1	0,9	0	0	3
153	5	4,03	-	17	18	7	7	13	15	12	5	11	8	18	11	11	3	5,87	21	1	4	6	2
154	4	4,39	+	17	21	12	12	18	15	16	7	14	17	20	13	18	2	8,59	20	2,1	3	6	4
155	2	2,53	+	31	20	13	14	16	17	10	3	8	7	14	12	8	1,5	5,17	19	1,2	3	5	2
156	3	3,60	+	21	21	15	16	13	11	4	9	6	8	7	12	11	1,65	5,22	10	0,15	0	1	2
157	3	3,40	+	22	17	6	6	14	13	11	2	6	10	12	9	12	1	1,96	5	1	0	1	2
158	3	3,87	-	19	20	13	14	17	11	13	3	10	13	16	10	10	2,95	5,47	11	1	2	3	3
159	3	4,20	-	17	22	16	17	13	13	10	0	3	2	16	11	11	1	0,25	2	1	0	2	3
160	3	1,98	-	37	21	15	17	12	15	10	0	7	6	20	12	12	4,35	10,7	26	1,7	2,5	8	3
161	3	3,14	+	26	18	6	6	14	10	6	0	5	8	17	7	8	1	5,31	12	1	1	1	2
162	2	3,49	-	20	22	17	18	10	11	7	6	3	5	12	10	16	4,9	9,13	18	2,05	2,25	9,7	3
163	3	4,00	-	17	18	6	6	13	13	12	3	10	11	12	6	5	1	1,31	11	1	2	4	3
164	3	3,65	-	18	19	11	10	10	11	9	0	2	5	14	9	6	2,05	0	0	0,1	2,2	0	3
165	3	3,62	-	21	20	13	14	14	13	10	4	7	9	15	10	11	2	4	11	1,08	1,39	3,6	3

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166	3	3,78	-	17	22	18	18	16	15	15	0	5	7	16	10	11	3	10,1	16	1	1	5	2
167	3	4,02	-	20	22	11	11	17	16	4	10	7	11	19	12	9	1,15	6,3	14	1	2	6	2
168	3	3,62	-	21	20	13	14	14	13	10	4	7	9	15	10	11	2	4	11	1,08	1,39	3,6	3
169	2	3,67	-	24	20	13	14	15	12	6	1	8	4	19	12	13	1,65	6,63	16	1,1	2,5	6	3
170	3	3,81	-	18	19	12	14	16	17	15	5	12	14	19	8	14	4,05	0	0	1,9	0	0	4
171	3	4,08	-	17	20	12	13	12	14	11	3	7	10	18	6	7	1,45	0	4	1,1	0	0	5
172	4	4,35	+	17	22	15	16	13	14	11	8	10	5	18	11	11	1	0	0	1	0	0	3
173	3	3,63	-	17	22	17	18	14	15	12	7	8	16	8	12	16	4,25	6,32	17	1,2	2,5	7	3
174	4	3,80	+	19	22	14	16	18	9	9	7	8	13	7	9	10	0,95	2,02	13	1	2	5	2
175	2	3,92	-	18	21	13	14	13	13	9	4	7	10	15	9	9	3	7	19	1	2	4	4
176	3	3,38	+	19	21	13	14	14	11	7	3	6	11	11	5	8	1,05	2,44	13	1	3	3	2
177	4	3,95	+	19	20	11	13	14	14	14	4	11	9	9	9	10	1,5	6,55	20	1,1	1	3	5
178	3	3,89	+	20	21	13	14	14	13	10	5	8	8	18	12	17	2,6	8,6	22	1,1	2	3	4
179	3	4,12	-	17	24	15	15	14	12	11	3	6	10	20	7	13	4,4	10	29	1,2	3	5	7
180	3	3,75	-	17	23	14	16	12	12	4	4	5	13	6	10	5	4	9,27	25	1,1	3	6	2
181	2	3,77	-	17	22	16	18	12	12	3	1	3	8	12	8	12	1,55	4,89	11	1	1	1	3
182	2	3,93	-	19	16	8	8	6	14	4	4	6	16	18	9	2	1,7	3,87	17	1	2	3	5
183	3	3,56	+	18	21	13	14	15	15	13	4	5	11	20	9	14	5,35	3,58	8	1	1	1	3
184	2	4,71	-	17	21	13	14	19	12	13	5	14	10	20	11	12	3,3	10,8	27	2,03	2	4	5
185	2	3,09	-	23	21	13	14	15	15	7	1	4	12	7	8	4	3	7	19	1	2	4	4
186	3	4,14	-	17	24	17	19	12	15	9	3	8	11	19	9	8	4,55	5,51	13	2	3	6	6
187	3	3,92	-	18	21	13	14	13	13	9	4	7	10	15	9	9	3	7	19	1	2	4	4
188	3	3,72	-	19	20	13	14	16	13	14	6	8	14	20	8	8	2,05	10,4	20	1	1	4	2
189	3	3,70	-	19	17	12	12	15	12	13	5	3	10	18	11	12	3,45	4,58	10	1	1	4	3
190	2	4,22	-	17	21	13	14	16	12	12	9	12	17	15	13	12	4,15	13,3	30	1	2	4	3
191	3	3,95	-	19	23	13	13	12	13	8	4	8	5	20	8	6	3	7	19	1	2	4	2
192	4	3,99	+	17	21	13	16	10	11	3	2	2	3	16	8	8	5,45	9,46	17	1,8	1	3	4
193	4	4,28	+	17	21	14	13	11	11	9	5	9	7	11	10	9	2,46	6,71	18,39	1,9	2,74	6,15	4
194	5	4,84	+	17	24	17	17	17	15	17	6	14	12	18	17	16	2,46	6,71	18,39	1,9	2,74	6,15	6
195	5	4,70	+	17	21	12	12	15	9	8	4	4	4	16	10	7	3,2	6,29	24	2,4	2	12	4
196	5	4,11	-	16	22	16	15	12	13	11	3	3	9	13	11	7	2,35	4,83	14	3,2	3	6	2
197	5	4,77	+	17	22	17	16	14	12	16	6	14	14	19	13	12	4,2	7,46	22	3,8	4,49	12,81	6
198	5	4,52	+	19	20	15	16	16	15	11	7	13	17	17	15	12	1,95	9,08	22	1	2	4	8
199	5	4,28	-	17	23	15	14	8	14	14	2	12	7	16	12	12	0,95	4,16	11	1,1	2	3	3
200	4	4,34	+	17	21	14	13	14	13	12	5	9	11	16	12	11	2,46	6,71	18,39	1,9	2,74	6,15	4
201	5	4,38	-	17	18	18	18	20	16	16	11	18	16	17	15	14	2,5	6,65	20	1,1	3	5	4
202	5	4,03	-	19	20	11	11	14	12	16	5	12	9	16	12	17	2,1	7,21	21	1,3	2	2	3
203	4	4,41	+	19	23	10	12	15	11	10	6	15	16	16	14	17	3,5	10,2	24	4,14	5,16	10	3
204	5	3,77	-	17	21	12	11	13	16	12	3	4	7	12	9	5	3,45	9,32	19	1	2	5	3
205	4	4,66	-	18	22	7	6	11	8	11	4	5	9	20	14	5	1,05	4	10	1	2	3	3
206	4	4,06	+	17	17	11	12	16	15	9	0	5	6	17	12	6	1,75	5,82	19	1,9	5,52	9	3
207	5	3,61	-	18	18	17	14	9	12	8	2	2	13	19	8	9	1,7	5,78	17	1	2	4	3
208	5	4,04	-	19	20	19	18	16	11	12	4	9	12	16	12	10	2,46	6,71	18,39	1,9	2,74	6,15	3
209	5	4,24	-	16	17	7	6	16	18	15	10	7	11	14	13	11	3,05	5,98	18	1	0	3	3
210	5	3,76	-	17	20	18	18	12	13	11	4	2	5	12	8	5	1,05	1,86	6	1,2	1	2	3
211	5	4,58	+	17	21	15	13	17	12	7	6	10	13	18	12	8	1,4	5,35	14	2	3,33	9	3
212	5	4,20	-	17	23	14	14	17	15	18	6	11	9	13	14	18	1	3,54	11	1	3,54	10,6	3
213	5	5,08	+	17	22	17	17	15	10	14	7	13	15	20	14	14	1,7	3,69	19	1,9	0,25	5	6
214	5	4,36	-	16	20	14	16	18	15	16	7	5	14	17	16	15	1,9	4,37	14,35	1,69	1,73	4,69	4
215	5	4,40	-	16	22	15	16	14	15	16	3	10	13	14	12	14	1,55	6,14	22	1,06	1	5	5
216	4	4,48	+	17	17	17	19	14	13	13	3	12	11	15	14	5	1,05	1,72	12	1	1	4	3
217	5	4,30	-	17	24	12	11	15	12	15	9	11	12	16	7	10	1,75	5,72	19	1,7	1	5	3
218	5	4,68	+	16	23	14	15	16	13	15	3	11	13	20	13	13	1,9	4,37	14,35	1,69	1,73	4,69	4
219	5	4,56	+	17	23	14	14	16	10	12	6	6	9	19	11	8	2,6	5,78	24	1,7	2,33	6	4
220	4	4,31	+	17	24	12	12	11	10	8	6	6	7	12	11	10	2,7	4,19	10	1,2	2	4	4
221	5	3,80	-	18	20	13	13	14	13	11	6	3	7	17	10	14	3	5,76	13	1,1	1	4	3
222	5	4,23	-	17	18	15	16	16	14	15	8	11	14	18	12	14	1	2,23	12	1,1	2	3	5
223	5	4,45	-	18	21	15	15	15	15	13	9	17	16	18	14	13	3,7	7,13	24	3,1	4,91	10,6	4
224	4	4,11	+	18	23	17	18	15	16	15	8	14	17	18	13	16	1	5,43	17	0,7	1	2	3

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225	5	4,03	-	18	21	13	14	13	9	7	2	1	6	18	8	12	1,9	4,37	14,35	1,69	1,73	4,69	4
226	5	4,06	-	18	22	18	18	16	14	13	2	9	15	18	12	16	1,1	3,67	9	1	0	1	3
227	5	4,68	+	17	23	14	15	18	12	14	5	10	15	20	15	11	4,2	7,25	8	4,17	1,2	0	3
228	5	4,45	+	17	21	12	12	15	13	11	7	7	11	19	10	11	1,25	1,19	14	1	0	3	4
229	5	5,10	+	18	21	12	13	18	13	13	9	15	12	16	20	9	1,65	2,99	9	1,5	0	0	3
230	5	4,49	+	17	22	18	18	15	16	10	6	11	12	20	13	13	1,15	4,16	18	2	2,24	5	4
231	4	4,69	-	17	11	6	7	16	8	9	12	13	15	16	16	18	0,95	2,88	15	1	1	3	3
232	5	4,68	+	16	17	12	14	15	9	12	1	12	7	17	13	9	1,35	8,78	19	1,3	2	3	3
233	5	4,28	-	17	17	16	16	18	12	10	6	12	11	20	12	17	1,65	3,54	12	2,1	5,71	9	5
234	4	4,24	+	18	18	13	14	15	13	10	7	11	12	18	13	12	1	1,28	7	1	3	5	4
235	4	4,05	+	18	17	12	13	12	13	6	2	5	10	19	10	8	1	2,04	13	1,79	2,51	5,77	3
236	5	4,57	+	17	19	12	13	15	15	13	8	11	15	19	15	14	2,25	9,35	21	2,8	3	4	6
237	5	4,35	-	17	17	13	14	15	12	7	2	7	9	20	12	11	2,7	4,68	14	3,5	3,58	6	3
238	5	4,52	+	17	21	16	16	15	13	10	7	11	12	18	13	12	1,25	4,14	17	2,5	3,75	7	4
239	5	4,62	+	17	22	15	16	15	17	14	16	17	14	18	14	15	1	1,99	15	1	3	7	6
240	5	4,77	+	17	18	13	14	15	13	10	7	11	12	18	13	12	1,35	5,33	19	2,8	2,03	12,74	4
241	5	4,61	+	18	21	16	17	14	16	15	15	16	18	16	18	19	1	0,37	14	1	0	3	4
242	5	4,02	-	17	21	13	15	12	12	5	2	5	11	18	8	10	2,73	6,66	13	1	2	4	5
243	5	4,50	+	18	21	16	17	14	16	15	15	16	18	17	18	19	1	0,98	11	1	1	7	3
244	5	4,62	+	17	22	11	11	16	14	9	3	12	12	13	12	7	1,85	5,34	16	1	1	3	4
245	4	4,12	+	17	11	6	7	14	12	7	5	10	9	13	10	12	1	4,51	13	1,79	2,51	5,77	3
246	5	4,62	+	17	19	12	13	14	13	6	5	11	17	20	11	11	2,1	3,37	13	3,66	3,81	11	5
247	5	3,82	-	18	21	18	18	12	12	11	3	12	11	20	9	13	1,25	7,35	17	1	5	5	4
248	3	2,91	+	29	19	14	14	15	14	12	3	5	9	12	12	4	0,85	0,43	11	1	1	2	3
249	3	3,51	+	22	20	14	16	14	10	15	6	10	12	15	7	14	1	1,98	14	1	1	4	4
250	3	3,78	+	20	20	14	14	14	13	12	5	7	10	15	11	11	3,85	6,35	16,6	2,11	2,21	4,09	4
251	4	3,79	+	21	22	11	12	17	15	14	3	9	12	19	12	13	1,2	3,61	17	1	3	5	3
252	4	3,95	+	18	20	14	14	13	15	16	10	6	11	20	9	14	1,05	0,75	0,25	3	0,15	0	4
253	3	3,44	+	17	17	13	12	15	10	13	3	5	12	17	9	10	10,95	10	13	3	4,98	0	5
254	3	3,52	+	20	20	14	14	16	16	11	3	8	15	19	9	17	3,85	6,35	16,6	2,11	2,21	4,09	4
255	3	3,87	-	18	21	13	13	11	15	15	5	4	5	16	12	15	1,5	0	2	1	2	2	5
256	3	3,85	-	19	21	13	12	12	13	4	4	3	6	9	10	7	3,85	6,35	16,6	2,11	2,21	4,09	4
257	3	3,85	-	21	16	15	12	14	13	11	6	6	9	18	14	10	4,9	14	31	4,2	4	7	3
258	4	4,55	+	17	25	17	17	12	14	15	6	12	8	17	11	5	3,15	8,16	17	2,6	2	6	4
259	4	4,29	+	16	20	15	15	15	13	10	7	9	13	11	13	12	5	11,7	31	3	4	9	4
260	3	4,36	-	17	21	11	12	14	15	14	6	6	11	12	15	9	3	6,85	14	1	0	0	5
261	4	3,67	+	20	24	14	14	12	12	6	3	3	11	9	13	11	2,6	8,99	25	1	2	3	2
262	3	3,93	-	21	18	16	15	14	11	9	7	7	6	19	10	7	6,95	9,76	24	3,5	2,33	7	4
263	5	3,78	-	19	22	11	10	6	12	7	3	5	8	17	9	5	1,3	0,99	6	0,9	3	5	2
264	5	3,79	-	21	20	10	12	10	10	7	1	1	5	20	11	10	1,85	3,43	11	0,9	0	1	2
265	4	3,30	-	25	21	11	10	17	10	6	1	3	3	11	7	6	1,1	3,99	16	1	1	3	2
266	5	3,81	-	18	21	12	13	12	12	10	5	6	6	10	7	5	1,9	5,28	12	1	1	3	3
267	3	4,30	-	17	24	9	9	15	15	12	4	8	8	12	12	9	1,2	3,85	15	1,1	3	6	3
268	3	3,40	+	22	22	13	13	15	14	6	4	4	10	20	11	13	2,3	7,85	18	1	4	9	2
269	4	4,00	+	19	23	14	15	14	11	8	3	4	11	19	11	7	1,2	7,42	16	1	3	6	3
270	5	3,87	-	20	22	13	13	13	12	8	3	5	8	15	11	9	2,07	5,35	15,13	1,34	2,49	5,63	3
271	5	3,75	-	19	21	11	12	14	12	3	3	6	10	16	10	14	3,4	0,94	2,2	1	3	5	3
272	3	4,00	-	17	22	13	13	15	13	13	3	6	6	19	9	16	2,07	5,35	15,13	1,34	2,49	5,63	3
273	5	4,10	-	21	19	15	16	15	12	4	3	5	10	12	14	8	2,05	5,35	13	1,9	0	5	3
274	4	3,75	+	21	24	18	18	14	12	12	2	5	9	13	12	8	2,85	8,98	21	2,1	3,25	10	3
275	5	3,93	-	19	23	13	14	14	15	5	4	8	11	9	14	15	2,75	10,3	28,05	1,4	3	6	3
276	5	3,38	-	23	22	15	17	11	12	4	1	1	9	20	11	8	2,35	7,25	19	1,1	2	5	2
277	4	3,77	+	24	21	11	10	16	12	4	2	9	6	20	11	9	1,1	3,99	16	0,9	3	5	2
278	3	4,03	-	20	22	13	13	13	10	8	1	6	6	10	11	11	2	5,35	15,13	2,32	3	7	4
279	3	3,73	-	19	20	12	13	12	13	10	3	5	9	10	13	10	3	6,36	16	2,1	4,66	10	3
280	4	4,15	+	20	23	18	18	15	10	8	3	7	7	15	13	2	2,75	4,03	12	1,5	3	3	3

The analysis of residues reflects the practically complete coincidence of the nominal values of Y_{4T} и Y_{4E}, that allows to speak about the relatively high quality of the linear model of multiple regression with taking into account of the large quantity of independent variables K_i.

2.A. The indicators of quality of the model of multiple regression with the complete set of predictors K_i and factor Y_2.

The results of the analysis of residues of the model of multiple regression with the complete set of independent variables K_i and dependent variable Y_2 are presented in tabl. A15.99.

Table A15.99

The analysis of residues of the linear model of multiple regression Y_2 with the complete set of independent variables K_i

№	Y_2	Y	EQU	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K_7	K_8	K_9	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}	K_{45}	L_{31N}	L_{36N}	L_{37}	L_{38N}
1	4	4,41	+	17	4	4	5	4	4	5	5	5	5	4	4	5	23	12	10	17	16	15	8	11	18	17	13	17	1,4	5,03	22	1,6	2	3	3	1	8	18	1
2	4	4,43	+	17	4	4	4	5	3	4	4	4	4	5	5	4	24	12	11	12	13	12	4	4	14	12	11	10	2,65	7,93	21	1,7	2	4	3	1	2	30	7
3	4	4,53	+	18	5	5	5	5	5	5	5	5	5	5	5	5	23	10	12	15	13	10	8	9	14	16	9	11	2,3	8,31	25	3,6	2	8	4	1	4	15	1
4	5	4,89	+	17	4	5	5	5	5	5	5	5	5	5	5	5	22	11	11	19	13	16	6	17	15	20	10	11	2,3	10,3	26	2,3	3,33	6	3	1	7	20	1
5	5	4,42	+	17	4	4	5	4	4	4	4	3	4	3	5	5	24	10	10	13	11	8	4	9	11	11	8	17	2,55	7,45	18	2,5	3,33	11	4	2	6	10	1
6	5	4,51	+	17	4	4	4	4	4	4	4	4	4	4	4	5	21	9	10	15	15	14	5	17	15	18	12	12	2,9	7,73	21	1,3	2	7	6	1	3	10	1
7	4	4,41	+	17	4	4	4	4	5	4	4	4	4	4	5	5	22	13	14	17	15	15	7	13	16	17	8	8	1,55	6,25	21	2,4	3	7	4	1	3	15	1
8	5	4,45	+	17	4	3	4	4	3	4	4	3	4	3	3	4	23	10	10	19	11	14	5	10	13	17	10	15	1,05	2,53	18	2,7	4	9	4	1	7	15	1
9	3	4,19	-	17	4	4	4	4	4	4	4	4	4	4	5	5	22	12	11	15	14	10	5	6	15	19	9	10	4,3	11,9	32	2,6	3,5	6	3	1	5	20	1
10	5	4,55	+	17	5	4	4	4	5	4	4	4	4	5	5	4	22	12	12	17	12	17	5	16	14	19	7	18	2,1	6,87	21	1	0,8	2	4	2	3	15	1
11	5	4,85	+	17	4	4	5	4	5	5	4	4	4	5	5	4	24	17	17	16	13	9	6	16	17	15	11	11	2,85	10	32	4	3,03	12	6	1	5	15	1
12	5	4,24	-	17	4	3	4	4	3	5	3	4	3	4	5	5	22	11	13	15	12	8	8	11	7	10	9	9	1	3,95	13	1	2	3	3	1	7	10	1
13	5	4,82	+	17	5	5	4	5	4	5	5	5	5	5	5	5	23	7	7	15	13	8	7	14	13	18	13	12	2,35	7,08	22	1,9	2	9	4	1	5	20	1
14	5	4,20	-	17	4	5	5	5	5	5	5	5	5	5	4	5	15	6	7	14	16	12	4	10	11	13	12	9	1,25	4,95	16	1	2	3	2	1	5	15	1
15	5	4,47	+	17	3	4	4	4	3	3	4	3	3	4	4	5	24	8	8	11	10	8	3	14	11	17	9	14	2,25	8,13	24	2,6	3,56	12	4	2	7	10	1
16	5	4,41	-	17	4	4	5	4	4	4	4	4	4	4	5	5	23	9	10	13	10	9	6	8	7	18	11	9	3	8,94	21	1	2	3	3	1	3	20	1
17	5	4,09	-	19	4	5	5	4	5	5	4	4	4	4	5	5	24	7	8	13	13	7	4	4	7	13	11	15	2,15	7,45	24	1	2	6	4	2	7	10	1
18	4	4,61	-	17	5	5	5	5	5	5	5	5	5	5	5	5	22	9	9	16	16	15	5	10	15	19	10	9	3,85	8,26	27	1	1	5	6	1	5	20	1
19	5	4,78	+	17	5	5	5	5	5	5	5	5	5	4	5	5	16	7	7	15	15	14	5	17	15	18	12	12	4	12,5	30	4	4,31	11	6	1	3	15	1
20	5	4,57	+	17	4	4	4	4	4	4	4	4	4	3	5	5	22	12	11	17	16	14	6	14	15	15	11	9	1,4	4,74	19	1	2	3	4	1	7	20	1
21	4	4,35	+	17	4	3	3	3	4	4	4	4	3	4	5	5	23	9	7	17	14	12	6	10	12	13	12	13	1	5	7	2,3	1	2	6	2	4	10	1
22	4	4,62	-	17	5	5	5	5	5	5	5	5	5	5	5	5	19	6	6	16	11	11	5	7	12	20	9	6	1,05	0,12	6	1	0	1	4	1	7	15	9
23	5	4,57	+	17	4	5	5	5	5	5	5	5	5	4	5	5	26	10	11	14	12	13	3	7	12	17	8	8	2,85	6,87	16	2,5	3,02	12	5	1	6	18	1
24	5	4,49	+	17	5	5	5	5	5	5	5	5	5	5	4	5	21	10	12	17	11	8	6	6	9	20	11	13	2,7	5,93	14	2,2	1	3	3	2	7	15	9
25	5	4,62	+	17	5	5	5	4	5	5	5	5	5	5	5	5	25	8	8	17	13	10	2	7	8	19	10	9	2,9	0,87	2	1	1	2	5	2	4	18	1
26	5	4,88	+	17	4	4	5	5	5	5	4	5	5	5	5	5	24	9	10	17	15	18	6	14	15	20	12	17	3	4	7	2	1,3	1	6	2	4	18	1
27	5	4,74	+	18	4	5	5	5	5	5	5	5	5	5	5	5	23	5	6	17	16	18	3	16	15	19	12	12	1	0	4	1	2	3	5	2	6	10	1
28	4	4,69	-	17	4	4	4	4	5	4	4	4	4	4	5	5	18	5	6	14	11	9	3	12	7	18	11	11	1,05	0,5	2	1,1	1	3	7	2	7	15	9
29	5	4,48	-	17	5	4	4	5	5	5	5	5	4	5	5	5	20	11	10	16	13	14	7	13	19	20	11	12	2,55	7,9	25	4,2	5,9	11	3	2	6	18	1
30	5	4,60	+	17	4	5	5	5	4	5	4	5	4	5	4	4	18	8	7	17	13	13	5	10	16	18	7	9	4,6	13,7	35	2,9	4,25	10	4	1	4	18	9
31	4	4,52	+	17	4	5	5	5	5	4	4	5	4	5	5	5	22	7	7	17	16	15	7	11	17	13	8	13	1,5	5,56	20	3,2	4,1	3	3	2	4	15	9
32	5	4,32	-	18	3	4	4	5	5	4	3	4	4	3	5	5	22	8	9	15	15	14	4	7	11	20	7	13	5,4	6,12	11	4,3	0	1	4	2	7	10	9
33	5	4,33	-	17	5	5	5	5	5	5	5	5	5	5	5	5	24	8	9	15	17	13	4	6	13	19	14	15	3,15	10,7	21	2	2,5	9	5	2	6	15	1
34	5	4,40	-	17	3	3	4	4	5	4	4	4	4	5	5	5	20	11	8	15	13	14	4	6	7	20	7	10	2,9	0,97	1	1	0	0	6	1	4	18	1
35	5	4,79	+	17	5	5	5	5	5	5	5	5	5	5	5	5	18	7	8	17	14	13	3	14	18	20	11	11	3,5	8,92	33	3,2	2,25	6	5	1	7	18	1
36	5	4,62	+	17	4	5	5	5	5	5	5	5	5	5	5	5	20	9	11	15	16	11	7	13	12	21	15	14	2,4	7,54	2	5	5,15	13	4	2	4	10	9
37	5	4,27	-	18	4	4	4	4	5	4	4	4	5	4	5	5	23	5	6	14	14	6	4	4	8	20	10	11	1	0,37	1	1	0	0	3	2	4	15	9
38	5	4,72	+	17	5	4	4	4	4	4	4	4	4	4	4	4	18	7	7	17	12	13	6	14	12	20	14	16	5,7	5,12	13	4,9	1,2	3	5	2	4	18	9

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39	3	4,70	-	17	4	4	5	4	4	4	5	5	5	4	4	5	21	12	13	17	10	5	5	9	10	17	7	8	2,4	8,47	19	1	2	3	5	1	4	18	9
40	5	4,36	-	18	4	4	5	4	5	4	5	5	4	4	5	5	20	12	9	15	16	14	3	14	10	14	9	18	4,9	8,38	19	3,2	3,2	8	5	2	7	10	9
41	5	4,47	+	18	4	4	4	4	4	4	4	4	4	4	4	4	24	7	8	17	10	7	4	11	8	14	12	13	2,1	5,9	14	3,5	4,25	9	3	2	4	10	9
42	4	4,24	+	18	5	5	5	5	5	5	5	5	5	5	5	5	25	6	7	13	12	14	5	9	12	15	11	10	1,55	3,69	17	1,3	4	7	4	1	4	10	9
43	5	4,24	-	17	4	4	5	4	4	4	4	5	4	4	4	5	23	12	13	16	14	13	5	4	8	18	12	13	2	5	10	1,2	2	6	6	1	7	15	1
44	5	4,66	+	17	5	5	5	5	5	5	5	5	5	5	5	5	24	10	10	19	15	15	7	13	15	19	10	14	4,4	13,4	46	2,3	1,83	5	7	1	6	10	1
45	5	4,25	-	17	4	4	4	4	4	5	4	4	4	3	4	5	18	12	14	15	15	12	5	11	17	20	13	11	4,3	8,66	21	1,1	2	3	4	1	4	15	9
46	5	4,58	+	17	4	5	4	5	4	5	5	5	4	5	5	5	25	7	8	15	15	8	4	9	9	18	9	11	1	3,66	10	1	0	2	3	1	7	18	9
47	4	4,27	+	17	3	3	4	4	3	4	3	3	3	3	4	5	22	11	9	19	16	17	8	14	13	15	13	16	13	11	29	1,3	3	3	4	2	6	18	1
48	4	4,18	+	17	4	4	4	4	5	4	4	5	4	3	5	5	22	15	15	15	17	15	6	11	7	17	12	16	5,4	12,2	27	4,01	3	9	4	2	7	18	9
49	2	3,67	-	17	3	3	3	4	4	4	4	4	4	4	4	4	22	13	15	10	15	15	9	6	14	17	9	16	1,75	5,08	21	3	2,2	3	3	2	4	15	0
50	4	4,44	+	17	4	3	4	4	5	4	4	4	5	3	4	5	19	10	8	18	16	12	14	16	9	13	17	18	3	7	13	2	1	1	3	2	7	18	1
51	4	4,74	-	17	5	5	5	5	5	5	5	5	5	5	5	5	24	8	8	17	14	13	5	13	12	19	12	3	2,15	3,59	13	2,1	1,5	5	4	1	6	15	1
52	4	4,31	+	17	4	4	4	4	4	4	4	4	4	4	4	5	22	10	11	18	12	9	9	9	16	20	12	12	10,7	11,3	29	1,5	1	1	4	1	4	18	9
53	4	4,40	+	17	5	5	5	5	5	5	5	5	5	5	5	5	24	10	10	17	9	9	7	5	18	19	10	10	3,55	5,51	28	1,7	3,33	7	4	1	7	10	0
54	4	4,74	-	16	5	5	5	5	5	5	5	5	5	5	5	5	25	12	14	17	16	14	7	18	11	19	11	11	4,15	10,8	32	2,5	2,44	10	4	1	7	18	9
55	4	4,28	+	16	5	4	4	4	4	5	5	5	4	5	4	4	21	13	16	17	16	14	10	13	17	20	11	14	5	9	20	1,5	1	0,9	5	2	6	18	1
56	5	4,43	-	18	5	5	5	5	5	5	5	5	5	5	5	5	21	15	16	16	12	9	4	10	10	10	7	13	7,6	8,46	22	1,4	2	3	4	2	4	15	1
57	5	4,21	-	17	5	5	5	5	5	5	5	5	5	5	5	5	12	4	5	18	12	12	6	5	8	20	12	8	4,1	10,9	29	1	3	4	3	1	7	18	1
58	5	3,97	-	17	5	5	5	5	5	5	5	5	5	5	5	5	23	9	10	13	12	10	4	5	11	19	9	9	10,7	11,3	29	1,6	5,5	7	5	1	4	15	1
59	3	3,84	-	18	3	3	4	4	4	3	4	4	3	3	4	5	18	12	14	9	14	11	4	8	17	20	16	12	3,4	11,7	22	1,4	1,5	4	5	2	7	10	1
60	5	4,74	+	18	4	5	5	5	5	5	4	4	5	5	4	5	25	10	10	15	11	3	2	9	13	20	9	12	3,4	11,7	22	1,3	1	3	3	1	6	18	1
61	5	4,44	-	16	4	5	5	5	5	5	5	5	5	5	4	5	18	7	7	18	12	8	2	2	9	14	6	9	1,65	7,16	10	1,4	1	4	4	1	4	10	0
62	4	4,25	+	16	4	4	4	4	4	5	4	4	4	5	4	5	19	8	9	17	13	5	10	10	14	16	11	16	12,6	15,7	38	4,01	4,03	12	5	2	7	15	9
63	3	4,14	-	17	3	3	3	4	5	5	3	3	3	3	5	5	22	9	10	10	12	4	4	7	6	17	11	15	1,05	4,71	14	2	0,5	6	4	2	7	10	0
64	5	4,60	+	18	4	4	4	4	4	4	5	5	4	4	5	5	19	8	7	18	13	12	5	10	15	16	13	8	1,95	3,27	6	1	0	3	3	1	4	18	0
65	4	4,17	+	17	4	4	5	5	5	5	5	5	5	4	5	5	21	7	7	14	13	16	10	13	10	19	11	10	11,5	6,96	18	2,6	1	3	3	1	4	10	0
66	4	4,00	+	17	4	4	4	4	3	4	4	5	4	4	4	5	20	16	17	13	15	11	3	8	13	17	11	7	2	5,6	11	1	2	2	3	1	4	10	1
67	4	4,00	+	17	4	5	5	4	5	4	5	5	5	5	5	4	20	6	8	10	11	5	2	4	12	20	8	8	1,05	5,7	19	1,6	3,5	7	3	1	7	15	1
68	5	3,77	-	17	3	3	3	3	4	4	3	3	3	3	3	4	21	7	7	9	16	5	4	6	14	17	8	11	1,95	6,09	19	1	2	5	3	2	4	18	9
69	5	4,23	-	21	4	4	4	4	4	4	4	4	4	4	5	5	21	8	8	14	10	3	2	4	13	16	13	7	3,5	11,2	26	1,7	2	3	4	2	6	15	1
70	5	4,42	-	18	3	3	4	4	4	4	3	4	3	4	4	4	25	8	7	14	11	13	5	13	11	12	7	7	2	4,07	16	1	2	6	4	1	7	18	9
71	5	4,40	-	17	5	5	5	5	5	5	5	5	5	5	5	5	24	8	8	15	11	14	4	5	7	14	8	9	1	2,22	8	1	2	5	5	1	7	15	9
72	4	4,39	+	17	5	5	5	5	5	5	5	5	5	5	5	4	13	5	5	16	15	13	1	7	10	18	10	11	5,38	9,95	32	3,5	2,24	9	5	1	6	18	1
73	4	4,32	+	19	3	3	5	4	3	3	4	4	3	3	4	4	14	15	15	16	10	15	3	5	13	16	11	13	1	2,39	13	1,2	1	5	5	1	4	10	0
74	4	4,57	-	17	4	4	4	5	5	5	5	5	5	5	5	4	23	7	8	16	16	11	5	13	14	18	11	13	2,1	3	7	2,1	3	7	5	2	7	15	0
75	4	4,39	+	17	5	5	5	5	5	5	5	5	4	4	5	4	18	8	7	13	16	10	3	5	7	19	9	9	1,1	4,37	8	1	0	3	5	1	6	18	1
76	5	4,30	-	25	4	5	5	5	5	5	3	3	4	4	5	4	21	12	13	16	10	17	1	8	5	6	8	11	1,75	3,58	10	1,5	1	3	4	1	7	10	9
77	5	3,98	-	22	4	4	5	4	5	4	5	5	5	4	5	4	19	11	14	11	9	6	9	7	9	6	6	6	2,05	5,77	26	1,6	3	6	4	1	4	15	0
78	5	4,57	+	17	5	5	5	5	5	5	5	5	5	5	5	5	22	8	7	14	10	10	3	8	13	14	11	16	5,45	11,2	24	3	2,25	7	4	2	7	18	9
79	4	4,39	+	17	5	5	5	5	5	5	5	5	5	5	5	5	22	11	9	12	12	5	3	5	15	20	9	9	1	5,59	17	1	1	3	4	1	6	10	1
80	2	3,90	-	30	4	4	4	4	4	4	3	3	4	4	4	4	21	8	8	11	9	8	2	5	7	6	6	4	1	6,09	8	0,2	0	0	3	1	4	15	1
81	5	4,23	-	17	5	5	4	4	5	4	4	4	4	4	4	4	20	10	8	12	12	14	5	11	15	20	15	17	3,3	8,46	27	1,5	1	1	4	2	6	18	1
82	5	4,37	-	19	4	5	5	5	4	5	5	5	4	5	5	4	21	14	14	13	12	15	5	6	15	14	14	11	2,05	5,77	26	1,6	3	6	5	1	4	18	0
83	5	3,99	-	24	4	4	5	4	4	4	4	4	4	4	5	4	19	11	14	14	18	13	7	14	6	7	16	12	2,03	5,77	26	1,6	3	6	5	1	7	10	9

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84	5	4,38	-	20	4	4	5	4	4	5	3	3	3	4	4	4	24	8	7	16	14	6	5	5	13	17	6	12	1	3,89	5	1	1	1	4	1	4	10	9
85	3	3,63	-	24	4	5	4	4	4	4	4	4	4	4	3	4	20	11	11	13	12	5	3	1	1	16	10	7	1	1,36	13	2,1	4	7	2	1	6	10	1
86	2	3,80	-	21	4	4	4	3	5	3	3	3	3	4	4	5	21	12	10	16	15	18	3	9	8	14	9	10	2	4,42	13	1,44	2,09	4,93	2	1	7	15	1
87	3	3,84	-	21	4	4	4	4	4	5	4	4	4	4	5	5	23	7	8	11	10	4	2	2	8	14	5	10	0,95	5,08	13	1	3	7	2	1	6	10	1
88	4	3,96	+	31	4	4	4	4	4	4	4	4	3	4	4	5	15	7	7	12	8	5	3	3	8	19	8	14	1,8	5,8	16	1,5	0	5	3	2	4	10	1
89	3	3,95	-	17	4	4	4	4	5	5	4	4	3	3	5	4	22	10	12	13	12	4	4	2	3	17	8	7	1	1,07	11	1,3	2	7	2	1	7	15	9
90	4	3,63	+	19	3	4	3	4	5	5	5	5	5	5	5	4	22	15	16	12	14	12	2	4	0	8	7	11	1,85	3,63	8	1	0	2	3	1	4	10	9
91	3	3,69	-	23	4	3	3	4	4	4	4	5	4	4	5	4	20	12	11	14	14	17	4	8	12	9	12	15	2	4,42	13	1,44	2,09	4,93	3	2	7	10	9
92	5	3,92	-	20	3	3	4	4	4	4	4	4	4	4	4	4	19	11	14	15	13	7	3	3	3	12	9	5	1,1	2,59	12	1,2	1	4	3	1	7	15	0
93	5	4,29	-	18	4	4	4	5	4	5	5	5	5	5	5	5	22	15	15	14	10	9	4	7	18	18	10	14	4,35	11,98	30	2,8	4,58	8	3	2	6	15	1
94	3	3,95	-	20	4	4	4	4	4	5	4	4	4	3	4	4	19	12	13	9	12	5	2	5	6	15	10	13	2,05	1,39	4	1,8	2,33	6	3	2	7	15	0
95	3	4,06	-	17	4	4	5	4	4	4	4	4	4	4	5	4	23	11	12	14	14	13	3	5	10	11	9	13	1,4	3,52	14	1,1	1	4	3	1	4	10	9
96	5	4,19	-	27	3	3	4	5	4	4	4	4	5	3	5	4	21	11	12	12	10	10	2	10	13	13	8	10	2,85	3,09	10	1,2	2	3	3	1	6	15	1
97	4	4,29	+	22	3	3	4	5	5	5	3	4	4	5	5	4	26	7	8	15	9	15	3	11	16	15	9	15	2,05	10,6	22	1,9	5,31	7	3	2	6	15	1
98	4	3,75	+	22	4	4	3	4	5	4	4	4	4	4	5	4	23	11	12	15	12	13	4	2	6	10	6	15	1,1	3,2	13	1	1	4	3	2	7	15	9
99	3	4,08	-	17	4	4	4	4	4	4	3	3	4	4	4	3	14	6	6	14	14	7	3	7	10	13	10	14	1	5,32	17	1	3	5	4	2	4	10	1
100	3	3,88	-	23	4	4	3	4	4	5	3	3	3	3	4	4	19	7	9	14	15	5	2	7	6	18	9	15	4,6	0	0	1,1	0	0	2	2	6	10	1
101	3	4,03	-	17	4	4	3	4	5	4	4	5	5	4	4	5	22	14	16	14	11	6	5	6	18	20	12	11	2,3	11	25	1	2	4	3	1	8	20	1
102	5	4,62	+	18	4	4	4	5	4	4	4	4	3	3	4	5	22	15	16	15	15	14	6	9	8	14	9	18	1,8	10,6	21	1	1	3	4	2	2	30	7
103	4	4,95	-	17	5	5	5	5	5	5	5	5	5	5	5	5	24	12	15	17	13	14	3	16	12	19	13	9	2,45	9,98	21	1	1	3	7	1	8	20	1
104	4	4,47	+	17	4	4	5	4	5	4	5	4	4	5	4	5	22	14	16	16	13	12	5	13	13	20	7	14	1,7	9,49	29	2,4	4	11	6	1	7	15	1
105	4	4,84	-	17	5	5	5	5	5	5	4	5	5	5	5	5	22	14	16	15	13	15	5	12	13	20	11	13	1,9	6,27	22	2,7	0	4	7	1	4	15	1
106	4	4,18	+	18	5	5	5	5	5	5	5	5	5	5	5	5	22	14	16	10	13	4	4	3	11	10	7	8	1,65	5,08	15	1,8	3	7	3	1	2	20	1
107	3	3,83	+	17	4	4	4	4	4	4	5	4	4	4	5	4	20	13	15	11	11	6	1	4	4	9	13	11	1,85	4,71	11	1,3	2	6	3	2	8	10	1
108	4	4,36	+	17	3	4	4	4	4	4	3	4	4	4	5	5	22	14	16	17	13	19	0	9	11	13	9	16	2,05	3,74	11	1,1	1	3	3	2	8	18	1
109	4	4,60	-	16	4	4	5	4	5	5	5	5	5	4	4	5	22	14	16	14	14	11	5	10	14	16	11	13	2,95	12,3	29	2,1	2,25	8	7	2	2	20	1
110	4	4,16	+	18	4	5	5	5	5	5	4	5	4	5	5	5	22	14	16	15	15	14	5	8	6	14	10	13	3,8	4,7	29	4,2	2,39	10	3	1	7	10	1
111	5	4,43	-	16	5	5	5	5	5	5	5	5	5	5	5	5	22	14	16	15	13	14	6	13	17	16	11	10	4	6,19	20	2,8	2	4	3	1	8	15	1
112	4	4,29	+	17	5	5	5	5	4	4	4	4	4	4	4	5	22	14	16	11	13	16	3	10	10	15	9	9	1,15	3,91	13	1	0	1	4	1	7	15	1
113	4	4,51	+	17	4	5	5	5	5	4	4	4	5	5	4	5	18	18	18	11	13	11	1	12	14	13	13	6	3,05	6,26	14	2,1	1	2	3	1	4	20	1
114	4	4,62	-	18	5	5	5	5	5	5	5	5	5	5	5	5	18	12	12	14	15	15	9	16	12	19	11	13	6,2	10,2	23	2,8	1	2	6	1	2	15	1
115	4	4,44	+	17	4	4	5	4	5	4	4	4	4	4	4	5	23	15	16	15	16	13	10	15	18	16	15	14	1,9	5,78	21	2,4	4	11	5	1	8	18	1
116	4	4,40	+	17	4	4	5	5	4	4	5	5	4	4	4	5	23	15	16	16	16	10	10	10	13	11	7	10	5,6	11,2	31	2,1	4,65	10	5	1	2	20	1
117	4	4,04	+	17	4	4	4	4	4	4	4	4	4	4	5	5	22	15	17	14	12	6	2	4	6	16	12	9	1,05	7	15	0,9	2	4	2	1	7	15	1
118	4	4,39	+	17	3	4	5	4	4	4	4	3	4	4	4	5	24	12	15	14	12	15	4	10	16	20	11	12	3,6	10,1	34	4	3	8	5	1	2	10	1
119	4	4,06	+	17	4	4	4	4	4	4	4	4	4	4	4	5	22	14	16	11	15	9	4	8	7	18	11	12	1,5	4,77	21	1,6	1	6	3	1	8	20	1
120	5	4,23	-	16	4	4	4	4	5	4	4	4	4	4	4	5	22	14	16	17	14	12	6	8	16	20	9	17	2,16	10,7	29	2,3	1	6	3	2	7	15	1
121	5	4,74	+	17	5	5	5	5	5	5	5	5	5	5	5	5	23	15	16	19	14	13	4	14	13	17	12	11	9,3	14,2	47	4,3	3,7	11	5	1	4	20	1
122	5	4,40	-	16	5	5	5	5	5	5	5	5	5	5	5	5	21	14	14	15	15	13	7	15	18	19	10	9	2	8,41	25	0,9	3	3	4	1	8	10	1
123	5	4,63	+	17	4	4	5	5	5	5	4	5	4	4	5	5	18	15	16	13	11	13	4	12	17	20	12	11	7,69	12,5	35	4	2	5	5	2	2	15	9
124	2	4,19	-	18	4	4	4	4	5	5	3	3	4	3	4	5	13	18	15	13	11	15	5	10	12	15	11	11	4	8	23	2,5	2,33	8	4	1	8	18	1
125	3	4,51	-	16	4	4	5	4	4	4	4	4	4	4	4	5	23	17	18	17	14	12	1	16	17	11	7	7	7,45	9,69	23	3,2	3	8	5	1	7	10	1
126	4	4,45	+	16	4	4	5	4	4	4	4	4	4	4	4	5	17	13	15	14	16	14	2	12	18	18	9	12	2	8,65	28	1,6	1	5	5	1	4	15	9
127	4	4,29	+	17	4	4	4	4	5	4	4	4	4	4	4	5	20	13	13	15	15	5	4	10	16	19	10	13	3,55	11,6	32	2,7	3,33	7	4	1	7	18	1
128	5	4,30	-	17	4	4	4	4	5	4	4	4	4	4	4	5	23	15	14	14	14	9	12	11	8	15	10	13	1	1,5	3	1,2	0	2	2	2	6	18	1

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129	5	4,73	+	17	5	5	5	5	5	5	5	5	5	5	5	5	20	13	12	15	14	13	7	16	15	15	13	15	2,85	10,1	21	1,1	0	0	5	2	3	10	1
130	3	3,76	-	17	4	3	3	3	4	3	3	3	3	4	4	4	19	14	14	15	12	5	4	2	3	10	8	5	4	8	23	2	2	7	4	1	4	15	9
131	4	4,31	+	17	5	5	4	5	5	5	5	5	5	5	5	5	17	14	15	15	15	15	10	13	14	16	11	12	2,75	9,64	30	1,1	2	5	5	1	7	18	1
132	3	4,44	-	17	4	4	4	5	5	5	5	5	5	5	5	5	18	12	12	15	12	4	0	8	5	13	12	10	4,3	6,79	17	1	2	4	3	1	3	18	9
133	5	3,94	-	19	4	4	4	4	5	4	4	4	4	4	4	5	13	4	5	15	13	6	5	5	9	12	11	9	6,85	5,54	14	1	0	0	4	1	7	15	9
134	4	4,06	+	17	4	4	4	4	4	4	4	4	5	3	4	5	23	15	13	15	15	11	7	7	9	18	13	13	2,2	8,64	25	1,1	2	7	3	1	5	10	9
135	5	4,46	+	18	3	3	5	4	4	4	3	3	3	3	4	5	17	14	15	16	14	11	11	15	14	15	11	15	3,8	12,9	39	3,8	7	16	4	2	3	15	1
136	4	4,24	+	17	4	4	4	4	5	4	4	4	4	4	5	5	19	14	14	14	12	10	0	5	6	13	12	9	1	1,91	5	1	0	3	3	1	5	18	1
137	5	4,27	-	17	4	4	4	4	5	4	4	4	4	4	4	5	21	16	15	16	14	11	4	9	12	16	12	8	2,95	9,49	30	1,1	1	5	5	1	7	15	9
138	5	4,16	-	17	3	3	3	4	3	3	3	3	4	3	4	4	23	9	7	14	14	10	5	9	16	20	9	11	3,5	5,14	11	1	1	3	3	1	4	10	9
139	5	4,17	-	18	4	4	3	4	4	4	4	3	4	4	4	4	23	5	6	15	11	13	3	13	11	13	12	10	7,35	0	0	1,42	1,53	2,83	4	2	6	10	1
140	5	4,44	-	18	4	5	4	4	5	4	5	5	4	4	4	4	26	10	11	15	15	14	7	16	14	15	10	16	2,8	9,44	25	2,1	0	0	5	1	4	15	9
141	3	4,06	-	17	4	5	4	4	5	4	3	4	4	3	4	4	21	10	12	12	8	6	5	5	6	19	8	7	4	8	21	2,2	2	4	4	1	7	15	1
142	3	4,33	-	17	4	4	4	4	4	4	4	4	4	4	4	4	25	8	8	15	12	11	4	9	11	16	10	11	3	5,2	14,42	1,42	1,53	2,83	4	2	7	18	9
143	5	4,35	-	18	4	4	4	4	4	4	4	4	4	4	4	4	23	5	6	15	12	11	4	9	11	16	10	11	3	5,2	14,42	1,8	0	0	4	2	6	18	1
144	3	4,12	-	17	5	5	4	5	5	5	5	5	5	4	4	4	18	5	6	11	11	9	4	6	11	18	8	5	3	5,2	14,42	1,42	1,53	2,83	4	1	4	15	0
145	4	4,73	-	16	5	5	5	5	5	5	5	5	5	5	5	4	19	6	6	17	15	16	5	14	9	20	11	16	1,7	6,29	22	1	1	2	5	2	7	18	1
146	4	4,34	+	18	4	5	4	3	3	5	5	5	5	5	5	5	22	8	9	14	9	11	1	11	13	11	10	14	3,95	0	0	0,7	0	0	3	2	7	10	9
147	5	4,39	-	17	4	5	5	4	4	5	5	5	5	4	5	5	23	5	6	13	12	12	4	7	11	17	7	6	2,3	9,12	22	1,4	1	3	5	1	6	15	1
148	3	4,38	-	17	4	4	4	4	4	4	5	4	4	4	5	5	24	7	8	13	8	13	2	6	9	20	10	11	1,9	4,29	18	0,8	0	1	4	2	4	18	9
149	4	4,04	+	17	3	4	4	4	4	4	3	3	3	3	4	3	24	8	9	14	11	6	5	4	6	11	8	7	3	5,2	14,42	1,42	1,53	2,83	4	1	7	10	0
150	4	4,39	+	17	5	5	5	4	4	5	5	5	5	5	5	4	20	11	8	14	12	14	4	9	9	17	10	11	2,5	8,6	22	2,55	4,4	7,3	5	1	7	18	9
151	4	4,29	+	17	3	3	5	4	3	4	4	4	3	4	3	5	18	7	8	18	13	10	3	3	4	18	8	8	3,5	5,14	11	1,1	1	1	4	1	6	18	1
152	4	4,41	+	17	4	4	4	4	4	4	4	4	4	4	4	4	20	9	11	16	12	7	5	10	15	10	10	6	2,1	0	1	0,9	0	0	3	1	4	15	1
153	3	3,57	-	17	4	3	3	3	4	4	4	3	4	3	4	5	18	7	7	13	15	12	5	11	8	18	11	11	3	5,87	21	1	4	6	2	1	7	10	0
154	4	4,69	-	17	5	5	5	5	5	5	5	5	5	5	5	4	21	12	12	18	15	16	7	14	17	20	13	18	2	8,59	20	2,1	3	6	4	2	7	18	1
155	3	3,79	-	31	4	4	4	5	5	4	4	4	5	4	4	5	20	13	14	16	17	10	3	8	7	14	12	8	1,5	5,17	19	1,2	3	5	2	1	4	10	1
156	3	3,85	-	21	3	3	3	3	4	5	4	4	3	4	5	5	21	15	16	13	11	4	9	6	8	7	12	11	1,65	5,22	10	0,15	0	1	2	2	7	15	1
157	5	3,89	-	22	3	5	3	4	5	4	3	4	3	4	5	4	17	6	6	14	13	11	2	6	10	12	9	12	1	1,96	5	1	0	1	2	1	6	10	1
158	5	4,51	+	19	5	4	4	5	4	5	4	5	5	5	5	5	20	13	14	17	11	13	3	10	13	16	10	10	2,95	5,47	11	1	2	3	3	1	4	18	9
159	4	4,22	+	17	5	5	5	5	5	5	4	4	4	4	4	5	22	16	17	13	13	10	0	3	2	16	11	11	1	0,25	2	1	0	2	3	1	6	15	1
160	4	3,68	+	37	4	4	4	4	4	4	4	4	4	4	4	5	21	15	17	12	15	10	0	7	6	20	12	12	4,35	10,7	26	1,7	2,5	8	3	2	7	18	9
161	4	4,00	+	26	3	4	3	3	3	4	3	4	3	3	5	5	18	6	6	14	10	6	0	5	8	17	7	8	1	5,31	12	1	1	1	2	1	4	10	9
162	4	3,65	+	20	4	5	3	4	5	4	5	5	4	4	5	5	22	17	18	10	11	7	6	3	5	12	10	16	4,9	9,13	18	2,05	2,25	9,7	3	1	7	15	9
163	4	3,96	+	17	3	3	3	4	5	4	4	5	4	4	3	5	18	6	6	13	13	12	3	10	11	12	6	5	1	1,31	11	1	2	4	3	1	6	18	1
164	4	3,96	+	18	4	5	5	5	5	5	5	4	4	4	4	5	19	11	10	10	11	9	0	2	5	14	9	6	2,05	0	0	0,1	2,2	0	3	1	4	10	0
165	4	4,03	+	21	4	4	4	4	4	4	4	4	4	4	4	5	20	13	14	14	13	10	4	7	9	15	10	11	2	4	11	1,08	1,39	3,6	3	2	7	15	0
166	5	4,19	-	17	5	5	5	5	5	5	5	5	5	5	5	5	22	18	18	16	15	15	0	5	7	16	10	11	3	10,1	16	1	1	5	2	1	6	18	1
167	3	4,14	-	20	4	4	4	4	3	3	4	3	4	3	4	5	22	11	11	17	16	4	10	7	11	19	12	9	1,15	6,3	14	1	2	6	2	2	7	10	9
168	3	4,13	-	21	4	4	4	4	4	4	4	4	4	4	4	5	20	13	14	14	13	10	4	7	9	15	10	11	2	4	11	1,08	1,39	3,6	3	2	4	15	0
169	3	4,16	-	24	4	4	3	4	4	4	3	3	3	3	4	5	20	13	14	15	12	6	1	8	4	19	12	13	1,65	6,63	16	1,1	2,5	6	3	1	7	18	9
170	4	4,33	+	18	4	4	4	5	4	5	4	4	4	4	5	4	19	12	14	16	17	15	5	12	14	19	8	14	4,05	0	0	1,9	0	0	4	1	6	10	1
171	4	4,42	+	17	4	4	4	5	3	4	4	4	4	3	4	5	20	12	13	12	14	11	3	7	10	18	6	7	1,45	0	4	1,1	0	0	5	1	4	15	1
172	4	4,46	+	17	4	5	5	5	5	5	5	5	5	5	5	5	22	15	16	13	14	11	8	10	5	18	11	11	1	0	0	1	0	0	3	1	7	18	1
173	4	3,88	+	17	4	4	4	3	4	4	4	5	4	4	4	5	22	17	18	14	15	12	7	8	16	8	12	16	4,25	6,32	17	1,2	2,5	7	3	2	6	18	1

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174	3	4,39	-	19	4	4	4	4	4	4	4	4	4	4	4	5	22	14	16	18	9	9	7	8	13	7	9	10	0,95	2,02	13	1	2	5	2	1	4	18	0
175	3	3,90	-	18	4	4	4	4	4	4	4	4	4	4	4	4	21	13	14	13	13	9	4	7	10	15	9	9	3	7	19	1	2	4	4	2	6	10	1
176	4	4,05	+	19	5	5	5	4	4	4	5	4	4	4	4	4	21	13	14	14	11	7	3	6	11	11	5	8	1,05	2,44	13	1	3	3	2	1	7	15	1
177	3	4,27	-	19	4	4	5	4	5	4	4	3	3	4	4	5	20	11	13	14	14	14	4	11	9	9	9	10	1,5	6,55	20	1,1	1	3	5	1	6	18	1
178	4	4,22	+	20	5	5	5	5	5	5	5	5	5	5	5	4	21	13	14	14	13	10	5	8	8	18	12	17	2,6	8,6	22	1,1	2	3	4	2	4	10	1
179	2	4,23	-	17	5	4	5	4	5	5	4	4	4	4	5	4	24	15	15	14	12	11	3	6	10	20	7	13	4,4	10	29	1,2	3	5	7	1	7	15	9
180	3	3,80	-	17	4	4	3	4	4	3	4	4	4	4	4	4	23	14	16	12	12	4	4	5	13	6	10	5	4	9,27	25	1,1	3	6	2	1	4	20	9
181	4	4,11	+	17	3	4	4	4	5	4	3	4	4	3	5	4	22	16	18	12	12	3	1	3	8	12	8	12	1,55	4,89	11	1	1	1	3	2	6	15	1
182	4	4,19	+	19	5	5	5	5	5	4	4	5	4	5	5	4	16	8	8	6	14	4	4	6	16	18	9	2	1,7	3,87	17	1	2	3	5	2	7	20	9
183	4	3,97	+	18	5	4	5	4	4	5	5	4	4	4	4	4	21	13	14	15	15	13	4	5	11	20	9	14	5,35	3,58	8	1	1	1	3	2	7	15	0
184	4	4,55	+	17	4	4	4	4	4	4	5	4	4	4	5	4	21	13	14	19	12	13	5	14	10	20	11	12	3,3	10,8	27	2,03	2	4	5	1	4	10	9
185	4	3,88	+	23	4	4	4	4	4	4	4	4	4	4	4	4	21	13	14	15	15	7	1	4	12	7	8	4	3	7	19	1	2	4	4	1	6	15	1
186	4	3,95	+	17	3	3	4	4	4	3	3	3	3	5	4	4	24	17	19	12	15	9	3	8	11	19	9	8	4,55	5,51	13	2	3	6	6	1	7	10	9
187	2	4,00	-	18	4	4	4	4	4	4	4	4	4	4	4	4	21	13	14	13	13	9	4	7	10	15	9	9	3	7	19	1	2	4	4	2	7	15	0
188	4	4,09	+	19	3	4	4	4	4	4	3	3	3	3	4	4	20	13	14	16	13	14	6	8	14	20	8	8	2,05	10,4	20	1	1	4	2	2	4	10	9
189	1	4,00	-	19	3	5	4	4	4	4	4	3	4	4	4	4	17	12	12	15	12	13	5	3	10	18	11	12	3,45	4,58	10	1	1	4	3	1	6	15	1
190	5	4,43	-	17	4	4	4	5	5	5	4	3	4	3	5	4	21	13	14	16	12	12	9	12	17	15	13	12	4,15	13,3	30	1	2	4	3	2	7	20	9
191	4	4,14	+	19	4	5	5	5	5	5	4	5	5	5	5	5	23	13	13	12	13	8	4	8	5	20	8	6	3	7	19	1	2	4	2	1	7	10	0
192	4	3,82	+	17	3	3	3	4	3	3	3	3	4	3	4	5	21	13	16	10	11	3	2	2	3	16	8	8	5,45	9,46	17	1,8	1	3	4	1	6	15	1
193	4	4,19	+	17	3	4	3	4	3	4	3	3	3	3	4	4	21	14	13	11	11	9	5	9	7	11	10	9	2,46	6,71	18,39	1,9	2,74	6,15	4	2	8	20	1
194	5	4,69	+	17	4	3	4	3	3	4	4	3	3	3	4	3	24	17	17	17	15	17	6	14	12	18	17	16	2,46	6,71	18,39	1,9	2,74	6,15	6	1	2	30	9
195	4	4,51	+	17	5	5	5	5	5	5	5	5	5	5	5	5	21	12	12	15	9	8	4	4	4	16	10	7	3,2	6,29	24	2,4	2	12	4	1	8	20	1
196	4	3,84	+	16	3	3	4	4	4	4	4	4	4	3	4	5	22	16	15	12	13	11	3	3	9	13	11	7	2,35	4,83	14	3,2	3	6	2	1	7	15	1
197	5	4,71	+	17	4	5	5	5	5	5	5	5	5	4	4	5	22	17	16	14	12	16	6	14	14	19	13	12	4,2	7,46	22	3,8	4,49	12,81	6	1	4	15	9
198	5	4,61	+	19	4	4	5	4	4	4	5	5	5	4	5	5	20	15	16	16	15	11	7	13	17	17	15	12	1,95	9,08	22	1	2	4	8	1	4	10	1
199	5	4,10	-	17	5	5	4	4	5	5	5	5	5	4	5	5	23	15	14	8	14	14	2	12	7	16	12	12	0,95	4,16	11	1,1	2	3	3	2	7	20	1
200	4	4,36	+	17	4	4	4	5	5	5	5	5	5	4	5	5	21	14	13	14	13	12	5	9	11	16	12	11	2,46	6,71	18,39	1,9	2,74	6,15	4	2	6	18	1
201	5	4,64	+	17	5	5	5	5	5	5	5	5	5	5	4	5	18	18	18	20	16	16	11	18	16	17	15	14	2,5	6,65	20	1,1	3	5	4	1	2	10	1
202	4	4,36	+	19	5	5	5	5	5	4	5	5	5	5	5	5	20	11	11	14	12	16	5	12	9	16	12	17	2,1	7,21	21	1,3	2	2	3	2	5	15	1
203	4	4,63	-	19	4	4	4	4	4	5	5	5	5	5	5	5	23	10	12	15	11	10	6	15	16	16	14	17	3,5	10,2	24	4,14	5,16	10	3	2	3	20	9
204	4	3,96	+	17	5	5	5	5	5	5	5	5	5	5	5	5	21	12	11	13	16	12	3	4	7	12	9	5	3,45	9,32	19	1	2	5	3	1	7	15	9
205	4	4,41	+	18	4	5	5	5	5	5	5	5	4	4	5	5	22	7	6	11	8	11	4	5	9	20	14	5	1,05	4	10	1	2	3	3	1	3	15	9
206	5	4,26	-	17	5	5	5	5	5	5	5	5	5	5	5	5	17	11	12	16	15	9	0	5	6	17	12	6	1,75	5,82	19	1,9	5,52	9	3	1	7	20	9
207	4	4,20	+	18	5	5	5	5	5	5	5	5	5	5	5	5	18	17	14	9	12	8	2	2	13	19	8	9	1,7	5,78	17	1	2	4	3	2	3	18	1
208	5	4,43	-	19	3	4	4	5	5	4	3	4	4	4	5	5	20	19	18	16	11	12	4	9	12	16	12	10	2,46	6,71	18,39	1,9	2,74	6,15	3	1	7	15	9
209	4	3,97	+	16	3	3	3	4	4	4	4	3	4	4	4	5	17	7	6	16	18	15	10	7	11	14	13	11	3,05	5,98	18	1	0	3	3	1	5	20	1
210	5	3,90	-	17	4	4	4	4	4	4	4	4	4	3	4	5	20	18	18	12	13	11	4	2	5	12	8	5	1,05	1,86	6	1,2	1	2	3	1	8	20	1
211	5	5,04	+	17	3	5	4	5	5	5	4	4	4	5	4	5	21	15	13	17	12	7	6	10	13	18	12	8	1,4	5,35	14	2	3,33	9	3	1	2	30	9
212	5	4,38	-	17	5	5	5	4	4	4	5	5	5	5	5	5	23	14	14	17	15	18	6	11	9	13	14	18	1	3,54	11	1	3,54	10,6	3	2	8	20	1
213	5	4,72	+	17	4	4	5	4	4	4	5	5	4	4	4	5	22	17	17	15	10	14	7	13	15	20	14	14	1,7	3,69	19	1,9	0,25	5	6	1	7	15	1
214	4	4,00	+	16	3	3	4	3	4	3	3	4	4	3	4	4	20	14	16	18	15	16	7	5	14	17	16	15	1,9	4,37	14,35	1,69	1,73	4,69	4	1	4	15	9
215	5	4,46	+	16	4	4	4	5	4	4	5	5	4	4	5	5	22	15	16	14	15	16	3	10	13	14	12	14	1,55	6,14	22	1,06	1	5	5	2	7	20	1
216	4	4,47	+	17	4	5	5	5	4	4	5	5	5	4	4	5	17	17	19	14	13	13	3	12	11	15	14	5	1,05	1,72	12	1	1	4	3	1	2	10	1
217	5	4,55	+	17	5	4	5	5	3	4	5	5	4	4	4	5	24	12	11	15	12	15	9	11	12	16	7	10	1,75	5,72	19	1,7	1	5	3	1	6	18	1
218	5	4,56	+	16	4	4	4	4	4	4	4	4	4	4	4	5	23	14	15	16	13	15	3	11	13	20	13	13	1,9	4,37	14,35	1,69	1,73	4,69	4	1	3	20	9

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219	5	4,38	-	17	5	5	5	5	5	5	5	5	5	5	5	5	23	14	14	16	10	12	6	6	9	19	11	8	2,6	5,78	24	1,7	2,33	6	4	1	4	10	1
220	4	4,11	+	17	3	3	4	3	3	3	3	3	3	3	5	5	24	12	12	11	10	8	6	6	7	12	11	10	2,7	4,19	10	1,2	2	4	4	2	7	15	9
221	5	4,20	-	18	3	4	5	4	4	4	4	3	4	3	4	5	20	13	13	14	13	11	6	3	7	17	10	14	3	5,76	13	1,1	1	4	3	2	3	15	9
222	4	4,64	-	17	4	5	5	5	5	5	5	5	5	5	4	5	18	15	16	16	14	15	8	11	14	18	12	14	1	2,23	12	1,1	2	3	5	2	7	20	9
223	5	4,62	+	18	4	5	5	5	5	5	5	5	5	5	5	5	21	15	15	15	15	13	9	17	16	18	14	13	3,7	7,13	24	3,1	4,91	10,6	4	1	5	15	1
224	4	4,60	-	18	4	4	5	5	5	5	5	5	5	5	5	5	23	17	18	15	16	15	8	14	17	18	13	16	1	5,43	17	0,7	1	2	3	2	3	18	1
225	5	4,10	-	18	3	3	3	4	4	4	3	3	3	4	4	4	21	13	14	13	9	7	2	1	6	18	8	12	1,9	4,37	14,35	1,69	1,73	4,69	4	2	5	20	1
226	5	4,19	-	18	4	3	4	3	4	5	5	4	4	4	4	5	22	18	18	16	14	13	2	9	15	18	12	16	1,1	3,67	9	1	0	1	3	2	7	15	9
227	5	4,69	+	17	5	5	5	5	5	5	5	5	5	5	5	5	23	14	15	18	12	14	5	10	15	20	15	11	4,2	7,25	8	4,17	1,2	0	3	1	8	20	1
228	5	4,81	+	17	5	5	5	5	5	5	5	5	5	5	4	5	21	12	12	15	13	11	7	7	11	19	10	11	1,25	1,19	14	1	0	3	4	1	2	30	9
229	5	4,77	+	18	5	5	5	5	5	5	5	5	5	5	5	4	21	12	13	18	13	13	9	15	12	16	20	9	1,65	2,99	9	1,5	0	0	3	1	8	20	1
230	5	4,78	+	17	4	4	5	4	4	4	5	5	5	5	5	4	22	18	18	15	16	10	6	11	12	20	13	13	1,15	4,16	18	2	2,24	5	4	1	2	30	9
231	4	4,77	-	17	4	4	5	5	5	5	4	5	5	4	5	4	11	6	7	16	8	9	12	13	15	16	16	18	0,95	2,88	15	1	1	3	3	1	8	20	1
232	5	4,41	-	16	4	5	4	4	4	4	4	4	4	4	5	4	17	12	14	15	9	12	1	12	7	17	13	9	1,35	8,78	19	1,3	2	3	3	1	7	15	1
233	5	4,30	-	17	4	3	4	3	4	3	4	3	3	3	4	3	17	16	16	18	12	10	6	12	11	20	12	17	1,65	3,54	12	2,1	5,71	9	5	1	4	15	9
234	5	4,35	-	18	4	4	4	4	4	4	5	5	4	4	5	4	18	13	14	15	13	10	7	11	12	18	13	12	1	1,28	7	1	3	5	4	1	7	20	1
235	4	4,07	+	18	4	4	4	4	4	5	4	4	4	4	5	4	17	12	13	12	13	6	2	5	10	19	10	8	1	2,04	13	1,79	2,51	5,77	3	1	2	10	1
236	5	4,64	+	17	5	5	5	5	4	5	5	5	5	5	5	4	19	12	13	15	15	13	8	11	15	19	15	14	2,25	9,35	21	2,8	3	4	6	2	6	18	1
237	5	4,38	-	17	4	4	4	4	4	4	5	5	4	4	5	4	17	13	14	15	12	7	2	7	9	20	12	11	2,7	4,68	14	3,5	3,58	6	3	1	3	20	9
238	4	4,31	+	17	4	4	4	4	4	4	5	5	4	4	5	4	21	16	16	15	13	10	7	11	12	18	13	12	1,25	4,14	17	2,5	3,75	7	4	1	4	10	1
239	5	4,65	+	17	5	5	5	5	5	5	5	5	5	5	5	5	22	15	16	15	17	14	16	17	14	18	14	15	1	1,99	15	1	3	7	6	2	7	15	9
240	5	4,48	+	17	4	4	4	4	4	4	5	5	4	4	5	4	18	13	14	15	13	10	7	11	12	18	13	12	1,35	5,33	19	2,8	2,03	12,74	4	1	3	15	9
241	5	4,40	-	18	4	4	3	4	4	4	4	4	4	3	5	4	21	16	17	14	16	15	15	16	18	16	18	19	1	0,37	14	1	0	3	4	2	7	20	9
242	5	4,17	-	17	4	4	4	4	4	4	4	4	4	4	5	4	21	13	15	12	12	5	2	5	11	18	8	10	2,73	6,66	13	1	2	4	5	1	5	15	1
243	5	4,51	+	18	3	4	4	4	4	4	4	4	4	3	5	4	21	16	17	14	16	15	15	16	18	17	18	19	1	0,98	11	1	1	7	3	2	3	18	1
244	5	4,74	+	17	5	5	5	5	5	5	5	5	4	5	5	4	22	11	11	16	14	9	3	12	12	13	12	7	1,85	5,34	16	1	1	3	4	1	5	20	1
245	4	4,16	-	17	3	3	4	4	4	3	4	4	4	4	4	4	11	6	7	14	12	7	5	10	9	13	10	12	1	4,51	13	1,79	2,51	5,77	3	1	7	15	9
246	5	4,51	+	17	5	5	4	4	5	5	5	5	5	5	5	4	19	12	13	14	13	6	5	11	17	20	11	11	2,1	3,37	13	3,66	3,81	11	5	1	8	20	1
247	5	4,77	+	18	5	5	5	5	5	5	5	5	5	5	5	5	21	18	18	12	12	11	3	12	11	20	9	13	1,25	7,35	17	1	5	5	4	2	2	30	9
248	4	4,00	+	29	5	5	4	4	4	5	4	4	5	5	5	5	19	14	14	15	14	12	3	5	9	12	12	4	0,85	0,43	11	1	1	2	3	1	8	20	1
249	4	4,79	-	22	4	4	5	5	5	4	5	5	5	4	5	5	20	14	16	14	10	15	6	10	12	15	7	14	1	1,98	14	1	1	4	4	2	2	30	9
250	4	4,06	+	20	4	4	4	4	5	4	4	4	4	4	5	5	20	14	14	14	13	12	5	7	10	15	11	11	3,85	6,35	16,6	2,11	2,21	4,09	4	1	8	20	1
251	5	4,16	-	21	4	4	4	4	4	4	4	4	4	4	5	5	22	11	12	17	15	14	3	9	12	19	12	13	1,2	3,61	17	1	3	5	3	1	7	15	1
252	4	4,42	+	18	4	5	5	5	5	5	4	5	5	5	5	5	20	14	14	13	15	16	10	6	11	20	9	14	1,05	0,75	0,25	3	0,15	0	4	2	4	15	9
253	4	4,11	+	17	4	4	5	5	5	4	5	5	4	5	5	5	17	13	12	15	10	13	3	5	12	17	9	10	10,95	10	13	3	4,98	0	5	1	7	20	1
254	4	4,36	+	20	4	5	5	5	4	4	5	5	4	5	4	4	20	14	14	16	16	11	3	8	15	19	9	17	3,85	6,35	16,6	2,11	2,21	4,09	4	2	2	10	1
255	3	3,99	-	18	4	4	4	4	4	4	3	4	4	4	5	5	21	13	13	11	15	15	5	4	5	16	12	15	1,5	0	2	1	2	2	5	2	6	18	1
256	4	4,11	+	19	3	4	3	4	4	4	3	3	3	3	5	4	21	13	12	12	13	4	4	3	6	9	10	7	3,85	6,35	16,6	2,11	2,21	4,09	4	1	3	20	9
257	4	3,87	+	21	4	4	4	4	5	5	4	4	4	4	5	5	16	15	12	14	13	11	6	6	9	18	14	10	4,9	14	31	4,2	4	7	3	1	4	10	1
258	5	4,31	-	17	5	5	5	5	5	4	4	4	4	4	4	5	25	17	17	12	14	15	6	12	8	17	11	5	3,15	8,16	17	2,6	2	6	4	1	7	15	9
259	4	4,17	+	16	4	4	4	4	5	5	4	3	3	4	5	4	20	15	15	15	13	10	7	9	13	11	13	12	5	11,7	31	3	4	9	4	1	3	15	9
260	4	4,19	+	17	4	3	5	4	5	4	3	4	3	3	5	5	21	11	12	14	15	14	6	6	11	12	15	9	3	6,85	14	1	0	0	5	1	7	20	9
261	4	3,81	+	20	3	3	3	4	5	5	3	3	4	4	5	5	24	14	14	12	12	6	3	3	11	9	13	11	2,6	8,99	25	1	2	3	2	2	5	15	1
262	4	4,31	+	21	4	4	5	4	4	4	3	3	3	4	4	5	18	16	15	14	11	9	7	7	6	19	10	7	6,95	9,76	24	3,5	2,33	7	4	1	3	18	1
263	3	3,87	-	19	4	4	4	4	4	4	4	4	4	4	5	5	22	11	10	6	12	7	3	5	8	17	9	5	1,3	0,99	6	0,9	3	5	2	2	8	20	1

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264	5	4,26	-	21	4	4	4	4	4	4	4	4	4	4	5	5	20	10	12	10	10	7	1	1	5	20	11	10	1,85	3,43	11	0,9	0	1	2	2	2	30	9
265	5	4,30	-	25	4	4	4	5	4	4	4	4	4	4	5	4	21	11	10	17	10	6	1	3	3	11	7	6	1,1	3,99	16	1	1	3	2	1	8	20	1
266	5	3,87	-	18	3	3	4	4	4	4	3	3	4	5	3	5	21	12	13	12	12	10	5	6	6	10	7	5	1,9	5,28	12	1	1	3	3	1	7	15	1
267	3	4,01	-	17	4	4	4	4	5	5	5	5	5	5	4	4	24	9	9	15	15	12	4	8	8	12	12	9	1,2	3,85	15	1,1	3	6	3	1	4	15	9
268	4	4,03	+	22	4	4	4	4	4	4	4	4	4	4	5	5	22	13	13	15	14	6	4	4	10	20	11	13	2,3	7,85	18	1	4	9	2	1	7	20	1
269	4	4,04	+	19	3	5	3	4	5	4	4	4	5	3	5	5	23	14	15	14	11	8	3	4	11	19	11	7	1,2	7,42	16	1	3	6	3	1	2	10	1
270	5	4,10	-	20	4	4	4	4	4	4	4	4	4	4	5	5	22	13	13	13	12	8	3	5	8	15	11	9	2,07	5,35	15,13	1,34	2,49	5,63	3	1	6	18	1
271	5	4,39	-	19	4	4	4	4	4	4	5	4	5	4	5	5	21	11	12	14	12	3	3	6	10	16	10	14	3,4	0,94	2,2	1	3	5	3	2	3	20	9
272	2	4,17	-	17	5	5	5	4	5	5	4	4	5	5	5	5	22	13	13	15	13	13	3	6	6	19	9	16	2,07	5,35	15,13	1,34	2,49	5,63	3	2	4	10	1
273	4	4,22	+	21	4	4	4	4	4	4	5	4	3	5	5	5	19	15	16	15	12	4	3	5	10	12	14	8	2,05	5,35	13	1,9	0	5	3	1	7	15	9
274	4	4,00	+	21	4	4	4	4	5	4	4	4	4	4	5	5	24	18	18	14	12	12	2	5	9	13	12	8	2,85	8,98	21	2,1	3,25	10	3	1	3	15	9
275	5	4,28	-	19	4	4	4	5	5	5	4	4	4	5	5	5	23	13	14	14	15	5	4	8	11	9	14	15	2,75	10,3	28,05	1,4	3	6	3	2	7	20	9
276	5	3,80	-	23	4	4	4	4	4	4	4	4	4	4	5	5	22	15	17	11	12	4	1	1	9	20	11	8	2,35	7,25	19	1,1	2	5	2	1	5	15	1
277	5	4,32	-	24	4	4	4	4	4	4	5	5	5	4	4	4	21	11	10	16	12	4	2	9	6	20	11	9	1,1	3,99	16	0,9	3	5	2	1	3	18	1
278	4	4,53	+	20	4	5	5	5	5	5	4	5	5	5	5	5	22	13	13	13	10	8	1	6	6	10	11	11	2	5,35	15,13	2,32	3	7	4	1	5	20	1
279	3	3,75	+	19	4	3	4	4	4	3	5	4	4	4	5	5	20	12	13	12	13	10	3	5	9	10	13	10	3	6,36	16	2,1	4,66	10	3	2	7	15	1
280	4	4,25	+	20	4	4	4	4	4	4	4	4	4	4	5	4	23	18	18	15	10	8	3	7	7	15	13	2	2,75	4,03	12	1,5	3	3	3	1	8	20	9

The analysis of residues reflects the practically complete coincidence of nominal values of Y_{2T} and Y_{2E}, which allows to speak about the relatively high quality of the linear model of multiple regression Y_2 with the complete set of independent variables K_i, taking into account a large quantity of independent variables – the parameters of PCMB.

The coarse scale of estimation of LRKT based on the quantity of correct answers to the questions does not provide the high quality of estimation of LRKT, so the level of quality of the linear model (equation) of multiple regression is potentially significantly reduced.

The exact scale of estimation of LRKT based on the sum of scored points on each correct variant of answer to the question directly allows more accurate to estimate LRKT, therefore the level of quality of the linear model of multiple regression is potentially and very significantly increasing, but the level of quality of the linear regression equation is relatively insignificantly reduced due to means of the increasing of the quantity of independent variables, which are located in its basis.

The highest qualitative linear equation of multiple regression is Y_2 with the complete ${}_2$set of independent variables, but proceeding from the results of the analysis of residues Y_2 with the reduced set of independent variables can be considered optimally qualitative (see also the nominal values of CMC and CMD).

At the analysis the nominal value of CMC (CMD), it should be taken into account, that the optimal and complete linear equation of multiple regression is Y_4 with the complete set of independent variables, as it takes into account a large quantity of independent variables (the quantity of parameters in the basis of the regression model).

2.B. The indicators of quality of the model of multiple regression with the complete set of predictors K_i and factor Y_4.

The results of the analysis of residues of the model of multiple regression with the complete set of independent variables K_i and dependent variable Y_4 are presented in tabl. A15.100.

Table A15.100

The analysis of residues of the linear model of multiple regression Y_4 with thecomplete set of independent variables K_i

№	Y	Y	EQU	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K_7	K_8	K_9	K_{14}	K_{15}	K_{16}	K_{17}	K_{18}	K_{19}	K_{20}	K_{21}	K_{22}	K_{23}	K_{24}	K_{25}	K_{27}	K_{28}	K_{29}	K_{45}	L_{31N}	L_{36N}	L_{37}	L_{38N}
1	3	4,63	-	17	4	4	5	4	4	5	5	5	5	4	4	5	23	12	10	17	16	15	8	11	18	17	13	17	1,4	5,03	22	1,6	2	3	3	1	8	18	1
2	3	4,20	-	17	4	4	4	5	3	4	4	4	4	5	5	4	24	12	11	12	13	12	4	4	14	12	11	10	2,65	7,93	21	1,7	2	4	3	1	2	30	7
3	4	4,70	-	18	5	5	5	5	5	5	5	5	5	5	5	5	23	10	12	15	13	10	8	9	14	16	9	11	2,3	8,31	25	3,6	2	8	4	1	4	15	1
4	5	4,80	+	17	4	5	5	5	5	5	5	5	5	5	5	5	22	11	11	19	13	16	6	17	15	20	10	11	2,3	10,3	26	2,3	3,33	6	3	1	7	20	1
5	4	4,27	+	17	4	4	5	4	4	4	4	3	4	3	5	5	24	10	10	13	11	8	4	9	11	11	8	17	2,55	7,45	18	2,5	3,33	11	4	2	6	10	1
6	5	4,66	+	17	4	4	4	4	4	4	4	4	4	4	4	5	21	9	10	15	15	14	5	17	15	18	12	12	2,9	7,73	21	1,3	2	7	6	1	3	10	1
7	4	4,25	+	17	4	4	4	4	5	4	4	4	4	4	5	5	22	13	14	17	15	15	7	13	16	17	8	8	1,55	6,25	21	2,4	3	7	4	1	3	15	1
8	4	4,35	+	17	4	3	4	4	3	4	4	3	4	3	3	4	23	10	10	19	11	14	5	10	13	17	10	15	1,05	2,53	18	2,7	4	9	4	1	7	15	1
9	3	4,13	-	17	4	4	4	4	4	4	4	4	4	4	5	5	22	12	11	15	14	10	5	6	15	19	9	10	4,3	11,9	32	2,6	3,5	6	3	1	5	20	1
10	4	4,20	+	17	5	4	4	4	5	4	4	4	4	5	5	4	22	12	12	17	12	17	5	16	14	19	7	18	2,1	6,87	21	1	0,8	2	4	2	3	15	1
11	4	4,76	-	17	4	4	5	4	5	5	4	4	4	5	5	4	24	17	17	16	13	9	6	16	17	15	11	11	2,85	10	32	4	3,03	12	6	1	5	15	1
12	4	3,96	+	17	4	3	4	4	3	5	3	4	3	4	5	5	22	11	13	15	12	8	8	11	7	10	9	9	1	3,95	13	1	2	3	3	1	7	10	1
13	5	5,29	+	17	5	5	4	5	4	5	5	5	5	5	5	5	23	7	7	15	13	8	7	14	13	18	13	12	2,35	7,08	22	1,9	2	9	4	1	5	20	1
14	5	4,33	-	17	4	5	5	5	5	5	5	5	5	5	4	5	15	6	7	14	16	12	4	10	11	13	12	9	1,25	4,95	16	1	2	3	2	1	5	15	1
15	4	4,77	-	17	3	4	4	4	3	3	4	3	3	4	4	5	24	8	8	11	10	8	3	14	11	17	9	14	2,25	8,13	24	2,6	3,56	12	4	2	7	10	1
16	4	4,59	-	17	4	4	5	4	4	4	4	4	4	4	5	5	23	9	10	13	10	9	6	8	7	18	11	9	3	8,94	21	1	2	3	3	1	3	20	1
17	4	4,03	+	19	4	5	5	4	5	5	4	4	4	4	5	5	24	7	8	13	13	7	4	4	7	13	11	15	2,15	7,45	24	1	2	6	4	2	7	10	1
18	3	4,67	-	17	5	5	5	5	5	5	5	5	5	5	5	5	22	9	9	16	16	15	5	10	15	19	10	9	3,85	8,26	27	1	1	5	6	1	5	20	1
19	4	4,81	-	17	5	5	5	5	5	5	5	5	5	4	5	5	16	7	7	15	15	14	5	17	15	18	12	12	4	12,5	30	4	4,31	11	6	1	3	15	1
20	4	4,32	+	17	4	4	4	4	4	4	4	4	4	3	5	5	22	12	11	17	16	14	6	14	15	15	11	9	1,4	4,74	19	1	2	3	4	1	7	20	1
21	5	4,79	+	17	4	3	3	3	4	4	4	4	3	4	5	5	23	9	7	17	14	12	6	10	12	13	12	13	1	5	7	2,3	1	2	6	2	4	10	1
22	5	4,86	+	17	5	5	5	5	5	5	5	5	5	5	5	5	19	6	6	16	11	11	5	7	12	20	9	6	1,05	0,12	6	1	0	1	4	1	7	15	9
23	5	4,56	+	17	4	5	5	5	5	5	5	5	5	4	5	5	26	10	11	14	12	13	3	7	12	17	8	8	2,85	6,87	16	2,5	3,02	12	5	1	6	18	1
24	4	4,72	-	17	5	5	5	5	5	5	5	5	5	5	4	5	21	10	12	17	11	8	6	6	9	20	11	13	2,7	5,93	14	2,2	1	3	3	2	7	15	9
25	5	4,97	+	17	5	5	5	4	5	5	5	5	5	5	5	5	25	8	8	17	13	10	2	7	8	19	10	9	2,9	0,87	2	1	1	2	5	1	4	18	1
26	5	4,73	+	17	4	4	5	5	5	5	4	5	5	5	5	5	24	9	10	17	15	18	6	14	15	20	12	17	3	4	7	2	1,3	1	6	2	4	18	1
27	4	4,64	-	18	4	5	5	5	5	5	5	5	5	5	5	5	23	5	6	17	16	18	3	16	15	19	12	12	1	0	4	1	2	3	5	2	6	10	1
28	5	5,06	+	17	4	4	4	4	5	4	4	4	4	4	5	5	18	5	6	14	11	9	3	12	7	18	11	11	1,05	0,5	2	1,1	1	3	7	2	7	15	9
29	5	4,32	-	17	5	4	4	5	5	5	5	5	4	5	5	5	20	11	10	16	13	14	7	13	19	20	11	12	2,55	7,9	25	4,2	5,9	12	3	2	6	18	1
30	5	3,86	-	17	4	5	5	5	4	5	4	5	4	5	4	4	18	8	7	17	13	13	5	10	16	18	7	9	4,6	13,7	35	2,9	4,25	10	4	1	4	18	9
31	5	3,92	-	17	4	5	5	5	5	4	4	5	4	5	5	5	22	7	7	17	16	15	7	11	17	13	8	13	1,5	5,56	20	3,2	4,1	3	3	2	4	15	9
32	4	3,84	+	18	3	4	4	5	5	4	3	4	4	3	5	5	22	8	9	15	15	14	4	7	11	20	7	13	5,4	6,12	11	4,3	0	1	4	2	7	10	9
33	4	4,47	+	17	5	5	5	5	5	5	5	5	5	5	5	5	24	8	9	15	17	13	4	6	13	19	14	15	3,15	10,7	21	2	2,5	9	5	2	6	15	1
34	5	4,79	+	17	3	3	4	4	5	4	4	4	4	5	5	5	20	11	8	15	13	14	4	6	7	20	7	10	2,9	0,97	1	1	0	0	6	1	4	18	1
35	5	4,89	+	17	5	5	5	5	5	5	5	5	5	5	5	5	18	7	8	17	14	13	3	14	18	20	11	11	3,5	8,92	33	3,2	2,25	6	5	1	7	18	1
36	5	4,86	+	17	4	5	5	5	5	5	5	5	5	5	5	5	20	9	11	15	16	11	7	13	12	21	15	14	2,4	7,54	2	5	5,15	13	4	2	4	10	9
37	4	4,62	-	18	4	4	4	4	5	4	4	4	5	4	5	5	23	5	6	14	14	6	4	4	8	20	10	11	1	0,37	1	1	0	0	3	2	4	15	9
38	5	4,95	+	17	5	4	4	4	4	4	4	4	4	4	4	4	18	7	7	17	12	13	6	14	12	20	14	16	5,7	5,12	13	4,9	1,2	3	5	2	4	18	9
39	5	4,86	+	17	4	4	5	4	4	4	5	5	5	4	4	5	21	12	13	17	10	5	5	9	10	17	7	8	2,4	8,47	19	1	2	3	5	1	4	18	9
40	4	4,20	+	18	4	4	5	4	5	4	5	5	4	4	5	5	20	12	9	15	16	14	3	14	10	14	9	18	4,9	8,38	19	3,2	3,2	8	5	2	7	10	9
41	4	4,43	+	18	4	4	4	4	4	4	4	4	4	4	4	4	24	7	8	17	10	7	4	11	8	14	12	13	2,1	5,9	14	3,5	4,25	9	3	2	4	10	9
42	5	4,40	-	18	5	5	5	5	5	5	5	5	5	5	5	5	25	6	7	13	12	14	5	9	12	15	11	10	1,55	3,69	17	1,3	4	7	4	1	4	10	9
43	5	4,27	-	17	4	4	5	4	4	4	4	5	4	4	4	5	23	12	13	16	14	13	5	4	8	18	12	13	2	5	10	1,2	2	6	6	1	7	15	1
44	5	4,89	+	17	5	5	5	5	5	5	5	5	5	5	5	5	24	10	10	19	15	15	7	13	15	19	10	14	4,4	13,4	46	2,3	1,83	5	7	1	6	10	1
45	5	3,98	-	17	4	4	4	4	4	5	4	4	4	3	4	5	18	12	14	15	15	12	5	11	17	20	13	11	4,3	8,66	21	1,1	2	3	4	1	4	15	9
46	5	4,69	+	17	4	5	4	5	4	5	5	5	4	5	5	5	25	7	8	15	15	8	4	9	9	18	9	11	1	3,66	10	1	0	2	3	1	7	18	9
47	4	3,60	+	17	3	3	4	4	3	4	3	3	3	3	4	5	22	11	9	19	16	17	8	14	13	15	13	16	13	11	29	1,3	3	3	4	2	6	18	1
48	5	4,12	-	17	4	4	4	4	5	4	4	5	4	3	5	5	22	15	15	15	17	15	6	11	7	17	12	16	5,4	12,2	27	4,01	3	9	4	2	7	18	9
49	3	3,92	-	17	3	3	3	4	4	4	4	4	4	4	4	4	22	13	15	10	15	15	9	6	14	17	9	16	1,75	5,08	21	3	2,2	3	3	2	4	15	10
50	5	4,91	+	17	4	3	4	4	5	4	4	4	5	3	4	5	19	10	8	18	16	12	14	16	9	13	17	18	3	7	13	2	1	1	3	2	7	18	1

51	5	5,03	+	17	5	5	5	5	5	5	5	5	5	5	5	5	24	8	8	17	14	13	5	13	12	19	12	3	2,15	3,59	13	2,1	1,5	5	4	1	6	15	1
52	4	4,30	+	17	4	4	4	4	4	4	4	4	4	4	4	5	22	10	11	18	12	9	9	9	16	20	12	12	10,7	11,3	29	1,5	1	1	4	1	4	18	9
53	5	4,48	+	17	5	5	5	5	5	5	5	5	5	5	5	5	24	10	10	17	9	9	7	5	18	19	10	10	3,55	5,51	28	1,7	3,33	7	4	1	7	10	10
54	5	4,97	+	16	5	5	5	5	5	5	5	5	5	5	5	5	25	12	14	17	16	14	7	18	11	19	11	11	4,15	10,8	32	2,5	2,44	10	4	1	7	18	9
55	4	4,18	+	16	5	4	4	4	4	5	5	5	4	5	4	4	21	13	16	17	16	14	10	13	17	20	11	14	5	9	20	1,5	1	0,9	5	2	6	18	1
56	5	3,98	-	18	5	5	5	5	5	5	5	5	5	5	5	5	21	15	16	16	12	9	4	10	10	10	7	13	7,6	8,46	22	1,4	2	3	4	2	4	15	1
57	5	4,37	-	17	5	5	5	5	5	5	5	5	5	5	5	5	12	4	5	18	12	12	6	5	8	20	12	8	4,1	10,9	29	1	3	4	3	1	7	18	1
58	5	3,85	-	17	5	5	5	5	5	5	5	5	5	5	5	5	23	9	10	13	12	10	4	5	11	19	9	9	10,7	11,3	29	1,6	5,5	7	5	1	4	15	1
59	4	3,77	+	18	3	3	4	4	4	3	4	4	3	3	4	5	18	12	14	9	14	11	4	8	17	20	16	12	3,4	11,7	22	1,4	1,5	4	5	2	7	10	1
60	5	4,58	+	18	4	5	5	5	5	5	4	4	5	5	4	5	25	10	10	15	11	3	2	9	13	20	9	12	3,4	11,7	22	1,3	1	3	3	1	6	18	1
61	5	4,51	+	16	4	5	5	5	5	5	5	5	5	5	4	5	18	7	7	18	12	8	2	2	9	14	6	9	1,65	7,16	10	1,4	1	4	4	1	4	10	10
62	4	4,53	+	16	4	4	4	4	4	5	4	4	4	5	4	5	19	8	9	17	13	5	10	10	14	16	11	16	12,6	15,7	38	4,01	4,03	12	5	2	7	15	9
63	5	4,37	-	17	3	3	3	4	5	5	3	3	3	3	5	5	22	9	10	10	12	4	4	7	6	17	11	15	1,05	4,71	14	2	0,5	6	4	2	7	10	10
64	5	4,65	+	18	4	4	4	4	4	4	5	5	4	4	5	5	19	8	7	18	13	12	5	10	15	16	13	8	1,95	3,27	6	1	0	3	3	1	4	18	10
65	5	4,40	-	17	4	4	5	5	5	5	5	5	5	4	5	5	21	7	7	14	13	16	10	13	10	19	11	10	11,5	6,96	18	2,6	1	3	3	1	4	10	10
66	3	3,84	-	17	4	4	4	4	3	4	4	5	4	4	4	5	20	16	17	13	15	11	3	8	13	17	11	7	2	5,6	11	1	2	2	3	1	4	10	1
67	5	4,25	-	17	4	5	5	4	5	4	5	5	5	5	5	4	20	6	8	10	11	5	2	4	12	20	8	8	1,05	5,7	19	1,6	3,5	7	3	1	7	15	1
68	4	3,57	+	17	3	3	3	3	4	4	3	3	3	3	3	4	21	7	7	9	16	5	4	6	14	17	8	11	1,95	6,09	19	1	2	5	3	2	4	18	9
69	5	4,17	-	21	4	4	4	4	4	4	4	4	4	4	5	5	21	8	8	14	10	3	2	4	13	16	13	7	3,5	11,2	26	1,7	2	3	4	1	6	15	1
70	3	3,89	-	18	3	3	4	4	4	4	3	4	3	4	4	4	25	8	7	14	11	13	5	13	11	12	7	7	2	4,07	16	1	2	6	4	1	7	18	9
71	5	4,66	+	17	5	5	5	5	5	5	5	5	5	5	5	5	24	8	8	15	11	14	4	5	7	14	8	9	1	2,22	8	1	2	5	5	1	7	15	9
72	3	4,40	-	17	5	5	5	5	5	5	5	5	5	5	5	4	13	5	5	16	15	13	1	7	10	18	10	11	5,38	9,95	32	3,5	2,24	9	5	1	6	18	1
73	3	3,61	-	19	3	3	5	4	3	3	4	4	3	3	4	4	14	15	15	16	10	15	3	5	13	16	11	13	1	2,39	13	1,2	1	5	5	1	4	10	10
74	3	4,49	-	17	4	4	4	5	5	5	5	5	5	5	5	4	23	7	8	16	16	11	5	13	14	18	11	13	2,1	3	7	2,1	3	7	5	2	7	15	10
75	5	4,01	-	17	5	5	5	5	5	5	5	5	4	4	5	4	18	8	7	13	16	10	3	5	7	19	9	9	1,1	4,37	8	1	0	3	5	1	6	18	1
76	4	3,00	-	25	4	5	5	5	5	5	3	3	4	4	5	4	21	12	13	16	10	17	1	8	5	6	8	11	1,75	3,58	10	1,5	1	3	4	1	7	10	9
77	4	3,73	+	22	4	4	5	4	5	4	5	5	5	4	5	4	19	11	14	11	9	6	9	7	9	6	6	6	2,05	5,77	26	1,6	3	6	4	1	4	15	10
78	5	4,74	+	17	5	5	5	5	5	5	5	5	5	5	5	5	22	8	7	14	10	10	3	8	13	14	11	16	5,45	11,2	24	3	2,25	7	4	2	7	18	9
79	5	4,54	+	17	5	5	5	5	5	5	5	5	5	5	5	5	22	11	9	12	12	5	3	5	15	20	9	9	1	5,59	17	1	1	3	4	1	6	10	1
80	3	2,69	+	30	4	4	4	4	4	4	3	3	4	4	4	4	21	8	8	11	9	8	2	5	7	6	6	4	1	6,09	8	0,2	0	0	3	1	4	15	1
81	3	4,34	-	17	5	5	4	4	5	4	4	4	4	4	4	4	20	10	8	12	12	14	5	11	15	20	15	17	3,3	8,46	27	1,5	1	1	4	2	6	18	1
82	3	4,06	-	19	4	5	5	5	4	5	5	5	4	5	5	4	21	14	14	13	12	15	5	6	15	14	14	11	2,05	5,77	26	1,6	3	6	5	1	4	18	10
83	5	3,49	-	24	4	4	5	4	4	4	4	4	4	4	5	4	19	11	14	14	18	13	7	14	6	7	16	12	2,03	5,77	26	1,6	3	6	5	1	7	10	9
84	4	3,30	-	20	4	4	5	4	4	5	3	3	3	4	4	4	24	8	7	16	14	6	5	5	13	17	6	12	1	3,89	5	1	1	1	4	1	4	10	9
85	3	3,30	+	24	4	5	4	4	4	4	4	4	4	4	3	4	20	11	11	13	12	5	3	1	1	16	10	7	1	1,36	13	2,1	4	7	2	1	6	10	1
86	3	3,45	+	21	4	4	4	3	5	3	3	3	3	4	4	5	21	12	10	16	15	18	3	9	8	14	9	10	2	4,42	13	1,44	2,09	4,93	2	1	7	15	1
87	3	3,51	-	21	4	4	4	4	4	5	4	4	4	4	5	5	23	7	8	11	10	4	2	2	8	14	5	10	0,95	5,08	13	1	3	7	2	1	6	10	1
88	3	2,93	+	31	4	4	4	4	4	4	4	4	3	4	4	5	15	7	7	12	8	5	3	3	8	19	8	14	1,8	5,8	16	1,5	0	5	3	2	4	10	1
89	3	3,55	+	17	4	4	4	4	5	5	4	4	3	3	5	4	22	10	12	13	12	4	4	2	3	17	8	7	1	1,07	11	1,3	2	7	2	1	7	15	9
90	5	4,10	-	19	3	4	3	4	5	5	5	5	5	5	5	4	22	15	16	12	14	12	2	4	0	8	7	11	1,85	3,63	8	1	0	2	3	1	4	10	9
91	3	3,05	+	23	4	3	3	4	4	4	4	5	4	4	5	4	20	12	11	14	14	17	4	8	12	9	12	15	2	4,42	13	1,44	2,09	4,93	3	2	7	10	9
92	3	3,79	-	20	3	3	4	4	4	4	4	4	4	4	4	4	19	11	14	15	13	7	3	3	3	12	9	5	1,1	2,59	12	1,2	1	4	3	1	7	15	10
93	5	4,23	-	18	4	4	4	5	4	5	5	5	5	5	5	5	22	15	15	14	10	9	4	7	18	18	10	14	4,35	11,98	30	2,8	4,58	8	3	2	6	15	1
94	3	3,53	+	20	4	4	4	4	4	5	4	4	4	3	4	4	19	12	13	9	12	5	2	5	6	15	10	13	2,05	1,39	4	1,8	2,33	6	3	2	7	15	10
95	3	3,75	-	17	4	4	5	4	4	4	4	4	4	4	5	4	23	11	12	14	14	13	3	5	10	11	9	13	1,4	3,52	14	1,1	1	4	3	1	4	10	9
96	3	2,93	+	27	3	3	4	5	4	4	4	4	5	3	5	4	21	11	12	12	10	10	2	10	13	13	8	10	2,85	3,09	10	1,2	2	3	3	1	6	15	1
97	3	3,14	+	22	3	3	4	5	5	5	3	4	4	5	5	4	26	7	8	15	9	15	3	11	16	15	9	15	2,05	10,6	22	1,9	5,31	7	3	2	6	15	1
98	3	3,24	+	22	4	4	3	4	5	4	4	4	4	4	5	4	23	11	12	15	12	13	4	2	6	10	6	15	1,1	3,2	13	1	1	4	3	2	7	15	9
99	3	3,53	+	17	4	4	4	4	4	4	3	3	4	4	4	3	14	6	6	14	14	7	3	7	10	13	10	14	1	5,32	17	1	3	5	4	2	4	10	1
100	3	2,75	+	23	4	4	3	4	4	5	3	3	3	3	4	4	19	7	9	14	15	5	2	7	6	18	9	15	4,6	0	0	1,1	0	0	2	2	6	10	1
101	4	4,26	+	17	4	4	3	4	5	4	4	5	5	4	4	5	22	14	16	14	11	6	5	6	18	20	12	11	2,3	11	25	1	2	4	3	1	8	20	1
102	5	3,77	-	18	4	4	4	5	4	4	4	4	3	3	4	5	22	15	16	15	15	14	6	9	8	14	9	18	1,8	10,6	21	1	1	3	4	2	2	30	7
103	5	5,11	+	17	5	5	5	5	5	5	5	5	5	5	5	5	24	12	15	17	13	14	3	16	12	19	13	9	2,45	9,98	21	1	1	3	7	1	8	20	1
104	5	4,67	+	17	4	4	5	4	5	4	5	4	4	5	4	5	22	14	16	16	13	12	5	13	13	20	7	14	1,7	9,49	29	2,4	4	11	6	1	7	15	1
105	5	5,03	+	17	5	5	5	5	5	5	4	5	5	5	5	5	22	14	16	15	13	15	5	12	13	20	11	13	1,9	6,27	22	2,7	0	4	7	1	4	15	1
106	5	4,00	-	18	5	5	5	5	5	5	5	5	5	5	5	5	22	14	16	10	13	4	4	3	11	10	7	8	1,65	5,08	15	1,8	3	7	3	1	2	20	1
107	5	4,12	-	17	4	4	4	4	4	4	5	4	4	4	5	4	20	13	15	11	11	6	1	4	4	9	13	11	1,85	4,71	11	1,3	2	6	3	2	8	10	1
108	3	3,90	-	17	3	4	4	4	4	4	3	4	4	4	5	5	22	14	16	17	13	19	0	9	11	13	9	16	2,05	3,74	11	1,1	1	3	3	2	8	18	1
109	5	4,93	+	16	4	4	5	4	5	5	5	5	5	4	4	5	22	14	16	14	14	11	5	10	14	16	11	13	2,95	12,3	29	2,1	2,25	8	7	2	2	20	1
110	5	4,11	-	18	4	5	5	5	5	5	4	5	4	5	5	5	22	14	16	15	15	14	5	8	6	14	10	13	3,8	4,7	29	4,2	2,39	10	3	1	7	10	1
111	5	4,52	+	16	5	5	5	5	5	5	5	5	5	5	5	5	22	14	16	15	13	14	6	13	17	16	11	10	4	6,19	20	2,8	2	4	3	1	8	15	1
112	5	4,10	-	17	5	5	5	5	4	4	4	4	4	4	4	5	22	14	16	11	13	16	3	10	10	15	9	9	1,15	3,91	13	1	0	1	4	1	7	15	1

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113	5	4,59	+	17	4	5	5	5	5	4	4	4	5	5	4	5	18	18	18	11	13	11	1	12	14	13	13	6	3,05	6,26	14	2,1	1	2	3	1	4	20	1
114	4	4,82	-	18	5	5	5	5	5	5	5	5	5	5	5	5	18	12	12	14	15	15	9	16	12	19	11	13	6,2	10,2	23	2,8	1	2	6	1	2	15	1
115	5	4,44	-	17	4	4	5	4	5	4	4	4	4	4	4	5	23	15	16	15	16	13	10	15	18	16	15	14	1,9	5,78	21	2,4	4	11	5	1	8	18	1
116	4	3,85	+	17	4	4	5	5	4	4	5	5	4	4	4	5	23	15	16	16	16	10	10	10	13	11	7	10	5,6	11,2	31	2,1	4,65	10	5	1	2	20	1
117	3	4,16	-	17	4	4	4	4	4	4	4	4	4	4	5	5	22	15	17	14	12	6	2	4	6	16	12	9	1,05	7	15	0,9	2	4	2	1	7	15	1
118	5	4,77	+	17	3	4	5	4	4	4	4	3	4	4	4	5	24	12	15	14	12	15	4	10	16	20	11	12	3,6	10,1	34	4	3	8	5	1	2	10	1
119	5	4,46	+	17	4	4	4	4	4	4	4	4	4	4	4	5	22	14	16	11	15	9	4	8	7	18	11	12	1,5	4,77	21	1,6	1	6	3	1	8	20	1
120	5	4,21	-	16	4	4	4	4	5	4	4	4	4	4	4	5	22	14	16	17	14	12	6	8	16	20	9	17	2,16	10,7	29	2,3	1	6	3	2	7	15	1
121	4	4,80	-	17	5	5	5	5	5	5	5	5	5	5	5	5	23	15	16	19	14	13	4	14	13	17	12	11	9,3	14,2	47	4,3	3,7	11	5	1	4	20	1
122	5	4,32	-	16	5	5	5	5	5	5	5	5	5	5	5	5	21	14	14	15	15	13	7	15	18	19	10	9	2	8,41	25	0,9	3	3	4	1	8	10	1
123	5	4,24	-	17	4	4	5	5	5	5	4	5	4	4	5	5	18	15	16	13	11	13	4	12	17	20	12	11	7,69	12,5	35	4	2	5	5	2	2	15	9
124	3	4,04	-	18	4	4	4	4	5	5	3	3	4	3	4	5	13	18	15	13	11	15	5	10	12	15	11	11	4	8	23	2,5	2,33	8	4	1	8	18	1
125	4	4,08	+	16	4	4	5	4	4	4	4	4	4	4	4	5	23	17	18	17	14	12	1	16	17	11	7	7	7,45	9,69	23	3,2	3	8	5	1	7	10	1
126	4	4,29	+	16	4	4	5	4	4	4	4	4	4	4	4	5	17	13	15	14	16	14	2	12	18	18	9	12	2	8,65	28	1,6	1	5	5	1	4	15	9
127	4	4,21	+	17	4	4	4	4	5	4	4	4	4	4	4	5	20	13	13	15	15	5	4	10	16	19	10	13	3,55	11,6	32	2,7	3,33	7	4	1	7	18	1
128	3	4,50	-	17	4	4	4	4	5	4	4	4	4	4	4	5	23	15	14	14	14	9	12	11	8	15	10	13	1	1,5	3	1,2	0	2	2	2	6	18	1
129	5	4,81	+	17	5	5	5	5	5	5	5	5	5	5	5	5	20	13	12	15	14	13	7	16	15	15	13	15	2,85	10,1	21	1,1	0	0	5	2	3	10	1
130	5	3,92	-	17	4	3	3	3	4	3	3	3	3	4	4	4	19	14	14	15	12	5	4	2	3	10	8	5	4	8	23	2	2	7	4	1	4	15	9
131	5	4,54	+	17	5	5	4	5	5	5	5	5	5	5	5	5	17	14	15	15	15	15	10	13	14	16	11	12	2,75	9,64	30	1,1	2	5	5	1	7	18	1
132	5	4,66	+	17	4	4	4	5	5	5	5	5	5	5	5	5	18	12	12	15	12	4	0	8	5	13	12	10	4,3	6,79	17	1	2	4	3	1	3	18	9
133	5	3,97	-	19	4	4	4	4	5	4	4	4	4	4	4	5	13	4	5	15	13	6	5	5	9	12	11	9	6,85	5,54	14	1	0	0	4	1	7	15	9
134	4	4,46	+	17	4	4	4	4	4	4	4	4	5	3	4	5	23	15	13	15	15	11	7	7	9	18	13	13	2,2	8,64	25	1,1	2	7	3	1	5	10	9
135	3	3,76	-	18	3	3	5	4	4	4	3	3	3	3	4	5	17	14	15	16	14	11	11	15	14	15	11	15	3,8	12,9	39	3,8	7	16	4	2	3	15	1
136	4	4,42	+	17	4	4	4	4	5	4	4	4	4	4	5	5	19	14	14	14	12	10	0	5	6	13	12	9	1	1,91	5	1	0	3	3	1	5	18	1
137	5	4,48	+	17	4	4	4	4	5	4	4	4	4	4	4	5	21	16	15	16	14	11	4	9	12	16	12	8	2,95	9,49	30	1,1	1	5	5	1	7	15	9
138	5	3,91	-	17	3	3	3	4	3	3	3	3	4	3	4	4	23	9	7	14	14	10	5	9	16	20	9	11	3,5	5,14	11	1	1	3	3	1	4	10	9
139	5	4,43	-	18	4	4	3	4	4	4	4	3	4	4	4	4	23	5	6	15	11	13	3	13	11	13	12	10	7,35	0	0	2,1	0	0	4	1	6	10	1
140	5	4,28	-	18	4	5	4	4	5	4	5	5	4	4	4	4	26	10	11	15	15	14	7	16	14	15	10	16	2,8	9,44	25	2,2	2	4	5	2	4	15	9
141	4	3,82	+	17	4	5	4	4	5	4	3	4	4	3	4	4	21	10	12	12	8	6	5	5	6	19	8	7	4	8	21	1,5	2	3	4	1	7	15	1
142	4	4,31	+	17	4	4	4	4	4	4	4	4	4	4	4	4	25	8	8	15	12	11	4	9	11	16	10	11	3	5,2	14,42	1,42	1,53	2,83	4	1	7	18	9
143	5	4,37	-	18	4	4	4	4	4	4	4	4	4	4	4	4	23	5	6	15	12	11	4	9	11	16	10	11	3	5,2	14,42	1,8	0	0	4	1	6	18	1
144	4	4,17	+	17	5	5	4	5	5	5	5	5	5	4	4	4	18	5	6	11	11	9	4	6	11	18	8	5	3	5,2	14,42	1,42	1,53	2,83	4	1	4	15	10
145	5	4,75	+	16	5	5	5	5	5	5	5	5	5	5	5	4	19	6	6	17	15	16	5	14	9	20	11	16	1,7	6,29	22	1	1	2	5	2	7	18	1
146	5	4,93	+	18	4	5	4	3	3	5	5	5	5	5	5	5	22	8	9	14	9	11	1	11	13	11	10	14	3,95	0	0	0,7	0	0	3	2	7	10	9
147	5	4,83	+	17	4	5	5	4	4	5	5	5	5	4	5	5	23	5	6	13	12	12	4	7	11	17	7	6	2,3	9,12	22	1,4	1	3	5	1	6	15	1
148	4	5,05	-	17	4	4	4	4	4	4	5	4	4	4	5	5	24	7	8	13	8	13	2	6	9	20	10	11	1,9	4,29	18	0,8	0	1	4	1	4	18	9
149	4	3,46	+	17	3	4	4	4	4	4	3	3	3	3	4	3	24	8	9	14	11	6	5	4	6	11	8	7	3	5,2	14,42	1,42	1,53	2,83	4	1	7	10	10
150	5	4,70	+	17	5	5	5	4	4	5	5	5	5	5	5	4	20	11	8	14	12	14	4	9	9	17	10	11	2,5	8,6	22	2,55	4,4	7,3	5	1	7	18	9
151	4	4,16	+	17	3	3	5	4	3	4	4	4	3	4	3	5	18	7	8	18	13	10	3	3	4	18	8	8	3,5	5,14	11	1,1	1	1	4	1	6	18	1
152	4	4,09	+	17	4	4	4	4	4	4	4	4	4	4	4	4	20	9	11	16	12	7	5	10	15	10	10	6	2,1	0	1	0,9	0	0	3	1	4	15	1
153	5	4,14	-	17	4	3	3	3	4	4	4	3	4	3	4	5	18	7	7	13	15	12	5	11	8	18	11	11	3	5,87	21	1	4	6	2	1	7	10	10
154	4	4,30	+	17	5	5	5	5	5	5	5	5	5	5	5	4	21	12	12	18	15	16	7	14	17	20	13	18	2	8,59	20	2,1	3	6	4	2	7	18	1
155	2	2,64	-	31	4	4	4	5	5	4	4	4	5	4	4	5	20	13	14	16	17	10	3	8	7	14	12	8	1,5	5,17	19	1,2	3	5	2	1	4	10	1
156	3	3,86	-	21	3	3	3	3	4	5	4	4	3	4	5	5	21	15	16	13	11	4	9	6	8	7	12	11	1,65	5,22	10	0,15	0	1	2	2	7	15	1
157	3	3,01	+	22	3	5	3	4	5	4	3	4	3	4	5	4	17	6	6	14	13	11	2	6	10	12	9	12	1	1,96	5	1	0	1	2	1	6	10	1
158	3	4,08	-	19	5	4	4	5	4	5	4	5	5	5	5	5	20	13	14	17	11	13	3	10	13	16	10	10	2,95	5,47	11	1	2	3	3	1	4	18	9
159	3	4,04	-	17	5	5	5	5	5	5	4	4	4	4	4	5	22	16	17	13	13	10	0	3	2	16	11	11	1	0,25	2	1	0	2	3	1	6	15	1
160	3	2,19	-	37	4	4	4	4	4	4	4	4	4	4	4	5	21	15	17	12	15	10	0	7	6	20	12	12	4,35	10,7	26	1,7	2,5	8	3	2	7	18	9
161	3	3,19	+	26	3	4	3	3	3	4	3	4	3	3	5	5	18	6	6	14	10	6	0	5	8	17	7	8	1	5,31	12	1	1	1	2	1	4	10	9
162	2	3,84	-	20	4	5	3	4	5	4	5	5	4	4	5	5	22	17	18	10	11	7	6	3	5	12	10	16	4,9	9,13	18	2,05	2,25	9,7	3	2	7	15	9
163	3	4,11	-	17	3	3	3	4	5	4	4	5	4	4	3	5	18	6	6	13	13	12	3	10	11	12	6	5	1	1,31	11	1	2	4	3	1	6	18	1
164	3	3,80	-	18	4	5	5	5	5	5	5	4	4	4	4	5	19	11	10	10	11	9	0	2	5	14	9	6	2,05	0	0	0,1	2,2	0	3	1	4	10	10
165	3	3,82	-	21	4	4	4	4	4	4	4	4	4	4	4	5	20	13	14	14	13	10	4	7	9	15	10	11	2	4	11	1,08	1,39	3,6	3	1	7	15	10
166	3	4,01	-	17	5	5	5	5	5	5	5	5	5	5	5	5	22	18	18	16	15	15	0	5	7	16	10	11	3	10,1	16	1	1	5	2	1	6	18	1
167	3	4,03	-	20	4	4	4	4	3	3	4	3	4	3	4	5	22	11	11	17	16	4	10	7	11	19	12	9	1,15	6,3	14	1	2	6	2	1	7	10	9
168	3	3,84	-	21	4	4	4	4	4	4	4	4	4	4	4	5	20	13	14	14	13	10	4	7	9	15	10	11	2	4	11	1,08	1,39	3,6	3	2	4	15	10
169	2	3,42	-	24	4	4	3	4	4	4	3	3	3	3	4	5	20	13	14	15	12	6	1	8	4	19	12	13	1,65	6,63	16	1,1	2,5	6	3	1	7	18	9
170	3	3,52	-	18	4	4	4	5	4	5	4	4	4	4	5	4	19	12	14	16	17	15	5	12	14	19	8	14	4,05	0	0	1,9	0	0	4	1	6	10	1
171	3	4,14	-	17	4	4	4	5	3	4	4	4	4	3	4	5	20	12	13	12	14	11	3	7	10	18	6	7	1,45	0	4	1,1	0	0	5	1	4	15	1
172	4	4,82	-	17	4	5	5	5	5	5	5	5	5	5	5	5	22	15	16	13	14	11	8	10	5	18	11	11	1	0	0	1	0	0	3	1	7	18	1
173	3	3,76	-	17	4	4	4	3	4	4	4	5	4	4	4	5	22	17	18	14	15	12	7	8	16	8	12	16	4,25	6,32	17	1,2	2,5	7	3	2	6	18	1
174	4	4,07	+	19	4	4	4	4	4	4	4	4	4	4	4	5	22	14	16	18	9	9	7	8	13	7	9	10	0,95	2,02	13	1	2	5	2	1	4	18	10

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175	2	3,7	-	18	4	4	4	4	4	4	4	4	4	4	4	4	21	13	14	13	13	9	4	7	10	15	9	9	3	7	19	1	2	4	4	1	6	10	1
176	3	3,42	+	19	5	5	5	4	4	4	5	4	4	4	4	4	21	13	14	14	11	7	3	6	11	11	5	8	1,05	2,44	13	1	3	3	2	1	7	15	1
177	4	3,98	+	19	4	4	5	4	5	4	4	3	3	4	4	5	20	11	13	14	14	14	4	11	9	9	9	10	1,5	6,55	20	1,1	1	3	5	1	6	18	1
178	3	3,88	-	20	5	5	5	5	5	5	5	5	5	5	5	4	21	13	14	14	13	10	5	8	8	18	12	17	2,6	8,6	22	1,1	2	3	4	2	4	10	1
179	3	3,81	-	17	5	4	5	4	5	5	4	4	4	4	5	4	24	15	15	14	12	11	3	6	10	20	7	13	4,4	10	29	1,2	3	5	7	1	7	15	9
180	3	3,63	-	17	4	4	3	4	4	3	4	4	4	4	4	4	23	14	16	12	12	4	4	5	13	6	10	5	4	9,27	25	1,1	3	6	2	1	4	20	9
181	2	3,39	-	17	3	4	4	4	5	4	3	4	4	3	5	4	22	16	18	12	12	3	1	3	8	12	8	12	1,55	4,89	11	1	1	1	3	2	6	15	1
182	2	3,56	-	19	5	5	5	5	5	4	4	5	4	5	5	4	16	8	8	6	14	4	4	6	16	18	9	2	1,7	3,87	17	1	2	3	5	2	7	20	9
183	3	3,47	+	18	5	4	5	4	4	5	5	4	4	4	4	4	21	13	14	15	15	13	4	5	11	20	9	14	5,35	3,58	8	1	1	1	3	2	7	15	10
184	2	4,66	-	17	4	4	4	4	4	4	5	4	4	4	5	4	21	13	14	19	12	13	5	14	10	20	11	12	3,3	10,8	27	2,03	2	4	5	1	4	10	9
185	2	2,96	-	23	4	4	4	4	4	4	4	4	4	4	4	4	21	13	14	15	15	7	1	4	12	7	8	4	3	7	19	1	2	4	4	1	6	15	1
186	3	3,72	-	17	3	3	4	4	4	3	3	3	3	5	4	4	24	17	19	12	15	9	3	8	11	19	9	8	4,55	5,51	13	2	3	6	6	1	7	10	9
187	3	3,79	-	18	4	4	4	4	4	4	4	4	4	4	4	4	21	13	14	13	13	9	4	7	10	15	9	9	3	7	19	1	2	4	4	1	7	15	10
188	3	3,14	+	19	3	4	4	4	4	4	3	3	3	3	4	4	20	13	14	16	13	14	6	8	14	20	8	8	2,05	10,4	20	1	1	4	2	1	4	10	9
189	3	3,88	-	19	3	5	4	4	4	4	4	3	4	4	4	4	17	12	12	15	12	13	5	3	10	18	11	12	3,45	4,58	10	1	1	4	3	1	6	15	1
190	2	3,78	-	17	4	4	4	5	5	5	4	3	4	3	5	4	21	13	14	16	12	12	9	12	17	15	13	12	4,15	13,3	30	1	2	4	3	1	7	20	9
191	3	4,02	-	19	4	5	5	5	5	5	4	5	5	5	5	5	23	13	13	12	13	8	4	8	5	20	8	6	3	7	19	1	2	4	2	1	7	10	10
192	4	4,17	+	17	3	3	3	4	3	3	3	3	4	3	4	5	21	13	16	10	11	3	2	2	3	16	8	8	5,45	9,46	17	1,8	1	3	4	1	6	15	1
193	4	4,04	+	17	3	4	3	4	3	4	3	3	3	3	4	4	21	14	13	11	11	9	5	9	7	11	10	9	2,46	6,71	18,39	1,9	2,74	6,15	4	1	8	20	1
194	5	4,44	-	17	4	3	4	3	3	4	4	3	3	3	4	3	24	17	17	17	15	17	6	14	12	18	17	16	2,46	6,71	18,39	1,9	2,74	6,15	6	1	2	30	9
195	5	5,01	+	17	5	5	5	5	5	5	5	5	5	5	5	5	21	12	12	15	9	8	4	4	4	16	10	7	3,2	6,29	24	2,4	2	12	4	1	8	20	1
196	5	4,14	-	16	3	3	4	4	4	4	4	4	4	3	4	5	22	16	15	12	13	11	3	3	9	13	11	7	2,35	4,83	14	3,2	3	6	2	1	7	15	1
197	5	4,92	+	17	4	5	5	5	5	5	5	5	5	4	4	5	22	17	16	14	12	16	6	14	14	19	13	12	4,2	7,46	22	3,8	4,49	12,81	6	1	4	15	9
198	5	4,76	+	19	4	4	5	4	4	4	5	5	5	4	5	5	20	15	16	16	15	11	7	13	17	17	15	12	1,95	9,08	22	1	2	4	8	1	4	10	1
199	5	4,61	+	17	5	5	4	4	5	5	5	5	5	4	5	5	23	15	14	8	14	14	2	12	7	16	12	12	0,95	4,16	11	1,1	2	3	3	2	7	20	1
200	4	4,57	+	17	4	4	4	5	5	5	5	5	5	4	5	5	21	14	13	14	13	12	5	9	11	16	12	11	2,46	6,71	18,39	1,9	2,74	6,15	4	1	6	18	1
201	5	4,48	+	17	5	5	5	5	5	5	5	5	5	5	4	5	18	18	18	20	16	16	11	18	16	17	15	14	2,5	6,65	20	1,1	3	5	4	1	2	10	1
202	5	4,38	-	19	5	5	5	5	5	4	5	5	5	5	5	5	20	11	11	14	12	16	5	12	9	16	12	17	2,1	7,21	21	1,3	2	2	3	2	5	15	1
203	4	4,99	-	19	4	4	4	4	4	5	5	5	5	5	5	5	23	10	12	15	11	10	6	15	16	16	14	17	3,5	10,2	24	4,14	5,16	10	3	2	3	20	9
204	5	4,03	-	17	5	5	5	5	5	5	5	5	5	5	5	5	21	12	11	13	16	12	3	4	7	12	9	5	3,45	9,32	19	1	2	5	3	1	7	15	9
205	4	4,56	-	18	4	5	5	5	5	5	5	5	4	4	5	5	22	7	6	11	8	11	4	5	9	20	14	5	1,05	4	10	1	2	3	3	1	3	15	9
206	4	4,22	+	17	5	5	5	5	5	5	5	5	5	5	5	5	17	11	12	16	15	9	0	5	6	17	12	6	1,75	5,82	19	1,9	5,52	9	3	1	7	20	9
207	5	4,05	-	18	5	5	5	5	5	5	5	5	5	5	5	5	18	17	14	9	12	8	2	2	13	19	8	9	1,7	5,78	17	1	2	4	3	2	3	18	1
208	5	3,83	-	19	3	4	4	5	5	4	3	4	4	4	5	5	20	19	18	16	11	12	4	9	12	16	12	10	2,46	6,71	18,39	1,9	2,74	6,15	3	1	7	15	9
209	5	4,69	+	16	3	3	3	4	4	4	4	3	4	4	4	5	17	7	6	16	18	15	10	7	11	14	13	11	3,05	5,98	18	1	0	3	3	1	5	20	1
210	5	3,95	-	17	4	4	4	4	4	4	4	4	4	3	4	5	20	18	18	12	13	11	4	2	5	12	8	5	1,05	1,86	6	1,2	1	2	3	1	8	20	1
211	5	4,89	+	17	3	5	4	5	5	5	4	4	4	5	4	5	21	15	13	17	12	7	6	10	13	18	12	8	1,4	5,35	14	2	3,33	9	3	1	2	30	9
212	5	4,62	+	17	5	5	5	4	4	4	5	5	5	5	5	5	23	14	14	17	15	18	6	11	9	13	14	18	1	3,54	11	1	3,54	10,6	3	2	8	20	1
213	5	5,17	+	17	4	4	5	4	4	4	5	5	4	4	4	5	22	17	17	15	10	14	7	13	15	20	14	14	1,7	3,69	19	1,9	0,25	5	6	1	7	15	1
214	5	3,99	-	16	3	3	4	3	4	3	3	4	4	3	4	4	20	14	16	18	15	16	7	5	14	17	16	15	1,9	4,37	14,35	1,69	1,73	4,69	4	1	4	15	9
215	5	4,42	-	16	4	4	4	5	4	4	5	5	4	4	5	5	22	15	16	14	15	16	3	10	13	14	12	14	1,55	6,14	22	1,06	1	5	5	2	7	20	1
216	4	4,57	-	17	4	5	5	5	4	4	5	5	5	4	4	5	17	17	19	14	13	13	3	12	11	15	14	5	1,05	1,72	12	1	1	4	3	1	2	10	1
217	5	4,42	-	17	5	4	5	5	3	4	5	5	4	4	4	5	24	12	11	15	12	15	9	11	12	16	7	10	1,75	5,72	19	1,7	1	5	3	1	6	18	1
218	5	4,76	+	16	4	4	4	4	4	4	4	4	4	4	4	5	23	14	15	16	13	15	3	11	13	20	13	13	1,9	4,37	14,35	1,69	1,73	4,69	4	1	3	20	9
219	5	4,72	+	17	5	5	5	5	5	5	5	5	5	5	5	5	23	14	14	16	10	12	6	6	9	19	11	8	2,6	5,78	24	1,7	2,33	6	4	1	4	10	1
220	4	4,34	+	17	3	3	4	3	3	3	3	3	3	3	5	5	24	12	12	11	10	8	6	6	7	12	11	10	2,7	4,19	10	1,2	2	4	4	2	7	15	9
221	5	4,12	-	18	3	4	5	4	4	4	4	3	4	3	4	5	20	13	13	14	13	11	6	3	7	17	10	14	3	5,76	13	1,1	1	4	3	2	3	15	9
222	5	4,69	+	17	4	5	5	5	5	5	5	5	5	5	4	5	18	15	16	16	14	15	8	11	14	18	12	14	1	2,23	12	1,1	2	3	5	2	7	20	9
223	5	4,65	+	18	4	5	5	5	5	5	5	5	5	5	5	5	21	15	15	15	15	13	9	17	16	18	14	13	3,7	7,13	24	3,1	4,91	10,6	4	1	5	15	1
224	4	4,39	+	18	4	4	5	5	5	5	5	5	5	5	5	5	23	17	18	15	16	15	8	14	17	18	13	16	1	5,43	17	0,7	1	2	3	2	3	18	1
225	5	3,88	-	18	3	3	3	4	4	4	3	3	3	4	4	4	21	13	14	13	9	7	2	1	6	18	8	12	1,9	4,37	14,35	1,69	1,73	4,69	4	2	5	20	1
226	5	4,43	-	18	4	3	4	3	4	5	5	4	4	4	4	5	22	18	18	16	14	13	2	9	15	18	12	16	1,1	3,67	9	1	0	1	3	2	7	15	9
227	5	4,89	+	17	5	5	5	5	5	5	5	5	5	5	5	5	23	14	15	18	12	14	5	10	15	20	15	11	4,2	7,25	8	4,17	1,2	0	3	1	8	20	1
228	5	5,02	+	17	5	5	5	5	5	5	5	5	5	5	4	5	21	12	12	15	13	11	7	7	11	19	10	11	1,25	1,19	14	1	0	3	4	1	2	30	9
229	5	4,93	+	18	5	5	5	5	5	5	5	5	5	5	5	4	21	12	13	18	13	13	9	15	12	16	20	9	1,65	2,99	9	1,5	0	0	3	1	8	20	1
230	5	4,94	+	17	4	4	5	4	4	4	5	5	5	5	5	4	22	18	18	15	16	10	6	11	12	20	13	13	1,15	4,16	18	2	2,24	5	4	1	2	30	9
231	4	4,57	-	17	4	4	5	5	5	5	4	5	5	4	5	4	11	6	7	16	8	9	12	13	15	16	16	18	0,95	2,88	15	1	1	3	3	1	8	20	1
232	5	4,48	+	16	4	5	4	4	4	4	4	4	4	4	5	4	17	12	14	15	9	12	1	12	7	17	13	9	1,35	8,78	19	1,3	2	3	3	1	7	15	1
233	5	3,73	-	17	4	3	4	3	4	3	4	3	3	3	4	3	17	16	16	18	12	10	6	12	11	20	12	17	1,65	3,54	12	2,1	5,71	9	5	1	4	15	9
234	4	4,15	+	18	4	4	4	4	4	4	5	5	4	4	5	4	18	13	14	15	13	10	7	11	12	18	13	12	1	1,28	7	1	3	5	4	1	7	20	1
235	4	3,86	+	18	4	4	4	4	4	5	4	4	4	4	5	4	17	12	13	12	13	6	2	5	10	19	10	8	1	2,04	13	1,79	2,51	5,77	3	1	2	10	1
236	5	4,65	+	17	5	5	5	5	4	5	5	5	5	5	5	4	19	12	13	15	15	13	8	11	15	19	15	14	2,25	9,35	21	2,8	3	4	6	2	6	18	1

237	5	4,36	-	17	4	4	4	4	4	4	5	5	4	4	5	4	17	13	14	15	12	7	2	7	9	20	12	11	2,7	4,68	14	3,5	3,58	6	3	1	3	20	9
238	5	4,32	-	17	4	4	4	4	4	4	5	5	4	4	5	4	21	16	16	15	13	10	7	11	12	18	13	12	1,25	4,14	17	2,5	3,75	7	4	2	4	10	1
239	5	4,85	+	17	5	5	5	5	5	5	5	5	5	5	5	5	22	15	16	15	17	14	16	17	14	18	14	15	1	1,99	15	1	3	7	6	2	7	15	9
240	5	4,66	+	17	4	4	4	4	4	4	5	5	4	4	5	4	18	13	14	15	13	10	7	11	12	18	13	12	1,35	5,33	19	2,8	2,03	12,7	4	1	3	15	9
241	5	4,38	-	18	4	4	3	4	4	4	4	4	4	3	5	4	21	16	17	14	16	15	15	16	18	16	18	19	1	0,37	14	1	0	3	4	2	7	20	9
242	5	3,88	-	17	4	4	4	4	4	4	4	4	4	4	5	4	21	13	15	12	12	5	2	5	11	18	8	10	2,73	6,66	13	1	2	4	5	1	5	15	1
243	5	4,25	-	18	3	4	4	4	4	4	4	4	4	3	5	4	21	16	17	14	16	15	15	16	18	17	18	19	1	0,98	11	1	1	7	3	2	3	18	1
244	5	4,29	-	17	5	5	5	5	5	5	5	5	4	5	5	4	22	11	11	16	14	9	3	12	12	13	12	7	1,85	5,34	16	1	1	3	4	1	5	20	1
245	4	4,20	+	17	3	3	4	4	4	3	4	4	4	4	4	4	11	6	7	14	12	7	5	10	9	13	10	12	1	4,51	13	1,79	2,51	5,77	3	1	7	15	9
246	5	4,75	+	17	5	5	4	4	5	5	5	5	5	5	5	4	19	12	13	14	13	6	5	11	17	20	11	11	2,1	3,37	13	3,66	3,81	11	5	1	8	20	1
247	5	4,34	-	18	5	5	5	5	5	5	5	5	5	5	5	5	21	18	18	12	12	11	3	12	11	20	9	13	1,25	7,35	17	1	5	5	4	2	2	30	9
248	3	3,53	+	29	5	5	4	4	4	5	4	4	5	5	5	5	19	14	14	15	14	12	3	5	9	12	12	4	0,85	0,43	11	1	1	2	3	1	8	20	1
249	3	4,16	-	22	4	4	5	5	5	4	5	5	5	4	5	5	20	14	16	14	10	15	6	10	12	15	7	14	1	1,98	14	1	1	4	4	2	2	30	9
250	3	3,95	-	20	4	4	4	4	5	4	4	4	4	4	5	5	20	14	14	14	13	12	5	7	10	15	11	11	3,85	6,35	16,6	2,11	2,21	4,09	4	1	8	20	1
251	4	3,77	+	21	4	4	4	4	4	4	4	4	4	4	5	5	22	11	12	17	15	14	3	9	12	19	12	13	1,2	3,61	17	1	3	5	3	1	7	15	1
252	4	4,46	+	18	4	5	5	5	5	5	4	5	5	5	5	5	20	14	14	13	15	16	10	6	11	20	9	14	1,05	0,75	0,25	3	0,15	0	4	2	4	15	9
253	3	3,69	-	17	4	4	5	5	5	4	5	5	4	5	5	5	17	13	12	15	10	13	3	5	12	17	9	10	10,95	10	13	3	4,98	0	5	1	7	20	1
254	3	3,43	+	20	4	5	5	5	4	4	5	5	4	5	4	4	20	14	14	16	16	11	3	8	15	19	9	17	3,85	6,35	16,6	2,11	2,21	4,09	4	2	2	10	1
255	3	4,01	-	18	4	4	4	4	4	4	3	4	4	4	5	5	21	13	13	11	15	15	5	4	5	16	12	15	1,5	0	2	1	2	2	5	2	6	18	1
256	3	3,64	-	19	3	4	3	4	4	4	3	3	3	3	5	4	21	13	12	12	13	4	4	3	6	9	10	7	3,85	6,35	16,6	2,11	2,21	4,09	4	1	3	20	9
257	3	3,96	-	21	4	4	4	4	5	5	4	4	4	4	5	5	16	15	12	14	13	11	6	6	9	18	14	10	4,9	14	31	4,2	4	7	3	1	4	10	1
258	4	4,29	+	17	5	5	5	5	5	4	4	4	4	4	4	5	25	17	17	12	14	15	6	12	8	17	11	5	3,15	8,16	17	2,6	2	6	4	1	7	15	9
259	4	3,96	+	16	4	4	4	4	5	5	4	3	3	4	5	4	20	15	15	15	13	10	7	9	13	11	13	12	5	11,7	31	3	4	9	4	1	3	15	9
260	3	3,79	-	17	4	3	5	4	5	4	3	4	3	3	5	5	21	11	12	14	15	14	6	6	11	12	15	9	3	6,85	14	1	0	0	5	1	7	20	9
261	4	3,72	+	20	3	3	3	4	5	5	3	3	4	4	5	5	24	14	14	12	12	6	3	3	11	9	13	11	2,6	8,99	25	1	2	3	2	2	5	15	1
262	3	3,92	-	21	4	4	5	4	4	4	3	3	3	4	4	5	18	16	15	14	11	9	7	7	6	19	10	7	6,95	9,76	24	3,5	2,33	7	4	1	3	18	1
263	5	3,95	-	19	4	4	4	4	4	4	4	4	4	4	5	5	22	11	10	6	12	7	3	5	8	17	9	5	1,3	0,99	6	0,9	3	5	2	2	8	20	1
264	5	4,24	-	21	4	4	4	4	4	4	4	4	4	4	5	5	20	10	12	10	10	7	1	1	5	20	11	10	1,85	3,43	11	0,9	0	1	2	2	2	30	9
265	4	3,26	-	25	4	4	4	5	4	4	4	4	4	4	5	4	21	11	10	17	10	6	1	3	3	11	7	6	1,1	3,99	16	1	1	3	2	1	8	20	1
266	5	4,22	-	18	3	3	4	4	4	4	3	3	4	5	3	5	21	12	13	12	12	10	5	6	6	10	7	5	1,9	5,28	12	1	1	3	3	1	7	15	1
267	3	4,44	-	17	4	4	4	4	5	5	5	5	5	5	4	4	24	9	9	15	15	12	4	8	8	12	12	9	1,2	3,85	15	1,1	3	6	3	1	4	15	9
268	3	3,47	+	22	4	4	4	4	4	4	4	4	4	4	5	5	22	13	13	15	14	6	4	4	10	20	11	13	2,3	7,85	18	1	4	9	2	1	7	20	1
269	4	4,14	+	19	3	5	3	4	5	4	4	4	5	3	5	5	23	14	15	14	11	8	3	4	11	19	11	7	1,2	7,42	16	1	3	6	3	1	2	10	1
270	5	4,03	-	20	4	4	4	4	4	4	4	4	4	4	5	5	22	13	13	13	12	8	3	5	8	15	11	9	2,07	5,35	15,1	1,34	2,49	5,63	3	1	6	18	1
271	5	4,41	-	19	4	4	4	4	4	4	5	4	5	4	5	5	21	11	12	14	12	3	3	6	10	16	10	14	3,4	0,94	2,2	1	3	5	3	2	3	20	9
272	3	4,34	-	17	5	5	5	4	5	5	4	4	5	5	5	5	22	13	13	15	13	13	3	6	6	19	9	16	2,07	5,35	15,13	1,34	2,49	5,63	3	2	4	10	1
273	5	4,30	-	21	4	4	4	4	4	4	5	4	3	5	5	5	19	15	16	15	12	4	3	5	10	12	14	8	2,05	5,35	13	1,9	0	5	3	1	7	15	9
274	4	3,76	+	21	4	4	4	4	5	4	4	4	4	4	5	5	24	18	18	14	12	12	2	5	9	13	12	8	2,85	8,98	21	2,1	3,25	10	3	1	3	15	9
275	5	3,96	-	19	4	4	4	5	5	5	4	4	4	5	5	5	23	13	14	14	15	5	4	8	11	9	14	15	2,75	10,3	28,0	1,4	3	6	3	2	7	20	9
276	5	3,42	-	23	4	4	4	4	4	4	4	4	4	4	5	5	22	15	17	11	12	4	1	1	9	20	11	8	2,35	7,25	19	1,1	2	5	2	1	5	15	1
277	4	3,93	+	24	4	4	4	4	4	4	5	5	5	4	4	4	21	11	10	16	12	4	2	9	6	20	11	9	1,1	3,99	16	0,9	3	5	2	1	3	18	1
278	3	4,37	-	20	4	5	5	5	5	5	4	5	5	5	5	5	22	13	13	13	10	8	1	6	6	10	11	11	2	5,35	15,13	2,32	3	7	4	1	5	20	1
279	3	3,93	-	19	4	3	4	4	4	3	5	4	4	4	5	5	20	12	13	12	13	10	3	5	9	10	13	10	3	6,36	16	2,1	4,66	10	3	2	7	15	1
280	4	3,96	+	20	4	4	4	4	4	4	4	4	4	4	5	4	23	18	18	15	10	8	3	7	7	15	13	2	2,75	4,03	12	1,5	3	3	3	1	8	20	9

The analysis of residues reflects the practically complete coincidence of the nominal values of Y_{4T} and Y_{4E}, that allows to speak about the relatively high quality of the linear model of multiple regression Y_4 with the complete set of independent variables K_i, taking into account a large quantity of independent variables – the parameters of PCMB.

The most qualitative linear equation of multiple regression is Y_4 with the complete set of independent variables, but proceeding from the results of the analysis of residues Y_4 with the reduced set of independent variables can be considered optimal (see also the nominal values of CMC and KMD).

The accurate scale based on the weight coefficients system for each correct variant of answer to the question is significantly more qualitatively, than the rough scale based on the sum of scored points for each correct answer to the question by the results of the analysis of data.

A15.6.7. The probabilistic graphs for the model of multiple regression

The probabilistic graphs allow to indicate the areas with the maximal density of distribution, through which the line of regression can potentially pass.

The justification of practical use of CMT and the efficiency of functioning of the innovative means of training (ET) based on the adaptive representation of information fragments processor is indicated by means of the indicator of resultativity of the formation of knowledge of the contingent of trainees, which can also be considered relevantly with the estimations of the level of residual knowledge in the basic disciplines.

In the information environment of automated training (at distance) the several main types of information-educational influences are distinguished:

- the information fragments, which are generated by the means of training;
- the information-educational influences, which are carried the stochastic basis and generated by the other sources of information and data.

At the processing of a posteriori data the control group are introduced into consideration (the level of influences of stochastic genesis is estimated) and the experimental group (the level of estimations and the efficiency of functioning of the innovative components of the automated training system, including the training systems at distance are estimated).

In the experiment does not provide the control group, as the other influences of IEE are significantly small in relation to the experimental ones and it can be neglected.

The experimental group includes: the three groups of trainees of the day department and the two groups of trainees of the evening department, which use the various innovative components of the automated training system based on CM.

It should be taken into account, that integrally the level of other influences in the subjects of basic cycle is negligible small in relation to the educational influences, which are generated by means of the developed adaptive means of training (ET).

Differentially there is the potential possibility directly to compare the regression of the estimation of LRKT in the discipline “Informatics” with the other parameters, which have the important value for the realization of the system analysis of IEE and ART system: the developed by the author CMT and the adaptive means of training (ET) were applied.

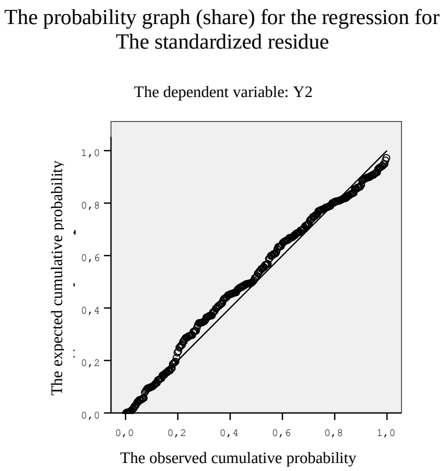
The probability graph of the share of regression for the standardized residue reflects the relative inconsistency of the expected and factual cumulative probability of occurrence of the nominal value of the given dependent variable (Y_2), that allows to estimate the degree of compliance of a sequence of following of the nominal values of dependent variable (Y_2) to the normal law of distribution of a sequence of numbers.

The compliance to the normal law of distribution is estimated by the means of use of the various analytical (the formulas for the calculating of the critical values of median and excess) and the graphical criteria (the quartile and percentile graphs, the graphs of accumulated frequencies), which allow this to be done with the sufficient accuracy.

1.A. The indicators of quality of the model of multiple regression with the reduced set of predictors K_i and factor Y_2.

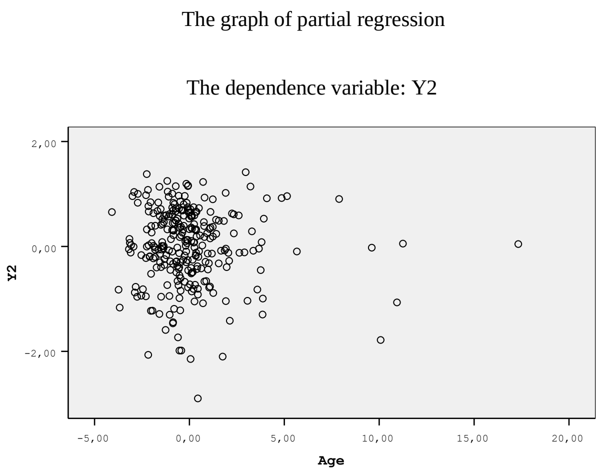
To the indicators of quality of the linear equation of multiple regression directly refer the probability graph of regression of the factual and predicted nominal value of the level of residual knowledge of the contingent of trainees.

In pic. A15.37 presents directly the probabilistic graph with the factual nominal values and the expected nominal values of dependent variable Y_2 with the reduced set of various independent variables K_i.

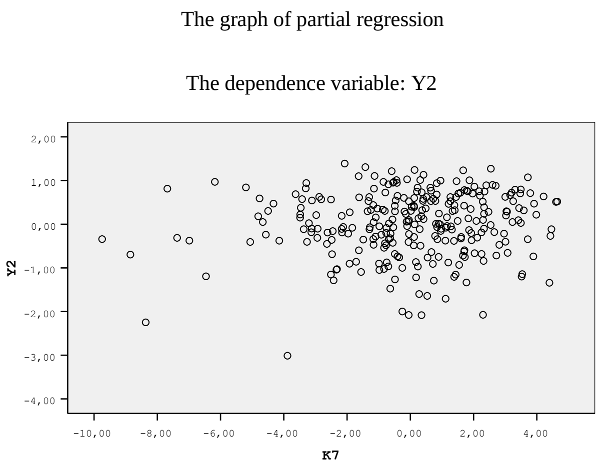


Picture A15.37. The probability graph of the regression of dependent variable Y_2 at the reduced set of independent variables K_i

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and the age (Age) is presented directly in pic. A15.38, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and protanopia (K_7) is presented in pic. A15.39.

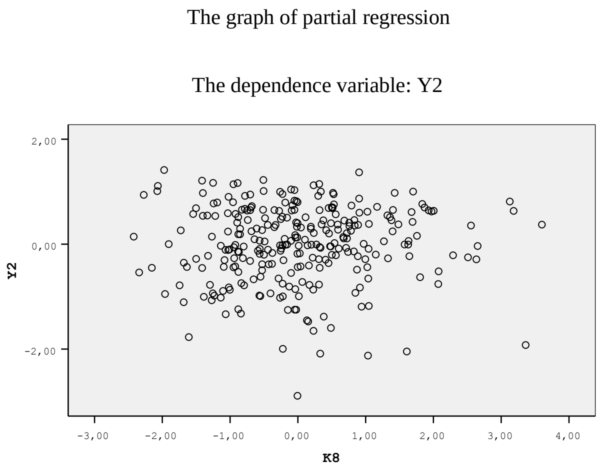


Picture A15.38. The partial regression of the age (Age) and the level of residual knowledge by the exact scale (Y_2)

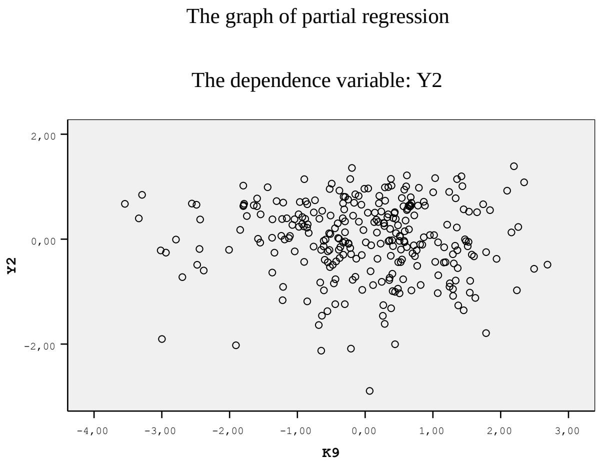


Picture A15.39. The partial regression of protanopia (K_7) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and deuteranopia (K_8) is presented ${}_{8}$directly in pic. A15.40, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and tritanopia (K_9) is presented in pic. A15.41.

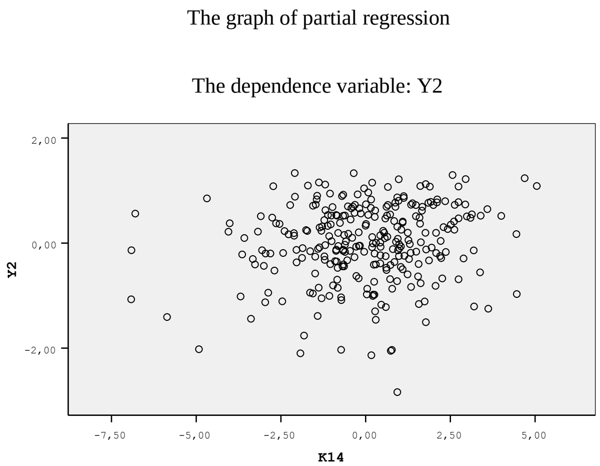


Picture A15.40. The partial regression of deuteranopia (K_8) and the level of residual knowledge by the exact scale (Y_2)

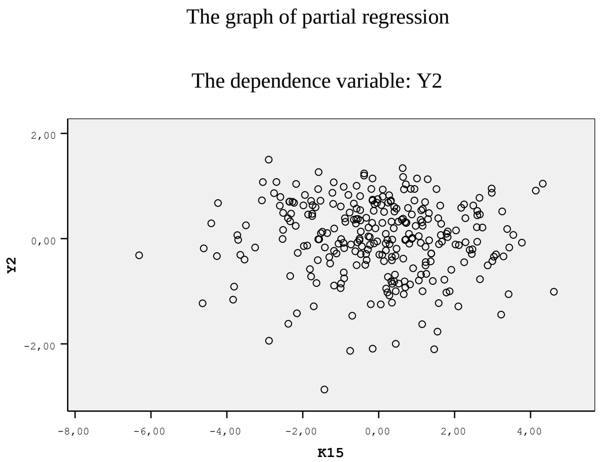


Picture A15.41. The partial regression of tritanopia (K_9) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and verbalization (K_{14}) is presented directly in pic. A15.42, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and generalization (K_{15}) is presented in pic. A15.43.

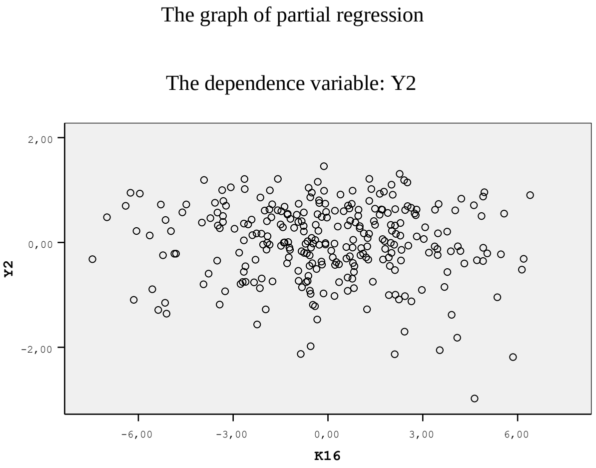


Picture A15.42. The partial regression of verbalization (K_{14}) and the level of residual knowledge by the exact scale (Y_2)

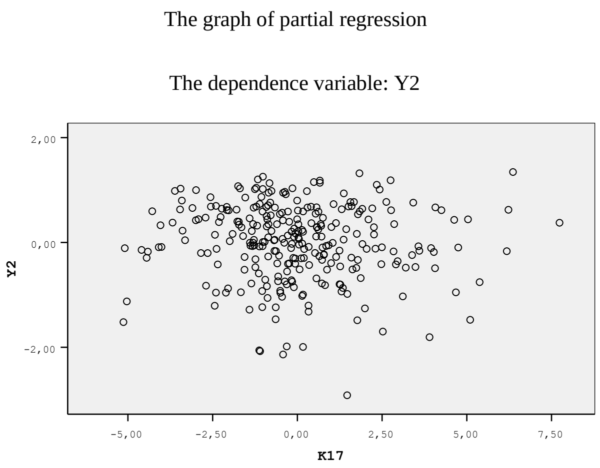


Picture A15.43. The partial regression of generalizations (K_{15}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and analyticity (K_{16}) is presented directly in pic. A15.44, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and classification (K_{17}) is presented in pic. A15.45.

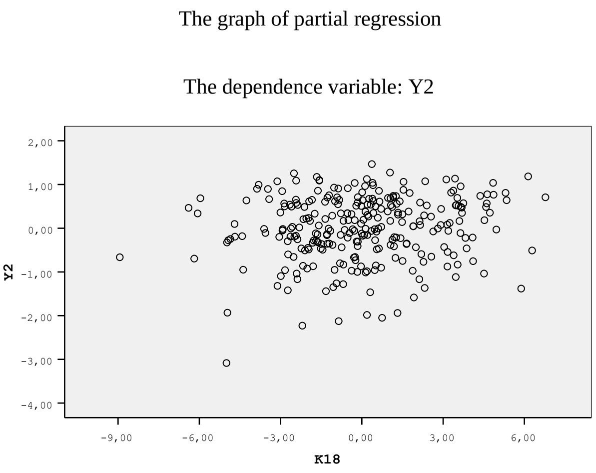


Picture A15.44. The partial regression of analyticity (K_{16}) and the level of residual knowledge by the exact scale (Y_2)

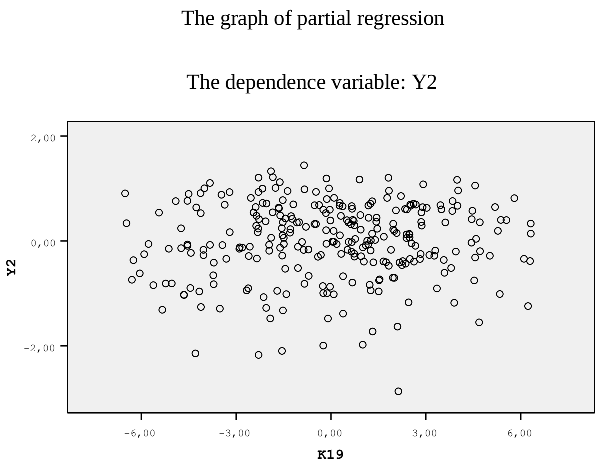


Picture A15.45. The partial regression of classification (K_{17}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and arithmetic abilities (K_{18}) is presented directly in pic. A15.46, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and combinatorics (K_{19}) is presented directly in pic. A15.47.

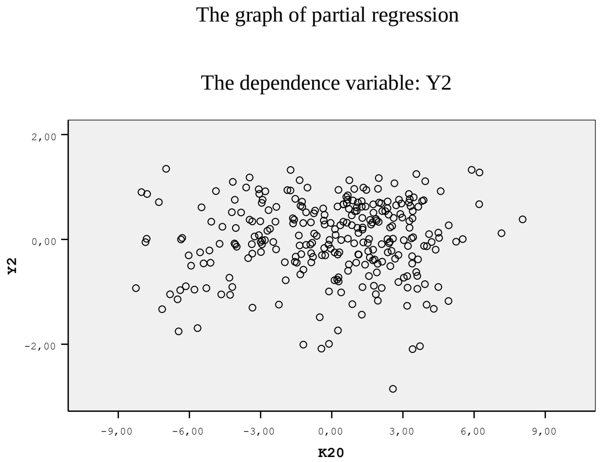


Picture A15.46. The partial regression of arithmetic abilities (K_{18}) and the level of residual knowledge by the exact scale (Y_2)

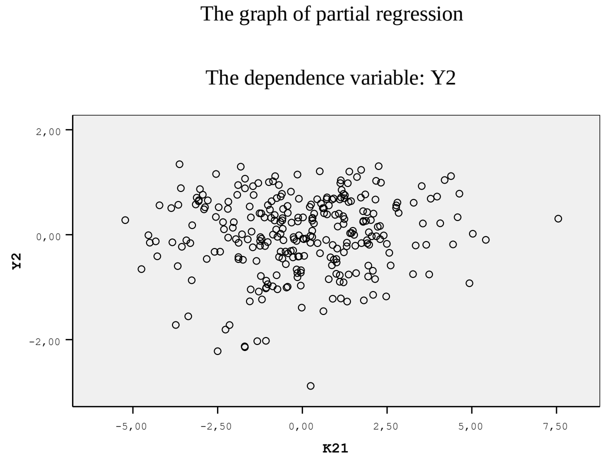


Picture A15.47. The partial regression of combinatorics (K_{19}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and mnemonic abilities (K_{20}) is presented directly in pic. A15.48, and the graph of the partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and planar thinking (K_{21}) is presented directly in pic. A15.49.

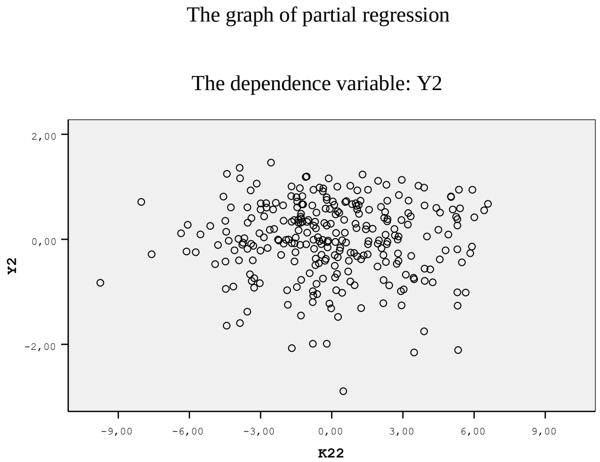


Picture A15.48. The partial regression of mnemonic abilities (K_{20}) and the level of residual knowledge by the exact scale (Y_2)

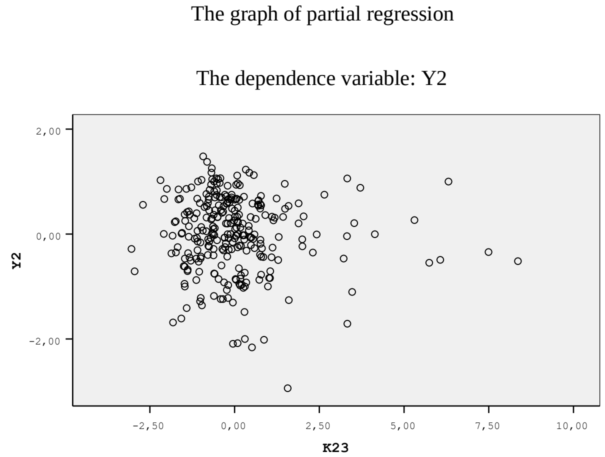


Picture A15.49. The partial regression of planar thinking (K_{21}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and the volumetric imagination (K_{22}) is presented directly in pic. A15.50, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and verbal originality (K_{23}) is presented directly in pic. A15.51.



Picture A15.50. The partial regression of volumetric imagination (K_{22}) and the level of residual knowledge by the exact scale (Y_2)

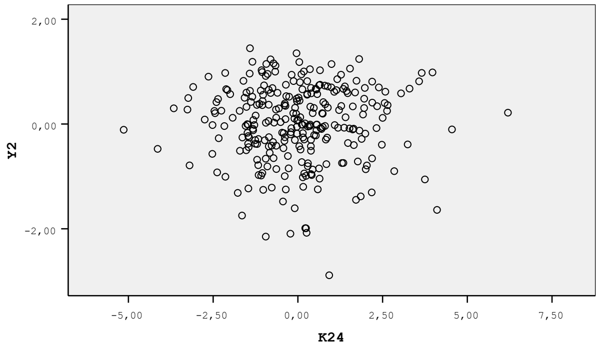


Picture A15.51. The partial regression of verbal originality (K_{23}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and verbal associativity (K_{24}) is presented directly in pic. A15.52, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and verbal selectivity (K_{25}) is presented directly in pic. A15.53.

The graph of partial regression

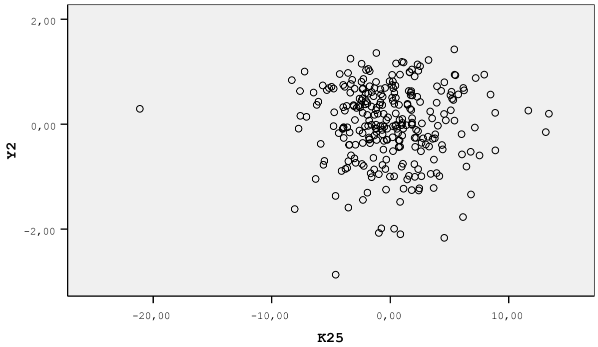
The dependence variable: Y2



Picture A15.52. The partial regression of verbal associativity (K_{24}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression

The dependence variable: Y2

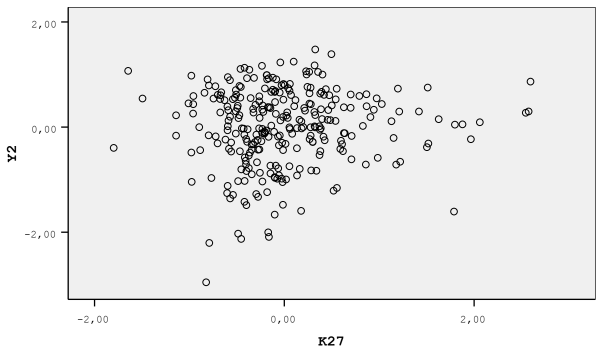


Picture A15.53. The partial regression of verbal selectivity (K_{25}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and figurative originality (K_{27}) is presented directly in pic. A15.54, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and figurative associativity (K_{28}) is presented directly in pic. A15.55.

The graph of partial regression

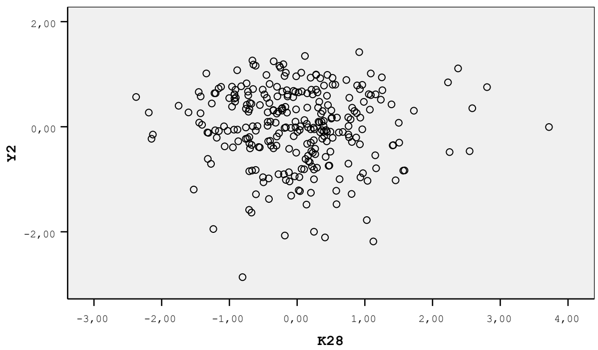
The dependence variable: Y2



Picture A15.54. The partial regression of figurative originality (K_{27}) and the level of residual knowledge by the exact scale (Y_2)

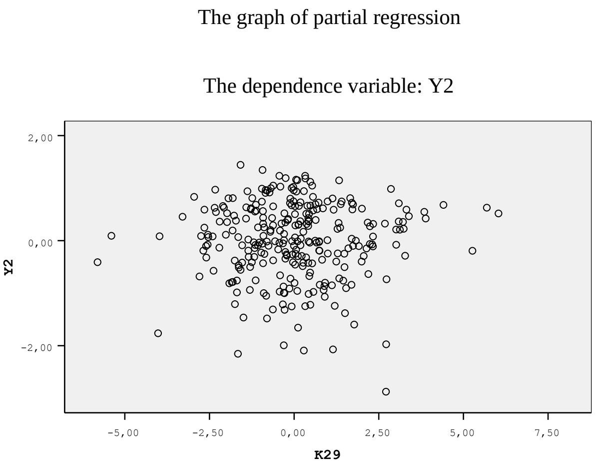
The graph of partial regression

The dependence variable: Y2

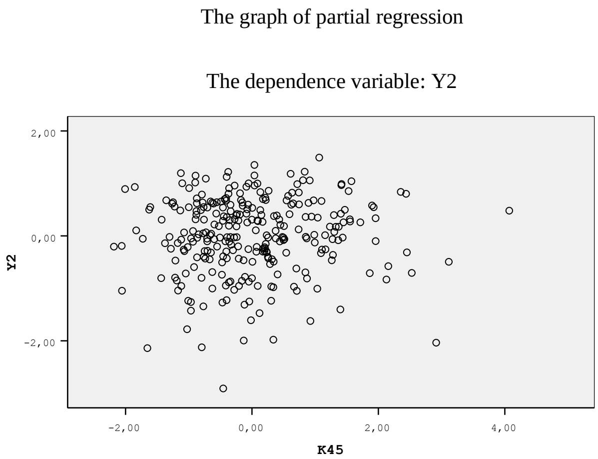


Picture A15.55. The partial regression of figurative associativity (K_{28}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and the figurative selectivity (K_{29}) is presented directly in pic. A15.56, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and the level of proficiency in the language of statement of the information (K_{45}) is presented in pic. A15.57.



Picture A15.56. The partial regression of figurative selectivity (K_{29}) and the level of residual knowledge by the exact scale (Y_2)

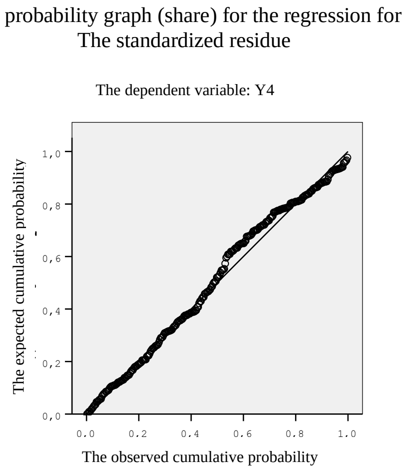


Picture A15.57. The partial regression of the level of proficiency in the language of statement of the information (K_{45}) and the level of residual knowledge by the exact scale (Y_2)

1.B. <u>The indicator of quality of the model of multiple regression with the reduced set of predictors K_i and factor Y_4.</u>

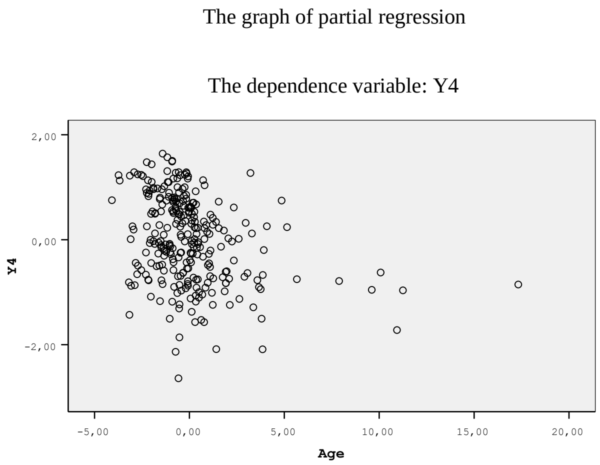
To the indicators of quality of the linear equation of multiple regression directly refer the probability graph of regression of the factual and predicted nominal value of the level of residual knowledge of the contingent of trainees.

In pic. A15.58 presents directly the probability graph with the factual nominal values and the expected nominal values of dependent variable Y_4 at the reduced set of various independent variables K_i.

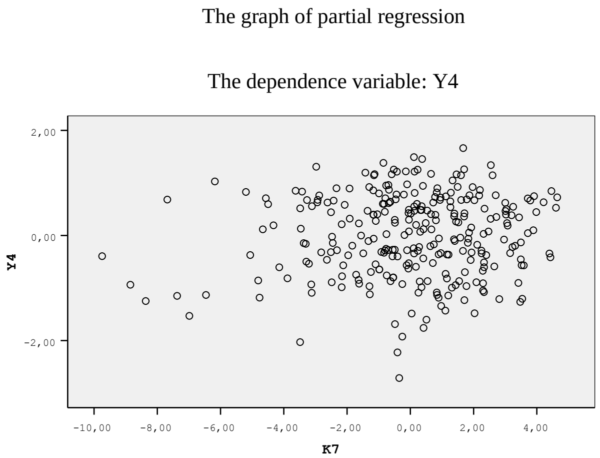


Picture A15.58. The probability graph of regression of the dependent variable Y_4 at the reduced set of independent variables K_i

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and the age (Age) is presented in pic. A15.59, and the graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and protanopia (K_7) is presented in pic. A15.60.

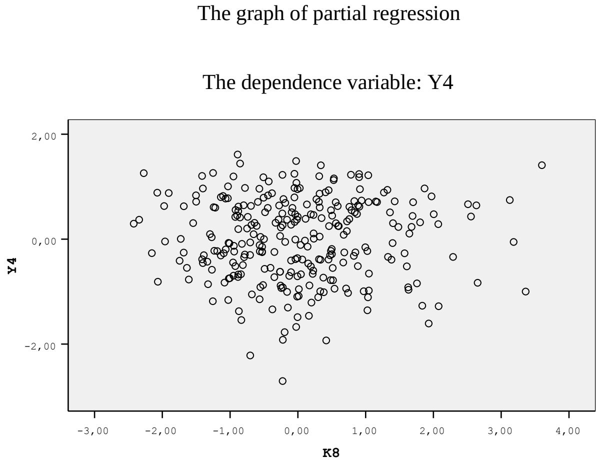


Picture A15.59. The partial regression of the age (Age) and the level of residual knowledge by the exact scale (Y_4)

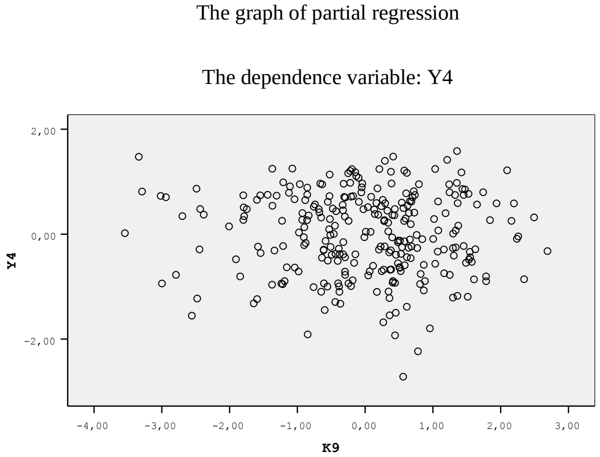


Picture A15.60. The partial regression of protanopia (K_7) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and deuteranopia (K_8) is presented directly in pic. A15.61, and the graph of partial regression of LRKT (Y_2) and tritanopia (K_9) is presented directly in pic. A15.62.

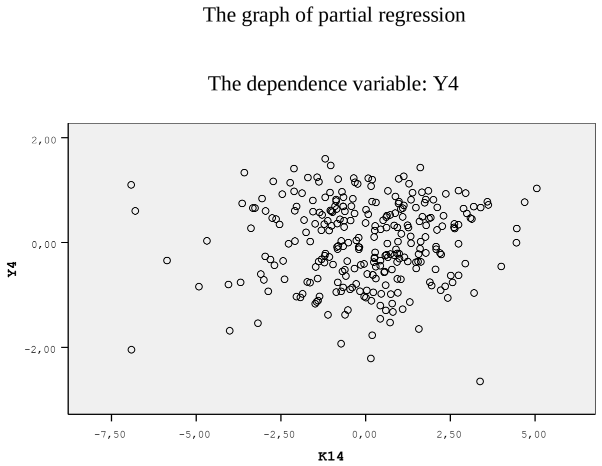


Picture A15.61. The partial regression of deuteranopia (K_8) and the level of residual knowledge by the exact scale (Y_4)

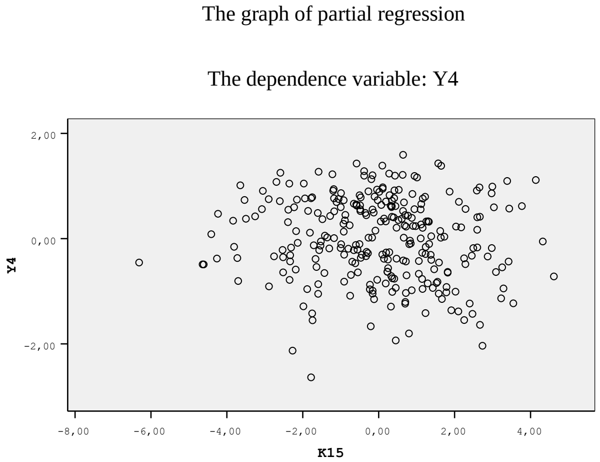


Picture A15.62. The partial regression of tritanopia (K_9) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and verbalization (K_{14}) is presented directly in pic. A15.63, and the graph of partial regression of LRKT (Y_2) and generalization (K_{15}) is presented directly in pic. A15.64.



Picture A15.63. The partial regression of verbalization (K_{14}) and the level of residual knowledge by the exact scale (Y_4)

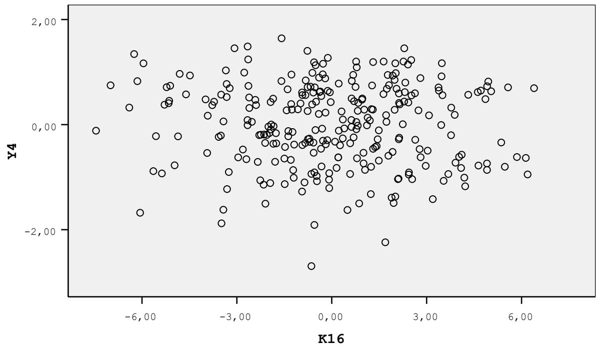


Picture A15.64. The partial regression of generalizations (K_{15}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_2) and analyticity (K_{16}) is presented in pic. A15.65, and the graph of partial regression of LRKT (Y_2) and classification (K_{17}) is presented in pic. A15.66.

The graph of partial regression

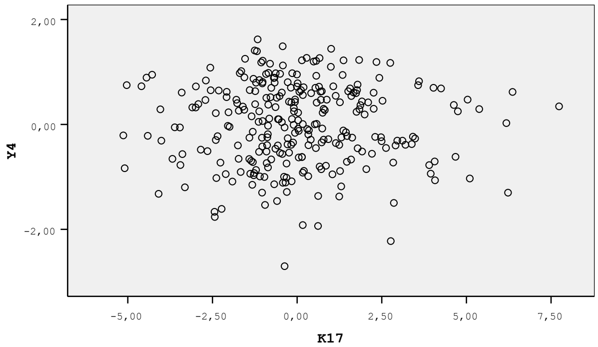
The dependence variable: Y4



Picture A15.65. The partial regression of analyticity (K_{16}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression

The dependence variable: Y4

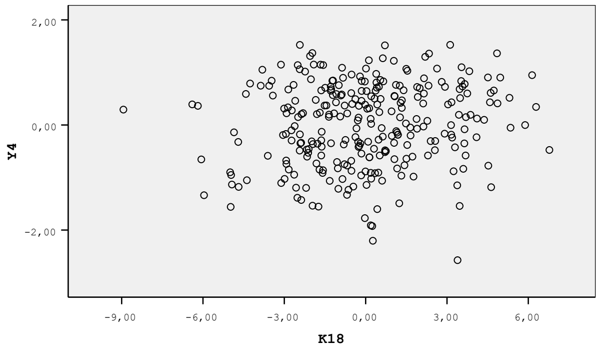


Picture A15.66. The partial regression of classification (K_{17}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_2) and arithmetic abilities (K_{18}) is presented directly in pic. A15.67, and the graph of partial regression of LRKT (Y_2) and combinatorics (K_{19}) is presented directly in pic. A15.68.

The graph of partial regression

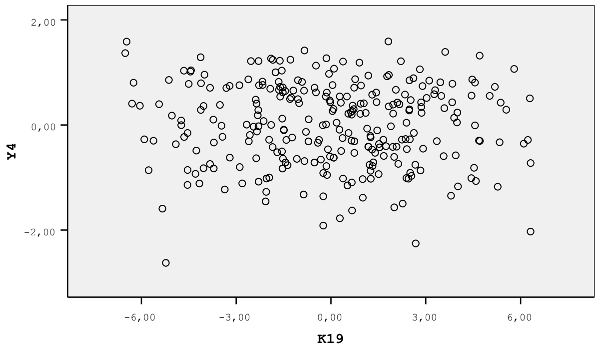
The dependence variable: Y4



Picture A15.67. The partial regression of arithmetic abilities (K_{18}) and the level of residual knowledge by the exact scale (Y_4)

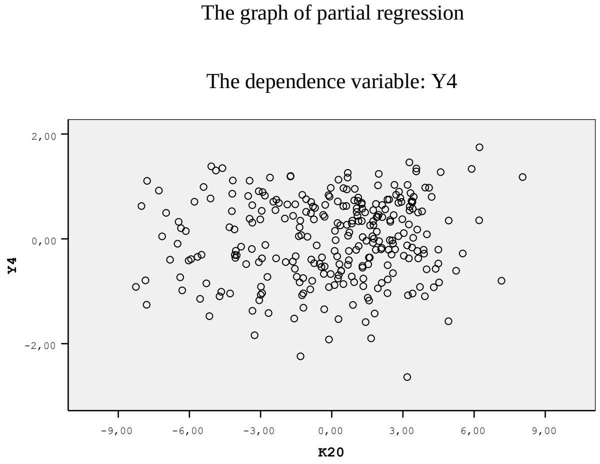
The graph of partial regression

The dependence variable: Y4

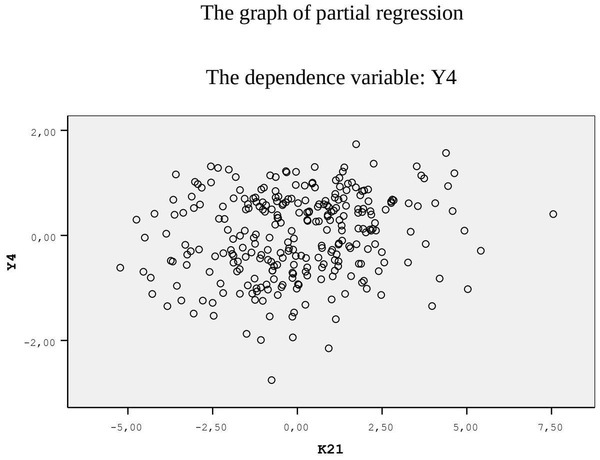


Picture A15.68. The partial regression of combinatorics (K_{19}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_2) and mnemonic abilities (K_{20}) is presented directly in pic. A15.69, and the graph of partial regression of LRKT (Y_2) and planar thinking (K_{21}) is presented directly in pic. A15.70.

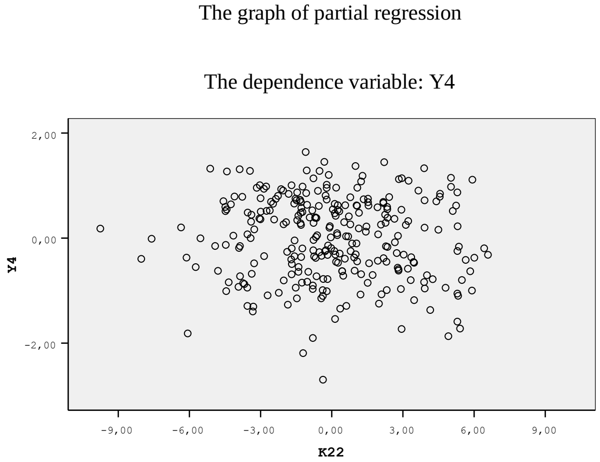


Picture A15.69. The partial regression of mnemonic abilities (K_{20}) and the level of residual knowledge by the exact scale (Y_4)

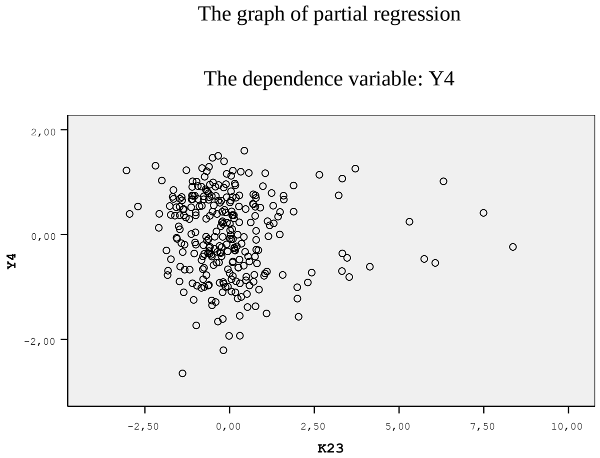


Picture A15.70. The partial regression of planar thinking (K_{21}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_2) and volumetric thinking (K_{22}) is presented directly in pic. A15.71, and the graph of partial regression of LRKT (Y_2) and verbal originality (K_{23}) is presented directly in pic. A15.72.



Picture A15.71. The partial regression of volumetric thinking (K_{22}) and the level of residual knowledge by the exact scale (Y_4)

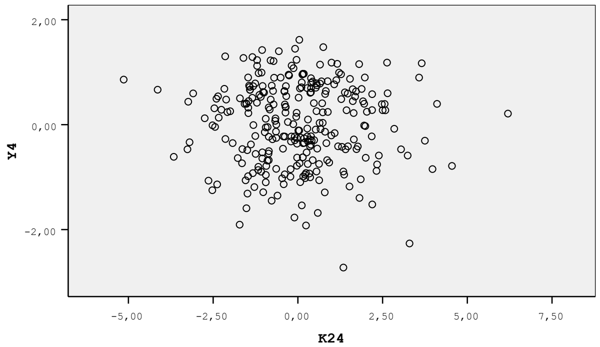


Picture A15.72. The partial regression of verbal originality (K_{23}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_2) and verbal associativity (K_{24}) is presented directly in pic. A15.73, and the graph of partial regression of LRKT (Y_2) and verbal selectivity (K_{25}) is presented directly in pic. A15.74.

The graph of partial regression

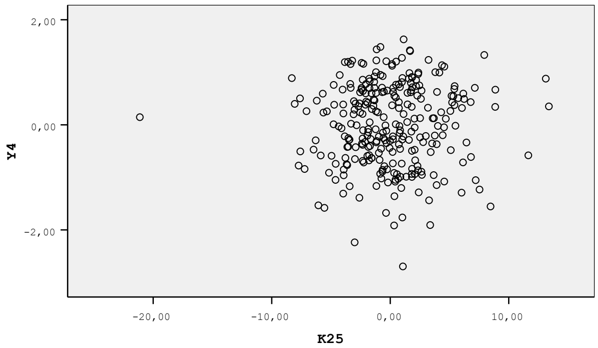
The dependence variable: Y4



Picture A15.73. The partial regression of verbal associativity (K_{24}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression

The dependence variable: Y4

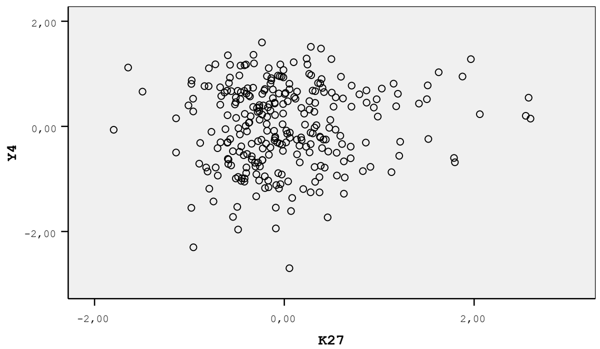


Picture A15.74. The partial regression of verbal selectivity (K_{25}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_2) and figurative originality (K_{27}) is presented directly in pic. A15.75, and the graph of partial regression of LRKT (Y_2) and figurative associativity (K_{28}) is presented directly in pic. A15.76.

The graph of partial regression

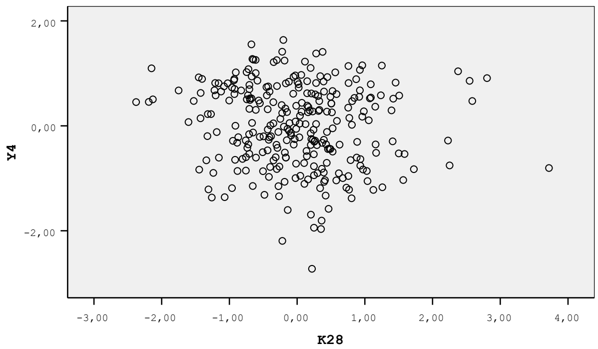
The dependence variable: Y4



Picture A15.75. The partial regression of figurative originality (K_{27}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression

The dependence variable: Y4

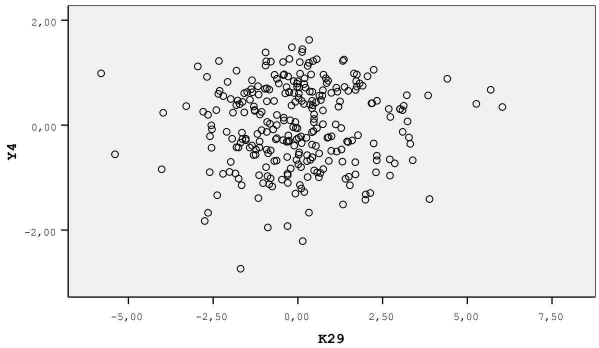


Picture A15.76. The partial regression of figurative associativity (K_{28}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_2) and figurative selectivity (K_{29}) is presented directly in pic. A15.77, and the graph of partial regression of LRKT (Y_2) and the level of proficiency in the language of statement of the information (K_{45}) is presented in pic. A15.78.

The graph of partial regression

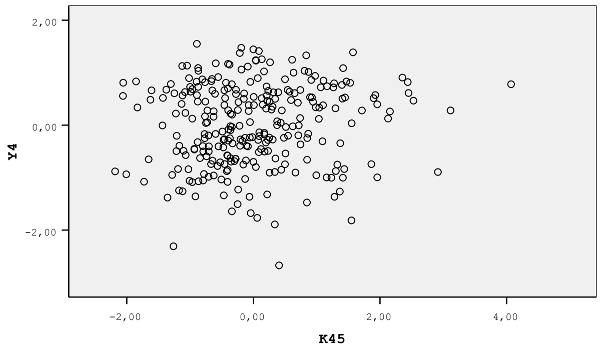
The dependence variable: Y4



Picture A15.77. The partial regression of figurative selectivity (K_{29}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression

The dependence variable: Y4

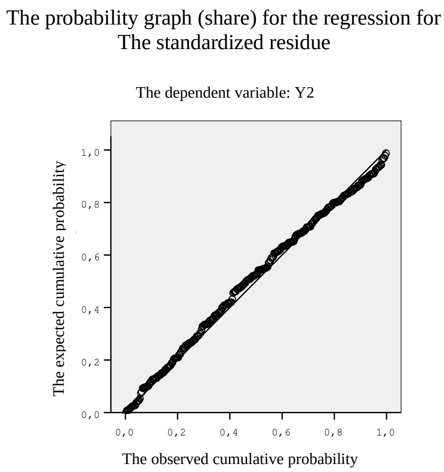


Picture A15.78. The partial regression and the level of proficiency in the language of statement of the information (K_{45}) and the level of residual knowledge by the exact scale (Y_4)

2.A. The indicators of quality of the model of multiple regression with the complete set of predictors K_i and factor Y_2.

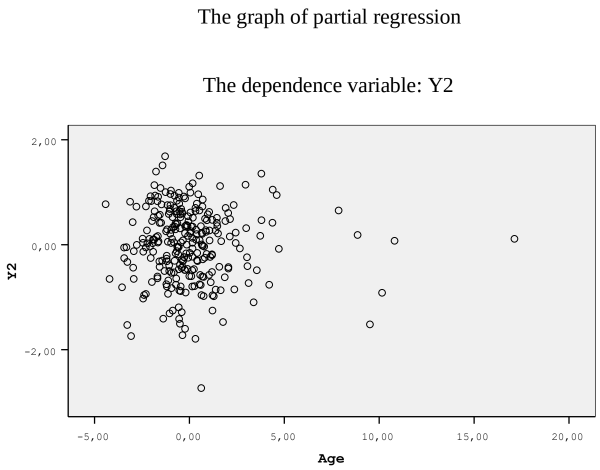
The indicators of quality of the linear equation of multiple regression directly refer the probability graph of regression of the factual and predicted nominal value of the level of residual knowledge of the contingent of trainees.

In pic. A15.79 presents directly the probability graph with the factual nominal values and the expected nominal values of dependent variable Y_2 at the complete set of various independent variables K_i.

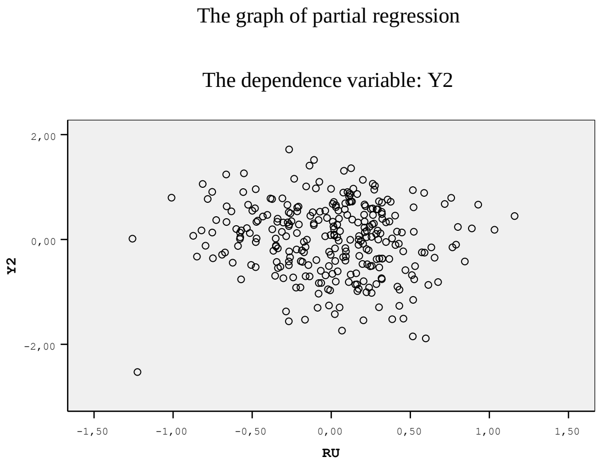


Picture A15.79. The probability graph of regression of the dependent variable Y_2 at the complete set of independent variables K_i

The graph of partial regression of LRKT (Y_2) and the age (Age) is presented directly in pic. A15.80, and the graph of partial regression of LRKT (Y_2) and the estimation in the Russian language (RU) is presented directly in pic. A15.81.



Picture A15.80. The partial regression of the age (Age) and the level of residual knowledge by the exact scale (Y_2)

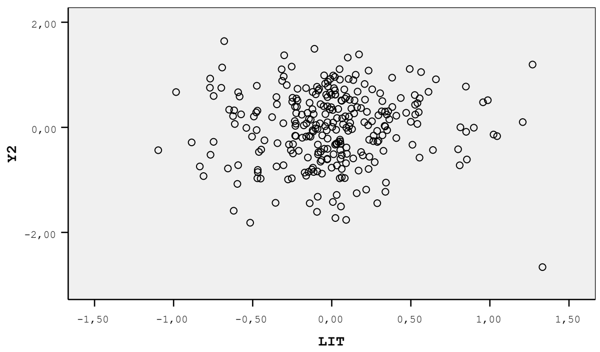


Picture A15.81. The partial regression of the estimation in the Russian language (RU) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the mark in literature (LIT) is presented directly in pic. A15.82, and the graph of partial regression of LRKT (Y_2) and the mark in foreign language (LG) is presented directly in pic. A15.83.

The graph of partial regression

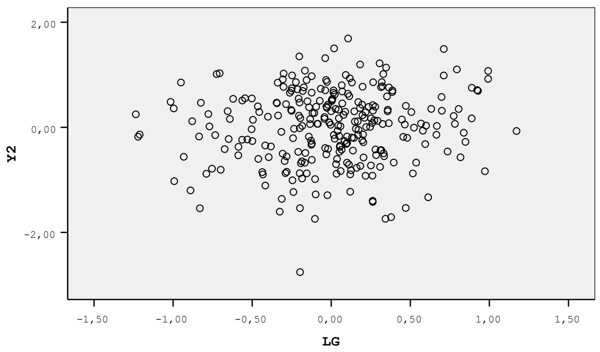
The dependence variable: Y2



Picture A15.82. The partial regression of the mark in literature (LIT) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression

The dependence variable: Y2

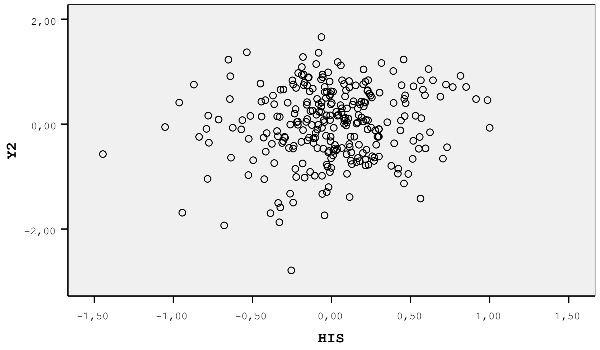


Picture A15.83. The partial regression of the mark in foreign language (LG) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the mark in history (HIS) is presented directly in pic. A15.84, and the graph of partial regression of LRKT (Y_2) and the mark in geography (GEO) is presented directly in pic. A15.85.

The graph of partial regression

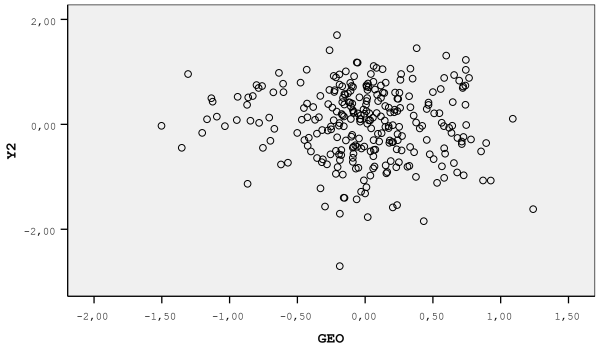
The dependence variable: Y2



Picture A15.84. The partial regression of the mark in history (HIS) and the level of residual knowledge by the exact scale (Y_2)

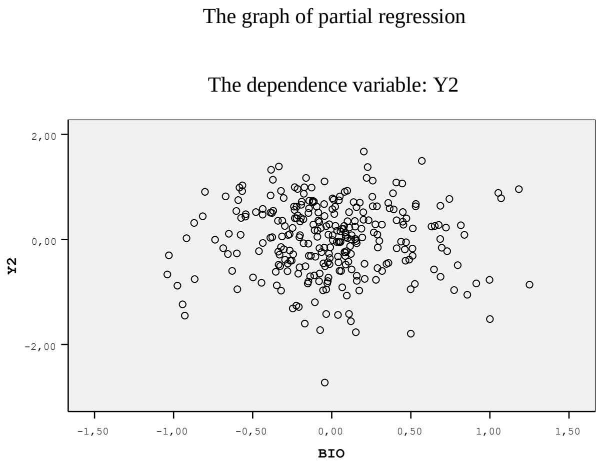
The graph of partial regression

The dependence variable: Y2

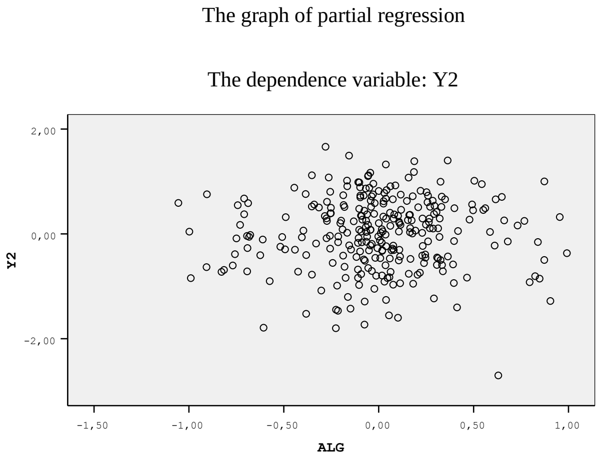


Picture A15.85. The partial regression of the mark in geography (GEO) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the mark in biology (BIO) is presented directly in pic. A15.86, and the graph of partial regression of LRKT (Y_2) and the mark in algebra (ALG) is presented directly in pic. A15.87.

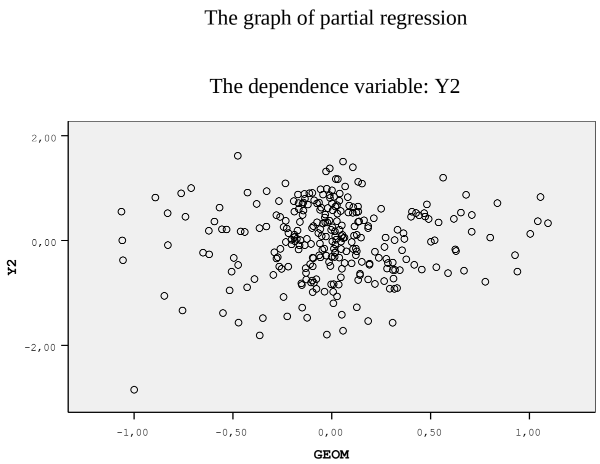


Picture A15.86. The partial regression of the mark in biology (BIO) and the level of residual knowledge by the exact scale (Y_2)

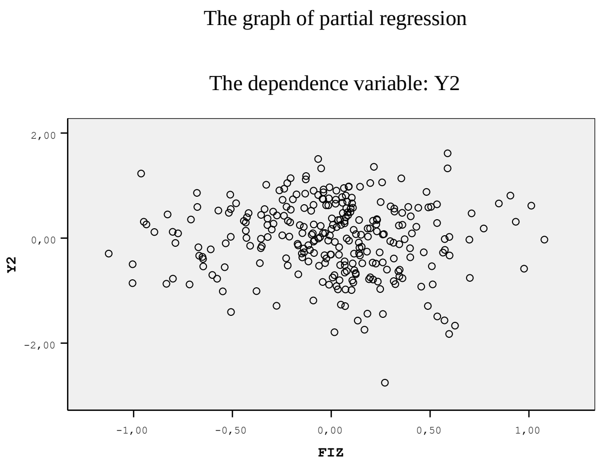


Picture A15.87. The partial regression of the mark in geography (GEO) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the mark in geometry (GEOM) is presented directly in pic. A15.88, and the graph of partial regression of LRKT (Y_2) and the mark in physics (FIS) is presented directly in pic. A15.89.

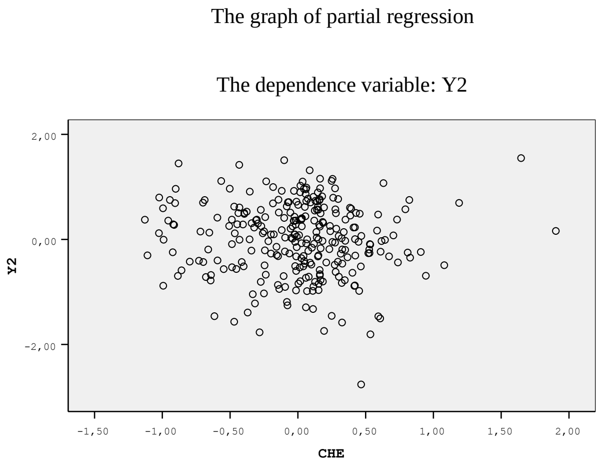


Picture A15.88. The partial regression of the mark in geometry (GEOM) and the level of residual knowledge by the exact scale (Y_2)

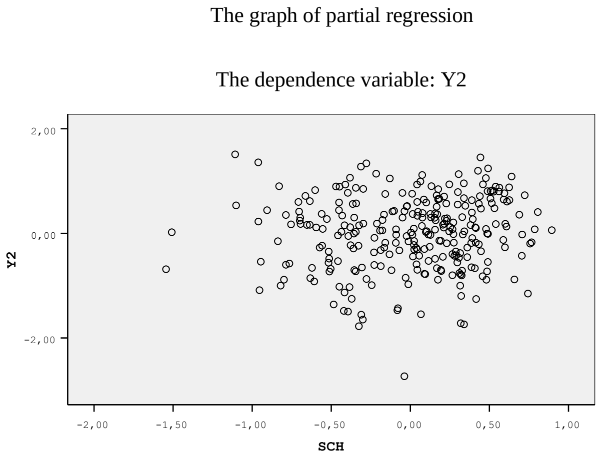


Picture A15.89. The partial regression of the mark in physics (FIS) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the mark in chemistry (GHE) is presented directly in pic. A15.90, and the graph of partial regression of LRKT (Y_2) and the mark in drawing (SCH) is presented directly in pic. A15.91.

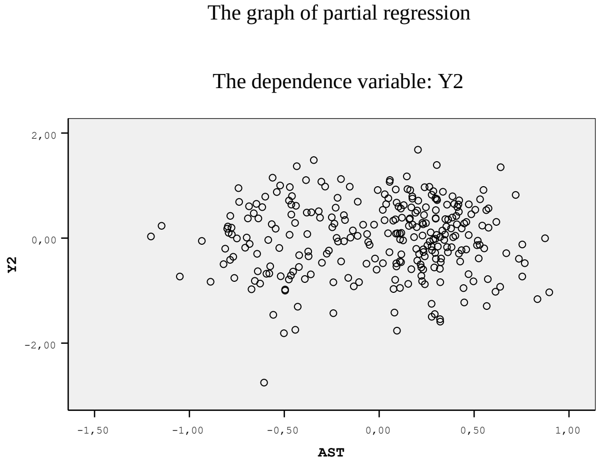


Picture A15.90. The partial regression of the mark in chemistry (CHE) and the level of residual knowledge by the exact scale (Y_2)

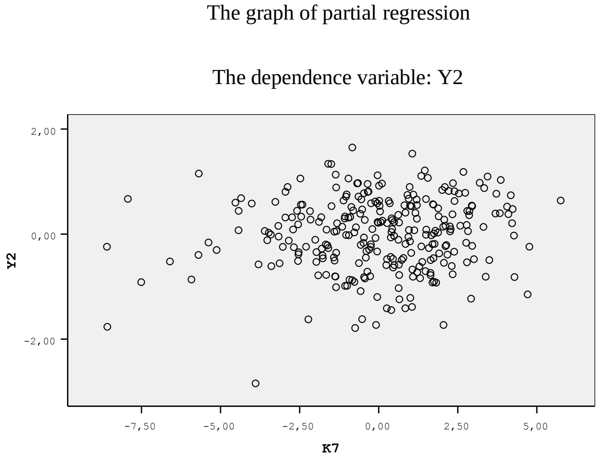


Picture A15.91. The partial regression of the mark in drawing (SCH) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the mark in astronomy (AST) is presented directly in pic. A15.92, and the graph of partial regression of LRKT (Y_2) and protanopia (K_7) is presented directly in pic. A15.93.

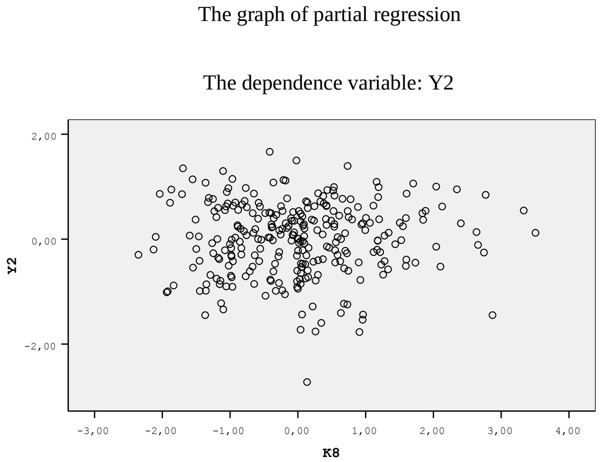


Picture A15.92. The partial regression of the mark in astronomy (AST) and the level of residual knowledge by the exact scale (Y_2)

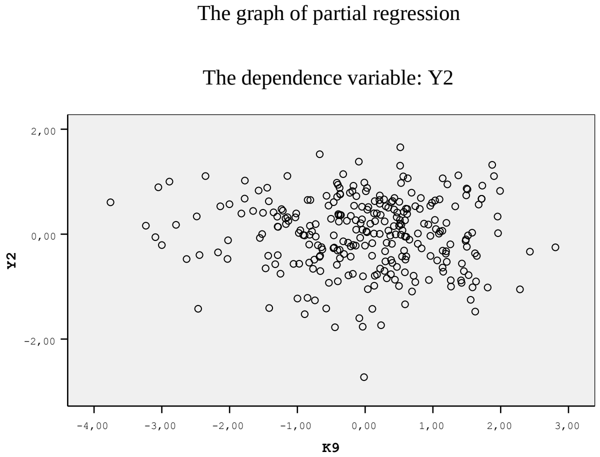


Picture A15.93. The partial regression of the protanopia (K_7) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and deuteranopia (K_8) is presented directly in pic. A15.94, and the graph of partial regression of LRKT (Y_2) and tritanopia (K_9) is presented directly in pic. A15.95.

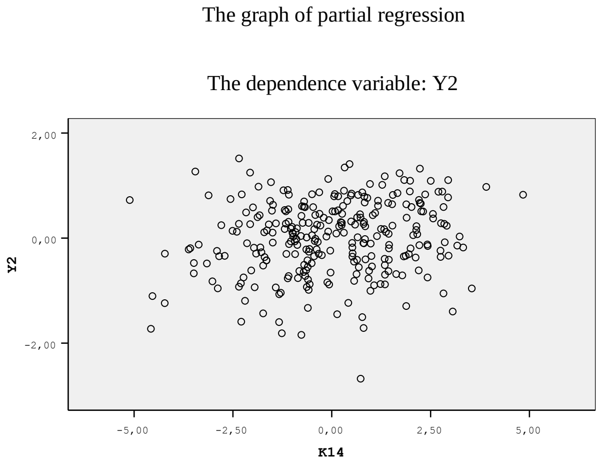


Picture A15.94. The partial regression of the deuteranopia (K_8) and the level of residual knowledge by the exact scale (Y_2)

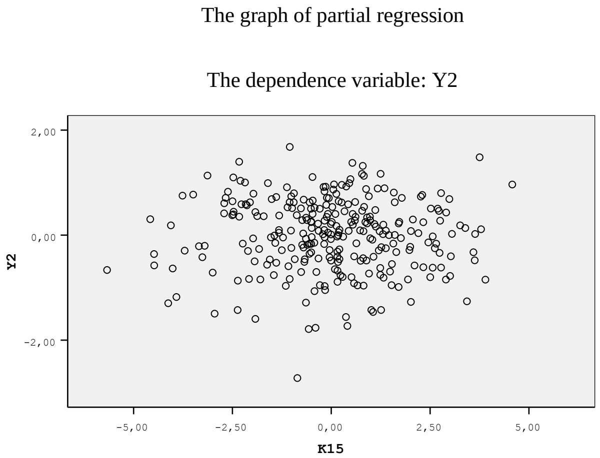


Picture A15.95. The partial regression of the tritanopia (K_9) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and verbalization (K_{14}) is presented directly in pic. A15.96, and the graph of partial regression of LRKT (Y_2) and generalization (K_{15}) is presented directly in pic. A15.97.

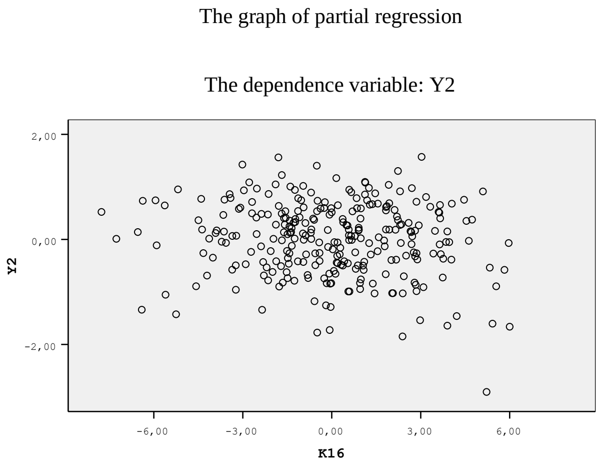


Picture A15.96. The partial regression of the verbalization (K_{14}) and the level of residual knowledge by the exact scale (Y_2)

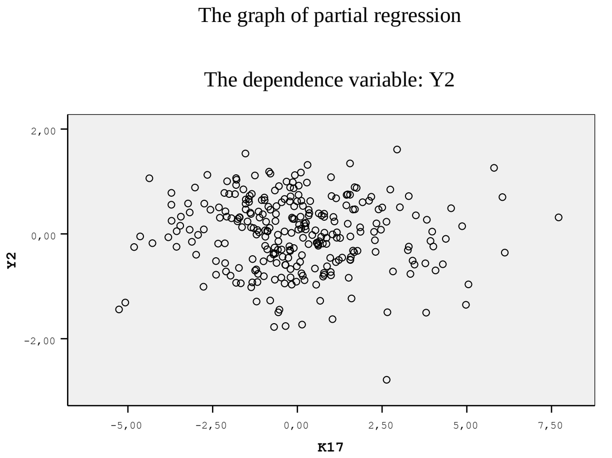


Picture A15.97. The partial regression of the generalization (K_{15}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and analyticity (K_{16}) is presented directly in pic. A15.98, and the graph of partial regression of LRKT (Y_2) and classification (K_{17}) is presented directly in pic. A15.99.

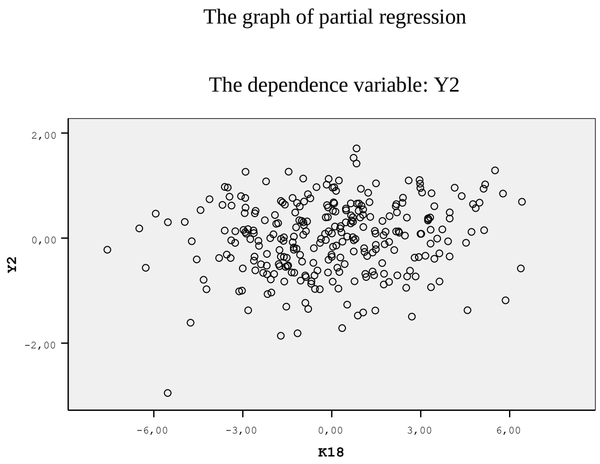


Picture A15.98. The partial regression of the analyticity (K_{16}) and the level of residual knowledge by the exact scale (Y_2)

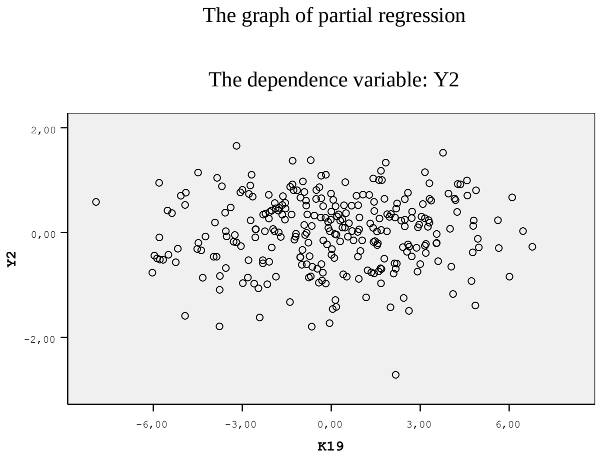


Picture A15.99. The partial regression of the classification (K_{17}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and arithmetic abilities (K_{18}) is presented directly in pic. A15.100, and the graph of partial regression of LRKT (Y_2) and combinatorial abilities (K_{19}) is presented directly in pic. A15.101.



Picture A15.100. The partial regression of the arithmetic abilities (K_{18}) and the level of residual knowledge by the exact scale (Y_2)

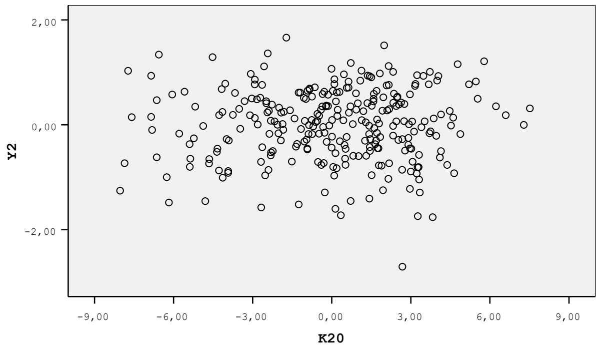


Picture A15.101. The partial regression combinatorial abilities (K_{19}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and mnemonic abilities (K_{20}) is presented directly in pic. A15.102, and the graph of partial regression of LRKT (Y_2) and planar thinking (K_{21}) is presented directly in pic. A15.103.

The graph of partial regression

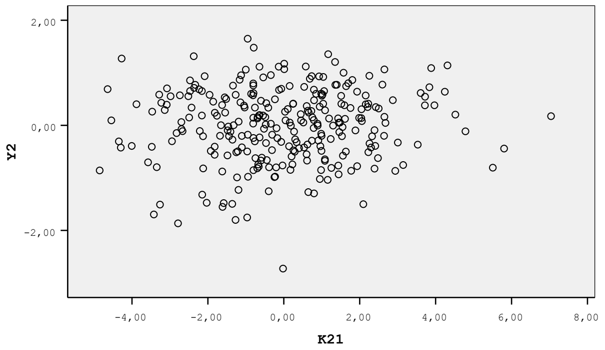
The dependence variable: Y2



Picture A15.102. The partial regression of the mnemonic abilities (K_{20}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression

The dependence variable: Y2

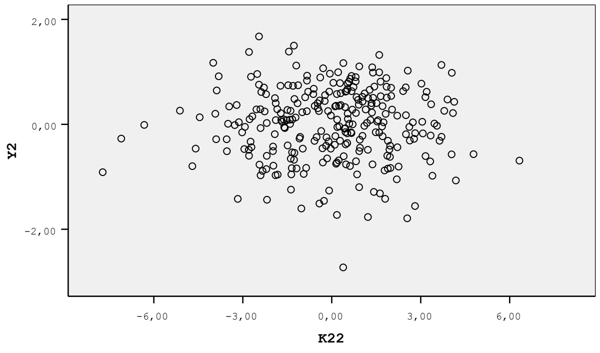


Picture A15.103. The partial regression of the planar thinking (K_{21}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and volumetric imagination (K_{22}) is presented directly in pic. A15.104, and the graph of partial regression of LRKT (Y_2) and verbal originality (K_{23}) is presented directly in pic. A15.105.

The graph of partial regression

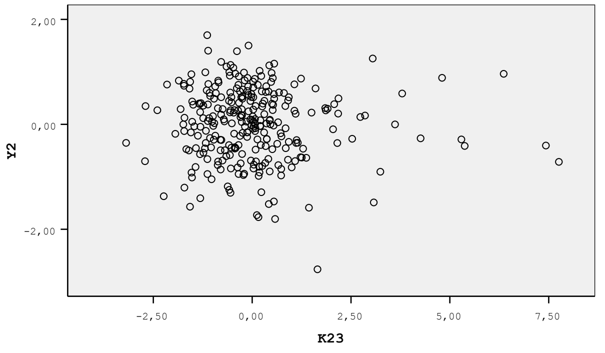
The dependence variable: Y2



Picture A15.104. The partial regression of the volumetric imagination (K_{22}) and the level of residual knowledge by the exact scale (Y_2)

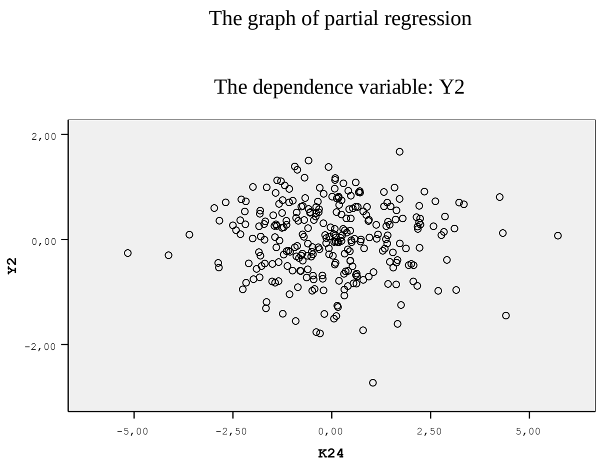
The graph of partial regression

The dependence variable: Y2

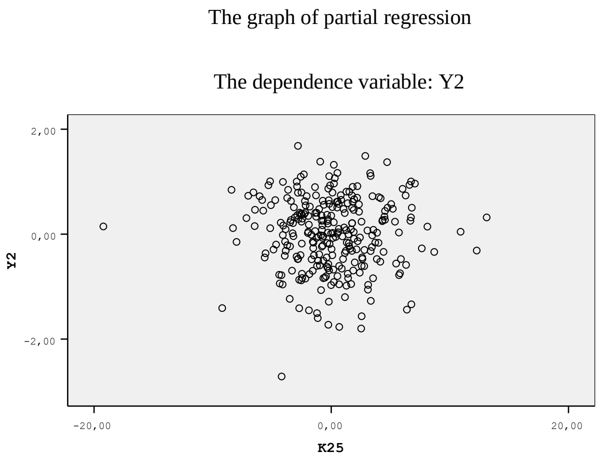


Picture A15.105. The partial regression of the verbal originality (K_{23}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and verbal associativity (K_{24}) is presented directly in pic. A15.106, and the graph of partial regression of LRKT (Y_2) and verbal selectivity (K_{25}) is presented directly in pic. A15.107.

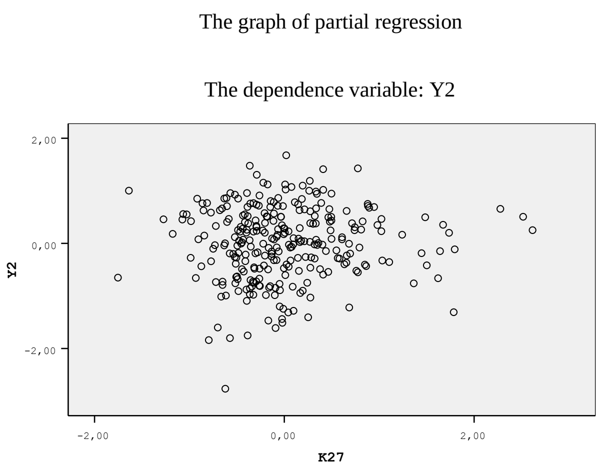


Picture A15.106. The partial regression of the verbal associativity (K_{24}) and the level of residual knowledge by the exact scale (Y_2)

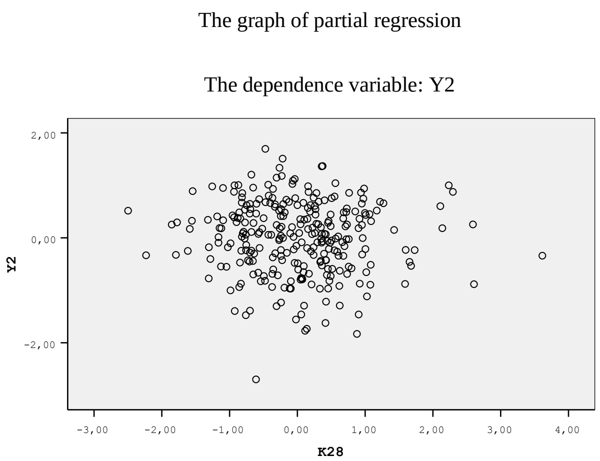


Picture A15.107. The partial regression of the verbal selectivity (K_{25}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and figurative originality (K_{27}) is presented directly in pic. A15.108, and the graph of partial regression of LRKT (Y_2) and figurative associativity (K_{28}) is presented directly in pic. A15.109.



Picture A15.108. The partial regression of the figurative originality (K_{27}) and the level of residual knowledge by the exact scale (Y_2)

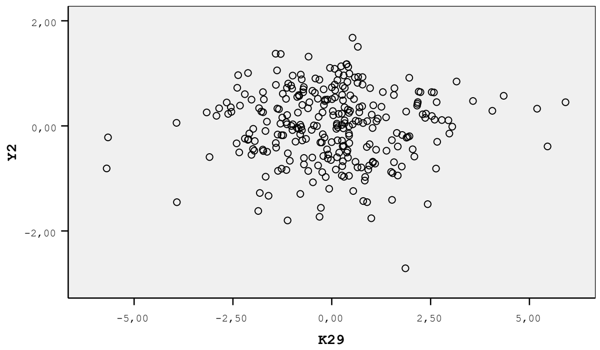


Picture A15.109. The partial regression of the figurative associativity (K_{28}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and figurative selectivity (K_{29}) is presented directly in pic. A15.110, and the graph of partial regression of LRKT (Y_2) and the level of proficiency in the language of statement of the information (K_{45}) is presented directly in pic. A15.111.

The graph of partial regression

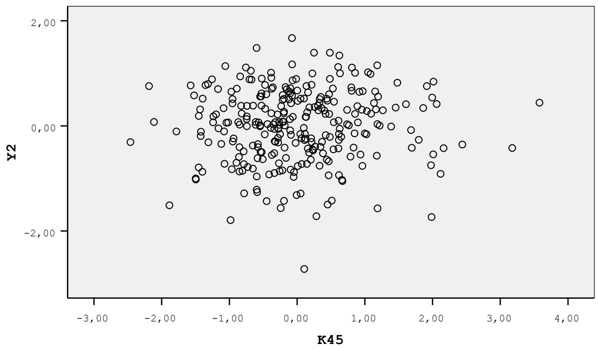
The dependence variable: Y2



Picture A15.110. The partial regression of the figurative selectivity (K_{29}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression

The dependence variable: Y2

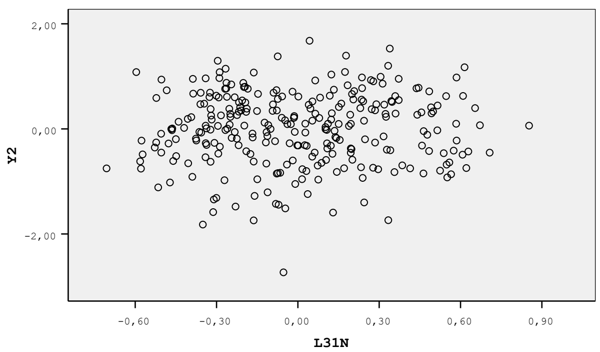


Picture A15.111. The partial regression of the level of proficiency in the language of statement of the information (K_{45}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the kind of information (L_{31N}) is presented directly in pic. A15.112, and the graph of partial regression of LRKT (Y_2) and the color of background (L_{36N}) is presented directly in pic. A15.113.

The graph of partial regression

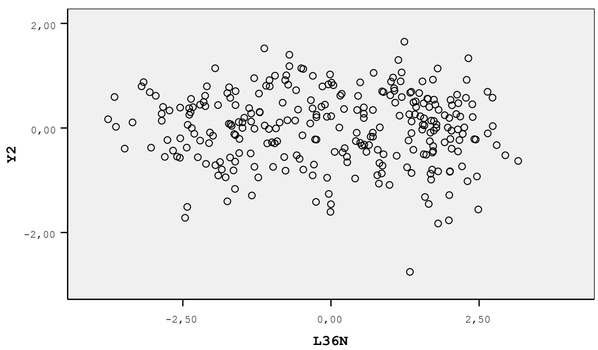
The dependence variable: Y2



Picture A15.112. The partial regression of the kind of information (L_{31N}) and the level of residual knowledge by the exact scale (Y_2)

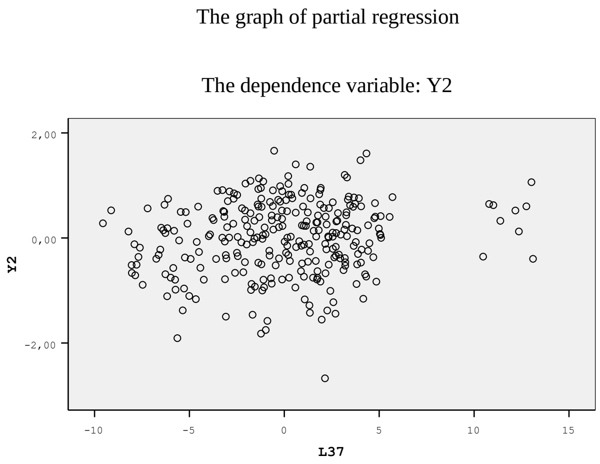
The graph of partial regression

The dependence variable: Y2

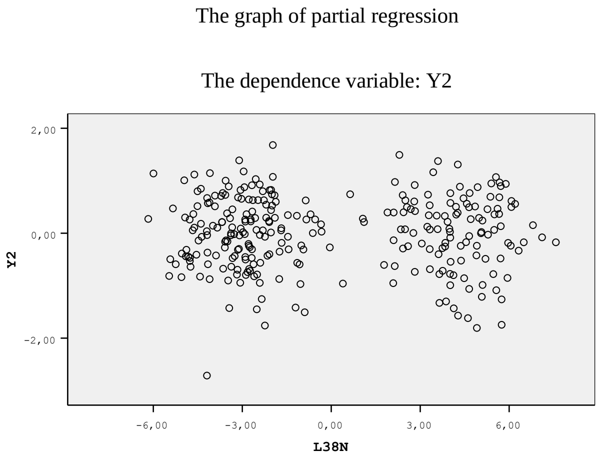


Picture A15.113. The partial regression of the color of background (L_{36N}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the size of point-size of symbol (L_{37}) is presented directly in pic. A15.114, and the graph of partial regression of LRKT (Y_2) and the color of symbol (L_{38N}) is presented directly in pic. A15.115.



Picture A15.114. The partial regression of the size of point-size of symbol (K_{37}) and the level of residual knowledge by the exact scale (Y_2)

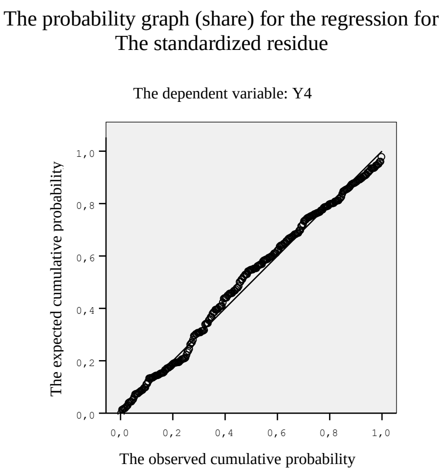


Picture A15.115. The partial regression of the color of symbol (K_{38N}) and the level of residual knowledge by the exact scale (Y_2)

2.B. The indicators of quality of the model of multiple regression with the complete set of predictors K_i and factor Y_4.

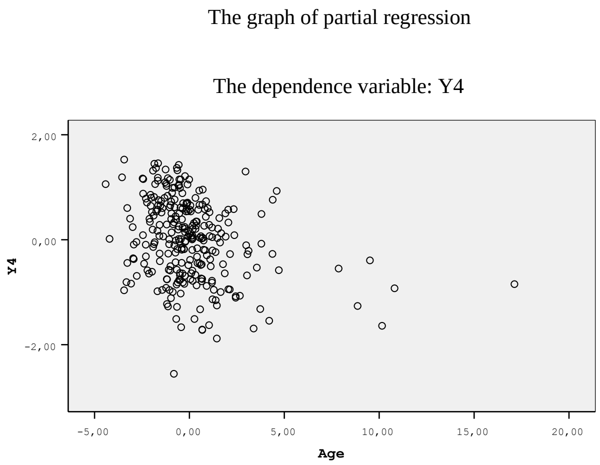
To the indicators of quality of the linear equation of multiple regression directly refer the probability graph of regression of the factual and predicted nominal value of the level of residual knowledge of the contingent of trainees.

In pic. A15.116 presents directly the probability graph with the factual nominal values and the expected nominal values of dependent variable Y_4 at the complete set of various independent variables K_i.

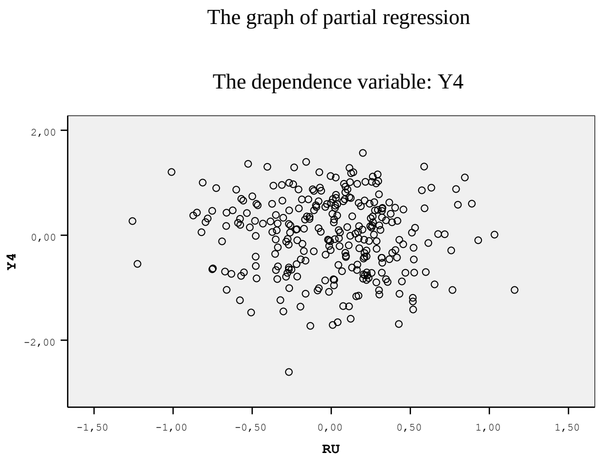


Picture A15.116. The probability graph of regression of the dependent variable Y_2 at the complete set of independent variables K_i

The graph of partial regression of LRKT (Y_4) and the age (Age) is presented directly in pic. A15.117, and the graph of partial regression of LRKT (Y_4) and the mark in the Russian language (RU) is presented directly in pic. A15.118.

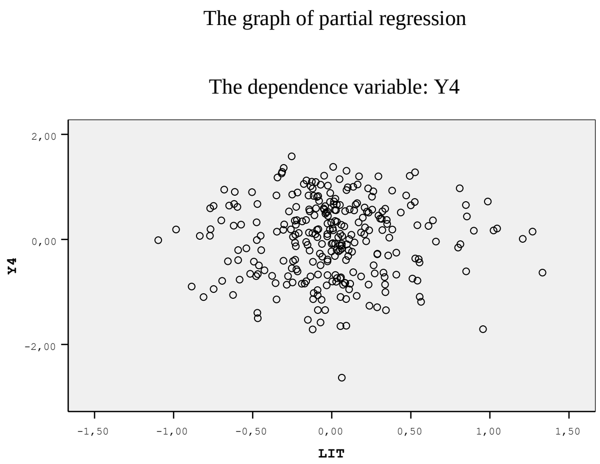


Picture A15.117. The partial regression of the age (Age) and the level of residual knowledge by the exact scale (Y_4)

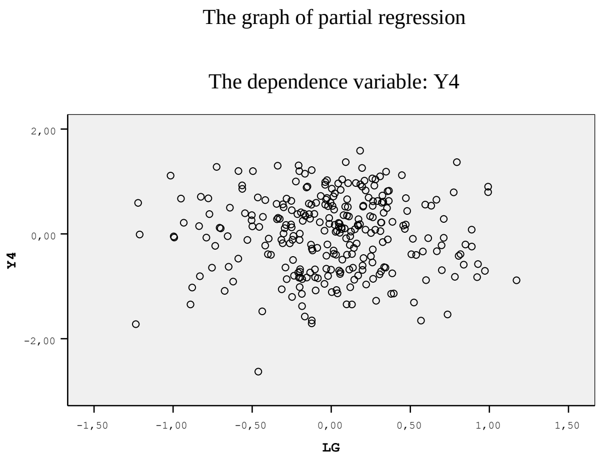


Picture A15.118. The partial regression of the mark in the Russian language (RU) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and the mark in literature (LIT) is presented directly in pic. A15.119, and the graph of partial regression of LRKT (Y_4) and the mark in foreign language (LG) is presented directly in pic. A15.120.

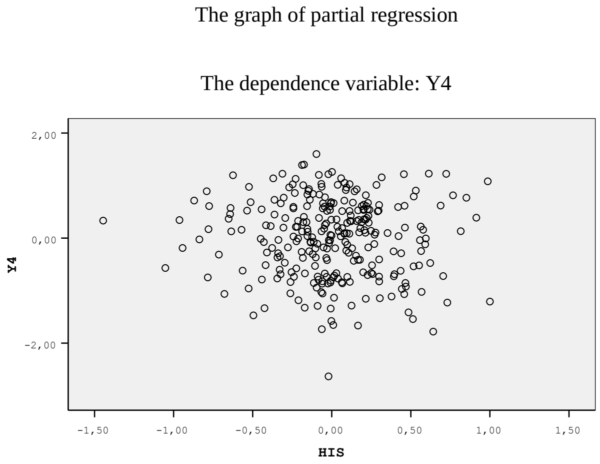


Picture A15.119. The partial regression of the mark in literature (LIT) and the level of residual knowledge by the exact scale (Y_4)

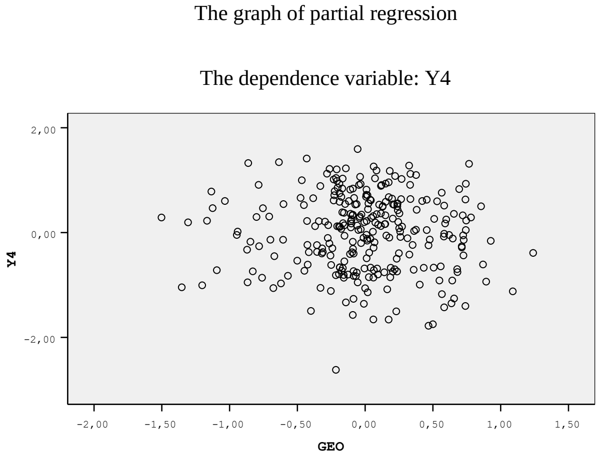


Picture A15.120. The partial regression of the mark in foreign language (LG) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and the mark in history (HIS) is presented directly in pic. A15.121, and the graph of partial regression of LRKT (Y_4) and the mark in geography (GEO) is presented directly in pic. A15.122.

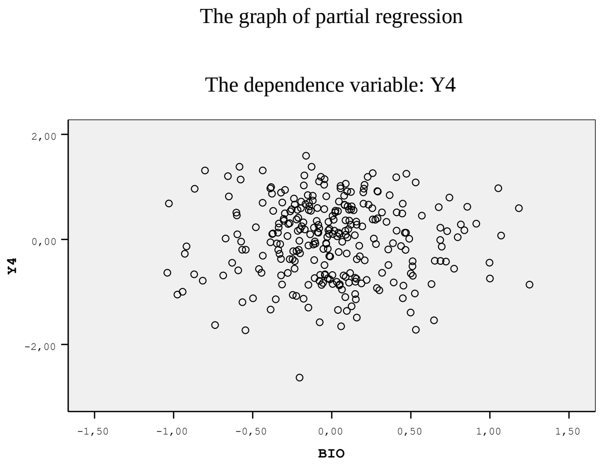


Picture A15.121. The partial regression of the mark in history (HIS) and the level of residual knowledge by the exact scale (Y_4)

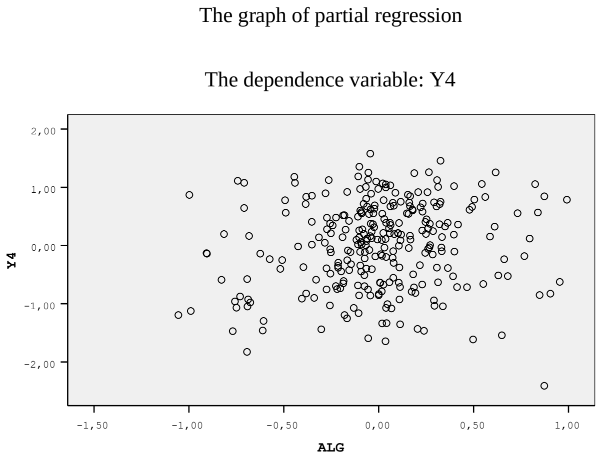


Picture A15.122. The partial regression of the mark in geography (GEO) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and the mark in biology (BIO) is presented directly in pic. A15.123, and the graph of partial regression of LRKT (Y_4) and the mark in algebra (ALG) is presented directly in pic. A15.124.

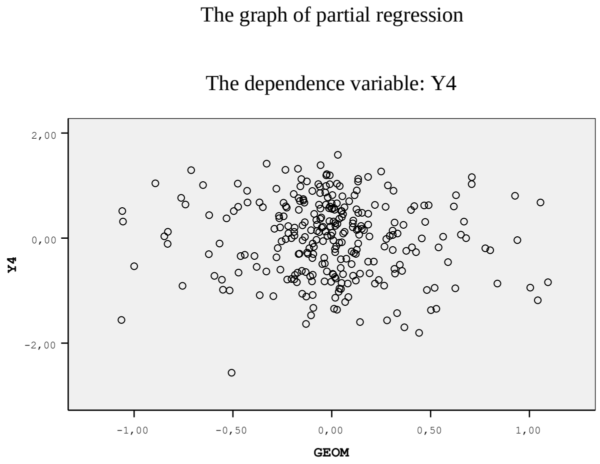


Picture A15.123. The partial regression of the mark in biology (BIO) and the level of residual knowledge by the exact scale (Y_4)

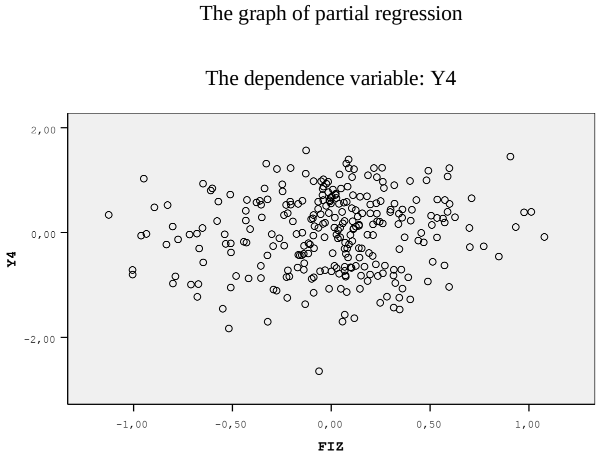


Picture A15.124. The partial regression of the mark in algebra (ALG) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and the mark in geometry (GEOM) is presented directly in pic. A15.125, the graph of partial regression of LRKT (Y_4) and the mark in physics (FIZ) is presented directly in pic. A15.126.

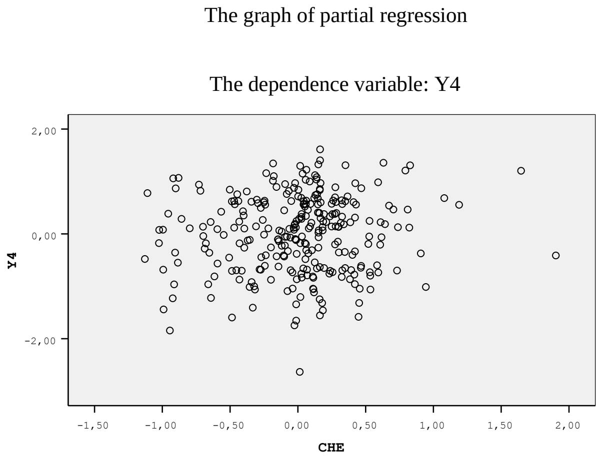


Picture A15.125. The partial regression of the mark in geometry (GEOM) and the level of residual knowledge by the exact scale (Y_4)

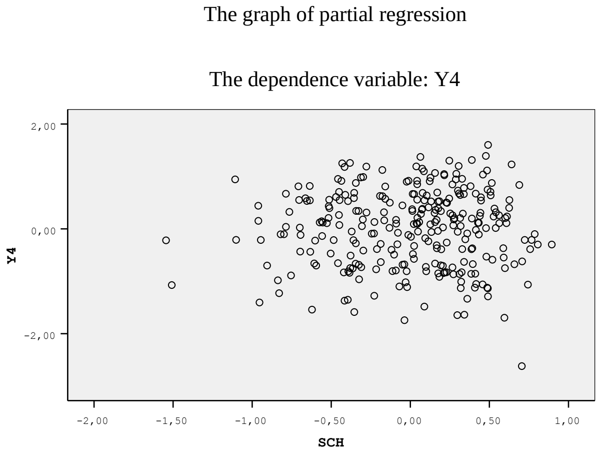


Picture A15.126. The partial regression of the mark in physics (FIZ) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and the mark in chemistry (CHE) is presented directly in pic. A15.127, and the graph of partial regression of LRKT (Y_4) and the mark in drawing (SCH) is presented directly in pic. A15.128.

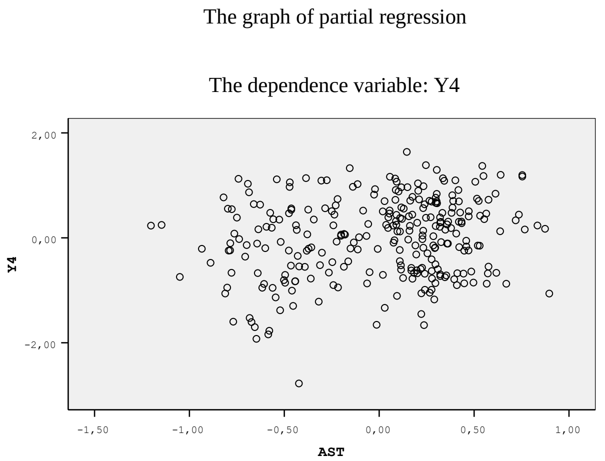


Picture A15.127. The partial regression of the mark in chemistry (CHE) and the level of residual knowledge by the exact scale (Y_4)

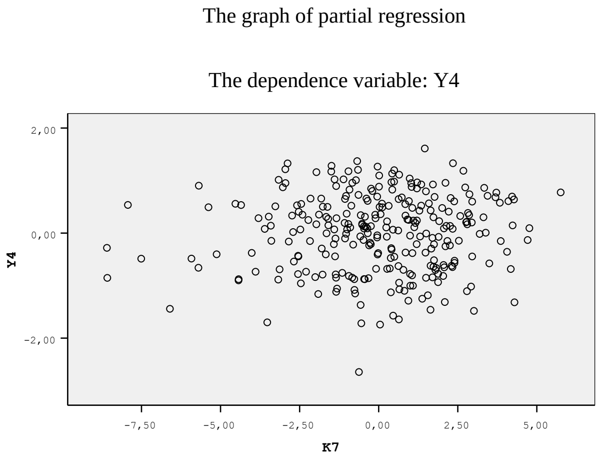


Picture A15.128. The partial regression of the mark in drawing (SCH) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and the mark in astronomy (AST) is presented directly in pic. A15.129, and the graph of partial regression of LRKT (Y_4) and protanopia (K_7) is presented directly in pic. A15.130.

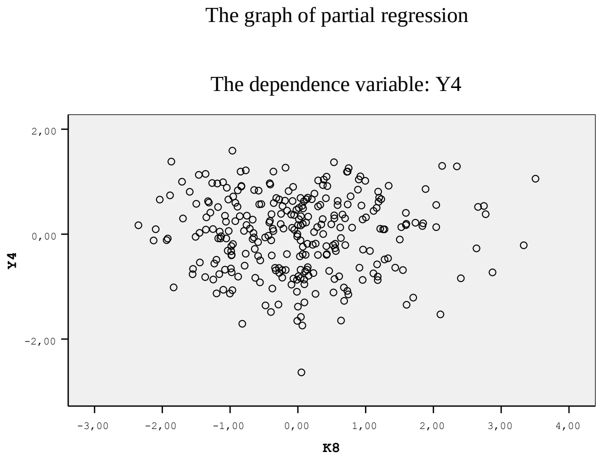


Picture A15.129. The partial regression of the mark in astronomy (AST) and the level of residual knowledge by the exact scale (Y_4)

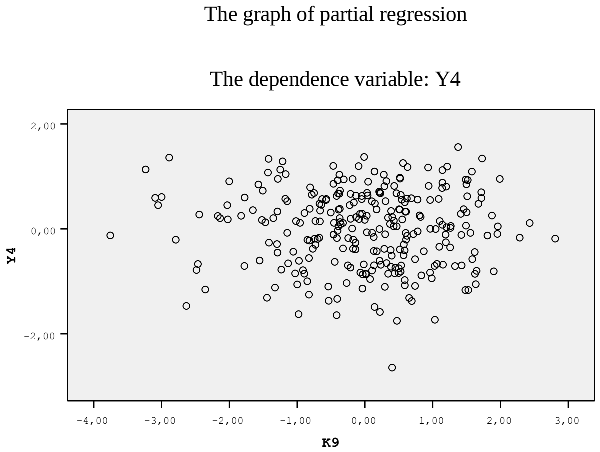


Picture A15.130. The partial regression of the protanopia (K_7) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and deuteranopia (K_8) is presented directly in pic. A15.131, and the graph of partial regression of LRKT (Y_4) and tritanopia (K_9) is presented directly in pic. A15.132.

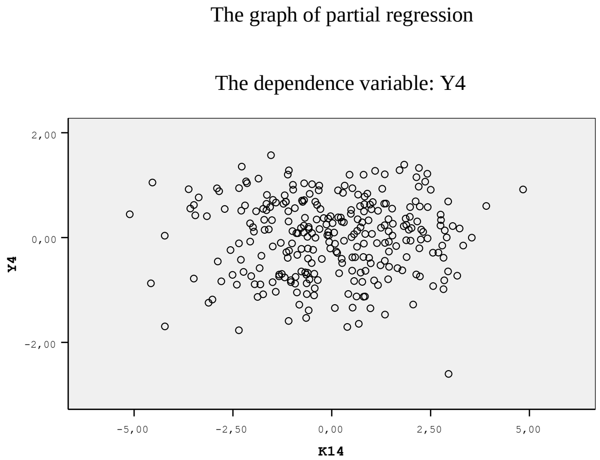


Picture A15.131. The partial regression of deuteranopia (K_8) and the level of residual knowledge by the exact scale (Y_4)

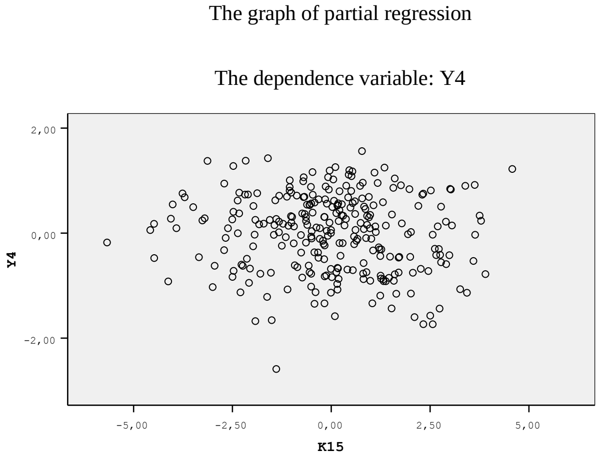


Picture A15.132. The partial regression of tritanopia (K_9) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and verbalization (K_{14}) is presented directly in pic. A15.133, and the graph of partial regression of LRKT (Y_4) and generalization (K_{15}) is presented directly in pic. A15.134.

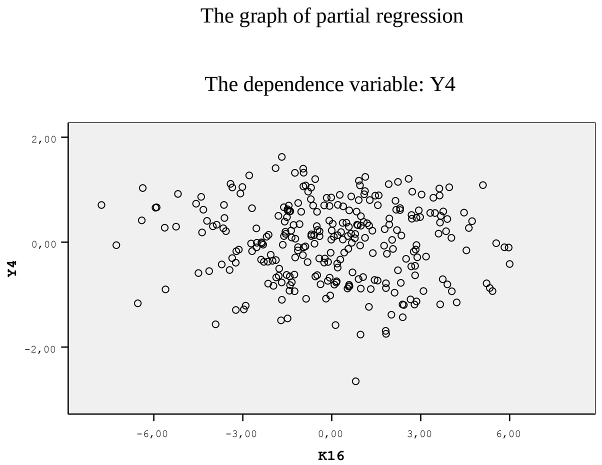


Picture A15.133. The partial regression of verbalization (K_{14}) and the level of residual knowledge by the exact scale (Y_4)

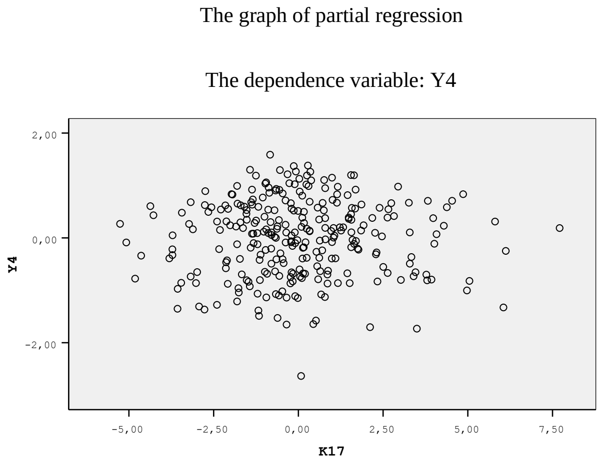


Picture A15.134. The partial regression of generalizations (K_{15}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and classification (K_{16}) is presented directly in pic. A15.135, and the graph of partial regression of LRKT (Y_4) and analyticity (K_{17}) is presented directly in pic. A15.136.

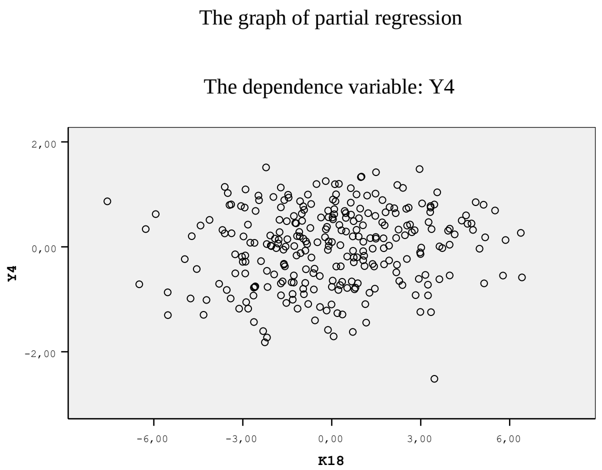


Picture A15.135. The partial regression of classification (K_{16}) and the level of residual knowledge by the exact scale (Y_4)

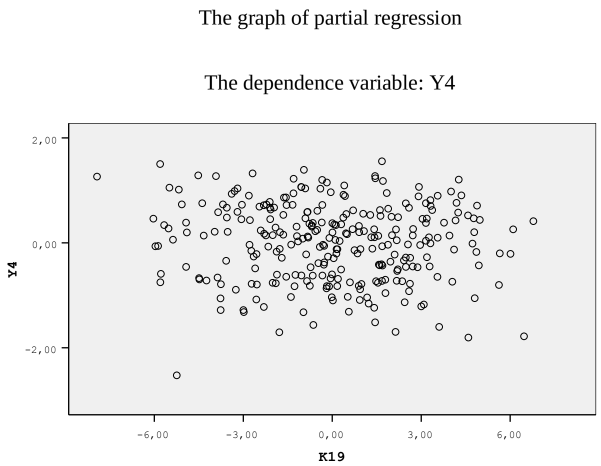


Picture A15.136. The partial regression of analyticity (K_{17}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and arithmetic abilities (K_{18}) is presented directly in pic. A15.137, and the graph of partial regression of LRKT (Y_4) and combinatorial abilities (K_{19}) is presented directly in pic. A15.138.

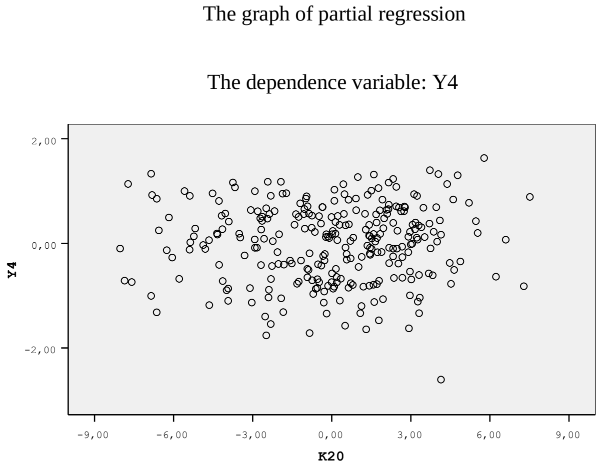


Picture A15.137. The partial regression of arithmetic abilities (K_{18}) and the level of residual knowledge by the exact scale (Y_4)

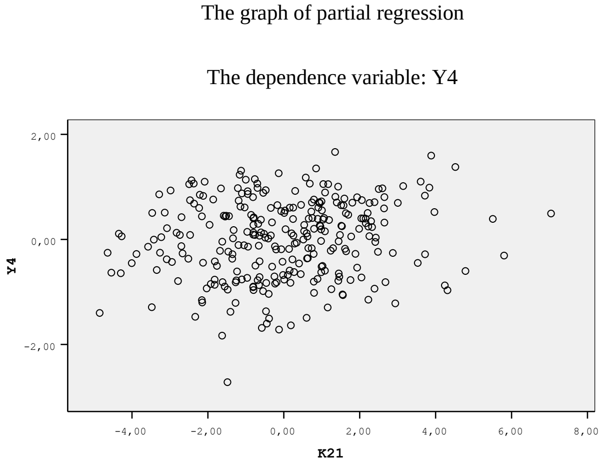


Picture A15.138. The partial regression of combinatorial abilities (K_{19}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and mnemonic abilities (K_{20}) is presented directly in pic. A15.139, and the graph of partial regression of LRKT (Y_4) and planar thinking (K_{21}) is presented directly in pic. A15.140.

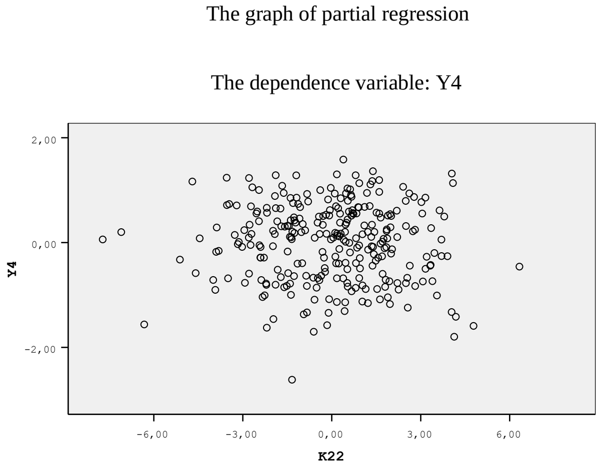


Picture A15.139. The partial regression of mnemonic abilities (K_{20}) and the level of residual knowledge by the exact scale (Y_4)

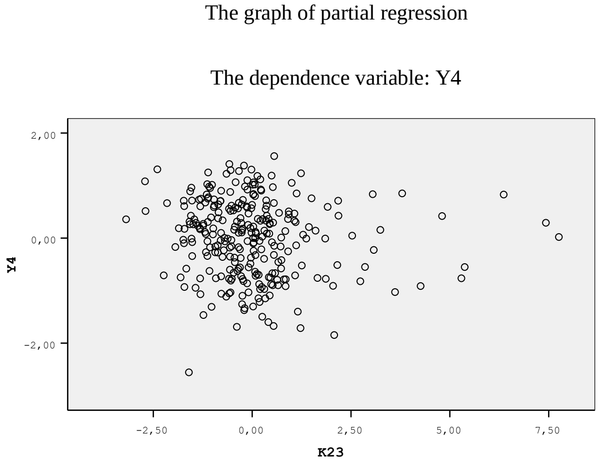


Picture A15.140. The partial regression of planar thinking (K_{21}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and spatial imagination (K_{22}) is presented directly in pic. A15.141, and the graph of partial regression of LRKT (Y_4) and verbal associativity (K_{23}) is presented directly in pic. A15.142.

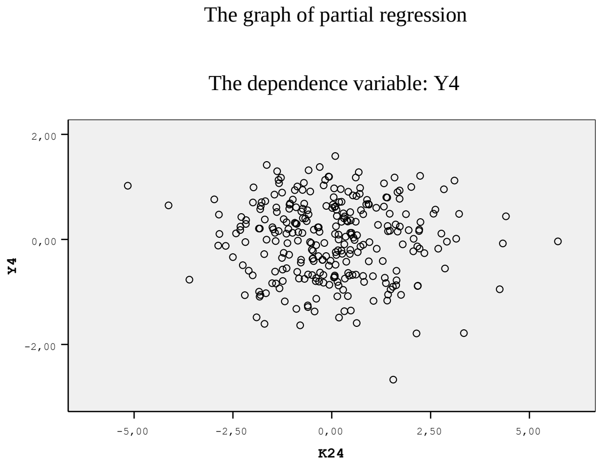


Picture A15.141. The partial regression of spatial imagination (K_{22}) and the level of residual knowledge by the exact scale (Y_4)

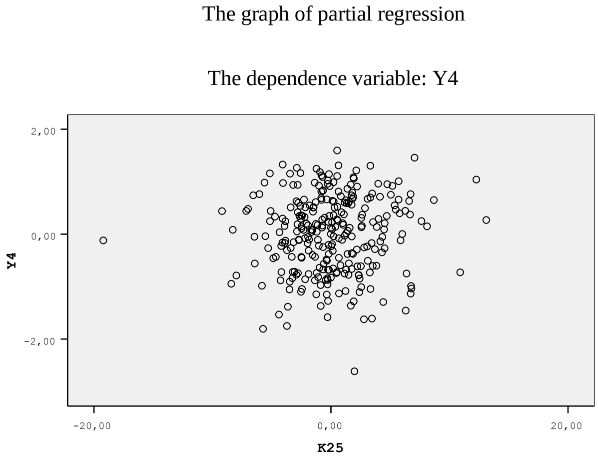


Picture A15.142. The partial regression of verbal associativity (K_{23}) and the level of residual knowledge by the exact scale (Y_4)

The graph of the partial regression of LRKT (Y_4) and verbal originality (K_{24}) is presented directly in pic. A15.143, and the graph of partial regression of LRKT (Y_4) and verbal selectivity (K_{25}) is presented directly in pic. A15.144.

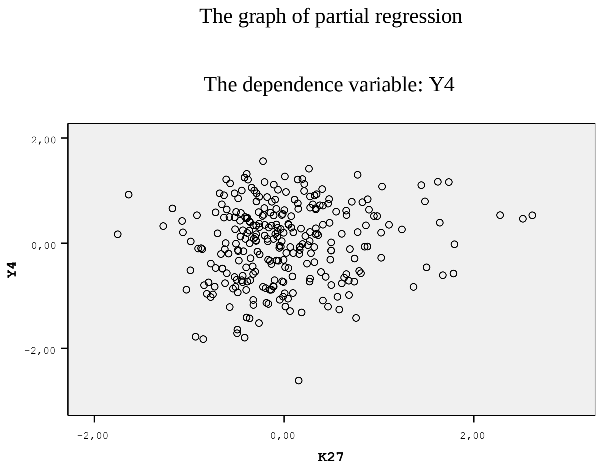


Picture A15.143. The partial regression of verbal originality (K_{24}) and the level of residual knowledge by the exact scale (Y_4)

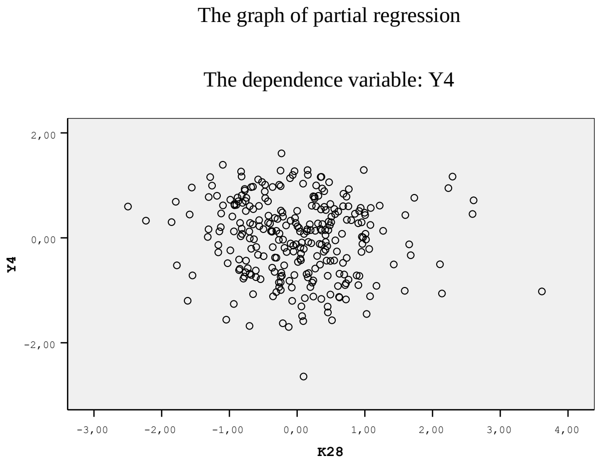


Picture A15.144. The partial regression of verbal selectivity (K_{25}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and figurative associativity (K_{27}) is presented directly in pic. A15.145, and the graph of partial regression of LRKT (Y_4) and figurative originality (K_{28}) is presented directly in pic. A15.146.



Picture A15.145. The partial regression of figurative associativity (K_{27}) and the level of residual knowledge by the exact scale (Y_4)

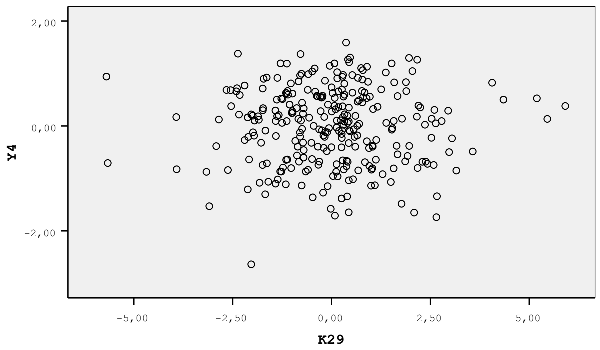


Picture A15.146. The partial regression of figurative originality (K_{28}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and figurative selectivity (K_{29}) is presented directly in pic. A15.147, and the graph of partial regression of LRKT (Y_4) and the level of proficiency in the language of statement (K_{45}) is presented directly in pic. A15.148.

The graph of partial regression

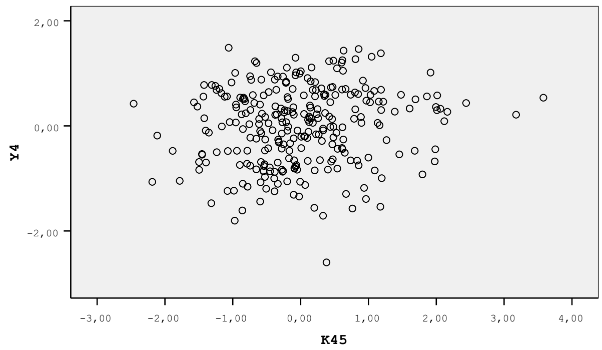
The dependence variable: Y4



Picture A15.147. The partial regression of figurative selectivity (K_{29}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression

The dependence variable: Y4

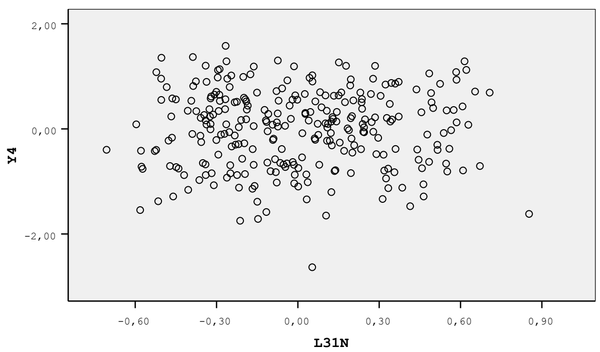


Picture A15.148. The partial regression of the level of proficiency in the language of statement of the information (K_{45}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and the kind of information (L_{31N}) is presented directly in pic. A15.149, and the graph of partial regression of LRKT (Y_4) and the color of background (L_{36N}) is presented directly in pic. A15.150.

The graph of partial regression

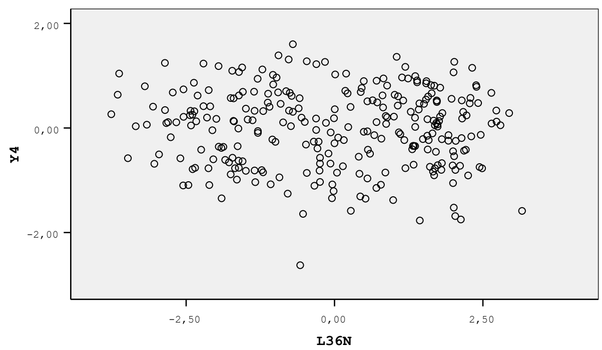
The dependence variable: Y4



Picture A15.149. The partial regression of the kind of information (L_{31N}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression

The dependence variable: Y4

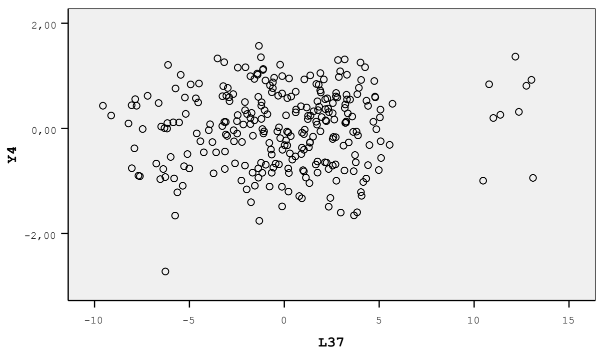


Picture A15.150. The partial regression of the color of background (L_{36N}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_4) and the size of point-size of symbol (L_{37}) is presented directly in pic. A15.151, and the graph of partial regression of LRKT (Y_4) and the color of symbol (L_{38N}) is presented directly in pic. A15.152.

The graph of partial regression

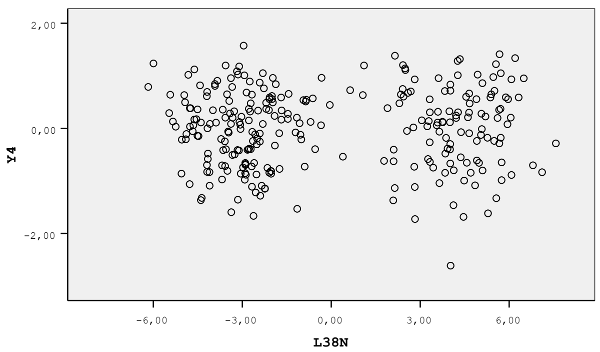
The dependence variable: Y4



Picture A15.151. The partial regression of the size of point-size of symbol (L_{37}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression

The dependence variable: Y4



Picture A15.152. The partial regression of the color of symbol (L_{38N}) and the level of residual knowledge by the exact scale (Y_4)

A15.7. The discriminant analysis

The statistical discriminant analysis for the mathematical processing of a posteriori data allows to research directly the influence of variation of the nominal values of a set of independent variables on the dispersion of dependent variable, which is represented in the scale of name (the nominative variable).

In the course of the discriminant analysis it is proposed to solve a set of tasks:

- to define the requirements and limitations to the using of the linear canonical discriminant analysis in relation to the samples with a posteriori data;
- to form the descriptive statistics on the reduced and complete set of independent variables and dependent variables in the linear equation of multiple regression according to the formed model Y_2 and Y_4;
- the system of canonical discriminant functions acts as the analogue to the linear equation of multiple regression for the providing of classification and prediction (the correlation of element to the class by the pattern of element and class);
- to form the graphical interpretation for the introducing of the centroids of classes directly into the space of canonical discriminant functions;
- to realize the classification by the nominal values of independent variables;
- to build the geometric places (points) of all available centroids of classes in the space of given canonical discriminant functions.

The centroid of class is called the geometric place (point) and locality:

- the point with the defined geometric coordinates, which are calculated as the average arithmetic of the coordinates of all elements of the centroid (class);
- the locality with the maximal density of distribution of the elements of centroid (class).

The linear discriminant analysis need to be performed in relation:

- the complete set of independent variables – all independent variables are included directly into the statistical discriminant analysis;
- the reduced set of independent variables – the limited set of independent variables are included into the statistical discriminant analysis.

The linear methods of regression and discrimination analysis act as the multidimensional, so there is the significant necessity of using of the means of automation – the packages of the applied programs of statistical appointment (“Statistika” and “SPSS”). The packages of the applied programs of statistical appointment are licensed.

A15.7.1. The descriptive statistics on all highlighted centroids

The descriptive statistics allow to calculate some measures of central tendency and to estimate the differentiation of the average arithmetic, minimum, maximum, median, mode, asymmetricity, excess and standard deviation.

The descriptive statistics similarly allow to calculate the analytical and graphical dependencies for the estimation of compliance to the normal law of distribution.

The practical interest has the relative geometric position of the centroids of classes corresponding to poor-students, mediocre-students, good-students and excellent-students.

It is proposed to research the available reduced set of independent variables K_i with taking into account the dependent variables (factors) Y_2 and Y_4, and also to research the statistical trends, dependencies and regularities of the formed centroids of various groups (classes): poor-students, mediocre-students, good-students and excellent-students.

1. The reduced set of independent variables K_i.

Table A15.101

The descriptive statistics on all highlighted centroids at the reduced set of independent variables K_i

The reduced set of independent variables K_i and dependent variable Y_2						The reduced set of independent variables K_i and dependent variable Y_4					
Y2	The indicator	The average	The standard deviation	The quantity of valid (the excepted whole)		Y4	The indicator	The average	The standard deviation	The quantity of valid (the excepted whole)	
				Unweighted	Weighed					Unweighted	Weighed
2,00	Age	19,7143	4,75094	7	7,000	2,00	Age	20,6667	4,66369	9	9,000
	K7	20,5714	3,50510	7	7,000		K7	20,4444	1,81046	9	9,000
	K8	13,1429	3,02372	7	7,000		K8	13,2222	2,48886	9	9,000
	K9	12,8571	2,79455	7	7,000		K9	14,2222	2,90593	9	9,000
	K14	13,1429	2,11570	7	7,000		K14	13,5556	3,84419	9	9,000
	K15	12,5714	2,14920	7	7,000		K15	13,1111	1,90029	9	9,000
	K16	12,7143	3,59232	7	7,000		K16	7,8889	3,40751	9	9,000
	K17	4,1429	2,34013	7	7,000		K17	3,7778	2,68225	9	9,000
	K18	7,0000	1,82574	7	7,000		K18	7,2222	3,83333	9	9,000
	K19	9,5714	2,82000	7	7,000		K19	9,8889	4,51233	9	9,000
	K20	15,1429	4,59814	7	7,000		K20	14,6667	4,06202	9	9,000
	K21	8,5714	1,61835	7	7,000		K21	10,2222	1,85592	9	9,000
	K22	11,2857	4,23140	7	7,000		K22	9,7778	4,49382	9	9,000
	K23	2,6029	1,24387	7	7,000		K23	2,7500	1,24122	9	9,000
	K24	6,5629	1,93889	7	7,000		K24	7,5322	3,03835	9	9,000
	K25	18,3043	6,93528	7	7,000		K25	19,5556	5,70331	9	9,000
	K27	1,5257	,94026	7	7,000		K27	1,2644	,44498	9	9,000
	K28	2,0157	,94828	7	7,000		K28	2,0833	,53033	9	9,000
	K29	4,3657	2,46933	7	7,000		K29	4,5222	2,37265	9	9,000
	K45	3,7143	1,60357	7	7,000		K45	3,5556	1,01379	9	9,000

The continuation of Tabl. A15.101

3,00	Age	18,9429	3,06731	35	35,000
	K7	20,7714	2,17047	35	35,000
	K8	11,1429	2,77746	35	35,000
	K9	11,9714	3,03398	35	35,000
	K14	13,2857	2,53877	35	35,000
	K15	12,5429	2,10522	35	35,000
	K16	8,2286	3,73446	35	35,000
	K17	3,8000	2,02630	35	35,000
	K18	6,5429	2,86298	35	35,000
	K19	8,8571	4,07390	35	35,000
	K20	14,4571	4,17516	35	35,000
	K21	10,1714	2,14868	35	35,000
	K22	10,0857	2,97412	35	35,000
	K23	2,4100	1,43198	35	35,000
	K24	5,4586	3,11752	35	35,000
	K25	15,5954	6,65597	35	35,000
	K27	1,3231	,56414	35	35,000
	K28	2,1294	1,10374	35	35,000
	K29	4,7769	2,11187	35	35,000
	K45	3,2000	1,05161	35	35,000
4,00	Age	18,2479	2,90928	117	117,000
	K7	20,6410	2,70205	117	117,000
	K8	12,1368	3,35000	117	117,000
	K9	12,6410	3,68235	117	117,000
	K14	14,2564	2,25967	117	117,000
	K15	13,1111	2,16468	117	117,000
	K16	10,9402	3,59667	117	117,000
	K17	4,7607	2,77193	117	117,000
	K18	8,2222	3,81944	117	117,000
	K19	10,8803	3,84878	117	117,000
	K20	15,9145	3,41794	117	117,000
	K21	10,5299	2,28025	117	117,000
	K22	10,8376	3,70684	117	117,000
	K23	2,8974	2,32370	117	117,000
	K24	6,1554	3,41276	117	117,000
	K25	17,2797	8,25558	117	117,000
	K27	1,7454	,89108	117	117,000
	K28	1,9429	1,30460	117	117,000
	K29	4,5909	2,97936	117	117,000
	K45	3,8120	1,13663	117	117,000
5,00	Age	17,9250	1,94099	120	120,000
	K7	21,1833	2,51043	120	120,000
	K8	11,5833	3,60575	120	120,000
	K9	12,0000	3,66679	120	120,000
	K14	15,0250	2,05987	120	120,000
	K15	13,0333	1,97435	120	120,000
	K16	11,2417	3,53849	120	120,000
	K17	5,0167	2,80451	120	120,000
	K18	9,8583	4,16124	120	120,000
	K19	11,6917	3,68234	120	120,000

3,00	Age	19,7361	3,78281	72	72,000
	K7	20,4306	2,68971	72	72,000
	K8	12,0694	3,05963	72	72,000
	K9	12,4167	3,27496	72	72,000
	K14	13,8472	1,77351	72	72,000
	K15	12,9444	1,98508	72	72,000
	K16	10,6944	3,75908	72	72,000
	K17	3,9583	2,44049	72	72,000
	K18	6,7361	2,90213	72	72,000
	K19	9,8750	3,64223	72	72,000
	K20	15,1250	3,66536	72	72,000
	K21	9,8472	2,18613	72	72,000
	K22	10,9583	3,46588	72	72,000
	K23	2,6000	1,69839	72	72,000
	K24	5,3983	3,35780	72	72,000
	K25	15,1536	8,05441	72	72,000
	K27	1,4747	,79426	72	72,000
	K28	2,0022	1,36484	72	72,000
	K29	4,3883	2,80561	72	72,000
	K45	3,3194	1,12371	72	72,000
4,00	Age	17,8873	1,86355	71	71,000
	K7	21,1972	2,81130	71	71,000
	K8	11,2958	3,39072	71	71,000
	K9	11,9437	3,50464	71	71,000
	K14	14,6761	2,37110	71	71,000
	K15	12,7183	2,34328	71	71,000
	K16	10,3099	3,68236	71	71,000
	K17	5,0141	2,60490	71	71,000
	K18	9,1549	3,92300	71	71,000
	K19	11,1408	3,95437	71	71,000
	K20	15,8028	3,78953	71	71,000
	K21	10,5352	2,28555	71	71,000
	K22	10,9859	3,61936	71	71,000
	K23	2,9693	2,54500	71	71,000
	K24	6,5690	3,57954	71	71,000
	K25	18,2999	8,77043	71	71,000
	K27	1,8393	1,00771	71	71,000
	K28	2,1600	1,30201	71	71,000
	K29	5,0314	3,30302	71	71,000
	K45	3,8028	,91993	71	71,000
5,00	Age	17,4141	1,21362	128	128,000
	K7	20,9766	2,42515	128	128,000
	K8	11,8281	3,60688	128	128,000
	K9	12,2656	3,79698	128	128,000
	K14	14,7031	2,29123	128	128,000
	K15	13,1563	1,97399	128	128,000
	K16	11,2969	3,61397	128	128,000
	K17	5,0859	2,82572	128	128,000
	K18	9,5781	4,21024	128	128,000
	K19	11,5000	3,81047	128	128,000

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	K20	16,5917	3,26297	120	120,000		K20	16,7188	3,13210	128	128,000
	K21	11,0583	2,68296	120	120,000		K21	11,2266	2,61496	128	128,000
	K22	11,6583	3,25782	120	120,000		K22	11,3594	3,30767	128	128,000
	K23	2,6750	1,71238	120	120,000		K23	2,6816	1,74349	128	128,000
	K24	6,3153	3,36130	120	120,000		K24	6,2244	3,11193	128	128,000
	K25	17,7107	8,90406	120	120,000		K25	17,6924	8,22846	128	128,000
	K27	1,8176	1,03507	120	120,000		K27	1,8138	,96164	128	128,000
	K28	2,1218	1,49561	120	120,000		K28	1,9945	1,42839	128	128,000
	K29	5,1422	3,39108	120	120,000		K29	5,0160	3,09586	128	128,000
	K45	3,9583	1,16241	120	120,000		K45	4,0703	1,24346	128	128,000
	Age	18,2330	2,63475	279	279,000		Age	18,2357	2,63043	280	280,000
	K7	20,8889	2,57936	279	279,000		K7	20,8750	2,58520	280	280,000
	K8	11,7993	3,39951	279	279,000		K8	11,8000	3,39344	280	280,000
	K9	12,2867	3,58005	279	279,000		K9	12,2857	3,57367	280	280,000
	K14	14,4373	2,28118	279	279,000		K14	14,4393	2,27734	280	280,000
	K15	12,9928	2,07415	279	279,000		K15	12,9893	2,07128	280	280,000
	K16	10,7742	3,70920	279	279,000		K16	10,7821	3,70494	280	280,000
	K17	4,7348	2,71047	279	279,000		K17	4,7357	2,70566	280	280,000
	K18	8,6846	3,98840	279	279,000		K18	8,6643	3,99572	280	280,000
	K19	10,9427	3,87627	279	279,000		K19	10,9393	3,86973	280	280,000
	K20	16,0036	3,53451	279	279,000		K20	16,0107	3,53019	280	280,000
	K21	10,6631	2,46729	279	279,000		K21	10,6643	2,46295	280	280,000
	K22	11,1075	3,46969	279	279,000		K22	11,1107	3,46388	280	280,000
	K23	2,7332	1,95418	279	279,000		K23	2,7358	1,95114	280	280,000
	K24	6,1470	3,32299	279	279,000		K24	6,1414	3,31835	280	280,000
	K25	17,2795	8,32442	279	279,000		K25	17,2535	8,32087	280	280,000
	K27	1,7180	,93439	279	279,000		K27	1,7154	,93370	280	280,000
	K28	2,0451	1,35791	279	279,000		K28	2,0413	1,35692	280	280,000
	K29	4,8457	3,06187	279	279,000		K29	4,8426	3,05680	280	280,000
	K45	3,7957	1,16815	279	279,000		K45	3,7929	1,16703	280	280,000

In the table directly presented the measures of central tendency, which allow to estimate the volume of samples with a posteriori data and the degree of deviation:

- the average arithmetic -- the main measure of central tendency or the most expected nominal value of independent variable by the sample,- proceeding from the results of the primary statistical analysis the significant anomalies were not revealed among the independent variables, that causes the potential possibility of using of the discriminant analysis;
- the standard deviation – the relative scatter (variation) of the nominal values of independent variable by the sample from the average arithmetic,- the standard deviation is not significant relative to the sample;
- the quantity of measurements – characterizes the volume of sample of a posteriori data and corresponds to the quantity of measurements of the variable (the quantity of examinees).

In the table the nominal values of statistical coefficients are calculated, which characterize the main measures of central tendency at the complex consideration of the reduced set of indicators Age, K_7, K_8, K_9, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21}, K_{22}, K_{23}, K_{24}, K_{25}, K_{27}, K_{28}, K_{29} and K_{45}:

- the centroid (class) of poor-students – does not have the important statistical heterogeneities;
  - the average arithmetic – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
  - the standard deviation – the coefficients cannot be accurately to calculate, as there are the very few elements in the class (centroid) of poor-students, that is the permissible anomaly with the sufficient accuracy for the practice;
- the centroid (class) of mediocre-students – does not have the important statistical heterogeneities despite on the change of dependent variable (the classifying sign);
  - the average arithmetic – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
  - the standard deviation – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
- the centroid (class) of good-students – does not have the important statistical heterogeneities despite on the change of dependent variable (the classifying sign);
  - the average arithmetic – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
    - the changing of the average arithmetic is caused only by the emissions and artifacts, as the experiment was carried out without the disrupting of technology;
    - the changing of the average arithmetic is caused by the errors of normalization or the filtering of data, but the normalization was carried out without the violations of technology of the processing of data, and the filtering was not carried out at all;
  - the standard deviation – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
- the centroid (class) of excellent-students – does not have the important statistical heterogeneities despite on the change of dependent variable (the classifying sign);
  - the average arithmetic – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
  - the standard deviation – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators.

2. The complete set of independent variables K_i.

It is proposed to research the complete set of predictors K_i with taking into account the factors Y_2 and Y_4, and also to calculate the statistical dimensions of the analyzed centroids of groups (classes).

Table A15.102

The descriptive statistics on all highlighted centroids at the complete set of independent variables K_i

The complete set of independent variables K_i and dependent variable Y_2						The complete set of independent variables K_i and dependent variable Y_4					
Y2	The indica-tor	The average	The standard deviation	The quantity of valid (the excepted whole)		Y4	The indica-tor	The averae	The standard deviation	The quantity of valid (the excepted whole)	
				Unweighted	Weighed					Unweighted	Weighed
2,00	Age	19,7143	4,75094	7	7,000	2,00	Age	20,6667	4,66369	9	9,000
	RU	4,1429	,69007	7	7,000		RU	4,0000	,50000	9	9,000
	LIT	4,0000	,57735	7	7,000		LIT	4,2222	,44096	9	9,000
	LG	4,1429	,69007	7	7,000		LG	3,8889	,60093	9	9,000
	HIS	3,8571	,37796	7	7,000		HIS	4,3333	,50000	9	9,000
	GEO	4,5714	,53452	7	7,000		GEO	4,5556	,52705	9	9,000
	BIO	4,2857	,75593	7	7,000		BIO	4,1111	,33333	9	9,000
	ALG	3,5714	,53452	7	7,000		ALG	4,0000	,70711	9	9,000
	GEOM	3,5714	,53452	7	7,000		GEOM	4,0000	,70711	9	9,000
	FIZ	4,0000	,57735	7	7,000		FIZ	4,0000	,50000	9	9,000
	CHE	4,0000	,57735	7	7,000		CHE	3,7778	,66667	9	9,000
	SCH	4,2857	,48795	7	7,000		SCH	4,5556	,52705	9	9,000
	AST	4,4286	,53452	7	7,000		AST	4,3333	,50000	9	9,000
	K7	20,5714	3,50510	7	7,000		K7	20,4444	1,81046	9	9,000
	K8	13,1429	3,02372	7	7,000		K8	13,2222	2,48886	9	9,000
	K9	12,8571	2,79455	7	7,000		K9	14,2222	2,90593	9	9,000
	K14	13,1429	2,11570	7	7,000		K14	13,5556	3,84419	9	9,000
	K15	12,5714	2,14920	7	7,000		K15	13,1111	1,90029	9	9,000
	K16	12,7143	3,59232	7	7,000		K16	7,8889	3,40751	9	9,000
	K17	4,1429	2,34013	7	7,000		K17	3,7778	2,68225	9	9,000
	K18	7,0000	1,82574	7	7,000		K18	7,2222	3,83333	9	9,000
	K19	9,5714	2,82000	7	7,000		K19	9,8889	4,51233	9	9,000
	K20	15,1429	4,59814	7	7,000		K20	14,6667	4,06202	9	9,000
	K21	8,5714	1,61835	7	7,000		K21	10,2222	1,85592	9	9,000
	K22	11,2857	4,23140	7	7,000		K22	9,7778	4,49382	9	9,000
	K23	2,6029	1,24387	7	7,000		K23	2,7500	1,24122	9	9,000
	K24	6,5629	1,93889	7	7,000		K24	7,5322	3,03835	9	9,000
	K25	18,3043	6,93528	7	7,000		K25	19,5556	5,70331	9	9,000
	K27	1,5257	,94026	7	7,000		K27	1,2644	,44498	9	9,000
	K28	2,0157	,94828	7	7,000		K28	2,0833	,53033	9	9,000
	K29	4,3657	2,46933	7	7,000		K29	4,5222	2,37265	9	9,000
	K45	3,7143	1,60357	7	7,000		K45	3,5556	1,01379	9	9,000
	L31N	1,2857	,48795	7	7,000		L31N	1,3333	,50000	9	9,000
	L36N	5,8571	1,77281	7	7,000		L36N	6,0000	1,22474	9	9,000
	L37	14,7143	2,36039	7	7,000		L37	14,7778	4,08588	9	9,000
	L38N	4,7143	4,64451	7	7,000		L38N	5,4444	4,21637	9	9,000

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3,00	Age	18,9429	3,06731	35	35,000	3,00	Age	19,7361	3,78281	72	72,000
	RU	3,9429	,33806	35	35,000		RU	3,9444	,62549	72	72,000
	LIT	3,8857	,52979	35	35,000		LIT	4,0556	,64762	72	72,000
	LG	3,8571	,60112	35	35,000		LG	4,1667	,65003	72	72,000
	HIS	4,0000	,42008	35	35,000		HIS	4,2083	,52908	72	72,000
	GEO	4,2286	,49024	35	35,000		GEO	4,2778	,61029	72	72,000
	BIO	4,1143	,63113	35	35,000		BIO	4,2778	,61029	72	72,000
	ALG	4,0000	,64169	35	35,000		ALG	3,9722	,67076	72	72,000
	GEOM	3,9429	,63906	35	35,000		GEOM	4,0833	,64459	72	72,000
	FIZ	3,9429	,63906	35	35,000		FIZ	3,9861	,63895	72	72,000
	CHE	3,8000	,53137	35	35,000		CHE	4,0556	,64762	72	72,000
	SCH	4,3429	,53922	35	35,000		SCH	4,4722	,55595	72	72,000
	AST	4,5429	,56061	35	35,000		AST	4,5139	,53056	72	72,000
	K7	20,7714	2,17047	35	35,000		K7	20,4306	2,68971	72	72,000
	K8	11,1429	2,77746	35	35,000		K8	12,0694	3,05963	72	72,000
	K9	11,9714	3,03398	35	35,000		K9	12,4167	3,27496	72	72,000
	K14	13,2857	2,53877	35	35,000		K14	13,8472	1,77351	72	72,000
	K15	12,5429	2,10522	35	35,000		K15	12,9444	1,98508	72	72,000
	K16	8,2286	3,73446	35	35,000		K16	10,6944	3,75908	72	72,000
	K17	3,8000	2,02630	35	35,000		K17	3,9583	2,44049	72	72,000
	K18	6,5429	2,86298	35	35,000		K18	6,7361	2,90213	72	72,000
	K19	8,8571	4,07390	35	35,000		K19	9,8750	3,64223	72	72,000
	K20	14,4571	4,17516	35	35,000		K20	15,1250	3,66536	72	72,000
	K21	10,1714	2,14868	35	35,000		K21	9,8472	2,18613	72	72,000
	K22	10,0857	2,97412	35	35,000		K22	10,9583	3,46588	72	72,000
	K23	2,4100	1,43198	35	35,000		K23	2,6000	1,69839	72	72,000
	K24	5,4586	3,11752	35	35,000		K24	5,3983	3,35780	72	72,000
	K25	15,5954	6,65597	35	35,000		K25	15,1536	8,05441	72	72,000
	K27	1,3231	,56414	35	35,000		K27	1,4747	,79426	72	72,000
	K28	2,1294	1,10374	35	35,000		K28	2,0022	1,36484	72	72,000
	K29	4,7769	2,11187	35	35,000		K29	4,3883	2,80561	72	72,000
	K45	3,2000	1,05161	35	35,000		K45	3,3194	1,12371	72	72,000
	L31N	1,3429	,48159	35	35,000		L31N	1,3333	,47471	72	72,000
	L36N	5,8000	1,51075	35	35,000		L36N	5,5972	1,61559	72	72,000
	L37	14,2571	3,84511	35	35,000		L37	15,2778	4,36769	72	72,000
	L38N	5,2857	4,23967	35	35,000		L38N	4,4722	4,15872	72	72,000
4,00	Age	18,2479	2,90928	117	117,000	4,00	Age	17,8873	1,86355	71	71,000
	RU	4,0598	,67327	117	117,000		RU	3,9859	,59745	71	71,000
	LIT	4,2393	,67785	117	117,000		LIT	4,1268	,63086	71	71,000
	LG	4,3761	,66600	117	117,000		LG	4,3239	,62734	71	71,000
	HIS	4,3675	,58129	117	117,000		HIS	4,2817	,51222	71	71,000
	GEO	4,4530	,66301	117	117,000		GEO	4,3803	,68382	71	71,000
	BIO	4,3846	,58496	117	117,000		BIO	4,3099	,59980	71	71,000
	ALG	4,2821	,69290	117	117,000		ALG	4,1549	,68968	71	71,000
	GEOM	4,3590	,67545	117	117,000		GEOM	4,1549	,72993	71	71,000
	FIZ	4,2479	,68110	117	117,000		FIZ	4,1549	,68968	71	71,000
	CHE	4,2479	,70596	117	117,000		CHE	4,0282	,65404	71	71,000
	SCH	4,5983	,52621	117	117,000		SCH	4,5211	,58209	71	71,000
	AST	4,6923	,48176	117	117,000		AST	4,6479	,50986	71	71,000
	K7	20,6410	2,70205	117	117,000		K7	21,1972	2,81130	71	71,000

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	K8	12,1368	3,35000	117	117,000		K8	11,2958	3,39072	71	71,000
	K9	12,6410	3,68235	117	117,000		K9	11,9437	3,50464	71	71,000
	K14	14,2564	2,25967	117	117,000		K14	14,6761	2,37110	71	71,000
	K15	13,1111	2,16468	117	117,000		K15	12,7183	2,34328	71	71,000
	K16	10,9402	3,59667	117	117,000		K16	10,3099	3,68236	71	71,000
	K17	4,7607	2,77193	117	117,000		K17	5,0141	2,60490	71	71,000
	K18	8,2222	3,81944	117	117,000		K18	9,1549	3,92300	71	71,000
	K19	10,8803	3,84878	117	117,000		K19	11,1408	3,95437	71	71,000
	K20	15,9145	3,41794	117	117,000		K20	15,8028	3,78953	71	71,000
	K21	10,5299	2,28025	117	117,000		K21	10,5352	2,28555	71	71,000
	K22	10,8376	3,70684	117	117,000		K22	10,9859	3,61936	71	71,000
	K23	2,8974	2,32370	117	117,000		K23	2,9693	2,54500	71	71,000
	K24	6,1554	3,41276	117	117,000		K24	6,5690	3,57954	71	71,000
	K25	17,2797	8,25558	117	117,000		K25	18,2999	8,77043	71	71,000
	K27	1,7454	,89108	117	117,000		K27	1,8393	1,00771	71	71,000
	K28	1,9429	1,30460	117	117,000		K28	2,1600	1,30201	71	71,000
	K29	4,5909	2,97936	117	117,000		K29	5,0314	3,30302	71	71,000
	K45	3,8120	1,13663	117	117,000		K45	3,8028	,91993	71	71,000
	L31N	1,2991	,45985	117	117,000		L31N	1,3099	,46573	71	71,000
	L36N	5,4444	1,87288	117	117,000		L36N	5,3239	1,85761	71	71,000
	L37	15,6667	4,02792	117	117,000		L37	15,3239	3,50825	71	71,000
	L38N	4,2051	4,01192	117	117,000		L38N	4,2113	4,01396	71	71,000
5,00	Age	17,9250	1,94099	120	120,000	5,00	Age	17,4141	1,21362	128	128,000
	RU	4,1750	,64381	120	120,000		RU	4,2422	,63675	128	128,000
	LIT	4,3083	,67108	120	120,000		LIT	4,3672	,68587	128	128,000
	LG	4,4333	,59030	120	120,000		LG	4,4531	,63815	128	128,000
	HIS	4,4250	,56005	120	120,000		HIS	4,4297	,61071	128	128,000
	GEO	4,4500	,59196	120	120,000		GEO	4,5234	,56072	128	128,000
	BIO	4,4500	,54772	120	120,000		BIO	4,4844	,56099	128	128,000
	ALG	4,3833	,66337	120	120,000		ALG	4,5234	,60137	128	128,000
	GEOM	4,3833	,70034	120	120,000		GEOM	4,5078	,66399	128	128,000
	FIZ	4,3167	,63489	120	120,000		FIZ	4,4297	,61071	128	128,000
	CHE	4,2667	,69492	120	120,000		CHE	4,3906	,69002	128	128,000
	SCH	4,6167	,53740	120	120,000		SCH	4,6406	,49778	128	128,000
	AST	4,6583	,51033	120	120,000		AST	4,7500	,46954	128	128,000
	K7	21,1833	2,51043	120	120,000		K7	20,9766	2,42515	128	128,000
	K8	11,5833	3,60575	120	120,000		K8	11,8281	3,60688	128	128,000
	K9	12,0000	3,66679	120	120,000		K9	12,2656	3,79698	128	128,000
	K14	15,0250	2,05987	120	120,000		K14	14,7031	2,29123	128	128,000
	K15	13,0333	1,97435	120	120,000		K15	13,1563	1,97399	128	128,000
	K16	11,2417	3,53849	120	120,000		K16	11,2969	3,61397	128	128,000
	K17	5,0167	2,80451	120	120,000		K17	5,0859	2,82572	128	128,000
	K18	9,8583	4,16124	120	120,000		K18	9,5781	4,21024	128	128,000
	K19	11,6917	3,68234	120	120,000		K19	11,5000	3,81047	128	128,000
	K20	16,5917	3,26297	120	120,000		K20	16,7188	3,13210	128	128,000
	K21	11,0583	2,68296	120	120,000		K21	11,2266	2,61496	128	128,000
	K22	11,6583	3,25782	120	120,000		K22	11,3594	3,30767	128	128,000
	K23	2,6750	1,71238	120	120,000		K23	2,6816	1,74349	128	128,000
	K24	6,3153	3,36130	120	120,000		K24	6,2244	3,11193	128	128,000
	K25	17,7107	8,90406	120	120,000		K25	17,6924	8,22846	128	128,000

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	K27	1,8176	1,03507	120	120,000		K27	1,8138	,96164	128	128,000
	K28	2,1218	1,49561	120	120,000		K28	1,9945	1,42839	128	128,000
	K29	5,1422	3,39108	120	120,000		K29	5,0160	3,09586	128	128,000
	K45	3,9583	1,16241	120	120,000		K45	4,0703	1,24346	128	128,000
	L31N	1,3417	,47626	120	120,000		L31N	1,3203	,46843	128	128,000
	L36N	5,3333	1,79791	120	120,000		L36N	5,4063	1,88420	128	128,000
	L37	16,5250	4,74556	120	120,000		L37	16,5000	4,69377	128	128,000
	L38N	4,3583	3,99957	120	120,000		L38N	4,4063	4,01265	128	128,000
	Age	18,2330	2,63475	279	279,000		Age	18,2357	2,63043	280	280,000
	RU	4,0968	,63014	279	279,000		RU	4,0929	,63242	280	280,000
	LIT	4,2186	,66696	279	279,000		LIT	4,2214	,66740	280	280,000
	LG	4,3297	,65058	279	279,000		LG	4,3286	,64971	280	280,000
	HIS	4,3333	,56898	279	279,000		HIS	4,3321	,56831	280	280,000
	GEO	4,4265	,61235	279	279,000		GEO	4,4250	,61179	280	280,000
	BIO	4,3763	,58606	279	279,000		BIO	4,3750	,58544	280	280,000
	ALG	4,2724	,68724	279	279,000		ALG	4,2714	,68620	280	280,000
	GEOM	4,2975	,70023	279	279,000		GEOM	4,2929	,70326	280	280,000
	FIZ	4,2330	,66207	279	279,000		FIZ	4,2321	,66103	280	280,000
	CHE	4,1935	,69310	279	279,000		CHE	4,1929	,69196	280	280,000
	SCH	4,5663	,53819	279	279,000		SCH	4,5643	,53829	280	280,000
	AST	4,6523	,50635	279	279,000		AST	4,6500	,50694	280	280,000
	K7	20,8889	2,57936	279	279,000		K7	20,8750	2,58520	280	280,000
	K8	11,7993	3,39951	279	279,000		K8	11,8000	3,39344	280	280,000
	K9	12,2867	3,58005	279	279,000		K9	12,2857	3,57367	280	280,000
	K14	14,4373	2,28118	279	279,000		K14	14,4393	2,27734	280	280,000
	K15	12,9928	2,07415	279	279,000		K15	12,9893	2,07128	280	280,000
	K16	10,7742	3,70920	279	279,000		K16	10,7821	3,70494	280	280,000
	K17	4,7348	2,71047	279	279,000		K17	4,7357	2,70566	280	280,000
	K18	8,6846	3,98840	279	279,000		K18	8,6643	3,99572	280	280,000
	K19	10,9427	3,87627	279	279,000		K19	10,9393	3,86973	280	280,000
	K20	16,0036	3,53451	279	279,000		K20	16,0107	3,53019	280	280,000
	K21	10,6631	2,46729	279	279,000		K21	10,6643	2,46295	280	280,000
	K22	11,1075	3,46969	279	279,000		K22	11,1107	3,46388	280	280,000
	K23	2,7332	1,95418	279	279,000		K23	2,7358	1,95114	280	280,000
	K24	6,1470	3,32299	279	279,000		K24	6,1414	3,31835	280	280,000
	K25	17,2795	8,32442	279	279,000		K25	17,2535	8,32087	280	280,000
	K27	1,7180	,93439	279	279,000		K27	1,7154	,93370	280	280,000
	K28	2,0451	1,35791	279	279,000		K28	2,0413	1,35692	280	280,000
	K29	4,8457	3,06187	279	279,000		K29	4,8426	3,05680	280	280,000
	K45	3,7957	1,16815	279	279,000		K45	3,7929	1,16703	280	280,000
	L31N	1,3226	,46830	279	279,000		L31N	1,3214	,46786	280	280,000
	L36N	5,4516	1,79437	279	279,000		L36N	5,4536	1,79145	280	280,000
	L37	15,8351	4,34750	279	279,000		L37	15,8321	4,33999	280	280,000
	L38N	4,4194	4,04291	279	279,000		L38N	4,4071	4,04082	280	280,000

In the course of the primary statistical processing before the conducting of discriminant analysis the minimal quantity of poor-students, the average quantity of mediocre-students, and also the maximal density of distribution of good-students and excellent-students (the relatively large quantity of trainees with the marks good and excellent).

In the table the nominal values of statistical coefficients are calculated, which characterize the main measures of central tendency at the complex consideration of the complete set of indicators Age, RU, LIT, LG, HIS, GEO, BIO, ALG, GEOM, FIZ, CHE, SCH, AST, K_7, K_8, K_9, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21}, K_{22}, K_{23}, K_{24}, K_{25}, K_{27}, K_{28}, K_{29}, K_{45}, L_{31N}, L_{36N}, L_{37} and L_{38N}:

- the centroid (class) of poor-students – does not have the important statistical heterogeneities;
  - the average arithmetic – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
  - the standard deviation -- the coefficients cannot be accurately to calculate, as there are the very few elements in the class (centroid) of poor-students, that is the permissible anomaly with the sufficient accuracy for the practice;
- the centroid (class) of mediocre-students – does not have the important statistical heterogeneities despite on the change of dependent variable (the classifying sign);
  - the average arithmetic – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
  - the standard deviation – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
- the centroid (class) of good-students – does not have the important statistical heterogeneities despite the change of dependent variable (the classifying sign);
  - the average arithmetic – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
  - the standard deviation – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
- the centroid (class) of excellent-students – does not have the important statistical heterogeneities despite on the change of dependent variable (the classifying sign);
  - the average arithmetic – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators;
  - the standard deviation – absolutely does not have the expressed statistical heterogeneities in relation to all presented indicators.

In general there is no the significant anomalous intersection of sets of the values of the centroids of classes, and the coordinates of the centroid of classes are formed as the average arithmetic of the coordinates of all elements of centroid based on the initial data.

A15.7.2. The test of equality of the average indicators by the groups for the reveaving of the inclusion of variables

The test of equality of the average indicators by the groups (classes) directly allows to analyze a sequence of the inclusion or exclusion of variables in the process of carrying out of the statistical discriminant analysis.

1. The reduced set of independent variables K_i.

It is proposed to consider the reduced set of independent variables K_i, and also the dependent variables Y_2 and Y_4 for their sequential inclusion (exclusion) into the canonical discriminant functions at the discriminant analysis.

Table A15.103

The results of the test of equality of the average indicators by the groups for the inclusion of the variables of reduced set

The reduced set of independent variables K_i and dependent variable Y_2						The reduced set of independent variables K_i and dependent variable Y_4					
	Lambda Wilkes	F	deg. fr.1	deg. fr.2	The value		Lambda Wilkes	F	deg. fr.1	deg. fr.2	The value
Age	0,977	2,159	3	275	0,093	Age	0,839	17,621	3	276	0,000
K_7	0,990	0,940	3	275	0,422	K_7	0,987	1,229	3	276	0,299
K_8	0,985	1,350	3	275	0,258	K_8	0,987	1,206	3	276	0,308
K_9	0,991	0,786	3	275	0,502	K_9	0,988	1,133	3	276	0,336
K_{14}	0,929	7,058	3	275	0,000	K_{14}	0,969	2,964	3	276	0,033
K_{15}	0,992	0,786	3	275	0,503	K_{15}	0,992	0,702	3	276	0,552
K_{16}	0,926	7,313	3	275	0,000	K_{16}	0,967	3,121	3	276	0,026
K_{17}	0,979	1,955	3	275	0,121	K_{17}	0,964	3,409	3	276	0,018
K_{18}	0,916	8,388	3	275	0,000	K_{18}	0,908	9,336	3	276	0,000
K_{19}	0,944	5,419	3	275	0,001	K_{19}	0,968	3,063	3	276	0,029
K_{20}	0,962	3,602	3	275	0,014	K_{20}	0,960	3,859	3	276	0,010
K_{21}	0,965	3,364	3	275	0,019	K_{21}	0,946	5,257	3	276	0,002
K_{22}	0,976	2,294	3	275	0,078	K_{22}	0,992	0,739	3	276	0,529
K_{23}	0,993	0,638	3	275	0,591	K_{23}	0,995	0,486	3	276	0,693
K_{24}	0,993	0,638	3	275	0,591	K_{24}	0,977	2,177	3	276	0,091
K_{25}	0,993	0,618	3	275	0,604	K_{25}	0,976	2,282	3	276	0,079
K_{27}	0,971	2,720	3	275	0,045	K_{27}	0,966	3,262	3	276	0,022
K_{28}	0,996	0,392	3	275	0,759	K_{28}	0,997	0,253	3	276	0,860
K_{29}	0,992	0,706	3	275	0,549	K_{29}	0,991	0,789	3	276	0,501
K_{45}	0,959	3,950	3	275	0,009	K_{45}	0,930	6,898	3	276	0,000

λ-Wilkes acts as the indicator of inclusion of the independent variable (predictor) K_i, at the formation of the canonical discriminant functions with the dependent variable Y_2 or Y_4 in the process of carrying out of the statistical regression analysis.

The 20 represented independent variables K_i are included and have the predominant value in the process of formation of the canonical discriminant functions.

2. The complete set of independent variables K_i.

It is proposed to complexly to consider the complete set of independent variables K_i, and also the dependent variables Y_2 and Y_4 for their sequential inclusion (exclusion) in the canonical discriminant functions at the discriminant analysis.

Table A15.104

The results of the test of equality of the average indicators by the groups for the inclusion of the variables of complete set

The complete set of independent variables K_i and dependent variable Y_2						The complete set of independent variables K_i and dependent variable Y_4					
	Lambda Wilkes	F	deg.fr.1	deg.fr.2	The val.		Lambda Wilkes	F	deg.fr.1	deg.fr.2	The val.
Age	0,977	2,159	3	275	0,093	Age	,839	17,621	3	276	0,000
RU	0,984	1,466	3	275	0,224	RU	,952	4,615	3	276	0,004
LIT	0,958	4,048	3	275	0,008	LIT	,957	4,128	3	276	0,007
LG	0,918	8,144	3	275	0,000	LG	,952	4,605	3	276	0,004
HIS	0,926	7,279	3	275	0,000	HIS	,972	2,628	3	276	0,051
GEO	0,984	1,489	3	275	0,218	GEO	,970	2,811	3	276	0,040
BIO	0,967	3,097	3	275	0,027	BIO	,967	3,123	3	276	0,026
ALG	0,943	5,572	3	275	0,001	ALG	,877	12,942	3	276	0,000
GEOM	0,931	6,804	3	275	0,000	GEOM	,919	8,125	3	276	0,000
FIZ	0,966	3,266	3	275	0,022	FIZ	,916	8,456	3	276	0,000
CHE	0,950	4,819	3	275	0,003	CHE	,926	7,316	3	276	0,000
SCH	0,966	3,208	3	275	0,024	SCH	,982	1,726	3	276	0,162
AST	0,987	1,253	3	275	0,291	AST	,951	4,745	3	276	0,003
K7	0,990	0,940	3	275	0,422	K7	,987	1,229	3	276	0,299
K8	0,985	1,350	3	275	0,258	K8	,987	1,206	3	276	0,308
K9	0,991	0,786	3	275	0,502	K9	,988	1,133	3	276	0,336
K14	0,929	7,058	3	275	0,000	K14	,969	2,964	3	276	0,033
K15	0,992	0,786	3	275	0,503	K15	,992	0,702	3	276	0,552
K16	0,926	7,313	3	275	0,000	K16	,967	3,121	3	276	0,026
K17	0,979	1,955	3	275	0,121	K17	,964	3,409	3	276	0,018
K18	0,916	8,388	3	275	0,000	K18	,908	9,336	3	276	0,000
K19	0,944	5,419	3	275	0,001	K19	,968	3,063	3	276	0,029
K20	0,962	3,602	3	275	0,014	K20	,960	3,859	3	276	0,010
K21	0,965	3,364	3	275	0,019	K21	,946	5,257	3	276	0,002
K22	0,976	2,294	3	275	0,078	K22	,992	0,739	3	276	0,529
K23	0,993	0,638	3	275	0,591	K23	,995	0,486	3	276	0,693
K24	0,993	0,638	3	275	0,591	K24	,977	2,177	3	276	0,091
K25	0,993	0,618	3	275	0,604	K25	,976	2,282	3	276	0,079
K27	0,971	2,720	3	275	0,045	K27	,966	3,262	3	276	0,022
K28	0,996	0,392	3	275	0,759	K28	,997	0,253	3	276	0,860
K29	0,992	0,706	3	275	0,549	K29	,991	0,789	3	276	0,501
K45	0,959	3,950	3	275	0,009	K45	,930	6,898	3	276	0,000
L31N	0,998	0,199	3	275	0,897	L31N	1,000	0,032	3	276	0,992
L36N	0,992	0,731	3	275	0,534	L36N	,994	0,584	3	276	0,626
L37	0,970	2,812	3	275	0,040	L37	,980	1,922	3	276	0,126
L38N	0,993	0,664	3	275	0,575	L38N	,997	0,257	3	276	0,856

36 independent variables are included into the canonical discriminant functions.

A15.7.3. The research of the covariance and correlation of independent variables

In the course of the discriminant statistical analysis of a posteriori data with the increasing of the quantity of independent variables the probability of appearance and revealing of the tendences, mutual dependencies and steady relationships is increased significantly.

For the providing of the high level of quality of the canonical discriminant functions there is the significant necessity of research of the covariation and correlation between the independent variables with the purpose of exclusion of their mutual influence:

- the covariance of variables reflects the degree of consistency of the change of nominal values of one variable under the influence of another variable;
- the correlation of variables reflects the certain statistical dependence (relationship) between the change of nominal values of the two or more variables.

The covariance table (matrix) is presented a set of named rows and columns on the intersection of which contain the values, characterizing the measure of the consistency of change of one variable in relation to another.

The correlation table (matrix) is presented a set of named rows and columns on the intersection of which contain the values, characterizing the degree of statistical dependence (relationship) between the two variables.

At the carrying out of the correlation analysis and regression analysis the standard correlation tables (matrices) were formed, which showed the absence of explicit strong dependencies between a set of independent variables.

In the course of the automated discriminant analysis it is recommended to generate the covariance and correlation tables (matrices) by means of using of the package of the programs of statistical appointment for the providing of the potential possibility of mutual comparison of the obtained results.

With the sufficient accuracy for the practical statistical analysis the presented correlation matrices will coincide at the considering of all available nominal values of the presented coefficients of correlation in the table.

The positive nominal value allows to speak, that to the consistent increasing (decreasing) of the nominal values of one variable corresponds the increasing (decreasing) of the nominal values of another presented variable.

The negative nominal value allows to speak, that to the consistent increasing (decreasing) of the nominal values of one variable corresponds the decreasing (increasing) of the nominal values of another presented variable.

1. The reduced set of independent variables K_i.

Further the table of covariance (tabl. A15.105) and the table of correlation (tabl. A15.106) of the reduced set of independent variables (the dependent variable Y_2) is presented.

Table A15.105

The covariance of the reduced set of independent variables at the consideration of the sample with the dependent variable Y_2

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The covariance	Age	6,856	-,557	-,102	-,011	-,736	-,781	-1,921	-1,735	-2,391	-2,678	-1,771	-,525	-,984	-,638	-,946	-2,363	-,390	-,172	-,512	-,899
	K7	-,557	6,657	1,136	1,332	,007	,055	,666	-,024	,287	,307	-,329	-,731	,408	-,135	,311	,402	-,051	,066	,526	,097
	K8	-,102	1,136	11,513	11,487	-,325	,831	1,306	,853	,748	,624	-,871	1,785	,836	-,204	1,222	3,567	,170	,600	1,835	-,068
	K9	-,011	1,332	11,487	12,846	-,407	,796	,903	,778	,836	,638	-1,029	1,716	,918	-,309	1,130	3,674	,142	,461	1,800	,015
	K14	-,736	,007	-,325	-,407	4,884	,973	2,895	1,600	3,394	2,220	,888	,984	1,828	,720	1,145	3,373	,318	,184	,367	,397
	K15	-,781	,055	,831	,796	,973	4,312	2,842	1,706	2,772	1,819	,725	1,303	1,861	,085	,406	1,457	,100	,040	,319	,400
	K16	-1,921	,666	1,306	,903	2,895	2,842	12,881	2,588	7,263	4,314	1,512	2,116	4,231	,352	,164	2,679	,421	-,144	-,404	1,210
	K17	-1,735	-,024	,853	,778	1,600	1,706	2,588	7,272	5,012	3,923	,733	2,423	3,253	,495	,811	4,403	,365	,243	,925	,467
	K18	-2,391	,287	,748	,836	3,394	2,772	7,263	5,012	14,733	7,864	2,188	3,476	4,836	,939	2,317	8,374	,959	,802	1,932	1,601
	K19	-2,678	,307	,624	,638	2,220	1,819	4,314	3,923	7,864	14,342	3,307	2,146	3,558	1,069	3,635	11,301	,803	,958	1,530	1,218
	K20	-1,771	-,329	-,871	-1,029	,888	,725	1,512	,733	2,188	3,307	12,152	1,083	2,014	,510	1,390	3,056	,575	,253	,344	,862
	K21	-,525	-,731	1,785	1,716	,984	1,303	2,116	2,423	3,476	2,146	1,083	5,936	2,537	,051	,581	1,796	,264	,228	,686	,218
	K22	-,984	,408	,836	,918	1,828	1,861	4,231	3,253	4,836	3,558	2,014	2,537	11,873	,492	1,337	3,367	,593	,301	1,314	,643
	K23	-,638	-,135	-,204	-,309	,720	,085	,352	,495	,939	1,069	,510	,051	,492	3,834	3,532	6,873	,739	,517	,641	,464
	K24	-,946	,311	1,222	1,130	1,145	,406	,164	,811	2,317	3,635	1,390	,581	1,337	3,532	11,086	23,541	1,262	1,810	4,058	,870
	K25	-2,363	,402	3,567	3,674	3,373	1,457	2,679	4,403	8,374	11,301	3,056	1,796	3,367	6,873	23,541	69,583	3,106	5,103	13,122	2,450
	K27	-,390	-,051	,170	,142	,318	,100	,421	,365	,959	,803	,575	,264	,593	,739	1,262	3,106	,857	,591	1,591	,236
	K28	-,172	,066	,600	,461	,184	,040	-,144	,243	,802	,958	,253	,228	,301	,517	1,810	5,103	,591	1,856	3,094	,083
	K29	-,512	,526	1,835	1,800	,367	,319	-,404	,925	1,932	1,530	,344	,686	1,314	,641	4,058	13,122	1,591	3,094	9,405	,448
	K45	-,899	,097	-,068	,015	,397	,400	1,210	,467	1,601	1,218	,862	,218	,643	,464	,870	2,450	,236	,083	,448	1,322

a The covariance matrix has the 275 degrees of freedom

Table A15.106

The correlation of the reduced set of independent variables and dependent variable Y_2

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The correlation	Age	1,000	-,082	-,012	-,001	-,127	-,144	-,204	-,246	-,238	-,270	-,194	-,082	-,109	-,125	-,109	-,108	-,161	-,048	-,064	-,298
	K7	-,082	1,000	,130	,144	,001	,010	,072	-,003	,029	,031	-,037	-,116	,046	-,027	,036	,019	-,021	,019	,066	,033
	K8	-,012	,130	1,000	,945	-,043	,118	,107	,093	,057	,049	-,074	,216	,071	-,031	,108	,126	,054	,130	,176	-,018
	K9	-,001	,144	,945	1,000	-,051	,107	,070	,080	,061	,047	-,082	,197	,074	-,044	,095	,123	,043	,094	,164	,004
	K14	-,127	,001	-,043	-,051	1,000	,212	,365	,268	,400	,265	,115	,183	,240	,166	,156	,183	,155	,061	,054	,156
	K15	-,144	,010	,118	,107	,212	1,000	,381	,305	,348	,231	,100	,258	,260	,021	,059	,084	,052	,014	,050	,167
	K16	-,204	,072	,107	,070	,365	,381	1,000	,267	,527	,317	,121	,242	,342	,050	,014	,089	,127	-,029	-,037	,293
	K17	-,246	-,003	,093	,080	,268	,305	,267	1,000	,484	,384	,078	,369	,350	,094	,090	,196	,146	,066	,112	,151
	K18	-,238	,029	,057	,061	,400	,348	,527	,484	1,000	,541	,163	,372	,366	,125	,181	,262	,270	,153	,164	,363
	K19	-,270	,031	,049	,047	,265	,231	,317	,384	,541	1,000	,251	,233	,273	,144	,288	,358	,229	,186	,132	,280
	K20	-,194	-,037	-,074	-,082	,115	,100	,121	,078	,163	,251	1,000	,128	,168	,075	,120	,105	,178	,053	,032	,215
	K21	-,082	-,116	,216	,197	,183	,258	,242	,369	,372	,233	,128	1,000	,302	,011	,072	,088	,117	,069	,092	,078
	K22	-,109	,046	,071	,074	,240	,260	,342	,350	,366	,273	,168	,302	1,000	,073	,117	,117	,186	,064	,124	,162
	K23	-,125	-,027	-,031	-,044	,166	,021	,050	,094	,125	,144	,075	,011	,073	1,000	,542	,421	,408	,194	,107	,206
	K24	-,109	,036	,108	,095	,156	,059	,014	,090	,181	,288	,120	,072	,117	,542	1,000	,848	,409	,399	,397	,227
	K25	-,108	,019	,126	,123	,183	,084	,089	,196	,262	,358	,105	,088	,117	,421	,848	1,000	,402	,449	,513	,255
	K27	-,161	-,021	,054	,043	,155	,052	,127	,146	,270	,229	,178	,117	,186	,408	,409	,402	1,000	,469	,560	,222
	K28	-,048	,019	,130	,094	,061	,014	-,029	,066	,153	,186	,053	,069	,064	,194	,399	,449	,469	1,000	,740	,053
	K29	-,064	,066	,176	,164	,054	,050	-,037	,112	,164	,132	,032	,092	,124	,107	,397	,513	,560	,740	1,000	,127
	K45	-,298	,033	-,018	,004	,156	,167	,293	,151	,363	,280	,215	,078	,162	,206	,227	,255	,222	,053	,127	1,000

a The covariance matrix has the 275 degrees of freedom

Further the table of covariance (tabl. A15.107) and the table of correlation (tabl. A15.108) of the reduced set of independent variables (the dependent variable Y_4) is presented.

Table A15.107

The covariance of the reduced set of independent variables and dependent variable Y_4

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The covariance	Age	5,870	-,354	-,332	-,221	-,540	-,794	-1,708	-1,333	-1,553	-2,279	-1,305	-,141	-,890	-,607	-,765	-1,645	-,268	-,174	-,292	-,665
	K7	-,354	6,667	1,157	1,329	,008	,082	,661	-,119	,282	,282	-,379	-,761	,469	-,196	,253	,256	-,073	,089	,525	,065
	K8	-,332	1,157	11,490	11,426	-,243	,824	1,633	1,015	,940	,811	-,746	1,747	,887	-,112	1,316	3,854	,243	,584	1,822	,007
	K9	-,221	1,329	11,426	12,753	-,379	,790	1,143	,887	,893	,723	-,961	1,680	,929	-,241	1,117	3,719	,195	,440	1,769	,055
	K14	-,540	,008	-,243	-,379	5,079	1,041	3,172	1,613	3,592	2,480	1,050	1,033	2,043	,714	1,156	3,293	,333	,191	,373	,409
	K15	-,794	,082	,824	,790	1,041	4,304	2,903	1,752	2,867	1,922	,745	1,287	1,879	,128	,458	1,576	,130	,047	,318	,414
	K16	-1,708	,661	1,633	1,143	3,172	2,903	13,421	2,755	7,667	4,812	1,752	2,027	4,451	,494	,574	3,484	,497	-,143	-,428	1,323
	K17	-1,333	-,119	1,015	,887	1,613	1,752	2,755	7,136	4,787	3,912	,678	2,290	3,321	,494	,751	4,117	,338	,233	,826	,408
	K18	-1,553	,282	,940	,893	3,592	2,867	7,667	4,787	14,652	8,026	2,131	3,254	5,175	,879	2,197	7,860	,931	,845	1,842	1,489
	K19	-2,279	,282	,811	,723	2,480	1,922	4,812	3,912	8,026	14,650	3,456	2,091	3,846	1,094	3,647	11,162	,831	,961	1,473	1,217
	K20	-1,305	-,379	-,746	-,961	1,050	,745	1,752	,678	2,131	3,456	12,091	,930	2,179	,558	1,427	2,938	,573	,267	,280	,803
	K21	-,141	-,761	1,747	1,680	1,033	1,287	2,027	2,290	3,254	2,091	,930	5,801	2,573	,053	,481	1,412	,234	,249	,638	,108
	K22	-,890	,469	,887	,929	2,043	1,879	4,451	3,321	5,175	3,846	2,179	2,573	12,032	,511	1,493	3,656	,623	,325	1,368	,691
	K23	-,607	-,196	-,112	-,241	,714	,128	,494	,494	,879	1,094	,558	,053	,511	3,828	3,487	6,757	,738	,490	,593	,472
	K24	-,765	,253	1,316	1,117	1,156	,458	,574	,751	2,197	3,647	1,427	,481	1,493	3,487	10,874	23,043	1,258	1,786	3,969	,842
	K25	-1,645	,256	3,854	3,719	3,293	1,576	3,484	4,117	7,860	11,162	2,938	1,412	3,656	6,757	23,043	68,295	3,060	5,060	12,844	2,317
	K27	-,268	-,073	,243	,195	,333	,130	,497	,338	,931	,831	,573	,234	,623	,738	1,258	3,060	,851	,587	1,556	,228
	K28	-,174	,089	,584	,440	,191	,047	-,143	,233	,845	,961	,267	,249	,325	,490	1,786	5,060	,587	1,856	3,100	,085
	K29	-,292	,525	1,822	1,769	,373	,318	-,428	,826	1,842	1,473	,280	,638	1,368	,593	3,969	12,844	1,556	3,100	9,365	,392
	K45	-,665	,065	,007	,055	,409	,414	1,323	,408	1,489	1,217	,803	,108	,691	,472	,842	2,317	,228	,085	,392	1,281

a The covariance matrix has the 276 degrees of freedom

Table A15.108

The correlation of the reduced set of independent variables and dependent variable Y_4

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The correlation	Age	1,000	-,057	-,040	-,026	-,099	-,158	-,192	-,206	-,168	-,246	-,155	-,024	-,106	-,128	-,096	-,082	-,120	-,053	-,039	-,243
	K7	-,057	1,000	,132	,144	,001	,015	,070	-,017	,029	,029	-,042	-,122	,052	-,039	,030	,012	-,031	,025	,066	,022
	K8	-,040	,132	1,000	,944	-,032	,117	,132	,112	,072	,063	-,063	,214	,075	-,017	,118	,138	,078	,126	,176	,002
	K9	-,026	,144	,944	1,000	-,047	,107	,087	,093	,065	,053	-,077	,195	,075	-,035	,095	,126	,059	,091	,162	,014
	K14	-,099	,001	-,032	-,047	1,000	,223	,384	,268	,416	,287	,134	,190	,261	,162	,156	,177	,160	,062	,054	,160
	K15	-,158	,015	,117	,107	,223	1,000	,382	,316	,361	,242	,103	,258	,261	,032	,067	,092	,068	,016	,050	,177
	K16	-,192	,070	,132	,087	,384	,382	1,000	,281	,547	,343	,138	,230	,350	,069	,048	,115	,147	-,029	-,038	,319
	K17	-,206	-,017	,112	,093	,268	,316	,281	1,000	,468	,383	,073	,356	,358	,094	,085	,187	,137	,064	,101	,135
	K18	-,168	,029	,072	,065	,416	,361	,547	,468	1,000	,548	,160	,353	,390	,117	,174	,248	,264	,162	,157	,344
	K19	-,246	,029	,063	,053	,287	,242	,343	,383	,548	1,000	,260	,227	,290	,146	,289	,353	,235	,184	,126	,281
	K20	-,155	-,042	-,063	-,077	,134	,103	,138	,073	,160	,260	1,000	,111	,181	,082	,124	,102	,179	,056	,026	,204
	K21	-,024	-,122	,214	,195	,190	,258	,230	,356	,353	,227	,111	1,000	,308	,011	,061	,071	,105	,076	,086	,040
	K22	-,106	,052	,075	,075	,261	,261	,350	,358	,390	,290	,181	,308	1,000	,075	,130	,128	,195	,069	,129	,176
	K23	-,128	-,039	-,017	-,035	,162	,032	,069	,094	,117	,146	,082	,011	,075	1,000	,541	,418	,409	,184	,099	,213
	K24	-,096	,030	,118	,095	,156	,067	,048	,085	,174	,289	,124	,061	,130	,541	1,000	,846	,413	,398	,393	,226
	K25	-,082	,012	,138	,126	,177	,092	,115	,187	,248	,353	,102	,071	,128	,418	,846	1,000	,401	,449	,508	,248
	K27	-,120	-,031	,078	,059	,160	,068	,147	,137	,264	,235	,179	,105	,195	,409	,413	,401	1,000	,467	,551	,219
	K28	-,053	,025	,126	,091	,062	,016	-,029	,064	,162	,184	,056	,076	,069	,184	,398	,449	,467	1,000	,744	,055
	K29	-,039	,066	,176	,162	,054	,050	-,038	,101	,157	,126	,026	,086	,129	,099	,393	,508	,551	,744	1,000	,113
	K45	-,243	,022	,002	,014	,160	,177	,319	,135	,344	,281	,204	,040	,176	,213	,226	,248	,219	,055	,113	1,000

a The covariance matrix has the 276 degrees of freedom

2. The complete set of independent variables K_i.

Further the table of covariance (tabl. A15.109) and the table of correlation (tabl. A15.110) of the complete set of independent variables (the dependent variable Y_2) is presented.

Table A15.109

The covariance of the complete set of independent variables and dependent variable Y_2

		Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
The covariance	Age	6,856	-,204	-,111	-,295	-,106	-,184	-,161	-,348	-,294	-,198	-,175	,027	-,055	-,557	-,102	-,011	-,736	-,781	-1,921	-1,735	-2,391	-2,678	-1,771	-,525	-,984	-,638	-,946	-2,363	-,390	-,172	-,512	-,899	,039	-,009	-,893	,092
	RU	-,204	,395	,279	,207	,162	,150	,185	,260	,239	,227	,237	,099	,040	,017	-,055	-,085	,211	,131	,375	,079	,445	,271	,483	,134	-,014	,063	,187	,786	,030	,040	,043	,141	-,010	,082	,320	-,328
	LIT	-,111	,279	,431	,225	,218	,202	,211	,236	,256	,255	,252	,108	,052	,059	-,156	-,153	,007	,003	,191	-,137	,197	,055	,419	-,023	-,264	-,044	,099	,439	,027	,029	,079	,046	-,028	,012	-,004	-,276
	LG	-,295	,207	,225	,393	,185	,135	,145	,204	,202	,187	,197	,051	,068	,009	,026	,047	,213	,086	,565	,104	,441	,320	,397	-,015	-,058	,063	,258	,942	,074	,121	,220	,224	-,031	-,050	-,018	-,247
	HIS	-,106	,162	,218	,185	,303	,168	,177	,160	,198	,201	,199	,084	,055	-,019	-,104	-,104	,061	,048	,378	,038	,282	,242	,297	-,063	-,190	,076	,207	,602	,056	,042	,020	,054	-,018	-,030	,208	-,198
	GEO	-,184	,150	,202	,135	,168	,373	,183	,135	,180	,194	,186	,113	,064	-,027	-,060	-,092	,052	,097	,267	,072	,267	,098	,209	,059	,030	,029	,262	,681	,078	,047	,123	,083	,014	,053	,085	-,110
	BIO	-,161	,185	,211	,145	,177	,183	,336	,173	,197	,200	,212	,112	,048	,080	-,213	-,238	,122	,050	,194	,067	,267	,198	,290	,041	,076	,074	,155	,451	,049	,029	,038	,049	,004	,018	,030	-,131
	ALG	-,348	,260	,236	,204	,160	,135	,173	,450	,354	,295	,260	,105	,059	,011	-,007	-,002	,188	,118	,378	,147	,528	,458	,473	,209	,091	-,008	,094	,575	,039	,123	,266	,125	-,003	-,074	,273	-,091
	GEOM	-,294	,239	,256	,202	,198	,180	,197	,354	,461	,316	,287	,138	,073	-,022	-,054	-,038	,146	,133	,509	,150	,481	,519	,450	,139	,042	-,036	,074	,459	,053	,083	,120	,121	,008	-,028	,322	-,143
	FIZ	-,198	,227	,255	,187	,201	,194	,200	,295	,316	,428	,259	,112	,084	,073	-,094	-,071	,153	,093	,360	,101	,455	,389	,432	,170	-,004	-,022	,067	,383	,016	,079	,062	,049	-,011	-,040	,201	-,313
	CHE	-,175	,237	,252	,197	,199	,186	,212	,260	,287	,259	,461	,118	,057	,123	-,188	-,181	,232	,060	,257	-,080	,360	,361	,228	-,040	-,112	,037	,180	,638	,062	,113	,134	,095	-,001	-,007	,257	-,300
	SCH	,027	,099	,108	,051	,084	,113	,112	,105	,138	,112	,118	,283	,027	,139	-,032	-,041	-,075	-,076	,099	-,070	,027	-,019	,009	,161	,091	-,046	,039	,069	,024	,049	,060	,023	,026	,054	,054	-,079
	AST	-,055	,040	,052	,068	,055	,064	,048	,059	,073	,084	,057	,027	,256	,146	,170	,127	,005	,067	,194	,023	,058	,047	,211	,042	-,063	,113	,269	,406	,014	-,013	,092	-,020	,009	,040	,082	-,325
	K7	-,557	,017	,059	,009	-,019	-,027	,080	,011	-,022	,073	,123	,139	,146	6,657	1,136	1,332	,007	,055	,666	-,024	,287	,307	-,329	-,731	,408	-,135	,311	,402	-,051	,066	,526	,097	,071	,219	,108	,099
	K8	-,102	-,055	-,156	,026	-,104	-,060	-,213	-,007	-,054	-,094	-,188	-,032	,170	1,136	11,513	11,487	-,325	,831	1,306	,853	,748	,624	-,871	1,785	,836	-,204	1,222	3,567	,170	,600	1,835	-,068	-,013	-,445	2,697	-,715
	K9	-,011	-,085	-,153	,047	-,104	-,092	-,238	-,002	-,038	-,071	-,181	-,041	,127	1,332	11,487	12,846	-,407	,796	,903	,778	,836	,638	-1,029	1,716	,918	-,309	1,130	3,674	,142	,461	1,800	,015	-,003	-,402	2,382	-,660
	K14	-,736	,211	,007	,213	,061	,052	,122	,188	,146	,153	,232	-,075	,005	,007	-,325	-,407	4,884	,973	2,895	1,600	3,394	2,220	,888	,984	1,828	,720	1,145	3,373	,318	,184	,367	,397	-,163	,010	-,279	-,090
	K15	-,781	,131	,003	,086	,048	,097	,050	,118	,133	,093	,060	-,076	,067	,055	,831	,796	,973	4,312	2,842	1,706	2,772	1,819	,725	1,303	1,861	,085	,406	1,457	,100	,040	,319	,400	,117	,019	-,125	-,449
	K16	-1,921	,375	,191	,565	,378	,267	,194	,378	,509	,360	,257	,099	,194	,666	1,306	,903	2,895	2,842	12,881	2,588	7,263	4,314	1,512	2,116	4,231	,352	,164	2,679	,421	-,144	-,404	1,210	,135	,061	,188	-,814
	K17	-1,735	,079	-,137	,104	,038	,072	,067	,147	,150	,101	-,080	-,070	,023	-,024	,853	,778	1,600	1,706	2,588	7,272	5,012	3,923	,733	2,423	3,253	,495	,811	4,403	,365	,243	,925	,467	,170	-,154	,770	,350
	K18	-2,391	,445	,197	,441	,282	,267	,267	,528	,481	,455	,360	,027	,058	,287	,748	,836	3,394	2,772	7,263	5,012	14,733	7,864	2,188	3,476	4,836	,939	2,317	8,374	,959	,802	1,932	1,601	,166	-,077	-,168	-1,552
	K19	-2,678	,271	,055	,320	,242	,098	,198	,458	,519	,389	,361	-,019	,047	,307	,624	,638	2,220	1,819	4,314	3,923	7,864	14,342	3,307	2,146	3,558	1,069	3,635	11,301	,803	,958	1,530	1,218	,151	-,752	,364	-1,317
	K20	-1,771	,483	,419	,397	,297	,209	,290	,473	,450	,432	,228	,009	,211	-,329	-,871	-1,029	,888	,725	1,512	,733	2,188	3,307	12,152	1,083	2,014	,510	1,390	3,056	,575	,253	,344	,862	,025	-,549	,344	-,366
	K21	-,525	,134	-,023	-,015	-,063	,059	,041	,209	,139	,170	-,040	,161	,042	-,731	1,785	1,716	,984	1,303	2,116	2,423	3,476	2,146	1,083	5,936	2,537	,051	,581	1,796	,264	,228	,686	,218	,123	,181	1,220	-,167
	K22	-,984	-,014	-,264	-,058	-,190	,030	,076	,091	,042	-,004	-,112	,091	-,063	,408	,836	,918	1,828	1,861	4,231	3,253	4,836	3,558	2,014	2,537	11,873	,492	1,337	3,367	,593	,301	1,314	,643	,975	-,160	-,258	-,050
	K23	-,638	,063	-,044	,063	,076	,029	,074	-,008	-,036	-,022	,037	-,046	,113	-,135	-,204	-,309	,720	,085	,352	,495	,939	1,069	,510	,051	,492	3,834	3,532	6,873	,739	,517	,641	,464	,016	-,124	-,282	,250
	K24	-,946	,187	,099	,258	,207	,262	,155	,094	,074	,067	,180	,039	,269	,311	1,222	1,130	1,145	,406	,164	,811	2,317	3,635	1,390	,581	1,337	3,532	11,086	23,541	1,262	1,810	4,058	,870	-,006	-,453	,255	-1,033
	K25	-2,363	,786	,439	,942	,602	,681	,451	,575	,459	,383	,638	,069	,406	,402	3,567	3,674	3,373	1,457	2,679	4,403	8,374	11,301	3,056	1,796	3,367	6,873	23,541	69,583	3,106	5,103	13,122	2,450	-,331	-,965	1,730	-2,945
	K27	-,390	,030	,027	,074	,056	,078	,049	,039	,053	,016	,062	,024	,014	-,051	,170	,142	,318	,100	,421	,365	,959	,803	,575	,264	,593	,739	1,262	3,106	,857	,591	1,591	,236	,032	-,108	-,260	,018
	K28	-,172	,040	,029	,121	,042	,047	,029	,123	,083	,079	,113	,049	-,013	,066	,600	,461	,184	,040	-,144	,243	,802	,958	,253	,228	,301	,517	1,810	5,103	,591	1,856	3,094	,083	,008	-,133	,055	-,072
	K29	-,512	,043	,079	,220	,020	,123	,038	,266	,120	,062	,134	,060	,092	,526	1,835	1,800	,367	,319	-,404	,925	1,932	1,530	,344	,686	1,314	,641	4,058	13,122	1,591	3,094	9,405	,448	-,016	-,130	-,183	,075
	K45	-,899	,141	,046	,224	,054	,083	,049	,125	,121	,049	,095	,023	-,020	,097	-,068	,015	,397	,400	1,210	,467	1,601	1,218	,862	,218	,643	,464	,870	2,450	,236	,083	,448	1,322	-,002	-,129	-,149	-,128
	L31N	,039	-,010	-,028	-,031	-,018	,014	,004	-,003	,008	-,011	-,001	,026	,009	,071	-,013	-,003	-,163	,117	,135	,170	,166	,151	,025	,123	,975	,016	-,006	-,331	,032	,008	-,016	-,002	,221	-,009	-,012	,085
	L36N	-,009	,082	,012	-,050	-,030	,053	,018	-,074	-,028	-,040	-,007	,054	,040	,219	-,445	-,402	,010	,019	,061	-,154	-,077	-,752	-,549	,181	-,160	-,124	-,453	-,965	-,108	-,133	-,130	-,129	-,009	3,229	-,491	-,976
	L37	-,893	,320	-,004	-,018	,208	,085	,030	,273	,322	,201	,257	,054	,082	,108	2,697	2,382	-,279	-,125	,188	,770	-,168	,364	,344	1,220	-,258	-,282	,255	1,730	-,260	,055	-,183	-,149	-,012	-,491	18,538	,576
	L38N	,092	-,328	-,276	-,247	-,198	-,110	-,131	-,091	-,143	-,313	-,300	-,079	-,325	,099	-,715	-,660	-,090	-,449	-,814	,350	-1,552	-1,317	-,366	-,167	-,050	,250	-1,033	-2,945	,018	-,072	,075	-,128	,085	-,976	,576	16,405

a The covariance matrix has the 275 degrees of freedom

Table A15.110

The correlation of the complete set of independent variables and dependent variable Y_2

		Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
The correlation	Age	1,000	-,124	-,064	-,179	-,073	-,115	-,106	-,198	-,165	-,116	-,099	,019	-,042	-,082	-,012	-,001	-,127	-,144	-,204	-,246	-,238	-,270	-,194	-,082	-,109	-,125	-,109	-,108	-,161	-,048	-,064	-,298	,031	-,002	-,079	,009
	RU	-,124	1,000	,675	,525	,469	,391	,507	,616	,560	,553	,556	,297	,126	,010	-,026	-,038	,152	,100	,166	,047	,185	,114	,221	,087	-,006	,052	,089	,150	,051	,047	,023	,196	-,035	,073	,118	-,129
	LIT	-,064	,675	1,000	,547	,604	,504	,555	,536	,575	,594	,566	,310	,158	,035	-,070	-,065	,005	,002	,081	-,077	,078	,022	,183	-,014	-,117	-,034	,045	,080	,044	,032	,039	,061	-,090	,011	-,001	-,104
	LG	-,179	,525	,547	1,000	,536	,354	,400	,485	,473	,455	,463	,153	,213	,006	,012	,021	,154	,066	,251	,061	,183	,135	,182	-,010	-,027	,051	,124	,180	,127	,141	,115	,311	-,105	-,044	-,007	-,097
	HIS	-,073	,469	,604	,536	1,000	,499	,556	,432	,531	,557	,532	,287	,197	-,014	-,055	-,053	,050	,042	,191	,026	,134	,116	,155	-,047	-,100	,071	,113	,131	,109	,056	,012	,086	-,070	-,030	,088	-,089
	GEO	-,115	,391	,504	,354	,499	1,000	,516	,329	,433	,484	,448	,348	,208	-,017	-,029	-,042	,038	,077	,122	,044	,114	,042	,098	,039	,014	,024	,129	,134	,139	,056	,066	,118	,048	,048	,032	-,045
	BIO	-,106	,507	,555	,400	,556	,516	1,000	,444	,501	,527	,538	,364	,165	,054	-,108	-,115	,096	,042	,093	,043	,120	,090	,144	,029	,038	,065	,081	,093	,091	,037	,021	,074	,015	,018	,012	-,056
	ALG	-,198	,616	,536	,485	,432	,329	,444	1,000	,776	,673	,571	,293	,173	,007	-,003	-,001	,127	,085	,157	,082	,205	,180	,202	,128	,039	-,006	,042	,103	,063	,134	,129	,161	-,008	-,062	,094	-,034
	GEOM	-,165	,560	,575	,473	,531	,433	,501	,776	1,000	,711	,622	,383	,212	-,013	-,023	-,016	,097	,094	,209	,082	,184	,202	,190	,084	,018	-,027	,033	,081	,084	,090	,058	,155	,026	-,023	,110	-,052
	FIZ	-,116	,553	,594	,455	,557	,484	,527	,673	,711	1,000	,583	,323	,253	,043	-,042	-,030	,106	,069	,153	,058	,181	,157	,190	,107	-,002	-,017	,031	,070	,027	,088	,031	,065	-,035	-,034	,071	-,118
	CHE	-,099	,556	,566	,463	,532	,448	,538	,571	,622	,583	1,000	,325	,166	,070	-,081	-,074	,154	,043	,105	-,044	,138	,140	,096	-,024	-,048	,028	,079	,113	,099	,122	,065	,122	-,002	-,006	,088	-,109
	SCH	,019	,297	,310	,153	,287	,348	,364	,293	,383	,323	,325	1,000	,101	,101	-,018	-,021	-,063	-,069	,052	-,049	,013	-,009	,005	,125	,050	-,044	,022	,016	,049	,067	,037	,038	,103	,057	,024	-,037
	AST	-,042	,126	,158	,213	,197	,208	,165	,173	,212	,253	,166	,101	1,000	,112	,099	,070	,005	,064	,107	,017	,030	,025	,120	,034	-,036	,115	,160	,096	,029	-,019	,059	-,034	,037	,044	,038	-,159
	K7	-,082	,010	,035	,006	-,014	-,017	,054	,007	-,013	,043	,070	,101	,112	1,000	,130	,144	,001	,010	,072	-,003	,029	,031	-,037	-,116	,046	-,027	,036	,019	-,021	,019	,066	,033	,059	,047	,010	,009
	K8	-,012	-,026	-,070	,012	-,055	-,029	-,108	-,003	-,023	-,042	-,081	-,018	,099	,130	1,000	,945	-,043	,118	,107	,093	,057	,049	-,074	,216	,071	-,031	,108	,126	,054	,130	,176	-,018	-,008	-,073	,185	-,052
	K9	-,001	-,038	-,065	,021	-,053	-,042	-,115	-,001	-,016	-,030	-,074	-,021	,070	,144	,945	1,000	-,051	,107	,070	,080	,061	,047	-,082	,197	,074	-,044	,095	,123	,043	,094	,164	,004	-,002	-,062	,154	-,045
	K14	-,127	,152	,005	,154	,050	,038	,096	,127	,097	,106	,154	-,063	,005	,001	-,043	-,051	1,000	,212	,365	,268	,400	,265	,115	,183	,240	,166	,156	,183	,155	,061	,054	,156	-,156	,003	-,029	-,010
	K15	-,144	,100	,002	,066	,042	,077	,042	,085	,094	,069	,043	-,069	,064	,010	,118	,107	,212	1,000	,381	,305	,348	,231	,100	,258	,260	,021	,059	,084	,052	,014	,050	,167	,119	,005	-,014	-,053
	K16	-,204	,166	,081	,251	,191	,122	,093	,157	,209	,153	,105	,052	,107	,072	,107	,070	,365	,381	1,000	,267	,527	,317	,121	,242	,342	,050	,014	,089	,127	-,029	-,037	,293	,080	,009	,012	-,056
	K17	-,246	,047	-,077	,061	,026	,044	,043	,082	,082	,058	-,044	-,049	,017	-,003	,093	,080	,268	,305	,267	1,000	,484	,384	,078	,369	,350	,094	,090	,196	,146	,066	,112	,151	,134	-,032	,066	,032
	K18	-,238	,185	,078	,183	,134	,114	,120	,205	,184	,181	,138	,013	,030	,029	,057	,061	,400	,348	,527	,484	1,000	,541	,163	,372	,366	,125	,181	,262	,270	,153	,164	,363	,092	-,011	-,010	-,100
	K19	-,270	,114	,022	,135	,116	,042	,090	,180	,202	,157	,140	-,009	,025	,031	,049	,047	,265	,231	,317	,384	,541	1,000	,251	,233	,273	,144	,288	,358	,229	,186	,132	,280	,085	-,111	,022	-,086
	K20	-,194	,221	,183	,182	,155	,098	,144	,202	,190	,190	,096	,005	,120	-,037	-,074	-,082	,115	,100	,121	,078	,163	,251	1,000	,128	,168	,075	,120	,105	,178	,053	,032	,215	,015	-,088	,023	-,026
	K21	-,082	,087	-,014	-,010	-,047	,039	,029	,128	,084	,107	-,024	,125	,034	-,116	,216	,197	,183	,258	,242	,369	,372	,233	,128	1,000	,302	,011	,072	,088	,117	,069	,092	,078	,107	,041	,116	-,017
	K22	-,109	-,006	-,117	-,027	-,100	,014	,038	,039	,018	-,002	-,048	,050	-,036	,046	,071	,074	,240	,260	,342	,350	,366	,273	,168	,302	1,000	,073	,117	,117	,186	,064	,124	,162	,602	-,026	-,017	-,004
	K23	-,125	,052	-,034	,051	,071	,024	,065	-,006	-,027	-,017	,028	-,044	,115	-,027	-,031	-,044	,166	,021	,050	,094	,125	,144	,075	,011	,073	1,000	,542	,421	,408	,194	,107	,206	,017	-,035	-,033	,032
	K24	-,109	,089	,045	,124	,113	,129	,081	,042	,033	,031	,079	,022	,160	,036	,108	,095	,156	,059	,014	,090	,181	,288	,120	,072	,117	,542	1,000	,848	,409	,399	,397	,227	-,004	-,076	,018	-,077
	K25	-,108	,150	,080	,180	,131	,134	,093	,103	,081	,070	,113	,016	,096	,019	,126	,123	,183	,084	,089	,196	,262	,358	,105	,088	,117	,421	,848	1,000	,402	,449	,513	,255	-,084	-,064	,048	-,087
	K27	-,161	,051	,044	,127	,109	,139	,091	,063	,084	,027	,099	,049	,029	-,021	,054	,043	,155	,052	,127	,146	,270	,229	,178	,117	,186	,408	,409	,402	1,000	,469	,560	,222	,074	-,065	-,065	,005
	K28	-,048	,047	,032	,141	,056	,056	,037	,134	,090	,088	,122	,067	-,019	,019	,130	,094	,061	,014	-,029	,066	,153	,186	,053	,069	,064	,194	,399	,449	,469	1,000	,740	,053	,012	-,054	,009	-,013
	K29	-,064	,023	,039	,115	,012	,066	,021	,129	,058	,031	,065	,037	,059	,066	,176	,164	,054	,050	-,037	,112	,164	,132	,032	,092	,124	,107	,397	,513	,560	,740	1,000	,127	-,011	-,024	-,014	,006
	K45	-,298	,196	,061	,311	,086	,118	,074	,161	,155	,065	,122	,038	-,034	,033	-,018	,004	,156	,167	,293	,151	,363	,280	,215	,078	,162	,206	,227	,255	,222	,053	,127	1,000	-,004	-,062	-,030	-,028
	L31N	,031	-,035	-,090	-,105	-,070	,048	,015	-,008	,026	-,035	-,002	,103	,037	,059	-,008	-,002	-,156	,119	,080	,134	,092	,085	,015	,107	,602	,017	-,004	-,084	,074	,012	-,011	-,004	1,000	-,011	-,006	,044
	L36N	-,002	,073	,011	-,044	-,030	,048	,018	-,062	-,023	-,034	-,006	,057	,044	,047	-,073	-,062	,003	,005	,009	-,032	-,011	-,111	-,088	,041	-,026	-,035	-,076	-,064	-,065	-,054	-,024	-,062	-,011	1,000	-,064	-,134
	L37	-,079	,118	-,001	-,007	,088	,032	,012	,094	,110	,071	,088	,024	,038	,010	,185	,154	-,029	-,014	,012	,066	-,010	,022	,023	,116	-,017	-,033	,018	,048	-,065	,009	-,014	-,030	-,006	-,064	1,000	,033
	L38N	,009	-,129	-,104	-,097	-,089	-,045	-,056	-,034	-,052	-,118	-,109	-,037	-,159	,009	-,052	-,045	-,010	-,053	-,056	,032	-,100	-,086	-,026	-,017	-,004	,032	-,077	-,087	,005	-,013	,006	-,028	,044	-,134	,033	1,000

a The covariance matrix has the 275 degrees of freedom

Further the table of covariance (tabl. A15.111) and the table of correlation (tabl. A15.112) of the complete set of independent variables (the dependent variable Y_4) is presented directly

Table A15.111

The covariance of the complete set of independent variables

		Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
The covariance	Age	5,870	-,116	-,046	-,212	-,085	-,119	-,104	-,189	-,192	-,061	-,080	,050	,041	-,354	-,332	-,221	-,540	-,794	-1,708	-1,333	-1,553	-2,279	-1,305	-,141	-,890	-,607	-,765	-1,645	-,268	-,174	-,292	-,665	,028	-,075	-,660	,052
	RU	-,116	,385	,264	,203	,159	,142	,179	,235	,224	,209	,222	,096	,031	,031	-,055	-,089	,215	,122	,369	,055	,425	,261	,431	,079	-,005	,067	,194	,784	,029	,052	,036	,123	-,008	,077	,293	-,328
	LIT	-,046	,264	,431	,233	,224	,195	,211	,221	,248	,244	,249	,109	,044	,046	-,142	-,152	,048	,004	,263	-,132	,189	,098	,424	-,052	-,225	-,025	,100	,404	,033	,029	,064	,037	-,028	-,001	,011	-,329
	LG	-,212	,203	,233	,406	,201	,138	,151	,197	,206	,184	,202	,061	,061	,000	,085	,091	,257	,109	,653	,109	,472	,392	,417	-,034	-,019	,080	,290	,983	,082	,120	,202	,229	-,030	-,062	,033	-,285
	HIS	-,085	,159	,224	,201	,317	,166	,184	,161	,209	,201	,206	,093	,055	-,012	-,095	-,103	,118	,064	,447	,059	,342	,318	,328	-,056	-,149	,092	,216	,610	,069	,044	,018	,060	-,017	-,050	,259	-,239
	GEO	-,119	,142	,195	,138	,166	,367	,181	,117	,171	,182	,181	,112	,059	-,035	-,040	-,086	,050	,097	,320	,057	,226	,093	,182	,008	,044	,037	,251	,642	,079	,047	,103	,070	,014	,047	,074	-,133
	BIO	-,104	,179	,211	,151	,184	,181	,335	,162	,194	,193	,208	,115	,042	,084	-,190	-,220	,149	,056	,225	,067	,286	,234	,285	,018	,095	,086	,180	,489	,054	,034	,031	,047	,005	,010	,042	-,151
	ALG	-,189	,235	,221	,197	,161	,117	,162	,417	,335	,266	,238	,103	,042	-,003	-,002	,006	,200	,114	,345	,101	,435	,437	,396	,144	,091	,006	,078	,477	,031	,131	,237	,084	-,001	-,082	,234	-,118
	GEOM	-,192	,224	,248	,206	,209	,171	,194	,335	,459	,299	,275	,144	,065	-,015	-,042	-,019	,177	,142	,497	,136	,472	,550	,405	,099	,044	-,014	,091	,465	,059	,092	,102	,104	,010	-,045	,313	-,172
	FIZ	-,061	,209	,244	,184	,201	,182	,193	,266	,299	,405	,244	,111	,069	,056	-,068	-,053	,158	,092	,373	,065	,378	,376	,376	,103	,005	-,010	,061	,323	,011	,083	,033	,020	-,010	-,045	,175	-,338
	CHE	-,080	,222	,249	,202	,206	,181	,208	,238	,275	,244	,448	,120	,046	,119	-,155	-,150	,262	,062	,281	-,082	,352	,399	,200	-,088	-,102	,065	,221	,693	,068	,118	,115	,086	-,001	-,019	,242	-,340
	SCH	,050	,096	,109	,061	,093	,112	,115	,103	,144	,111	,120	,288	,027	,144	-,023	-,036	-,044	-,065	,138	-,062	,057	,024	,017	,155	,111	-,035	,047	,080	,033	,051	,055	,025	,026	,041	,079	-,103
	AST	,041	,031	,044	,061	,055	,059	,042	,042	,065	,069	,046	,027	,247	,130	,198	,159	-,017	,071	,159	-,013	-,020	,013	,154	-,001	-,086	,117	,264	,370	,005	-,012	,066	-,040	,010	,043	,049	-,321
	K7	-,354	,031	,046	,000	-,012	-,035	,084	-,003	-,015	,056	,119	,144	,130	6,667	1,157	1,329	,008	,082	,661	-,119	,282	,282	-,379	-,761	,469	-,196	,253	,256	-,073	,089	,525	,065	,083	,225	,189	,184
	K8	-,332	-,055	-,142	,085	-,095	-,040	-,190	-,002	-,042	-,068	-,155	-,023	,198	1,157	11,490	11,426	-,243	,824	1,633	1,015	,940	,811	-,746	1,747	,887	-,112	1,316	3,854	,243	,584	1,822	,007	-,025	-,499	2,704	-,880
	K9	-,221	-,089	-,152	,091	-,103	-,086	-,220	,006	-,019	-,053	-,150	-,036	,159	1,329	11,426	12,753	-,379	,790	1,143	,887	,893	,723	-,961	1,680	,929	-,241	1,117	3,719	,195	,440	1,769	,055	-,012	-,447	2,357	-,794
	K14	-,540	,215	,048	,257	,118	,050	,149	,200	,177	,158	,262	-,044	-,017	,008	-,243	-,379	5,079	1,041	3,172	1,613	3,592	2,480	1,050	1,033	2,043	,714	1,156	3,293	,333	,191	,373	,409	-,155	-,031	,009	-,180
	K15	-,794	,122	,004	,109	,064	,097	,056	,114	,142	,092	,062	-,065	,071	,082	,824	,790	1,041	4,304	2,903	1,752	2,867	1,922	,745	1,287	1,879	,128	,458	1,576	,130	,047	,318	,414	,115	-,015	-,106	-,516
	K16	-1,708	,369	,263	,653	,447	,320	,225	,345	,497	,373	,281	,138	,159	,661	1,633	1,143	3,172	2,903	13,421	2,755	7,667	4,812	1,752	2,027	4,451	,494	,574	3,484	,497	-,143	-,428	1,323	,126	-,002	,430	-1,055
	K17	-1,333	,055	-,132	,109	,059	,057	,067	,101	,136	,065	-,082	-,062	-,013	-,119	1,015	,887	1,613	1,752	2,755	7,136	4,787	3,912	,678	2,290	3,321	,494	,751	4,117	,338	,233	,826	,408	,173	-,152	,835	,288
	K18	-1,553	,425	,189	,472	,342	,226	,286	,435	,472	,378	,352	,057	-,020	,282	,940	,893	3,592	2,867	7,667	4,787	14,652	8,026	2,131	3,254	5,175	,879	2,197	7,860	,931	,845	1,842	1,489	,190	-,124	,164	-1,606
	K19	-2,279	,261	,098	,392	,318	,093	,234	,437	,550	,376	,399	,024	,013	,282	,811	,723	2,480	1,922	4,812	3,912	8,026	14,650	3,456	2,091	3,846	1,094	3,647	11,162	,831	,961	1,473	1,217	,158	-,818	,714	-1,491
	K20	-1,305	,431	,424	,417	,328	,182	,285	,396	,405	,376	,200	,017	,154	-,379	-,746	-,961	1,050	,745	1,752	,678	2,131	3,456	12,091	,930	2,179	,558	1,427	2,938	,573	,267	,280	,803	,029	-,584	,432	-,523
	K21	-,141	,079	-,052	-,034	-,056	,008	,018	,144	,099	,103	-,088	,155	-,001	-,761	1,747	1,680	1,033	1,287	2,027	2,290	3,254	2,091	,930	5,801	2,573	,053	,481	1,412	,234	,249	,638	,108	,130	,165	1,176	-,216
	K22	-,890	-,005	-,225	-,019	-,149	,044	,095	,091	,044	,005	-,102	,111	-,086	,469	,887	,929	2,043	1,879	4,451	3,321	5,175	3,846	2,179	2,573	12,032	,511	1,493	3,656	,623	,325	1,368	,691	,976	-,198	-,037	-,120
	K23	-,607	,067	-,025	,080	,092	,037	,086	,006	-,014	-,010	,065	-,035	,117	-,196	-,112	-,241	,714	,128	,494	,494	,879	1,094	,558	,053	,511	3,828	3,487	6,757	,738	,490	,593	,472	,013	-,124	-,216	,204
	K24	-,765	,194	,100	,290	,216	,251	,180	,078	,091	,061	,221	,047	,264	,253	1,316	1,117	1,156	,458	,574	,751	2,197	3,647	1,427	,481	1,493	3,487	10,874	23,043	1,258	1,786	3,969	,842	-,002	-,470	,405	-1,100
	K25	-1,645	,784	,404	,983	,610	,642	,489	,477	,465	,323	,693	,080	,370	,256	3,854	3,719	3,293	1,576	3,484	4,117	7,860	11,162	2,938	1,412	3,656	6,757	23,043	68,295	3,060	5,060	12,844	2,317	-,314	-,980	1,959	-3,023
	K27	-,268	,029	,033	,082	,069	,079	,054	,031	,059	,011	,068	,033	,005	-,073	,243	,195	,333	,130	,497	,338	,931	,831	,573	,234	,623	,738	1,258	3,060	,851	,587	1,556	,228	,034	-,110	-,209	,003
	K28	-,174	,052	,029	,120	,044	,047	,034	,131	,092	,083	,118	,051	-,012	,089	,584	,440	,191	,047	-,143	,233	,845	,961	,267	,249	,325	,490	1,786	5,060	,587	1,856	3,100	,085	,011	-,131	,098	-,037
	K29	-,292	,036	,064	,202	,018	,103	,031	,237	,102	,033	,115	,055	,066	,525	1,822	1,769	,373	,318	-,428	,826	1,842	1,473	,280	,638	1,368	,593	3,969	12,844	1,556	3,100	9,365	,392	-,008	-,121	-,151	,117
	K45	-,665	,123	,037	,229	,060	,070	,047	,084	,104	,020	,086	,025	-,040	,065	,007	,055	,409	,414	1,323	,408	1,489	1,217	,803	,108	,691	,472	,842	2,317	,228	,085	,392	1,281	,000	-,137	-,139	-,173
	L31N	,028	-,008	-,028	-,030	-,017	,014	,005	-,001	,010	-,010	-,001	,026	,010	,083	-,025	-,012	-,155	,115	,126	,173	,190	,158	,029	,130	,976	,013	-,002	-,314	,034	,011	-,008	,000	,221	-,011	-,006	,091
	L36N	-,075	,077	-,001	-,062	-,050	,047	,010	-,082	-,045	-,045	-,019	,041	,043	,225	-,499	-,447	-,031	-,015	-,002	-,152	-,124	-,818	-,584	,165	-,198	-,124	-,470	-,980	-,110	-,131	-,121	-,137	-,011	3,224	-,570	-,961
	L37	-,660	,293	,011	,033	,259	,074	,042	,234	,313	,175	,242	,079	,049	,189	2,704	2,357	,009	-,106	,430	,835	,164	,714	,432	1,176	-,037	-,216	,405	1,959	-,209	,098	-,151	-,139	-,006	-,570	18,651	,419
	L38N	,052	-,328	-,329	-,285	-,239	-,133	-,151	-,118	-,172	-,338	-,340	-,103	-,321	,184	-,880	-,794	-,180	-,516	-1,055	,288	-1,606	-1,491	-,523	-,216	-,120	,204	-1,100	-3,023	,003	-,037	,117	-,173	,091	-,961	,419	16,460

a The covariance matrix has the 276 degrees of freedom

Table A15.112

The correlation of the complete set of independent variables and dependent variable Y_4

The correlation	Age	1,000	-,077	-,029	-,137	-,063	-,081	-,074	-,120	-,117	-,039	-,049	,039	,034	-,057	-,040	-,026	-,099	-,158	-,192	-,206	-,168	-,246	-,155	-,024	-,106	-,128	-,096	-,082	-,120	-,053	-,039	-,243	,025	-,017	-,063	,005
	RU	-,077	1,000	,649	,512	,454	,378	,498	,586	,532	,530	,533	,289	,099	,020	-,026	-,040	,154	,095	,162	,033	,179	,110	,200	,053	-,002	,055	,095	,153	,051	,061	,019	,175	-,028	,069	,109	-,130
	LIT	-,029	,649	1,000	,557	,605	,490	,554	,522	,557	,585	,566	,311	,135	,027	-,064	-,065	,033	,003	,110	-,076	,075	,039	,186	-,033	-,099	-,019	,046	,074	,054	,032	,032	,049	-,092	-,001	,004	-,123
	LG	-,137	,512	,557	1,000	,559	,358	,408	,479	,478	,453	,474	,178	,192	,000	,039	,040	,179	,083	,280	,064	,193	,161	,188	-,022	-,009	,064	,138	,187	,139	,138	,103	,317	-,101	-,054	,012	-,110
	HIS	-,063	,454	,605	,559	1,000	,486	,563	,443	,548	,561	,545	,307	,195	-,009	-,050	-,051	,093	,054	,217	,039	,159	,148	,167	-,041	-,076	,083	,116	,131	,133	,058	,010	,094	-,066	-,049	,107	-,105
	GEO	-,081	,378	,490	,358	,486	1,000	,517	,299	,416	,473	,447	,343	,196	-,022	-,019	-,040	,037	,077	,144	,035	,097	,040	,087	,006	,021	,031	,126	,128	,142	,057	,055	,103	,049	,044	,028	-,054
	BIO	-,074	,498	,554	,408	,563	,517	1,000	,433	,494	,524	,535	,371	,147	,056	-,097	-,107	,114	,047	,106	,043	,129	,105	,142	,013	,047	,076	,095	,102	,101	,043	,018	,072	,018	,010	,017	-,064
	ALG	-,120	,586	,522	,479	,443	,299	,433	1,000	,765	,648	,550	,296	,131	-,002	-,001	,003	,137	,085	,146	,059	,176	,177	,176	,092	,040	,005	,036	,089	,053	,149	,120	,114	-,002	-,071	,084	-,045
	GEOM	-,117	,532	,557	,478	,548	,416	,494	,765	1,000	,693	,606	,397	,194	-,009	-,018	-,008	,116	,101	,200	,075	,182	,212	,172	,061	,019	-,010	,041	,083	,094	,100	,049	,135	,031	-,037	,107	-,063
	FIZ	-,039	,530	,585	,453	,561	,473	,524	,648	,693	1,000	,572	,324	,219	,034	-,031	-,023	,111	,070	,160	,039	,155	,155	,170	,067	,002	-,008	,029	,061	,018	,096	,017	,028	-,033	-,039	,064	-,131
	CHE	-,049	,533	,566	,474	,545	,447	,535	,550	,606	,572	1,000	,335	,140	,069	-,068	-,063	,173	,045	,115	-,046	,138	,156	,086	-,055	-,044	,050	,100	,125	,110	,129	,056	,113	-,003	-,016	,084	-,125
	SCH	,039	,289	,311	,178	,307	,343	,371	,296	,397	,324	,335	1,000	,100	,104	-,013	-,019	-,037	-,059	,070	-,043	,028	,012	,009	,120	,060	-,033	,026	,018	,066	,070	,033	,041	,104	,043	,034	-,047
	AST	,034	,099	,135	,192	,195	,196	,147	,131	,194	,219	,140	,100	1,000	,101	,118	,090	-,015	,069	,087	-,010	-,011	,007	,089	-,001	-,050	,120	,161	,090	,011	-,017	,044	-,072	,041	,049	,023	-,159
	K7	-,057	,020	,027	,000	-,009	-,022	,056	-,002	-,009	,034	,069	,104	,101	1,000	,132	,144	,001	,015	,070	-,017	,029	,029	-,042	-,122	,052	-,039	,030	,012	-,031	,025	,066	,022	,068	,049	,017	,018
	K8	-,040	-,026	-,064	,039	-,050	-,019	-,097	-,001	-,018	-,031	-,068	-,013	,118	,132	1,000	,944	-,032	,117	,132	,112	,072	,063	-,063	,214	,075	-,017	,118	,138	,078	,126	,176	,002	-,015	-,082	,185	-,064
	K9	-,026	-,040	-,065	,040	-,051	-,040	-,107	,003	-,008	-,023	-,063	-,019	,090	,144	,944	1,000	-,047	,107	,087	,093	,065	,053	-,077	,195	,075	-,035	,095	,126	,059	,091	,162	,014	-,007	-,070	,153	-,055
	K14	-,099	,154	,033	,179	,093	,037	,114	,137	,116	,111	,173	-,037	-,015	,001	-,032	-,047	1,000	,223	,384	,268	,416	,287	,134	,190	,261	,162	,156	,177	,160	,062	,054	,160	-,146	-,008	,001	-,020
	K15	-,158	,095	,003	,083	,054	,077	,047	,085	,101	,070	,045	-,059	,069	,015	,117	,107	,223	1,000	,382	,316	,361	,242	,103	,258	,261	,032	,067	,092	,068	,016	,050	,177	,118	-,004	-,012	-,061
	K16	-,192	,162	,110	,280	,217	,144	,106	,146	,200	,160	,115	,070	,087	,070	,132	,087	,384	,382	1,000	,281	,547	,343	,138	,230	,350	,069	,048	,115	,147	-,029	-,038	,319	,073	,000	,027	-,071
	K17	-,206	,033	-,076	,064	,039	,035	,043	,059	,075	,039	-,046	-,043	-,010	-,017	,112	,093	,268	,316	,281	1,000	,468	,383	,073	,356	,358	,094	,085	,187	,137	,064	,101	,135	,138	-,032	,072	,027
	K18	-,168	,179	,075	,193	,159	,097	,129	,176	,182	,155	,138	,028	-,011	,029	,072	,065	,416	,361	,547	,468	1,000	,548	,160	,353	,390	,117	,174	,248	,264	,162	,157	,344	,106	-,018	,010	-,103
	K19	-,246	,110	,039	,161	,148	,040	,105	,177	,212	,155	,156	,012	,007	,029	,063	,053	,287	,242	,343	,383	,548	1,000	,260	,227	,290	,146	,289	,353	,235	,184	,126	,281	,088	-,119	,043	-,096
	K20	-,155	,200	,186	,188	,167	,087	,142	,176	,172	,170	,086	,009	,089	-,042	-,063	-,077	,134	,103	,138	,073	,160	,260	1,000	,111	,181	,082	,124	,102	,179	,056	,026	,204	,017	-,094	,029	-,037
	K21	-,024	,053	-,033	-,022	-,041	,006	,013	,092	,061	,067	-,055	,120	-,001	-,122	,214	,195	,190	,258	,230	,356	,353	,227	,111	1,000	,308	,011	,061	,071	,105	,076	,086	,040	,115	,038	,113	-,022
	K22	-,106	-,002	-,099	-,009	-,076	,021	,047	,040	,019	,002	-,044	,060	-,050	,052	,075	,075	,261	,261	,350	,358	,390	,290	,181	,308	1,000	,075	,130	,128	,195	,069	,129	,176	,598	-,032	-,002	-,009
	K23	-,128	,055	-,019	,064	,083	,031	,076	,005	-,010	-,008	,050	-,033	,120	-,039	-,017	-,035	,162	,032	,069	,094	,117	,146	,082	,011	,075	1,000	,541	,418	,409	,184	,099	,213	,015	-,035	-,026	,026
	K24	-,096	,095	,046	,138	,116	,126	,095	,036	,041	,029	,100	,026	,161	,030	,118	,095	,156	,067	,048	,085	,174	,289	,124	,061	,130	,541	1,000	,846	,413	,398	,393	,226	-,002	-,079	,028	-,082
	K25	-,082	,153	,074	,187	,131	,128	,102	,089	,083	,061	,125	,018	,090	,012	,138	,126	,177	,092	,115	,187	,248	,353	,102	,071	,128	,418	,846	1,000	,401	,449	,508	,248	-,081	-,066	,055	-,090
	K27	-,120	,051	,054	,139	,133	,142	,101	,053	,094	,018	,110	,066	,011	-,031	,078	,059	,160	,068	,147	,137	,264	,235	,179	,105	,195	,409	,413	,401	1,000	,467	,551	,219	,078	-,066	-,053	,001
	K28	-,053	,061	,032	,138	,058	,057	,043	,149	,100	,096	,129	,070	-,017	,025	,126	,091	,062	,016	-,029	,064	,162	,184	,056	,076	,069	,184	,398	,449	,467	1,000	,744	,055	,017	-,053	,017	-,007
	K29	-,039	,019	,032	,103	,010	,055	,018	,120	,049	,017	,056	,033	,044	,066	,176	,162	,054	,050	-,038	,101	,157	,126	,026	,086	,129	,099	,393	,508	,551	,744	1,000	,113	-,005	-,022	-,011	,009
	K45	-,243	,175	,049	,317	,094	,103	,072	,114	,135	,028	,113	,041	-,072	,022	,002	,014	,160	,177	,319	,135	,344	,281	,204	,040	,176	,213	,226	,248	,219	,055	,113	1,000	,001	-,068	-,028	-,038
	L31N	,025	-,028	-,092	-,101	-,066	,049	,018	-,002	,031	-,033	-,003	,104	,041	,068	-,015	-,007	-,146	,118	,073	,138	,106	,088	,017	,115	,598	,015	-,002	-,081	,078	,017	-,005	,001	1,000	-,013	-,003	,048
	L36N	-,017	,069	-,001	-,054	-,049	,044	,010	-,071	-,037	-,039	-,016	,043	,049	,049	-,082	-,070	-,008	-,004	,000	-,032	-,018	-,119	-,094	,038	-,032	-,035	-,079	-,066	-,066	-,053	-,022	-,068	-,013	1,000	-,074	-,132
	L37	-,063	,109	,004	,012	,107	,028	,017	,084	,107	,064	,084	,034	,023	,017	,185	,153	,001	-,012	,027	,072	,010	,043	,029	,113	-,002	-,026	,028	,055	-,053	,017	-,011	-,028	-,003	-,074	1,000	,024
	L38N	,005	-,130	-,123	-,110	-,105	-,054	-,064	-,045	-,063	-,131	-,125	-,047	-,159	,018	-,064	-,055	-,020	-,061	-,071	,027	-,103	-,096	-,037	-,022	-,009	,026	-,082	-,090	,001	-,007	,009	-,038	,048	-,132	,024	1,000

a The covariance matrix has the 276 degrees of freedom

The features of statistical correlation dependences (relationships) were studied directly at the realization of the regression analysis of a posteriori data, and the graph of two-dimensional scattering are presented earlier and characterize the form of relationships.

A15.7.4. The definition of the ranks of centroids of the selected classes

Consider the problem of determination of the deterministic rank as the optimal quantity of variables based on the canonical discriminant functions at the realization of the discriminant analysis with taking into account the reduced set of independent variables K_i, and also the given dependent variables (factors) Y_2 and Y_4 (see tabl. A15.113).

1. The reduced set of independent variables K_i.

Table A15.113

The ranks of the centroids of selected classes at the reduced set of independent variables

The reduced set of independent variables K_i and dependent variable Y_2

The log. determinants

Y_2	The rank	The log. determinant
2,00	.(a)	.(b)
3,00	20	19,748
4,00	20	30,186
5,00	20	29,231
The merged within groups	20	30,818

The ranks and natural logarithms of determinants of the group covariance matrixes are printed.
a Rank < 7
b There are not enough observations for nonsingularity.

The results of test(a)

M Box		757,371
F	Approximately	1,516
	deg.fr.1	420
	deg.fr.2	31268,680
	The value	,000

The checking of zero hypothesis about the equality of covariance matrixes.
a As some covariance matrixes are singular, the usual procedures will not be work. The nonsingular groups will be tested relative to their united intra-group covariance matrix. The logarithm of its determinant is 31.259.

The reduced set of independent variables K_i and dependent variable Y_4

The log. determinants

Y_4	The rank	The log. determinant
2,00	.(a)	.(b)
3,00	20	27,024
4,00	20	27,269
5,00	20	28,457
The merged within groups	20	30,656

The ranks and natural logarithms of determinants of the group covariance matrixes are printed.
a Rank < 9
b There are not enough observations for nonsingularity.

The results of test(a)

M Box		931,856
F	Approximately	1,965
	deg.fr.1	420
	deg.fr.2	123726,006
	The value	,000

The checking of zero hypothesis about the equality of covariance matrixes.
a As some covariance matrixes are singular, the usual procedures will not be work. The nonsingular groups will be tested relative to their united intra-group covariance matrix. The logarithm of its determinant is 31.244.

2. T h e   c o m p l e t e   s e t   o f   i n d e p e n d e n t   v a r i a b l e s K_i.

Consider the problem of determining of the deterministic rank as the optimal quantity of variables in the basis of the canonical discriminant functions at the realization of the statistical discriminant analysis with taking into account the complete set of independent variables K, and also the dependent variables (factors) Y_2 and Y_4 of variables K_i (see tabl. A15.114).

Table A15.114

The ranks of the centroids of selected classes at the complete set of independent variables

The complete set of independent variables K_i and dependent variable Y_2

The log. determinants

Y_2	The rank	The log. determi-nant
2,00	.(a)	.(b)
3,00	.(c)	.(b)
4,00	36	13,426
5,00	36	10,312
The merged within groups	36	15,888

The ranks and natural logarithms of determinants of the group covariance matrixes are printed.

a Rank < 7

b There are not enough observations for nonsingularity.

c Rank < 35

The results of test(a)

M Box		2278,997
F	Approximately	2,877
	deg.fr.1	666
	deg.fr.2	166413,998
	The value	,000

The checking of zero hypothesis about the equality of covariance matrixes.

a As some covariance matrixes are singular, the usual procedures will not be work. The nonsingular groups will be tested relative to their united intra-group covariance matrix.

The logarithm of its determinant is 31.259.

The complete set of independent variables K_i and dependent variable Y_4

The log. determinants

Y_4	The rank	The log. determi-nant
2,00	.(a)	.(b)
3,00	36	8,011
4,00	36	5,435
5,00	36	9,479
The merged within groups	36	15,790

The ranks and natural logarithms of determinants of the group covariance matrixes are printed.

a Rank < 9

b There are not enough observations for nonsingularity.

The results of test(a)

M Box		2362,290
F	Approximately	1,404
	deg.fr.1	1332
	deg.fr.2	122697,266
	The value	,000

The checking of zero hypothesis about the equality of covariance matrixes.

a As some covariance matrixes are singular, the usual procedures will not be work. The nonsingular groups will be tested relative to their united intra-group covariance matrix.

The logarithm of its determinant is 31.244.

A15.7.5. The eigenvalues of the canonical discriminant functions

The eigenvalue of the certain canonical discriminant function allows to estimate the dispersion of dependent variable (Y_2 or Y_4) caused by the variation of the reduced or complete set of independent variables K_i, and also provides the estimation of informativity of the given function in relation to the others.

λ-Wilkes directly allows to compare the level of quality of the certain canonical discriminant function relative to the presented others, at the statistical reliability of differences is estimated by means of the criterion χ^2 (tabl. A15.115).

1. The reduced set of independent variables K_i.

Table A15.115

The eigenvalues of the canonical discriminant functions at the reduced set of independent variables K_i

The reduced set of independent variables K_i and dependent variable Y_2

The eigenvalues

The function	The eigenvalue	% of explained dispersion	The cumulative%	The canonical correlation
1	0,183(a)	51,6	51,6	0,393
2	0,131(a)	37,2	88,8	0,341
3	0,040(a)	11,2	100,0	0,196

a In the analysis the first 3 canonical discriminant functions are used.

Lambda Wilkes

The checking of function(s)	Lambda Wilkes	Chi-square	deg.fr.	The value
from 1 to 3	0,719	87,815	60	0,011
from 2 to 3	0,850	43,222	38	0,258
3	0,962	10,371	18	0,919

The reduced set of independent variables K_i and dependent variable Y_4

The eigenvalues

The function	The eigenvalue	% of explained dispersion	The cumulative%	The canonical correlation
1	0,414(a)	76,6	76,6	0,541
2	0,082(a)	15,3	91,9	0,276
3	0,044(a)	8,1	100,0	0,205

a In the analysis the first 3 canonical discriminant functions are used.

Lambda Wilkes

The checking of function(s)	Lambda Wilkes	Chi-square	deg.fr.	The value
from 1 to 3	0,626	125,181	60	0,000
from 2 to 3	0,885	32,630	38	0,716
3	0,958	11,469	18	0,873

In the table it is necessary to pay attention on the eigenvalues of functions:

- at the consideration of the reduced set of independent variables K_i and the dependent variable Y_2: the nominal values of eigenvalues allow to speak about the greatest informativity of the first (0,171) and the second (0,103) canonical discriminant function in relation to the third (0,073), which describe respectively 49,3%, 29,7% and 20,9% of the share of dispersion of the dependent variable Y_2 under the influence of variation of a set of independent variables K_i;
- at the consideration of the reduced set of independent variables K_i and the dependent variable Y_4: the nominal values of eigenvalues allow to speak about the greatest informativity of the first (0,361) canonical discriminant function in relation to the second (0,067) and the third (0,048), which describe respectively 75,8%, 14,1% and 10,1% of the share of dispersion of the dependent variable Y_4 under the influence of variation of a set of independent variables K_i.

2. The complete set of independent variables K_i.

Table A15.116

The eigenvalues of the canonical discriminant functions at the complete set of independent variables K_i

The complete set of independent variables K_i and dependent variable Y_2					The complete set of independent variables K_i and dependent variable Y_4				
The eigenvalues					The eigenvalues				
The function	The eigenvalue	% of explained dispersion	The cumulative %	The canonical correlation	The function	Eigenvalue	% of explained dispersion	The cumulative%	The canonical correlation
1	0,350(a)	52,9	52,9	0,509	1	0,582(a)	67,8	67,8	,607
2	0,206(a)	31,1	84,0	0,413	2	0,169(a)	19,6	87,4	,380
3	0,106(a)	16,0	100,0	0,309	3	0,108(a)	12,6	100,0	,313
a In the analysis the first 3 canonical discriminant functions are used.					a In the analysis the first 3 canonical discriminant functions are used.				
Lambda Wilkes					Lambda Wilkes				
The checking of function(s)	Lambda Wilkes	Chi-square	deg.fr.	The value	The checking of function(s)	Lambda Wilkes	Chi-square	deg.fr.	The value
from 1 to 3	0,556	151,651	108	0,004	from 1 to 3	0,488	185,909	108	0,000
from 2 to 3	0,750	74,254	70	0,341	from 2 to 3	0,772	67,048	70	0,578
3	0,904	25,938	34	0,838	3	0,902	26,639	34	0,812

In the table it is necessary to pay attention on the eigenvalues of functions:

- at the consideration of the complete set of independent variables K_i and the dependent variable Y_2: the nominal values of eigenvalues allow to speak about the greatest informativity of the first (0,269) canonical discriminant function in relation to the second (0,162) and the third (0,126), which describe respectively 48,4%, 29,0% and 22,6% of the share of dispersion of the dependent variable Y_2 under the influence of variation of a set of independent variables K_i;
- at the consideration of the reduced set of independent variables K_i and the dependent variable Y_4: the nominal values of eigenvalues allow to speak about the greatest informativity of the first (0,522) canonical discriminant function in relation to the second (0,153) and the third (0,118), which describe respectively 65,8%, 19,3% and 14,9% of the share of dispersion of the dependent variable Y_4 under the influence of variation of a set of independent variables K_i.

The several important conclusions can be made in the course of the discriminant analysis:

- at the consideration of the reduced set of independent variables K_i and the dependent variable Y_2 – the first and the second functions in compare with the third function describe the maximal share of dispersion of the dependent variable Y_2;
- at the consideration of the reduced set of independent variables K_i and the dependent variable Y_4 – the first and the second functions in compare with the third function describe the maximal share of dispersion of the dependent variable Y_4;
- at the consideration of the complete set of independent variables K_i and the dependent variable Y_2 – the first, the second and the third functions approximately the same describe the maximal share of dispersion of the dependent variable Y_2;
- at the consideration of the complete set of independent variables K_i and the dependent variable Y_4 – the first function in relation with the second and the third functions describes the maximal share of dispersion of the dependent variable Y_4.

A15.7.6. The features of the functions of classification of the discriminant analysis

The canonical discriminant functions of classification allow to realize the bring into correlation of the object to the class of objects by a set of nominal values of signs.

The coefficients of the canonical discriminant functions allow to realize the one-to-one bringing into correlation of the arbitrary element to one from the classes, at the same time:

- the position of the centroids of classes in the space of the canonical discriminant functions is given by a set of the nominal values of independent variables;
- the position of independent variables in the space of the scales of the centroids of classes of the canonical discriminant functions is given by a set of nominal values of the various coefficients of the canonical discriminant functions.

1. The reduced set of independent variables K_i.

In tabl. A15.117 the coefficients of the canonical discriminant functions for the reduced set of independent variables and the dependent variables Y_2 and Y_4 are proposed.

Table A15.117

The coefficients of the canonical discriminant functions of classification at the reduced set of independent variables

The reduced set of independent variables K_i and dependent variable Y_2					The reduced set of independent variables K_i and dependent variable Y_4				
The coefficients of classifying function					The coefficients of classifying function				
The indicator	Y_2				The indicator	Y_4			
	2,00	3,00	4,00	5,00		2,00	3,00	4,00	5,00
Age	4,569	4,313	4,349	4,330	Age	4,946	4,805	4,486	4,427
K_7	3,588	3,713	3,671	3,764	K_7	3,498	3,491	3,642	3,608
K_8	1,375	0,456	0,754	0,794	K_8	0,505	0,741	0,487	0,670
K_9	-0,621	0,089	-0,104	-0,207	K_9	0,337	-0,018	0,145	-0,006
K_{14}	2,624	2,825	2,908	3,033	K_{14}	2,697	2,677	2,786	2,752
K_{15}	2,597	2,785	2,757	2,662	K_{15}	3,135	2,994	2,825	2,868
K_{16}	-0,057	-0,531	-0,372	-0,436	K_{16}	-0,601	-0,266	-0,458	-0,410
K_{17}	0,188	0,015	0,087	0,021	K_{17}	0,032	0,054	0,105	0,048
K_{18}	-1,230	-1,121	-1,180	-1,049	K_{18}	-1,244	-1,439	-1,220	-1,242
K_{19}	0,411	0,410	0,492	0,490	K_{19}	0,469	0,511	0,438	0,441
K_{20}	1,370	1,311	1,377	1,408	K_{20}	1,270	1,283	1,288	1,349
K_{21}	1,155	1,656	1,583	1,653	K_{21}	1,415	1,339	1,489	1,600
K_{22}	-0,034	-0,104	-0,152	-0,115	K_{22}	-0,124	-0,026	-0,116	-0,122
K_{23}	0,500	0,662	0,640	0,541	K_{23}	0,730	0,856	0,740	0,684
K_{24}	-0,561	-0,750	-0,701	-0,668	K_{24}	-0,446	-0,705	-0,673	-0,703
K_{25}	0,119	0,122	0,103	0,085	K_{25}	0,096	0,079	0,114	0,113
K_{27}	1,418	1,119	1,670	1,550	K_{27}	0,437	0,795	1,168	1,087
K_{28}	1,093	1,192	0,929	0,920	K_{28}	1,406	1,402	1,248	1,066
K_{29}	-0,540	-0,439	-0,482	-0,413	K_{29}	-0,601	-0,474	-0,518	-0,440
K_{45}	4,019	3,703	3,956	3,961	K_{45}	3,900	3,541	3,703	3,878
(Constant)	-143,126	-140,060	-144,590	-147,517	(Constant)	-151,857	-145,886	-142,374	-143,327
The linear discriminant functions of Fisher					The linear discriminant functions of Fisher				

In tabl. A15.118 proposes the standardized coefficients of discriminant functions for the reduced set of independent variables and the dependent variables Y_2 and Y_4.

Table A15.118

The standardized coefficients of the canonical discriminant functions at the reduced set of independent variables

The reduced set of independent variables K_i and dependent variable Y_2				The reduced set of independent variables K_i and dependent variable Y_4			
The normalized coefficients of the canonical discriminant function				The normalized coefficients of the canonical discriminant function			
The ind.	The function			The ind.	The function		
	1	2	3		1	2	3
Age	-0,047	0,245	-0,226	Age	0,645	0,215	0,164
K_7	0,194	-0,233	-0,171	K_7	-0,227	0,101	-0,219
K_8	0,535	1,128	-0,883	K_8	0,219	-0,907	0,743
K_9	-0,604	-0,767	1,114	K_9	-0,032	1,053	-0,328
K_{14}	0,436	-0,204	0,141	K_{14}	-0,129	0,097	-0,157
K_{15}	-0,199	-0,040	0,360	K_{15}	0,219	0,052	0,360
K_{16}	0,003	0,757	-0,156	K_{16}	0,314	-0,774	-0,145
K_{17}	-0,088	0,270	0,113	K_{17}	-0,018	0,091	-0,283
K_{18}	0,383	-0,412	-0,503	K_{18}	-0,493	0,486	0,010
K_{19}	0,200	0,091	0,306	K_{19}	0,177	-0,107	0,016
K_{20}	0,244	0,075	-0,001	K_{20}	-0,128	-0,175	0,275
K_{21}	0,158	-0,482	0,331	K_{21}	-0,384	-0,079	0,374
K_{22}	-0,006	-0,033	-0,423	K_{22}	0,207	-0,172	-0,109
K_{23}	-0,192	-0,017	0,330	K_{23}	0,201	-0,058	-0,211
K_{24}	0,162	0,179	-0,305	K_{24}	0,038	0,495	0,240
K_{25}	-0,252	0,018	0,017	K_{25}	-0,188	0,097	-0,026
K_{27}	0,207	0,273	0,456	K_{27}	-0,226	-0,082	-0,356
K_{28}	-0,241	-0,133	-0,260	K_{28}	0,280	0,169	-0,296
K_{29}	0,151	-0,223	-0,173	K_{29}	-0,060	-0,371	0,193
K_{45}	0,169	0,184	0,076	K_{45}	-0,206	0,067	0,428

The presented standardized coefficients of the canonical discriminant functions directly allow to write the two systems from the three standardized canonical discriminant equations for the reduced set of independent variables and dependent variables Y_2 and Y_4, which are equivalent to the early considered linear equations of multiple regression.

The direct bring into correlation of the certain element to one from the entered classes is made on the basis of using of the principle of the greatest correspondence by the nominal values of a set of independent variables and dependent variable. The nominal values of variables are exposed to the linear standardization or normalization by means of use of the rule and procedure of Z-conversion.

In tabl. A15.119 proposes the coefficients of structural matrix directly for the reduced set of independent variables and the dependent variables Y_2 and Y_4.

Table A15.119

The coefficients of structural matrix at the reduced set of independent variables

The reduced set of independent variables K_i and dependent variable Y_2

The structural matrix

The ind.	The function		
	1	2	3
K_{18}	0,706(*)	-0,037	-0,076
K_{14}	0,646(*)	-0,054	0,107
K_{19}	0,554(*)	0,106	0,196
K_{20}	0,456(*)	0,086	0,099
K_{45}	0,444(*)	0,221	0,139
K_{21}	0,373(*)	-0,249	0,285
K_{27}	0,364(*)	0,155	0,242
K_{22}	0,352(*)	0,054	-0,224
Age	-0,327(*)	0,068	-0,295
K_{17}	0,322(*)	0,093	0,179
K_{24}	0,159(*)	0,133	-0,029
K_{25}	0,158(*)	0,127	-0,037
K_{16}	0,479	0,536(*)	-0,044
K_8	-0,018	0,327(*)	0,125
K_{23}	0,045	0,149	0,303(*)
K_{15}	0,145	0,097	0,296(*)
K_9	-0,074	0,205	0,227(*)
K_{28}	0,046	-0,122	-0,221(*)
K_7	0,182	-0,132	-0,221(*)
K_{29}	0,150	-0,137	-0,168(*)

The united intra-group correlations between the discriminant variables and the normalized canonical discriminant functions.
The variables are ordered by the absolute value of correlations inside the function.
* The maximal by the absolute value correlation between the variables and discriminant functions.

The reduced set of independent variables K_i and dependent variable Y_4

The structural matrix

The ind.	The function		
	1	2	3
Age	0,668(*)	0,275	0,107
K_{18}	-0,495(*)	0,027	0,050
K_{45}	-0,412(*)	-0,040	0,324
K_{17}	-0,297(*)	-0,024	-0,099
K_{20}	-0,287(*)	-0,242	0,263
K_{19}	-0,282(*)	-0,043	0,048
K_{27}	-0,279(*)	-0,063	-0,254
K_{14}	-0,274(*)	-0,045	-0,143
K_{29}	-0,142(*)	0,040	-0,043
K_{16}	-0,124	-0,577(*)	0,050
K_{24}	-0,149	0,417(*)	0,063
K_{25}	-0,191	0,341(*)	0,046
K_{22}	-0,087	-0,244(*)	-0,010
K_8	0,101	0,035	0,448(*)
K_{21}	-0,343	-0,113	0,409(*)
K_9	0,081	0,171	0,405(*)
K_{15}	-0,030	-0,123	0,370(*)
K_{23}	-0,049	0,158	-0,225(*)
K_7	-0,163	0,086	-0,199(*)
K_{28}	-0,013	0,126	-0,177(*)

The united intra-group correlations between the discriminant variables and the normalized canonical discriminant functions.
The variables are ordered by the absolute value of correlations inside the function.
* The maximal by the absolute value correlation between the variables and discriminant functions.

The nominal values of the coefficients of the structural matrix allows to estimate the degree of contribution of a set of independent variables into the dispersion of the dependent variable Y_2:

- the dispersion of the first canonical discriminant function are determined the following independent variables: K_{18} (0,649), K_{45} (0,562), K_{14} (0,561), K_{16} (0,548), Age (-0,480), K_{20} (0,478), K_{19} (0,473), K_{27} (0,450), K_{17} (0,372), K_{21} (0,254), K_{25} (0,214);
- the dispersion of the second canonical discriminant function are determined the following independent variables: K_8 (0,334), K_9 (0,321), K_{23} (0,264), K_7 (-0,247);
- the dispersion of the third canonical discriminant function are determined the following independent variables: K_{15} (0,362), K_{29} (0,339), K_{24} (0,335), K_{22} (0,303), K_{28} (0,203).

Obviously, that the sets of independent variables do not intersect between each other: the intersection of sets directly allows to speak about the dual consideration of each element in relation to the certain centroid of classes of independent variables.

The nominal values of the coefficients of the structural matrix allow to estimate the degree of contribution of a set of independent variables into the dispersion of the dependent variable Y_4:

- the dispersion of the first considered canonical discriminant function is determined by the following independent variables: Age (0,697), K_{18} (-0,499), K_{45} (-0,405), K_{17} (-0,314), K_{14} (-0,289), K_{27} (-0,270), K_{19} (-0,269), K_{22} (-0,135) and K_{29} (-0,127);
- the dispersion of the second considered canonical discriminant function is determined by the following independent variables: K_{16} (-,508), K_{24} (0,435) and K_{25} (0,340);
- the dispersion of the third considered canonical discriminant function is determined by the following independent variables: K_{21} (0,406), K_{15} (0,349), K_{20} (0,343), K_8 (0,304), K_9 (0,297), K_7 (-0,225), K_{23} (-0,176) and K_{28} (-0,109).

The nominal values of the coefficients of the structural matrix allow to distinguish directly the various groupings of independent variables in relation to the certain canonical discriminant functions for the realization of analysis:

- to reveal a set of independent variables in the basis of the certain canonical discriminant function, which allow to determine the share of dispersion of the dependent variable under the influence of a limited set of independent variables;
- to reveal the most important canonical discriminant functions with taking into account directly the revealed groupings of independent variables.

The direct belonging of the certain variable to the given canonical discriminant function is indicated by the means of use of the marker of type “*”, at the same time the sets of independent variables in relation to the canonical discriminant function do not intersect, that allows to provide the optimality of classification.

The nominal value of the coefficient or standardized coefficient in the basis of the normal or standardized canonical discriminant function allows to estimate the dispersion of normal or standardized dependent variable.

The significant value has the relative position of the elements of classes and the centroids of classes in the space of the given axes of canonical discriminant functions, and also the position of the centroids of classes in the axes of coordinate of the independent variables.

Further it is proposed to consider directly the relative position of the centroids of various classes in the space of the canonical discriminant functions.

In tabl. A15.120 the standardized coefficients of discriminant function for the reduced set of independent variables and dependent variables Y_2 and Y_4 are proposed.

Table A15.120

The coefficients of the canonical discriminant function at the reduced set of independent variables

The reduced set of independent variables K_i and dependent variable Y_2

The coefficients of discriminant function

The indicator	The function		
	1	2	3
Age	-0,018	0,094	-0,086
K_7	0,075	-0,090	-0,066
K_8	0,158	0,332	-0,260
K_9	-0,169	-0,214	0,311
K_{14}	0,197	-0,093	0,064
K_{15}	-0,096	-0,019	0,174
K_{16}	0,001	0,211	-0,043
K_{17}	-0,033	0,100	0,042
K_{18}	0,100	-0,107	-0,131
K_{19}	0,053	0,024	0,081
K_{20}	0,070	0,022	0,000
K_{21}	0,065	-0,198	0,136
K_{22}	-0,002	-0,009	-0,123
K_{23}	-0,098	-0,009	0,169
K_{24}	0,049	0,054	-0,092
K_{25}	-0,030	0,002	0,002
K_{27}	0,224	0,294	0,492
K_{28}	-0,177	-0,097	-0,191
K_{29}	0,049	-0,073	-0,056
K_{45}	0,147	0,160	0,066
(Constant)	-6,053	-0,637	-0,879

The nonnormalized coefficients

The reduced set of independent variables K_i and dependent variable Y_4

The coefficients of discriminant function

The indicator	The function		
	1	2	3
Age	0,266	0,089	0,068
K_7	-0,088	0,039	-0,085
K_8	0,065	-0,268	0,219
K_9	-0,009	0,295	-0,092
K_{14}	-0,057	0,043	-0,070
K_{15}	0,106	0,025	0,174
K_{16}	0,086	-0,211	-0,040
K_{17}	-0,007	0,034	-0,106
K_{18}	-0,129	0,127	0,003
K_{19}	0,046	-0,028	0,004
K_{20}	-0,037	-0,050	0,079
K_{21}	-0,160	-0,033	0,155
K_{22}	0,060	-0,050	-0,031
K_{23}	0,103	-0,030	-0,108
K_{24}	0,012	0,150	0,073
K_{25}	-0,023	0,012	-0,003
K_{27}	-0,245	-0,089	-0,386
K_{28}	0,205	0,124	-0,217
K_{29}	-0,019	-0,121	0,063
K_{45}	-0,182	0,059	0,378
(Constant)	-2,045	-1,595	-4,611

The nonnormalized coefficients

The presented coefficients (the non-standardized coefficients) of the canonical discriminant functions directly allow to write the two systems from the three standardized canonical discriminant equations for the reduced set of independent variables and dependent variables Y_2 and Y_4, which are equivalent to the early considered linear equations of multiple regression. The direct bring into correlation of the certain element to one from the entered classes is made on the basis of use of the principle of the largest correspondence by the nominal values of a set of independent variables and dependent variable. At the same time the nominal values of non-standardized variables are not subjected to the linear standardization or normalization by means of the rule Z-transformation.

The system of the canonical discriminant functions allows to realize quickly the classification of all elements of the initial set of independent variables.

2. T h e c o m p l e t e s e t o f i n d e p e n d e n t v a r i a b l e s K_i .

In tabl. A15.121 the coefficients of the canonical discriminant functions for the complete set of independent variables and the dependent variables Y_2 and Y_4 are proposed.

Table A15.121

The coefficients of the canonical discriminant function of classification at the complete set of independent variables

The complete set of independent variables K_i and dependent variable Y_2

The coefficients of classifying function

The indicator	Y2			
	2,00	3,00	4,00	5,00
Age	4,912	4,631	4,692	4,673
RU	-2,289	-2,924	-4,724	-4,497
LIT	2,712	2,440	3,344	3,423
LG	4,841	3,912	4,968	5,001
HIS	4,662	7,891	7,829	8,214
GEO	5,437	4,525	4,098	3,967
BIO	3,568	2,642	2,728	2,784
ALG	5,310	6,904	6,914	7,020
GEOM	-6,528	-4,264	-4,280	-4,520
FIZ	-1,705	-3,680	-3,654	-3,660
CHE	-3,030	-4,678	-3,946	-4,325
SCH	9,787	9,798	10,777	10,746
AST	13,310	14,472	14,367	14,261
K_7	2,956	3,158	3,085	3,184
K_8	1,033	0,151	0,506	,520
K_9	-0,159	,488	0,238	,148
K_{14}	3,405	3,816	3,903	4,058
K_{15}	2,957	3,146	3,185	3,099
K_{16}	-,882	-1,478	-1,371	-1,439
K_{17}	,080	-0,180	-0,070	-,154
K_{18}	-1,245	-1,111	-1,167	-1,035
K_{19}	,915	0,843	0,915	,919
K_{20}	,930	0,829	0,893	,912
K_{21}	,466	1,036	0,948	1,015
K_{22}	,058	-0,063	-0,056	-,037
K_{23}	,380	0,485	0,549	,441
K_{24}	-1,306	-1,621	-1,582	-1,545
K_{25}	,185	0,253	0,229	,207
K_{27}	1,839	1,567	2,076	1,980
K_{28}	1,723	1,954	1,558	1,542
K_{29}	-1,043	-1,039	-1,067	-,985
K_{45}	4,593	4,441	4,649	4,661
L_{31N}	4,298	5,483	5,231	5,510
L_{36N}	2,379	2,263	2,269	2,228
L_{37}	,950	0,893	0,988	1,044
L_{38N}	,784	0,758	0,707	,717
(Constant)	-235,316	-236,706	-248,443	-252,450

The linear discriminant functions of Fisher

The complete set of independent variables K_i and dependent variable Y_4

The coefficients of classifying function

The indicator	Y4			
	2,00	3,00	4,00	5,00
Age	5,007	4,864	4,517	4,470
RU	-2,352	-2,314	-2,804	-2,795
LIT	4,115	2,886	3,157	3,279
LG	1,323	2,854	3,020	2,545
HIS	8,265	6,549	6,584	6,456
GEO	6,676	5,264	5,459	5,269
BIO	1,317	2,725	2,320	2,325
ALG	7,979	6,893	7,660	8,177
GEOM	-6,010	-5,373	-6,134	-6,138
FIZ	-2,866	-3,017	-2,353	-2,249
CHE	-5,320	-3,621	-4,386	-3,529
SCH	9,556	9,153	9,432	9,360
AST	12,816	13,700	14,566	14,911
K_7	2,942	2,911	3,059	2,997
K_8	0,221	0,398	0,115	0,314
K_9	0,793	0,436	0,604	0,447
K_{14}	3,653	3,431	3,632	3,547
K_{15}	3,380	3,232	3,066	3,103
K_{16}	-1,532	-1,173	-1,399	-1,352
K_{17}	-0,103	-0,060	-0,026	-0,052
K_{18}	-1,220	-1,396	-1,166	-1,199
K_{19}	0,874	0,867	0,793	0,778
K_{20}	0,846	0,860	0,839	0,881
K_{21}	0,862	0,839	0,977	1,071
K_{22}	-0,204	-0,003	-0,148	-0,113
K_{23}	0,472	0,580	0,427	0,350
K_{24}	-1,238	-1,480	-1,519	-1,526
K_{25}	0,252	0,217	0,283	0,275
K_{27}	0,545	1,016	1,526	1,518
K_{28}	2,099	2,015	1,900	1,682
K_{29}	-1,148	-0,997	-1,100	-1,038
K_{45}	5,088	4,513	4,778	5,021
L_{31N}	5,946	4,802	5,463	5,240
L_{36N}	2,706	2,498	2,389	2,448
L_{37}	0,773	0,820	0,831	0,866
L_{38N}	0,887	0,807	0,796	0,839
(Constant)	-248,218	-236,297	-236,490	-241,810

The linear discriminant functions of Fisher

In tabl. A15.122 and A15.123 the standardized coefficients of discriminant functions for the reduced set of independent and dependent variables Y_2 and Y_4 are proposed.

Table A15.122

The standardized coefficients of the canonical discriminant functions at the complete set of independent variables

The complete set of independent variables K_i and dependent variable Y_2				The complete set of independent variables K_i and dependent variable Y_4			
The normalized coefficients of the canonical discriminant function				The normalized coefficients of the canonical discriminant function			
The ind.	The function			The ind.	The function		
	1	2	3		1	2	3
Age	-0,033	0,236	0,051	Age	-0,569	0,039	0,227
RU	-0,615	-0,149	0,578	RU	-0,173	-0,056	0,074
LIT	0,342	0,154	-0,078	LIT	0,089	0,254	0,279
LG	0,311	0,280	-0,049	LG	-0,023	-0,168	-0,590
HIS	0,328	-0,517	-0,128	HIS	-0,089	0,350	0,243
GEO	-0,264	0,111	0,105	GEO	-0,046	0,348	0,146
BIO	-0,024	0,144	0,136	BIO	-0,081	-0,302	-0,198
ALG	0,182	-0,294	-0,149	ALG	0,407	0,155	0,377
GEOM	0,104	-0,372	-0,506	GEOM	-0,273	-0,217	-0,009
FIZ	-0,161	0,343	0,264	FIZ	0,273	0,065	-0,021
CHE	-0,005	0,445	-0,199	CHE	0,062	-0,702	0,246
SCH	0,287	0,105	-0,173	SCH	0,054	0,110	-0,001
AST	0,017	-0,154	-0,169	AST	0,365	-0,155	-0,105
K_7	0,101	-0,228	0,233	K_7	0,137	0,155	-0,206
K_8	0,321	1,015	0,332	K_8	-0,185	-0,638	0,613
K_9	-0,385	-0,720	-0,590	K_9	-0,013	0,755	-0,214
K_{14}	0,415	-0,270	0,136	K_{14}	0,135	0,316	-0,116
K_{15}	-0,001	-0,050	-0,308	K_{15}	-0,182	0,015	0,250
K_{16}	-0,195	0,688	0,064	K_{16}	-0,309	-0,629	-0,066
K_{17}	-0,047	0,289	-0,193	K_{17}	0,027	0,007	-0,118
K_{18}	0,224	-0,281	0,525	K_{18}	0,406	0,406	-0,111
K_{19}	0,128	0,122	-0,006	K_{19}	-0,195	-0,010	0,035
K_{20}	0,118	0,124	0,083	K_{20}	0,033	-0,091	0,124
K_{21}	0,148	-0,441	-0,046	K_{21}	0,303	-0,033	0,123
K_{22}	-0,005	0,101	0,153	K_{22}	-0,186	-0,357	0,008
K_{23}	-0,019	0,015	-0,318	K_{23}	-0,234	-0,047	-0,117
K_{24}	0,005	0,276	0,319	K_{24}	-0,139	0,251	0,268
K_{25}	-0,141	-0,151	-0,269	K_{25}	0,265	0,206	-0,102
K_{27}	0,185	0,178	-0,185	K_{27}	0,300	-0,068	-0,264
K_{28}	-0,277	-0,185	0,068	K_{28}	-0,246	0,145	-0,171
K_{29}	0,091	-0,071	0,306	K_{29}	-0,058	-0,282	0,091
K_{45}	0,121	0,090	-0,017	K_{45}	0,268	0,135	0,361
L_{31N}	0,077	-0,197	0,064	L_{31N}	0,093	0,269	0,005
L_{36N}	-0,062	0,072	-0,042	L_{36N}	-0,087	0,046	0,257
L_{37}	0,332	0,095	0,203	L_{37}	0,116	-0,128	0,052
L_{38N}	-0,108	-0,022	0,130	L_{38N}	0,040	0,023	0,261

Table A15.123

The coefficients of structural matrix at the complete set of independent variables

The complete set of independent variables K_i and dependent variable Y_2

The structural matrix

The ind.	The function 1	2	3
HIS	0,470(*)	,043	-0,134
K_{18}	0,467(*)	,030	0,376
LG	0,460(*)	,265	-0,045
K_{14}	0,449(*)	-,001	0,248
GEOM	0,438(*)	-,029	-0,256
ALG	0,404(*)	-,115	-0,089
K_{19}	0,396(*)	,112	0,124
CHE	0,351(*)	,203	-0,101
LIT	0,341(*)	,131	-0,003
K_{20}	0,318(*)	,095	0,137
K_{45}	0,314(*)	,197	0,081
FIZ	0,311(*)	,094	0,000
SCH	0,305(*)	,060	-0,125
K_{21}	0,288(*)	-,188	0,062
BIO	0,288(*)	,147	0,052
L_{37}	0,282(*)	,052	0,150
K_{27}	0,273(*)	,132	0,000
Age	-0,257(*)	,050	0,002
K_{17}	0,238(*)	,085	0,029
L_{36N}	-0,150(*)	-,018	-0,005
K_{15}	0,133(*)	0,066	-0,120
L_{38N}	-0,112(*)	-0,098	0,091
K_{16}	0,312	0,461(*)	0,137
K_8	0,000	0,246(*)	-0,145
GEO	0,133	0,221(*)	0,005
K_{24}	0,102	0,119(*)	0,063
K_{25}	0,101	0,115(*)	0,067
K_{22}	0,210	0,086	0,277(*)
K_7	0,097	-0,074	0,235(*)
RU	0,165	0,083	0,219(*)
AST	0,160	0,013	-0,211(*)
K_9	-0,025	0,139	-0,204(*)
K_{29}	0,082	-0,084	0,192(*)
K_{23}	0,066	0,099	-0,180(*)
K_{28}	0,005	-0,076	0,170(*)
L_{31N}	0,013	-0,069	0,103(*)

The united intra-group correlations between the discriminant variables and normalized canonical discriminant functions. The variables are ordered by the absolute value of correlations inside the function.
* The maximal by the absolute value correlation between the variables and discriminant functions.

The complete set of independent variables K_i and dependent variable Y_4

The structural matrix

The ind.	The function 1	2	3
Age	-0,567(*)	0,098	0,152
ALG	0,445(*)	-0,197	0,418
K_{18}	0,415(*)	0,087	-0,027
FIZ	0,367(*)	-0,145	0,300
K_{45}	0,352(*)	0,027	0,156
K_{21}	0,298(*)	-0,034	0,217
AST	0,283(*)	-0,169	-0,012
LG	0,273(*)	-0,195	-0,032
K_{20}	0,253(*)	-0,131	0,129
K_{17}	0,248(*)	0,025	-0,099
K_{19}	0,239(*)	0,009	-0,004
K_{27}	0,232(*)	-0,003	-0,196
K_{14}	0,229(*)	0,007	-0,124
K_{29}	0,117(*)	0,048	-0,043
K_{16}	0,123	-0,385(*)	0,007
CHE	0,272	-0,382(*)	0,330
K_{24}	0,112	0,311(*)	0,029
K_{25}	0,150	0,263(*)	0,012
BIO	0,201	-0,219(*)	0,146
K_{22}	0,081	-0,158(*)	-0,021
GEOM	0,328	-0,255	0,369(*)
LIT	0,228	-0,064	0,359(*)
RU	0,238	-0,144	0,356(*)
GEO	0,185	0,070	0,300(*)
K_8	-0,078	0,007	0,297(*)
K_9	-0,066	0,105	0,270(*)
HIS	0,191	-0,025	0,257(*)
K_{15}	0,036	-0,084	0,229(*)
SCH	0,153	-0,035	0,212(*)
L_{37}	0,149	-0,157	0,188(*)
L_{36N}	-0,081	0,030	0,148(*)
K_{23}	0,032	0,118	-0,146(*)
K_7	0,130	0,084	-0,145(*)
L_{38N}	-0,030	0,047	0,133(*)
K_{28}	0,003	0,091	-0,112(*)
L_{31N}	-0,018	-0,017	0,031(*)

The united intra-group correlations between the discriminant variables and normalized canonical discriminant functions. The variables are ordered by the absolute value of correlations inside the function.
* The maximal by the absolute value correlation between the variables and discriminant functions.

The nominal values of the coefficients of the structural matrix allow to estimate the degree of contribution of a set of independent variables into the dispersion of dependent variable Y_2:

- the dispersion of the first canonical discriminant function are determined the following independent variables: LG (0,516), K_{18} (0,489), HIS (0,464), K_{45} (0,451), K_{16} (0,444), K_{14} (0,428), LIT (0,412), GEOM (0,398), K_{19} (0,391), Age (-0,381), K_{20} (0,378), CHE (0,347), K_{27} (0,344), ALG (0,336), FIZ (0,334), BIO (0,308), L_{37} (0,303), K_{17} (0,298), GEO (0,254), RU (0,217), SCH (0,204), K_{21} (0,184), L_{36N} (-0,168), K_{25} (0,166) and AST (0,136);
- the dispersion of the second considered canonical discriminant function are determined the following independent variables: K_{15} (0,262), K_{24} (0,250), K_{29} (0,236), K_{22} (0,236), L_{31N} (0,231), L_{38N} (0,188) and K_{28} (0,129);
- the dispersion of the third canonical discriminant function are determined the following independent variables: K_8 (-0,295), K_9 (-0,290), K_{23} (-0,219) and K_7 (0,218).

Obviously, that the sets of independent variables does not intersect between each other.

The nominal values of coefficients of the structural matrix allows to estimate the degree of contribution of a set of independent variables into the dispersion of dependent variable Y_4:

- the dispersion of the first canonical discriminant function are determined the following independent variables: Age (-0,581), FIZ (0,423), K_{18} (0,412), K_{45} (0,341), AST (0,285), K_{21} (0,283), K_{20} (0,278), LG (0,275), K_{17} (0,258), K_{14} (0,237), BIO (0,234), K_{19} (0,224), K_{27} (0,221), SCH (0,162), K_{22} (0,113) and K_{29} (0,103);
- the dispersion of the second canonical discriminant function are determined the following variables: K_{16} (-0,313), K_{24} (0,291), GEO (0,254), K_{25} (0,233) and K_9 (0,185);
- the dispersion of the third canonical discriminant function are determined the following independent variables: ALG (0,470), GEOM (0,451), CHE (0,383), RU (0,329), LIT (0,318), HIS (0,287), K_{15} (0,242), L_{37} (0,238), K_7 (-0,178), L_{38N} (0,170), K_8 (0,164), K_{23} (-0,133), L_{36N} (0,130), K_{28} (-0,077) and L_{31N} (-0,064).

Obviously, that the sets of independent variables does not intersect between each other.

The nominal values of coefficients of the canonical discriminant functions directly allows to write the system from the three canonical discriminant equations, which is equivalent to the linear equation of multiple regression.

The system of canonical discriminant equations allows to realize:

- directly the analysis of the various groupings of independent variables K_i, which provide the occurrence of the dispersion of dependent variable;
- directly to estimate the degree of influence of the variation of each from the formed set of independent variables on the dispersion of dependent variable.

In tabl. A15.124 the standardized coefficients of discriminant function for the reduced set of independent variables and dependent variables Y_2 and Y_4 are proposed.

Table A15.124

The non-standardized coefficients of the canonical discriminant functions at the complete set of independent variables

The complete set of independent variables K_i and dependent variable Y_2

The coefficients of the canonical discriminant function

The ind.	The function		
	1	2	3
Age	-0,013	0,090	0,019
RU	-0,978	-0,238	0,920
LIT	0,521	0,235	-0,120
LG	0,496	0,447	-0,078
HIS	0,596	-0,938	-0,232
GEO	-0,433	0,181	0,172
BIO	-0,041	0,248	0,234
ALG	0,271	-0,438	-0,222
GEOM	0,153	-0,547	-0,745
FIZ	-0,246	0,524	0,404
CHE	-0,008	0,656	-0,293
SCH	0,539	0,198	-0,326
AST	0,033	-0,304	-0,334
K_7	0,039	-0,088	0,090
K_8	0,095	0,299	0,098
K_9	-0,108	-0,201	-0,165
K_{14}	0,188	-0,122	0,062
K_{15}	-0,001	-0,024	-0,148
K_{16}	-0,054	0,192	0,018
K_{17}	-0,018	0,107	-0,071
K_{18}	0,058	-0,073	0,137
K_{19}	0,034	0,032	-0,002
K_{20}	0,034	0,036	0,024
K_{21}	0,061	-0,181	-0,019
K_{22}	-0,001	0,029	0,045
K_{23}	-0,010	0,008	-0,163
K_{24}	0,001	0,083	0,096
K_{25}	-0,017	-0,018	-0,032
K_{27}	0,200	0,192	-0,200
K_{28}	-0,203	-0,136	0,050
K_{29}	0,030	-0,023	0,100
K_{45}	0,105	0,079	-0,015
L_{31N}	0,164	-0,418	0,137
L_{36N}	-0,034	0,040	-0,023
L_{37}	0,077	0,022	0,047
L_{38N}	-0,027	-0,006	0,032
(Constant)	-9,950	-0,491	0,261

The non-normalized coefficients

The complete set of independent variables K_i and dependent variable Y_4

The coefficients of the canonical discriminant function

The ind.	The function		
	1	2	3
Age	-0,235	0,016	0,094
RU	-0,279	-0,090	0,119
LIT	0,136	0,387	0,425
LG	-0,036	-0,264	-0,926
HIS	-0,157	0,622	0,432
GEO	-0,075	0,574	0,241
BIO	-0,139	-0,522	-0,342
ALG	0,631	0,239	0,584
GEOM	-0,403	-0,320	-0,013
FIZ	0,429	0,102	-0,033
CHE	0,092	-1,049	0,367
SCH	0,100	0,205	-0,002
AST	0,735	-0,312	-0,212
K_7	0,053	0,060	-0,080
K_8	-0,055	-0,188	0,181
K_9	-0,004	0,211	-0,060
K_{14}	0,060	0,140	-0,051
K_{15}	-0,088	0,007	0,120
K_{16}	-0,084	-0,172	-0,018
K_{17}	0,010	0,003	-0,044
K_{18}	0,106	0,106	-0,029
K_{19}	-0,051	-0,003	0,009
K_{20}	0,009	-0,026	0,036
K_{21}	0,126	-0,014	0,051
K_{22}	-0,054	-0,103	0,002
K_{23}	-0,120	-0,024	-0,060
K_{24}	-0,042	0,076	0,081
K_{25}	0,032	0,025	-0,012
K_{27}	0,325	-0,074	-0,286
K_{28}	-0,180	0,107	-0,125
K_{29}	-0,019	-0,092	0,030
K_{45}	0,236	0,119	0,319
L_{31N}	0,198	0,571	0,010
L_{36N}	-0,048	0,025	0,143
L_{37}	0,027	-0,030	0,012
L_{38N}	0,010	0,006	0,064
(Constant)	-2,371	-0,996	-7,406

The non-normalized coefficients

A15.7.7. The features of arrangement of the centroids of classes in the space of the canonical discriminant functions

The location of the centroids of classes in the space of the canonical discriminant functions acts as the geometric place of points with the given coordinates (see tabl. A15.125).

The research of location of the centroids of classes excellent-students, good-students, good-students, mediocre-students and poor-students in the space of the canonical discriminant functions is considered.

1. The reduced set of independent variables K_i.

Table A15.125

The coordinates of the centroids of classes in the space of the canonical discriminant functions at the reduced set of independent variables

The reduced set of independent variables K_i and dependent variable Y_2

The functions in the centroids of groups

Y_2	The function		
	1	2	3
2,00	-0,636	1,506	-0,865
3,00	-0,834	-0,588	-0,130
4,00	-0,139	0,226	0,186
5,00	0,416	-0,136	-0,093

The non-normalized canonical discriminant functions are calculated in the centroids of groups.

The reduced set of independent variables K_i and dependent variable Y_4

The functions in the centroids of groups

Y_4	The function		
	1	2	3
2,00	0,892	1,233	0,640
3,00	1,006	-0,177	-0,035
4,00	-0,275	0,257	-0,290
5,00	-0,476	-0,130	0,136

The non-normalized canonical discriminant functions are calculated in the centroids of groups.

2. The complete set of independent variables K_i.

Table A15.126

The coordinates of the centroids of classes in the space of the canonical discriminant functions at the complete set of independent variables

The complete set of independent variables K_i and dependent variable Y_2

The functions in the centroids of groups

Y_2	The function		
	1	2	3
2,00	-1,786	2,122	0,879
3,00	-1,201	-0,746	0,069
4,00	0,013	0,196	-0,353
5,00	0,441	-0,097	0,273

The non-normalized canonical discriminant functions are calculated in the centroids of groups.

The complete set of independent variables K_i and dependent variable Y_4

The functions in the centroids of groups

Y_4	The function		
	1	2	3
2,00	-1,193	1,689	1,059
3,00	-1,152	-0,308	-0,027
4,00	0,198	0,389	-0,458
5,00	0,622	-0,162	0,195

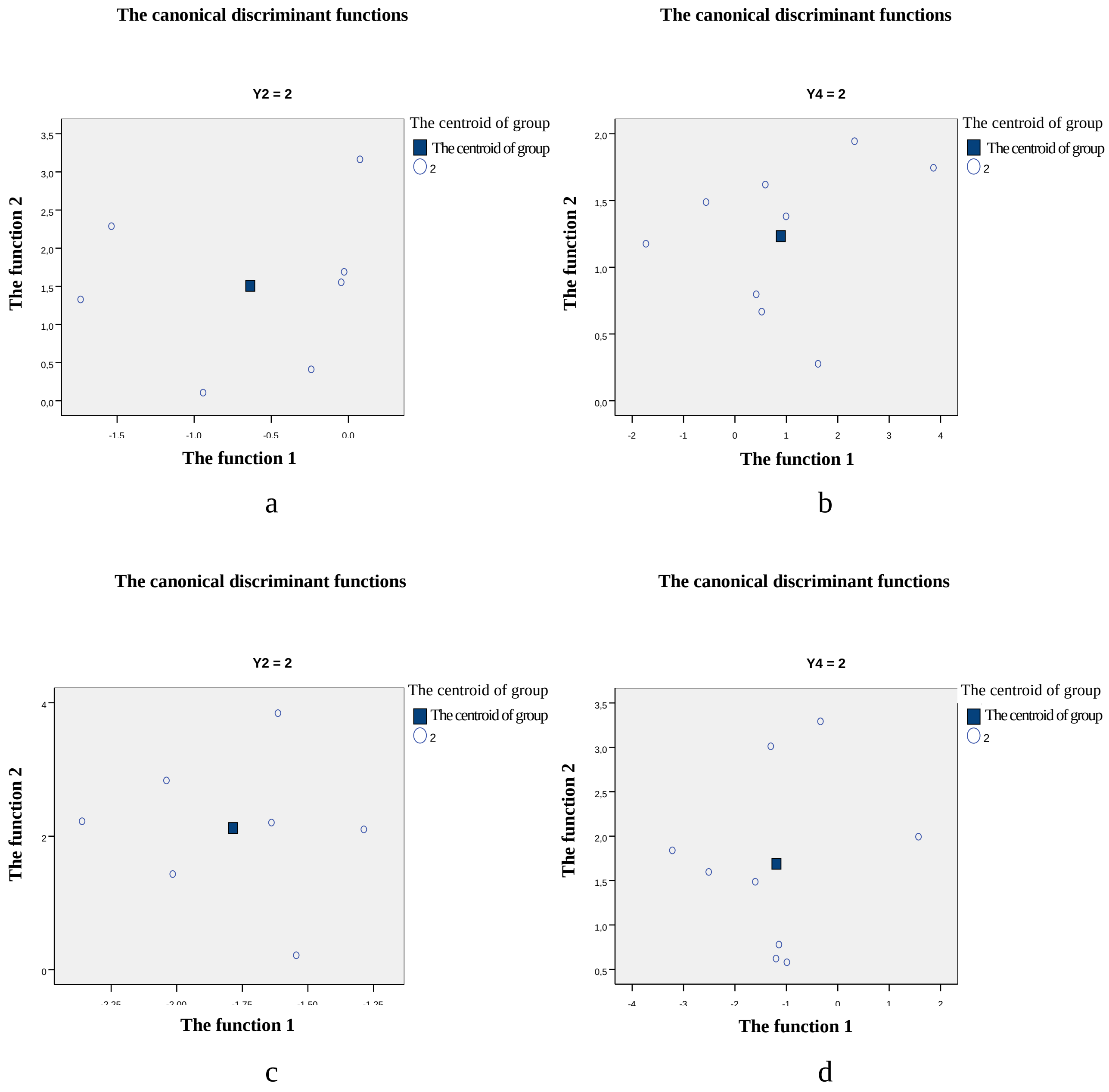
The non-normalized canonical discriminant functions are calculated in the centroids of groups.

In the tables the coordinates of the centroids of classes of the excellent-students, good-students, mediocre-students and poor-students in the space of the three canonical discriminant functions with taking into account the reduced and complete set of all independent variables K_i are presented.

A15.7.8. The features of geometric position of the centroids of classes in the space of the canonical discriminant functions

The geometric position of the centroids of classes is determined by a set of several various points in the space of the canonical discriminant functions.

In pic. A15.153 the position of the centroid of the second class in the space of discriminant functions at the reduced set of predictors K_i and factors Y_2 and Y_4.



Picture A15.153. The features of position of the centroid of the second class

a – at the reduced set of independent variables and the dependent variable Y_2

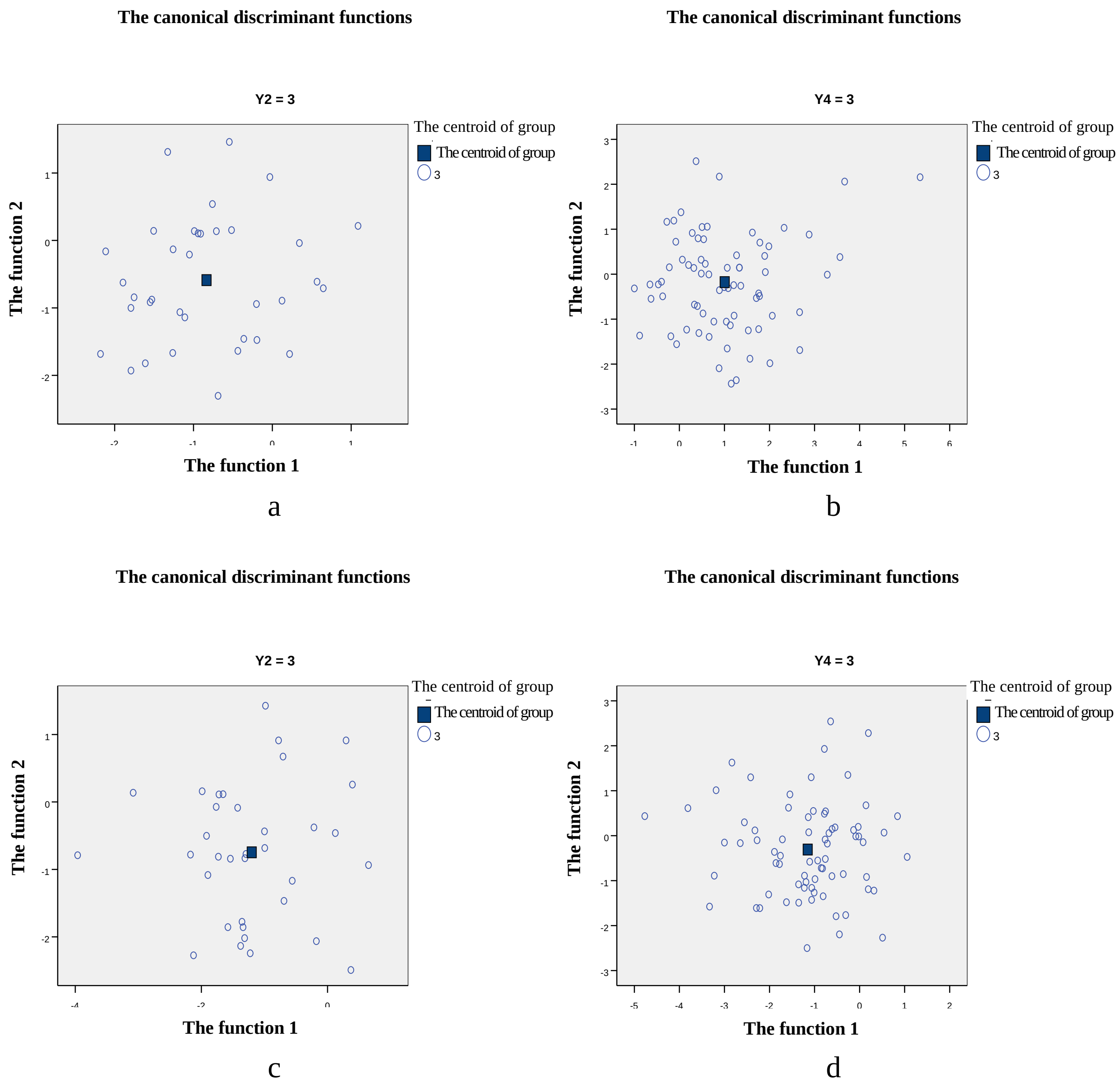
b – at the reduced set of independent variables and the dependent variable Y_4

c – at the complete set of independent variables and the dependent variable Y_2

d – at the complete set of independent variables and the dependent variable Y_4

At the reduced set and the complete set of independent variables with the using of reconfigurable exact scale based on the sum of scored points (Y_4) it was possible to improve significantly the accuracy of estimation of LRKT, that is confirmed directly by the appearance of some quantity of elements of the class of poor-students.

In pic. A15.154 the position of the centroid of the third class in the space of discriminant functions at the reduced set of predictors K_i and factors Y_2 and Y_4 is presented.



Picture A15.154. The features of position of the centroid of the third class

a – at the reduced set of independent variables and the dependent variable Y_2

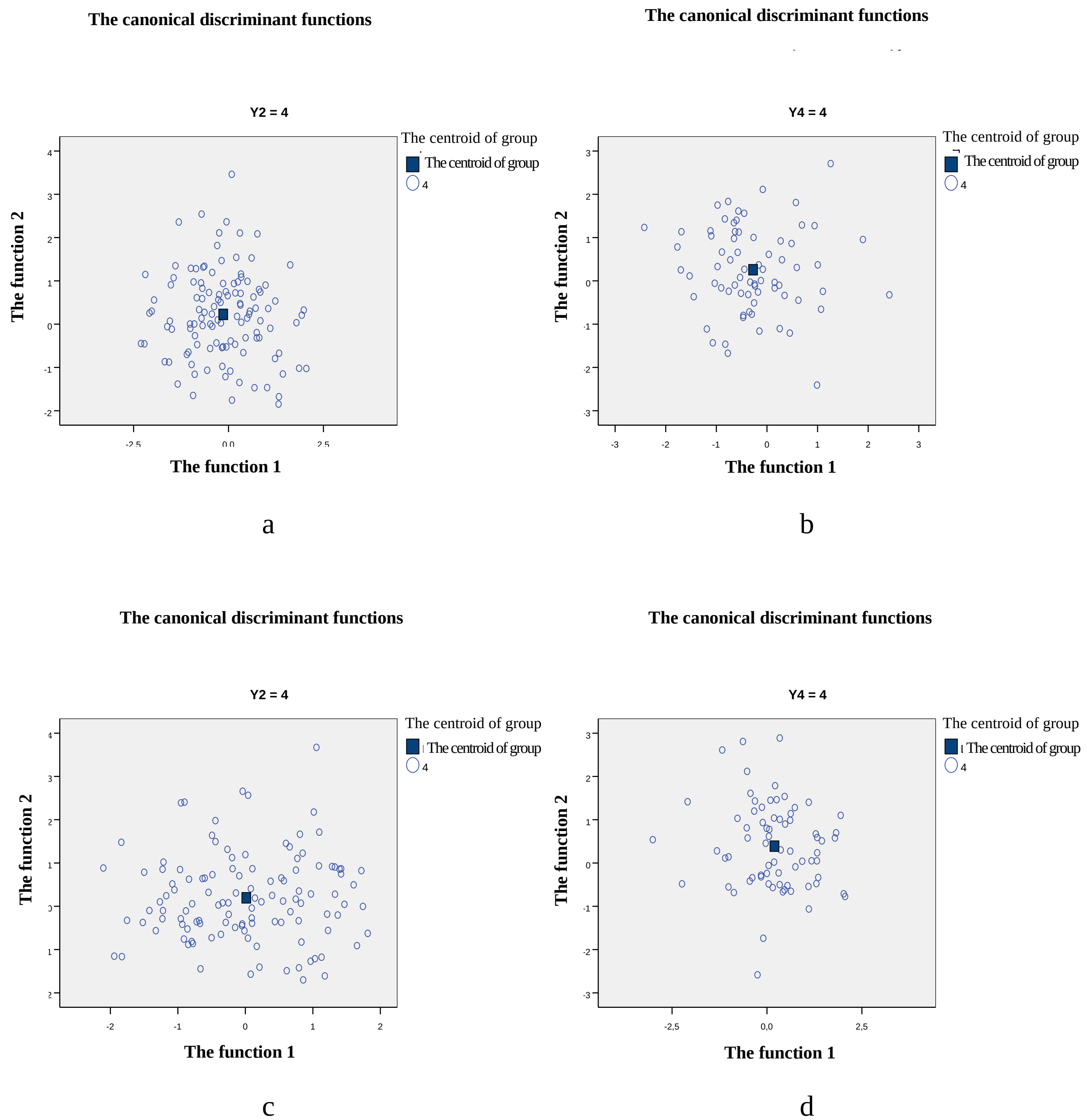
b – at the reduced set of independent variables and the dependent variable Y_4

c – at the complete set of independent variables and the dependent variable Y_2

d – at the complete set of independent variables and the dependent variable Y_4

Pic. A15.154, b and d indicate about the significant increasing in the density of distribution of the values in the vicinity of centroid of the third class in comparation with pic. A15.154, a and c.

In pic. A15.155 the position of the centroid of the fourth class in the space of discriminant functions at the reduced set of predictors K_i and factors Y_2 and Y_4 is presented.



Picture A15.155. The features of position of the centroid of the fourth class

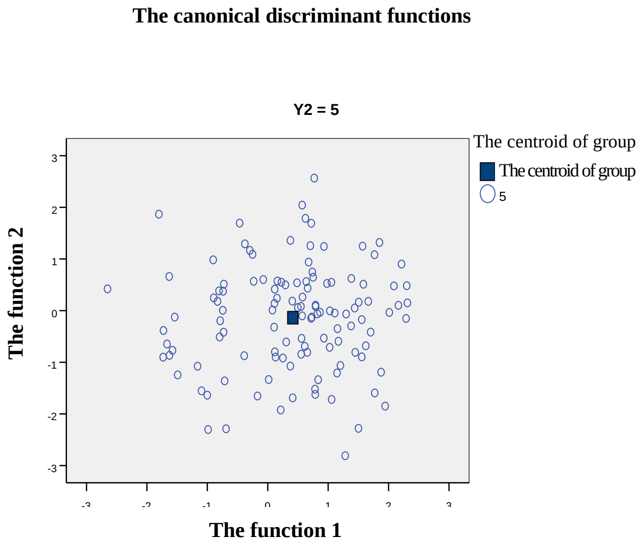
a – at the reduced set of independent variables and the dependent variable Y_2

b – at the reduced set of independent variables and the dependent variable Y_4

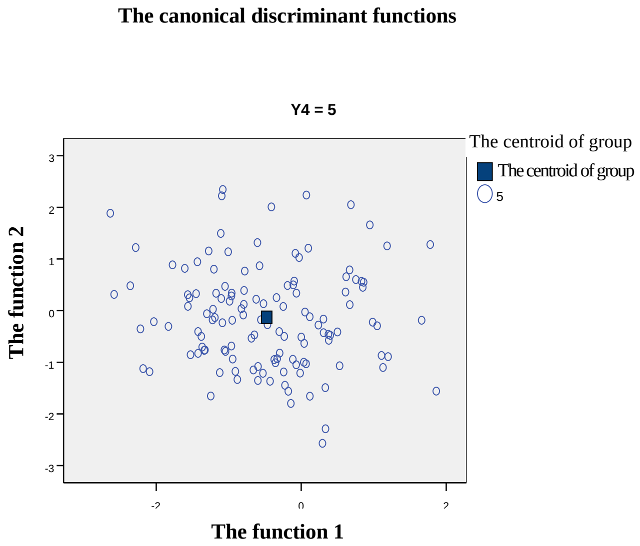
c – at the complete set of independent variables and the dependent variable Y_2

d – at the complete set of independent variables and the dependent variable Y_4

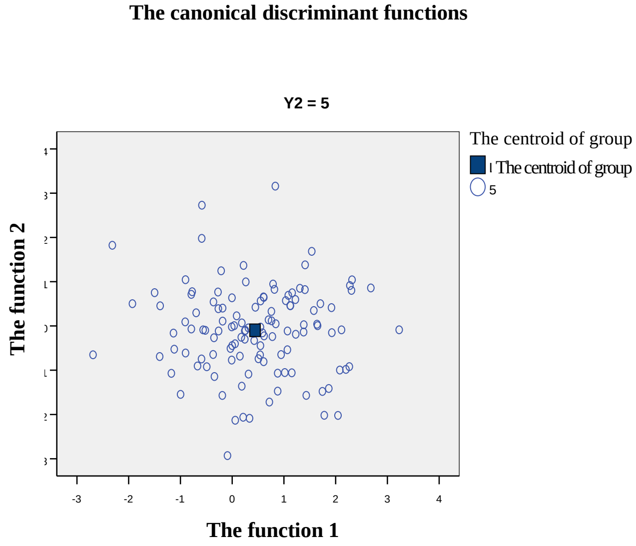
In pic. A15.156 the position of the centroid of the fifth class in the space of discriminant functions at the reduced set of predictors K_i and factors Y_2 and Y_4 is presented.



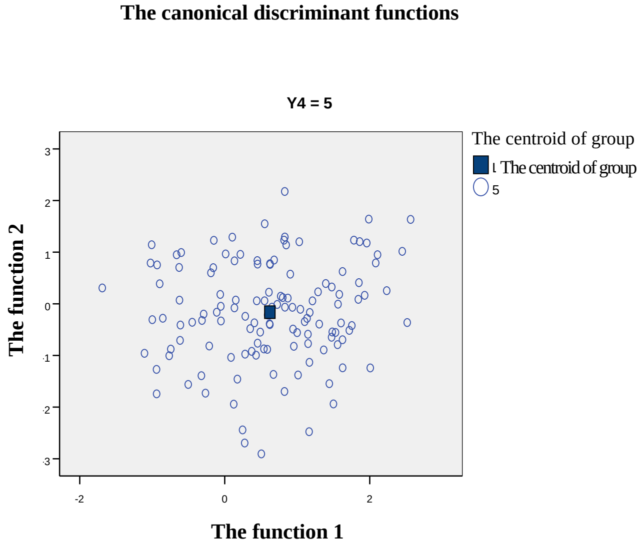
a



b



c



d

Picture A15.156. The features of position of the centroid of the fifth class

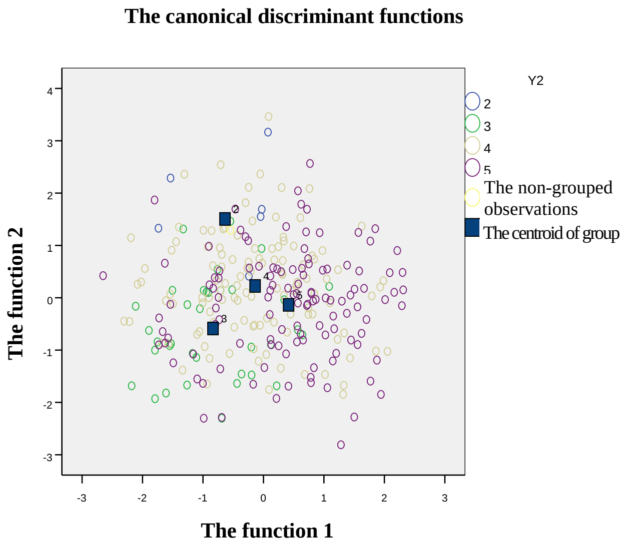
a – at the reduced set of independent variables and the dependent variable Y_2

b – at the reduced set of independent variables and the dependent variable Y_4

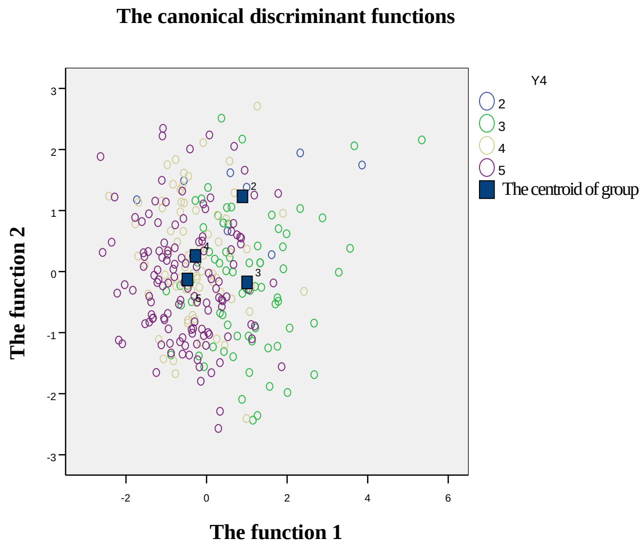
c – at the complete set of independent variables and the dependent variable Y_2

d – at the complete set of independent variables and the dependent variable Y_4

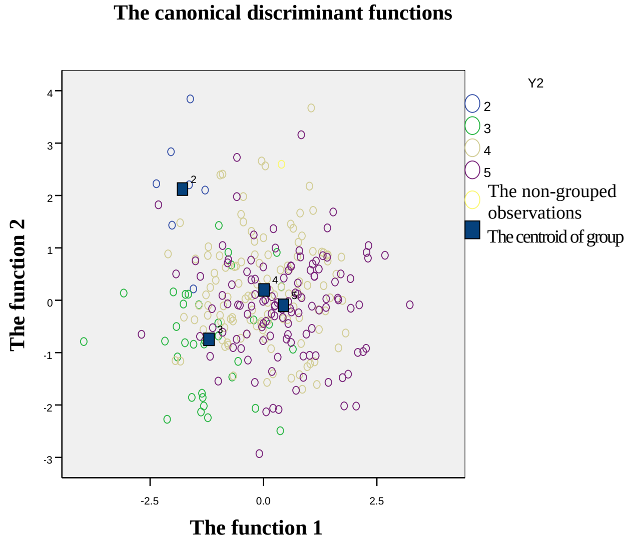
In pic. A15.157 the mutual position of the centroids of all classes in the space of discriminant functions at the reduced set of predictors K_i and factors Y_2 and Y_4.



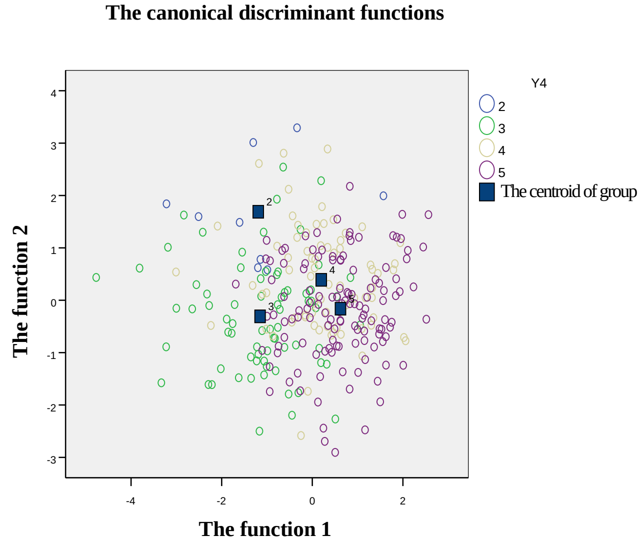
a



b



c



d

Picture A15.157. The features of mutual arrangement of the centroids of classes in the space of the canonical discriminant functions

a – at the reduced set of independent variables and the dependent variable Y_2

b – at the reduced set of independent variables and the dependent variable Y_4

c – at the complete set of independent variables and the dependent variable Y_2

d – at the complete set of independent variables and the dependent variable Y_4

At the analysis of pic. A15.157, a the four centroids of different classes are clearly visible, at the same time:

- relatively to the first function the centroids of the classes of poor-students, united the good-students and excellent-students and mediocre-students are clearly distinguished, but the centroids of the classes of good-students and excellent-students are relatively practically indistinguishable;
- relatively to the second function the centroids of the classes of poor-students are clearly distinguished, united the mediocre-students and excellent-students, good students, but the centroids of the classes of mediocre-students and excellent-students are relatively not practically indistinguishable.

At the analysis of pic. A15.157, b, the four centroids of various classes are clearly visible, at the same time:

- relatively to the first function the centroids of the united classes of poor-students with mediocre-students and good-students with excellent-students are clearly distinguished, but the centroids of the classes of poor-students with mediocre-students and good-students with excellent-students are indistinguishable;
- relatively to the second canonical discriminant function the centroids of the classes of poor-students with the united centroid of the classes of mediocre-students, good-students and excellent students are clearly distinguished, but the separate centroids of the classes of mediocre-students, good-students and excellent students are relatively practically not distinguished.

At the analysis of pic. A15.157, c the four centroids of various classes are clearly visible, at the same time:

- relatively to the first canonical discriminant function the centroid of the class of mediocre-students with the centroids of the united classes of poor-students, good-students and excellent-students are clearly distinguished, but the centroids of the separate classes of poor-students, good-students and excellent-students are relatively practically indistinguishable;
- relatively to the second canonical discriminant function the centroid of the centroid of class poor-students with the centroids of the united classes of mediocre-students, good-students and excellent-students are clearly distinguished, but the centroids of the separate classes of mediocre-students, good-students and excellent-students are relatively practically indistinguishable.

In the analysis of pic. A15.157, d, the four centroids of various classes are clearly visible, at the same time:

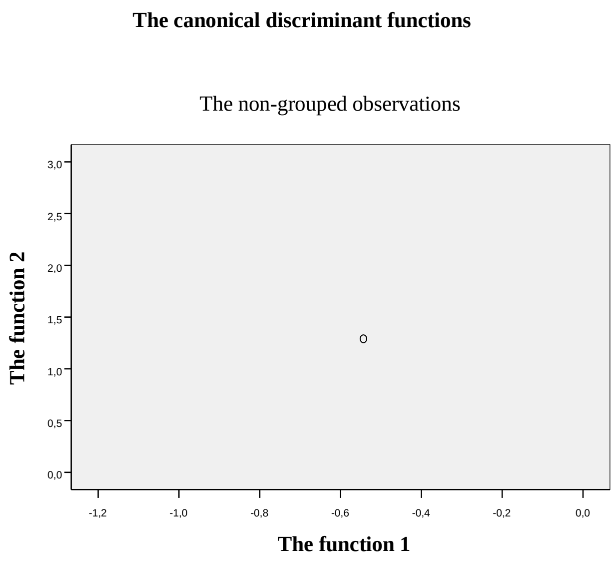
- relatively to the first function the centroids of the united classes of poor-students with mediocre-students and good-students with excellent-students are differed, but the centroids of the classes of poor-students with mediocre-students and good-students with excellent-students are indistinguishable;
- relatively to the second canonical discriminant function the centroids of the classes of poor-students with the united centroid of the classes of mediocre-students, good-students and excellent-students are clearly distinguished, but the separate centroids of the classes of mediocre-students, good-students and excellent-students are relatively not practically indistinguishable.

A15.7.9. The analysis of presence of the ambiguously classified values

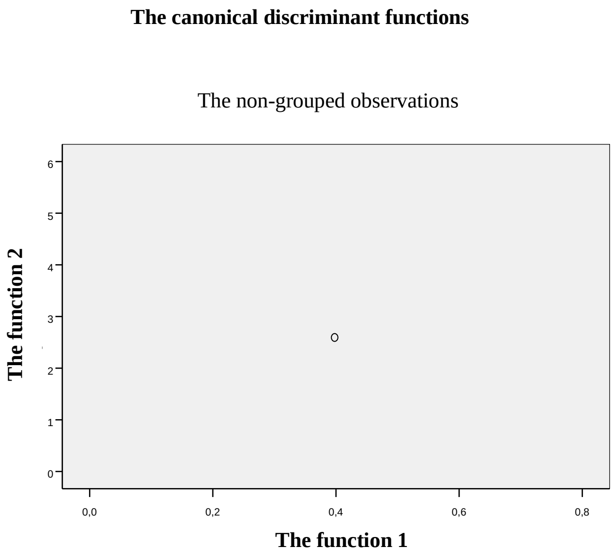
A set of nominal values of indicators and coefficients of the canonical discriminant function characterize the potential possibility to bring into correlation the object to one from the centroids of classes by the principle of greatest likelihood.

The certain combinations of the nominal values of indicators does not allow the mutually one-to-one correlation of the specified object to the certain centroid of class, therefore the object practically does not belong to any from the available centroids.

In pic. A15.158 in the space of the two canonical discriminant functions ambiguously identifiable object is represented, which is practically impossible to attribute to any one from the four presented centroids of classes.



a



b

Not detected

c

Not detected

d

Picture A15.158. The features of position of the ambiguously classified values

a – at the reduced set of independent variables and the dependent variable Y_2

b – at the reduced set of independent variables and the dependent variable Y_4

c – at the complete set of independent variables and the dependent variable Y_2

d – at the complete set of independent variables and the dependent variable Y_4

A15.7.10. The analysis of the level of quality of the classification of the canonical discriminant functions of the centroids of classes

The analysis of the quality of classification by the means of use of the canonical discriminant functions of the centroids of class is comes down to the calculation of theoretical prognostic nominal value and the practical experimental nominal value, and also to the calculation of difference between them as the elementary residue (tabl. A15.127).

1. The reduced set of independent variables K_i.

Table A15.127

The results of classification by means of the canonical discriminant functions

The reduced set of independent variables K_i and dependent variable Y_2

		Y2	The predicted affiliation to the group				
			2,00	3,00	4,00	5,00	
	The frequency	2,00	6	1	0	0	7
		3,00	2	23	5	5	35
		4,00	20	27	40	30	117
		5,00	13	24	16	67	120
		Nesgr.	0	0	1	0	1
	%	2,00	85,7	14,3	,0	,0	100,0
		3,00	5,7	65,7	14,3	14,3	100,0
		4,00	17,1	23,1	34,2	25,6	100,0
		5,00	10,8	20,0	13,3	55,8	100,0
		Nesgr.	,0	,0	100,0	,0	100,0
The cross-checked (a)	The frequency	2,00	0	2	4	1	7
		3,00	2	17	9	7	35
		4,00	22	29	28	38	117
		5,00	15	26	23	56	120
	%	2,00	,0	28,6	57,1	14,3	100,0
		3,00	5,7	48,6	25,7	20,0	100,0
		4,00	18,8	24,8	23,9	32,5	100,0
		5,00	12,5	21,7	19,2	46,7	100,0

a The cross-checking is performed only for the observations in the analysis. At the cross-checking each observation is classified by the functions, derived by the all observations, with the exception of itself.
b 48,7% of the initial grouped observations are classified correctly.
c 36,2% of the cross-checked grouped observations are classified correctly.

The reduced set of independent variables K_i and dependent variable Y_4

		Y4	The predicted affiliation to the group				
			2,00	3,00	4,00	5,00	
	The frequency	2,00	6	1	1	1	9
		3,00	14	43	6	9	72
		4,00	10	10	32	19	71
		5,00	12	20	33	63	128
	%	2,00	66,7	11,1	11,1	11,1	100,0
		3,00	19,4	59,7	8,3	12,5	100,0
		4,00	14,1	14,1	45,1	26,8	100,0
		5,00	9,4	15,6	25,8	49,2	100,0
The cross-checked (a)	The frequency	2,00	2	3	2	2	9
		3,00	18	33	10	11	72
		4,00	11	11	22	27	71
		5,00	14	21	37	56	128
	%	2,00	22,2	33,3	22,2	22,2	100,0
		3,00	25,0	45,8	13,9	15,3	100,0
		4,00	15,5	15,5	31,0	38,0	100,0
		5,00	10,9	16,4	28,9	43,8	100,0

a The cross-checking is performed only for the observations in the analysis. At the cross-checking each observation is classified by the functions, derived by the all observations, with the exception of itself.
b 51,7% of the initial grouped observations are classified correctly.
c 40,4% of the cross-checked grouped observations are classified correctly.

2. The complete set of independent variables K_i.

Table A15.128

The results of classification by means of the canonical discriminant functions

The complete set of independent variables K_i and dependent variable Y_2

		Y2	The predicted affiliation				
			2,00	3,00	4,00	5,00	
	The frequency	2,00	6	1	0	0	7
		3,00	0	27	5	3	35
		4,00	8	21	53	35	117
		5,00	5	17	29	69	120
		Nesgr.	0	0	1	0	1
	%	2,00	85,7	14,3	,0	,0	100,0
		3,00	,0	77,1	14,3	8,6	100,0
		4,00	6,8	17,9	45,3	29,9	100,0
		5,00	4,2	14,2	24,2	57,5	100,0
		Nesgr.	,0	,0	100,0	,0	100,0
The cross-checked (a)	The frequency	2,00	2	2	3	0	7
		3,00	5	15	9	6	35
		4,00	10	27	30	50	117
		5,00	8	21	34	57	120
	%	2,00	28,6	28,6	42,9	,0	100,0
		3,00	14,3	42,9	25,7	17,1	100,0
		4,00	8,5	23,1	25,6	42,7	100,0
		5,00	6,7	17,5	28,3	47,5	100,0

a The cross-checking is performed only for the observations in the analysis. At the cross-checking each observation is classified by the functions, derived by all observations, with the exception of himself.
b 55.6% of the original grouped observations are classified correctly.
c 37.3% cross-verifiable grouped observations are classified correctly.

The complete set of independent variables K_i and dependent variable Y_4

		Y4	The predicted affiliation				
			2,00	3,00	4,00	5,00	
	The frequency	2,00	7	1	1	0	9
		3,00	8	48	8	8	72
		4,00	7	8	34	22	71
		5,00	6	18	28	76	128
	%	2,00	77,8	11,1	11,1	,0	100,0
		3,00	11,1	66,7	11,1	11,1	100,0
		4,00	9,9	11,3	47,9	31,0	100,0
		5,00	4,7	14,1	21,9	59,4	100,0
The cross-checked (a)	The frequency	2,00	0	6	2	1	9
		3,00	13	32	15	12	72
		4,00	11	13	18	29	71
		5,00	8	22	34	64	128
	%	2,00	,0	66,7	22,2	11,1	100,0
		3,00	18,1	44,4	20,8	16,7	100,0
		4,00	15,5	18,3	25,4	40,8	100,0
		5,00	6,3	17,2	26,6	50,0	100,0

a Cross-checking is performed only for observations in the analysis. In cross-checking, each observation is classified by functions, derived from all observations, with the exception of himself.
b 58.9% of the original grouped observations are classified correctly.
c 40.7% cross-verifiable grouped observations are classified correctly.

A15.8. The cluster analysis

The cluster analysis allows to go to the reduced space of new irrelevant variables and reflects the features of a sequence of uniting of the independent variables, and also the optimal quantity of generalized classes.

The specific of application of the cluster analysis consists in a row of stages:

- the checking of the normality of distribution of the nominal values in the samples with data;
  - the analytical criteria – the critical values of the measure of asymmetricity and the measure of sharpness of a sequence of following of the numbers;
  - the graphical criteria – the quartile and percentile graphs, the graphs of accumulated frequencies allow to estimate visually the normal distribution;
- the planning of the mathematical processing of a posteriori data of the experiment;
- the selection of a set of independent variables for the subsequent uniting;
- the selection of the method of uniting of the integral set of independent variables in the course of application of the statistical method of cluster analysis;
  - the method of near linkage – the nominal value as the element corresponds to the certain neighboring class by the principle of smallest Descartes distance (a set of a posteriori data in the result is significantly compressed);
  - the method of average linkage – the nominal value as the element is correlated with the certain neighboring class by the principle of the average arithmetic Descartes distance (a set of a posteriori data in the result is not significantly expanded);
  - the method of long-distance (far) linkage - the nominal value as the element corresponds to the certain neighboring far class by the principle of maximal Descartes distance (a set of a posteriori data in the result is significantly expanded);
- the analysis of the degree of proximity of the two or more independent variables or clusters – the Descartes distance between the independent variables (classes);
- the verification of the quantity of the formed clusters of data, the sequences of uniting of the independent variables and the clusters of data, the logics and scientific justification of the formed set of the clusters of data for the realization of analysis;
- the scientific justification of the revealed statistical tendences, dependencies and regularities on the basis of a set of fundamental and applied sciences;
- the interpretation of revealed tendences and regularities in the certain applied sphere of use (science, technics, technology, production and sales).

A15.8.1. The analysis of the relationship between the variables

A lot of important value in the process of realization of the statistical cluster analysis has the degree of proximity between the presented independent variables.

The maximal proximity of independent variables causes the potential possibility of uniting into the unique cluster of data for the statistical analysis.

1. The reduced set of independent variables K_i.

The degree of proximity of the reduced set of variables K_i is presented in table A15.129.

Table A15.129

The table of the degree of proximity of the reduced set of variables

The observation	The input matrix file																		
	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
Age	,000	6093,000	16784,000	15394,000	7945,000	11299,000	22489,000	56036,000	33590,000	22677,000	7903,000	20060,000	20121,000	70625,869	46519,811	22922,737	78838,092	75975,139	55081,572	61256,000
K7	6093,000	,000	27549,000	25391,000	14842,000	20434,000	33832,000	76827,000	47731,000	33428,000	12100,000	33105,000	31628,000	95145,569	65520,751	24536,877	104906252	101641,039	76107,492	83873,000
K8	16784,000	27549,000	,000	456,000	6805,000	4329,000	6471,000	18740,000	10042,000	7229,000	12115,000	4332,000	6233,000	27363,369	14547,571	28823,917	31826,852	30078,499	18405,592	21564,000
K9	15394,000	25391,000	456,000	,000	6573,000	4447,000	7477,000	21140,000	11312,000	7919,000	11513,000	5092,000	6829,000	30308,009	16576,251	27749,637	35010,312	33223,899	20735,072	24128,000
K14	7945,000	14842,000	6805,000	6573,000	,000	2654,000	7198,000	28849,000	12991,000	7534,000	4898,000	6449,000	6722,000	40451,329	23099,331	20956,517	46799,172	44890,499	29573,092	33275,000
K15	11299,000	20434,000	4329,000	4447,000	2654,000	,000	4754,000	21339,000	9277,000	5470,000	6778,000	3659,000	4482,000	31636,349	17151,871	24738,577	36956,472	35251,399	22209,032	25015,000
K16	22489,000	33832,000	6471,000	7477,000	7198,000	4754,000	,000	14501,000	5121,000	5230,000	13806,000	4291,000	4638,000	22769,329	12695,871	33055,097	26785,112	25830,799	16517,952	17103,000
K17	56036,000	76827,000	18740,000	21140,000	28849,000	21339,000	14501,000	,000	7834,000	14641,000	40563,000	12168,000	14879,000	3932,629	5169,731	62685,317	4605,152	4456,339	4117,172	2364,000
K18	33590,000	47731,000	10042,000	11312,000	12991,000	9277,000	5121,000	7834,000	,000	5183,000	21435,000	5110,000	6495,000	14831,869	7876,851	39390,797	17593,772	16776,179	9945,832	10454,000
K19	22677,000	33428,000	7229,000	7919,000	7534,000	5470,000	5230,000	14641,000	5183,000	,000	12692,000	4527,000	5330,000	23459,809	11571,071	28125,797	27721,612	26327,899	16272,972	18069,000
K20	7903,000	12100,000	12115,000	11513,000	4898,000	6778,000	13806,000	40563,000	21435,000	12692,000	,000	12439,000	12244,000	53573,649	32970,771	21343,757	60568,052	58491,659	40761,152	45095,000
K21	20060,000	33105,000	4332,000	5092,000	6449,000	3659,000	4291,000	12168,000	5110,000	4527,000	12439,000	,000	3609,000	20322,809	10146,611	32114,537	24186,032	22892,779	13359,632	15136,000
K22	20121,000	31628,000	6233,000	6829,000	6722,000	4482,000	4638,000	14879,000	6495,000	5330,000	12244,000	3609,000	,000	23771,889	12529,551	31211,517	27943,112	26718,099	16175,032	18307,000
K23	70625,869	95145,569	27363,369	30308,009	40451,329	31636,349	22769,329	3932,629	14831,869	23459,809	53573,649	20322,809	23771,889	,000	5428,873	75593,084	1182,445	1434,789	4572,206	1488,769
K24	46519,811	65520,751	14547,571	16576,251	23099,331	17151,871	12695,871	5169,731	7876,851	11571,071	32970,771	10146,611	12529,551	5428,873	,000	43888,670	8082,257	7295,280	3904,884	4480,511
K25	22922,737	24536,877	28823,917	27749,637	20956,517	24738,577	33055,097	62685,317	39390,797	28125,797	21343,757	32114,537	31211,517	75593,084	43888,670	,000	85388,626	81806,493	57790,809	68984,817
K27	78838,092	104906252	31826,852	35010,312	46799,172	36956,472	26785,112	4605,152	17593,772	27721,612	60568,052	24186,032	27943,112	1182,445	8082,257	85388,626	,000	460,949	4703,818	1680,052
K28	75975,139	101641,039	30078,499	33223,899	44890,499	35251,399	25830,799	4456,339	16776,179	26327,899	58491,659	22892,779	26718,099	1434,789	7295,280	81806,493	460,949	,000	3603,383	1706,299
K29	55081,572	76107,492	18405,592	20735,072	29573,092	22209,032	16517,952	4117,172	9945,832	16272,972	40761,152	13359,632	16175,032	4572,206	3904,884	57790,809	4703,818	3603,383	,000	3034,032
K45	61256,000	83873,000	21564,000	24128,000	33275,000	25015,000	17103,000	2364,000	10454,000	18069,000	45095,000	15136,000	18307,000	1488,769	4480,511	68984,817	1680,052	1706,299	3034,032	,000

The presented table allows to identify mutually one-to-one the potential possibility of uniting of the several independent variables for the formation of the unique clusters of data with the purpose of the further mathematical processing by means of using of the various methods of statistical analysis.

2. The complete set of independent variables K_i.

The degree of proximity of the complete set of independent variables Ki is presented in tabl. A15.130.

Table A15.130

The table of the degree of proximity of the complete set of variables

The input matrix file	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7
Age	,000	58192,000	57164,000	56399,000	56238,000	55631,000	55945,000	56904,000	56722,000	57117,000	57397,000	54366,000	53763,000	6048,000
RU	58192,000	,000	84,000	125,000	126,000	155,000	123,000	104,000	122,000	109,000	113,000	196,000	243,000	80866,000
LIT	57164,000	84,000	,000	109,000	90,000	119,000	103,000	116,000	112,000	97,000	109,000	172,000	213,000	79666,000
LG	56399,000	125,000	109,000	,000	91,000	138,000	122,000	125,000	129,000	128,000	132,000	175,000	172,000	78625,000
HIS	56238,000	126,000	90,000	91,000	,000	99,000	81,000	122,000	104,000	95,000	105,000	130,000	153,000	78586,000
GEO	55631,000	155,000	119,000	138,000	99,000	,000	96,000	161,000	139,000	122,000	142,000	127,000	154,000	77857,000
BIO	55945,000	123,000	103,000	122,000	81,000	96,000	,000	127,000	117,000	106,000	110,000	119,000	160,000	78197,000
ALG	56904,000	104,000	116,000	125,000	122,000	161,000	127,000	,000	58,000	81,000	113,000	170,000	203,000	79190,000
GEOM	56722,000	122,000	112,000	129,000	104,000	139,000	117,000	58,000	,000	75,000	103,000	152,000	195,000	79008,000
FIZ	57117,000	109,000	97,000	128,000	95,000	122,000	106,000	81,000	75,000	,000	104,000	165,000	190,000	79551,000
CHE	57397,000	113,000	109,000	132,000	105,000	142,000	110,000	113,000	103,000	104,000	,000	177,000	224,000	79863,000
SCH	54366,000	196,000	172,000	175,000	130,000	127,000	119,000	170,000	152,000	165,000	177,000	,000	137,000	76390,000
AST	53763,000	243,000	213,000	172,000	153,000	154,000	160,000	203,000	195,000	190,000	224,000	137,000	,000	75617,000
K7	6048,000	80866,000	79666,000	78625,000	78586,000	77857,000	78197,000	79190,000	79008,000	79551,000	79863,000	76390,000	75617,000	,000
K8	16734,000	19786,000	19308,000	18723,000	18768,000	18411,000	18661,000	19024,000	18976,000	19223,000	19439,000	17798,000	17335,000	27668,000
K9	15333,000	22393,000	21863,000	21242,000	21299,000	20934,000	21188,000	21561,000	21501,000	21760,000	21996,000	20265,000	19796,000	25493,000
K14	7954,000	31408,000	30772,000	30013,000	30052,000	29633,000	29815,000	30388,000	30296,000	30633,000	30807,000	28856,000	28361,000	14814,000
K15	11291,000	23391,000	22833,000	22240,000	22213,000	21810,000	22032,000	22529,000	22417,000	22728,000	22930,000	21183,000	20712,000	20345,000
K16	22481,000	16233,000	15833,000	15200,000	15285,000	15080,000	15262,000	15581,000	15429,000	15712,000	15904,000	14645,000	14310,000	33599,000
K17	56022,000	2212,000	2286,000	2113,000	2126,000	2119,000	2115,000	2122,000	2118,000	2153,000	2269,000	2150,000	2093,000	76838,000
K18	33636,000	10112,000	9928,000	9495,000	9554,000	9417,000	9489,000	9608,000	9576,000	9753,000	9901,000	9170,000	8985,000	47770,000
K19	22693,000	17227,000	16841,000	16260,000	16279,000	16088,000	16176,000	16433,000	16317,000	16620,000	16778,000	15601,000	15280,000	33377,000
K20	7853,000	43309,000	42469,000	41730,000	41745,000	41322,000	41524,000	42123,000	41997,000	42402,000	42746,000	40443,000	39820,000	11867,000
K21	20052,000	13810,000	13426,000	13019,000	13006,000	12679,000	12823,000	13112,000	13082,000	13281,000	13535,000	12084,000	11873,000	32838,000
K22	20143,000	17235,000	16871,000	16316,000	16365,000	15968,000	16078,000	16495,000	16449,000	16690,000	16886,000	15359,000	15158,000	31715,000
K23	70702,914	1646,134	1807,714	1829,874	1809,734	1922,694	1855,294	1834,954	1866,574	1807,514	1753,234	2089,614	2077,594	95357,214
K24	46586,611	4227,191	4159,571	3935,211	3939,651	3839,411	3925,111	4123,571	4120,411	4146,691	4134,511	3800,511	3597,991	65635,171
K25	22924,697	67269,637	66580,857	65449,297	65604,757	64965,577	65380,697	66161,517	66075,257	66479,997	66614,717	64227,997	63461,117	24695,837
K27	78853,118	1914,098	2099,358	2218,238	2214,078	2341,038	2283,018	2171,798	2195,378	2119,098	2052,338	2574,538	2709,138	104985,718
K28	76008,759	1780,039	1961,459	2039,859	2061,219	2173,059	2119,879	1975,059	2033,399	1938,299	1891,339	2351,939	2492,199	101728,419
K29	55109,301	2829,381	2780,501	2657,501	2745,441	2678,981	2722,961	2666,781	2753,201	2776,001	2763,741	2658,401	2627,761	76252,321
K45	61264,000	428,000	514,000	429,000	500,000	543,000	529,000	490,000	500,000	513,000	485,000	602,000	661,000	83888,000
L31N	81717,000	2275,000	2503,000	2676,000	2647,000	2790,000	2706,000	2579,000	2623,000	2506,000	2458,000	3011,000	3160,000	108537,000
L36N	48555,000	1487,000	1449,000	1408,000	1369,000	1276,000	1316,000	1473,000	1443,000	1468,000	1484,000	1177,000	1136,000	69201,000
L37	9379,000	43745,000	43075,000	42332,000	42175,000	41762,000	42046,000	42599,000	42435,000	42894,000	43110,000	40819,000	40288,000	14169,000
L38N	59892,000	4876,000	4870,000	4847,000	4786,000	4735,000	4739,000	4762,000	4796,000	4877,000	4881,000	4700,000	4839,000	82260,000

The continuation of tabl. A15.130

K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16	K15	K14	K9	K8
55109,301	76008,759	78853,118	22924,697	46586,611	70702,914	20143,000	20052,000	7853,000	22693,000	33636,000	56022,000	22481,000	11291,000	7954,000	15333,000	16734,000
2829,381	1780,039	1914,098	67269,637	4227,191	1646,134	17235,000	13810,000	43309,000	17227,000	10112,000	2212,000	16233,000	23391,000	31408,000	22393,000	19786,000
2780,501	1961,459	2099,358	66580,857	4159,571	1807,714	16871,000	13426,000	42469,000	16841,000	9928,000	2286,000	15833,000	22833,000	30772,000	21863,000	19308,000
2657,501	2039,859	2218,238	65449,297	3935,211	1829,874	16316,000	13019,000	41730,000	16260,000	9495,000	2113,000	15200,000	22240,000	30013,000	21242,000	18723,000
2745,441	2061,219	2214,078	65604,757	3939,651	1809,734	16365,000	13006,000	41745,000	16279,000	9554,000	2126,000	15285,000	22213,000	30052,000	21299,000	18768,000
2678,981	2173,059	2341,038	64965,577	3839,411	1922,694	15968,000	12679,000	41322,000	16088,000	9417,000	2119,000	15080,000	21810,000	29633,000	20934,000	18411,000
2722,961	2119,879	2283,018	65380,697	3925,111	1855,294	16078,000	12823,000	41524,000	16176,000	9489,000	2115,000	15262,000	22032,000	29815,000	21188,000	18661,000
2666,781	1975,059	2171,798	66161,517	4123,571	1834,954	16495,000	13112,000	42123,000	16433,000	9608,000	2122,000	15581,000	22529,000	30388,000	21561,000	19024,000
2753,201	2033,399	2195,378	66075,257	4120,411	1866,574	16449,000	13082,000	41997,000	16317,000	9576,000	2118,000	15429,000	22417,000	30296,000	21501,000	18976,000
2776,001	1938,299	2119,098	66479,997	4146,691	1807,514	16690,000	13281,000	42402,000	16620,000	9753,000	2153,000	15712,000	22728,000	30633,000	21760,000	19223,000
2763,741	1891,339	2052,338	66614,717	4134,511	1753,234	16886,000	13535,000	42746,000	16778,000	9901,000	2269,000	15904,000	22930,000	30807,000	21996,000	19439,000
2658,401	2351,939	2574,538	64227,997	3800,511	2089,614	15359,000	12084,000	40443,000	15601,000	9170,000	2150,000	14645,000	21183,000	28856,000	20265,000	17798,000
2627,761	2492,199	2709,138	63461,117	3597,991	2077,594	15158,000	11873,000	39820,000	15280,000	8985,000	2093,000	14310,000	20712,000	28361,000	19796,000	17335,000
76252,321	101728,419	104985,718	24695,837	65635,171	95357,214	31715,000	32838,000	11867,000	33377,000	47770,000	76838,000	33599,000	20345,000	14814,000	25493,000	27668,000
18215,301	29878,659	31611,278	28948,277	14553,231	27188,414	6179,000	4192,000	12233,000	7223,000	10130,000	18502,000	6375,000	4303,000	6696,000	469,000	,000
20644,121	33100,679	34887,518	27860,197	16653,471	30206,554	6840,000	5005,000	11596,000	7936,000	11401,000	20977,000	7384,000	4448,000	6457,000	,000	469,000
29601,201	44922,939	46822,538	20937,877	23166,591	40509,774	6713,000	6448,000	4853,000	7543,000	12998,000	28862,000	7211,000	2651,000	,000	6457,000	6696,000
22252,781	35276,079	36962,998	24874,137	17260,671	31633,094	4482,000	3659,000	6830,000	5470,000	9277,000	21339,000	4754,000	,000	2651,000	4448,000	4303,000
16548,381	25845,359	26796,958	33099,057	12770,751	22783,674	4638,000	4291,000	13922,000	5230,000	5121,000	14501,000	,000	4754,000	7211,000	7384,000	6375,000
4136,201	4473,499	4603,398	62675,277	5219,331	3899,574	14879,000	12168,000	40811,000	14641,000	7834,000	,000	14501,000	21339,000	28862,000	20977,000	18502,000
9992,261	16798,739	17607,418	39542,757	7992,371	14833,814	6495,000	5110,000	21547,000	5183,000	,000	7834,000	5121,000	9277,000	12998,000	11401,000	10130,000
16324,721	26348,579	27730,738	28227,357	11666,751	23456,254	5330,000	4527,000	12780,000	,000	5183,000	14641,000	5230,000	5470,000	7543,000	7936,000	7223,000
41069,581	58809,819	60877,098	21169,717	33191,651	53810,394	12288,000	12623,000	,000	12780,000	21547,000	40811,000	13922,000	6830,000	4853,000	11596,000	12233,000
13353,721	22894,399	24192,918	31971,297	10150,611	20357,154	3609,000	,000	12623,000	4527,000	5110,000	12168,000	4291,000	3659,000	6448,000	5005,000	4192,000
16232,441	26749,839	27949,878	31433,877	12670,511	23753,034	,000	3609,000	12288,000	5330,000	6495,000	14879,000	4638,000	4482,000	6713,000	6840,000	6179,000
4527,980	1408,729	1162,587	75399,489	5391,167	,000	23753,034	20357,154	53810,394	23456,254	14833,814	3899,574	22783,674	31633,094	40509,774	30206,554	27188,414
3878,301	7272,749	8054,295	43804,310	,000	5391,167	12670,511	10150,611	33191,651	11666,751	7992,371	5219,331	12770,751	17260,671	23166,591	16653,471	14553,231
57627,674	81611,129	85176,856	,000	43804,310	75399,489	31433,877	31971,297	21169,717	28227,357	39542,757	62675,277	33099,057	24874,137	20937,877	27860,197	28948,277
4688,956	460,711	,000	85176,856	8054,295	1162,587	27949,878	24192,918	60877,098	27730,738	17607,418	4603,398	26796,958	36962,998	46822,538	34887,518	31611,278
3592,873	,000	460,711	81611,129	7272,749	1408,729	26749,839	22894,399	58809,819	26348,579	16798,739	4473,499	25845,359	35276,079	44922,939	33100,679	29878,659
,000	3592,873	4688,956	57627,674	3878,301	4527,980	16232,441	13353,721	41069,581	16324,721	9992,261	4136,201	16548,381	22252,781	29601,201	20644,121	18215,301
3025,401	1712,399	1680,658	68853,977	4484,831	1474,714	18307,000	15136,000	45359,000	18069,000	10454,000	2364,000	17103,000	25015,000	33288,000	24019,000	21366,000
6100,781	718,419	340,158	90083,817	9501,571	1627,634	29550,000	25927,000	63920,000	29846,000	19377,000	5219,000	28698,000	39084,000	49501,000	37018,000	33663,000
3663,661	4739,379	5123,858	59523,077	4326,171	4114,814	13330,000	10125,000	36198,000	13994,000	8379,000	3201,000	12704,000	17998,000	25003,000	17614,000	15417,000
41747,561	59008,899	61372,698	24041,317	34481,631	54478,994	14776,000	13597,000	8266,000	15556,000	23703,000	41193,000	15804,000	8724,000	7149,000	11032,000	11543,000
7208,701	6691,239	6841,778	71934,897	9189,751	6226,774	20575,000	17342,000	46349,000	21539,000	15030,000	6502,000	20389,000	26651,000	34312,000	25725,000	23218,000

The completion of tabl. A15.130

K45	L31N	L36N	L37	L38N
61264,000	81717,000	48555,000	9379,000	59892,000
428,000	2275,000	1487,000	43745,000	4876,000
514,000	2503,000	1449,000	43075,000	4870,000
429,000	2676,000	1408,000	42332,000	4847,000
500,000	2647,000	1369,000	42175,000	4786,000
543,000	2790,000	1276,000	41762,000	4735,000
529,000	2706,000	1316,000	42046,000	4739,000
490,000	2579,000	1473,000	42599,000	4762,000
500,000	2623,000	1443,000	42435,000	4796,000
513,000	2506,000	1468,000	42894,000	4877,000
485,000	2458,000	1484,000	43110,000	4881,000
602,000	3011,000	1177,000	40819,000	4700,000
661,000	3160,000	1136,000	40288,000	4839,000
83888,000	108537,000	69201,000	14169,000	82260,000
21366,000	33663,000	15417,000	11543,000	23218,000
24019,000	37018,000	17614,000	11032,000	25725,000
33288,000	49501,000	25003,000	7149,000	34312,000
25015,000	39084,000	17998,000	8724,000	26651,000
17103,000	28698,000	12704,000	15804,000	20389,000
2364,000	5219,000	3201,000	41193,000	6502,000
10454,000	19377,000	8379,000	23703,000	15030,000
18069,000	29846,000	13994,000	15556,000	21539,000
45359,000	63920,000	36198,000	8266,000	46349,000
15136,000	25927,000	10125,000	13597,000	17342,000
18307,000	29550,000	13330,000	14776,000	20575,000
1474,714	1627,634	4114,814	54478,994	6226,774
4484,831	9501,571	4326,171	34481,631	9189,751
68853,977	90083,817	59523,077	24041,317	71934,897
1680,658	340,158	5123,858	61372,698	6841,778
1712,399	718,419	4739,379	59008,899	6691,239
3025,401	6100,781	3663,661	41747,561	7208,701
,000	2107,000	2139,000	46207,000	5146,000
2107,000	,000	5636,000	63960,000	7159,000
2139,000	5636,000	,000	36646,000	6273,000
46207,000	63960,000	36646,000	,000	46139,000
5146,000	7159,000	6273,000	46139,000	,000

The degree of proximity of the independent variables has the principial value at the determining of a sequence of uniting into the generalized classes (clusters).

There are a row of the main methods of uniting of the independent variables into the clusters:

- the method of nearest neighbor – allows to realize a sequence of uniting into the independent cluster of data in fact of the registration of the minimal distance with one from the neighboring independent variables from the mathematical set, and the resulting set of clusters is narrowed relative to the initial one;
- the method of far neighbor – allows to realize a sequence of uniting into the independent cluster of data in fact of the registration of the maximal distance with one from the neighboring independent variables from a set, and the resulting set of clusters is expanded relative to the initial set;
- the method of average linkage – allows to realize a sequence of uniting into the independent cluster of data in fact of the registration of the average arithmetic distance with one from the neighboring independent variables from a set, and the resulting set of clusters is relatively narrowed relative to the initial one.

Each cluster of data acts as the substantially compact and is constructed on the basis of a united set of independent variables, and its identifier includes the composite name from the names of the corresponding independent variables.

The essential value has not only the revealed statistical proximity of the given independent variables, but also the scientific and logical justification of the result of uniting of the two or more independent variables into the unique or several clusters of data for the providing of the potential possibility of further mathematical processing of the samples of data samples by means of the different statistical methods.

A15.8.2. The analysis of the plan of agglomeration of the variables

The plan of agglomeration is based on the various analytically numeric methods, which are embedded in the package of applied programs for the realization of statistical processing of a posteriori data, at the same time it directly reflects a sequence of realization of the uniting of independent variables by the means of using of the selected method of uniting (the nearest neighbor, far neighbor and average linkage).

1. The reduced set of independent variables K_i.

A sequence of carrying out of the uniting of the reduced set of independent variables is presented directly in tabl. A15.131.

Table A15.131

The table of the steps of agglomeration of the reduced set of variables

The stage	The cluster was merged with the cluster		The coeff-ficients	The stage of the first appearance of cluster		The next stage
	The cluster 1	The cluster 2		The cluster 1	The cluster 2	
1	3	4	456,000	0	0	13
2	17	18	460,949	0	0	3
3	14	17	1308,617	0	2	4
4	14	20	1625,040	3	0	7
5	5	6	2654,000	0	0	13
6	12	13	3609,000	0	0	9
7	8	14	3839,530	0	4	11
8	15	19	3904,884	0	0	11
9	7	12	4464,500	0	6	10
10	7	10	5029,000	9	0	12
11	8	15	5048,726	7	8	19
12	7	9	5477,250	10	0	15
13	3	5	5538,500	1	5	15
14	1	2	6093,000	0	0	16
15	3	7	7073,600	13	12	17
16	1	11	10001,500	14	0	17
17	1	3	20230,333	16	15	18
18	1	16	27914,147	17	0	19
19	1	8	35766,738	18	11	0

The presented coefficients in the table reflect the relative distance between the two clusters of data (variables) with the directly given numbers at the considering of a sequence of uniting of the initial independent variables.

Directly all stages of carrying out of the uniting are reflected iteratively and sequentially, and also are indicated by the means of use of the end-to-end numbering.

At the realization of uniting of the several clusters the identifier of the resulting cluster is assigned adequately to the number of the last cluster of data.

The vertical plan of agglomeration in the table acts as the rational alternative to the graphical representation by the means of application of the dendrogram in the picture, at the same time it allows to track clearly a sequence of formation of the resulting clusters due to means of the analysis of identifiers and special labels (table A15.132).

Table A15.132

The vertical icicle plan of agglomeration of the reduced set of variables

The quantity of clusters	The observations																																						
	K29		K24		K45		K28		K27		K23		K17		K25		K18		K19		K22		K21		K16		K15		K14		K9		K8		K20		K7		Age
1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
5	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x
6	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x		x		x	x	x
7	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x		x		x		x
8	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x		x	x	x		x	x	x		x		x		x
9	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x		x	x	x	x	x	x	x		x	x	x		x	x	x		x		x		x
10	x	x	x		x	x	x	x	x	x	x	x	x		x		x		x	x	x	x	x	x	x		x	x	x		x	x	x		x		x		x
11	x	x	x		x	x	x	x	x	x	x	x	x		x		x		x		x	x	x	x	x		x	x	x		x	x	x		x		x		x
12	x	x	x		x	x	x	x	x	x	x	x	x		x		x		x		x	x	x		x		x	x	x		x	x	x		x		x		x
13	x		x		x	x	x	x	x	x	x	x	x		x		x		x		x	x	x		x		x	x	x		x	x	x		x		x		x
14	x		x		x	x	x	x	x	x	x		x		x		x		x		x	x	x		x		x	x	x		x	x	x		x		x		x
15	x		x		x	x	x	x	x	x	x		x		x		x		x		x		x		x		x	x	x		x	x	x		x		x		x
16	x		x		x	x	x	x	x	x	x		x		x		x		x		x		x		x		x		x		x	x	x		x		x		x
17	x		x		x		x	x	x	x	x		x		x		x		x		x		x		x		x		x		x	x	x		x		x		x
18	x		x		x		x	x	x		x		x		x		x		x		x		x		x		x		x		x	x	x		x		x		x
19	x		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x	x	x		x		x		x

On the vertical plane of agglomeration the aggregation of independent variables and the sequence of uniting of the clusters of data for the realization of the potential possibility of mathematical processing by the means of use of a set of various statistical methods (the correlation analysis, the regression analysis, the discriminant analysis, the factor analysis and other statistical methods) is clearly tracked.

The inclusion of a certain independent variable in the formed united cluster of data or the several clusters of data is reflected by the marker of type “plus”.

The quantity of the clusters of data is iteratively traced by the left column and allows to select the optimal quantity of the clusters of data for the realization more deeper or local mathematical processing of a posteriori data by the means of using of a set of various suitable statistical methods. Further can use the regression, discriminant and factor analysis.

2. The complete set of independent variables K_i.

A sequence of carrying out of the iterative uniting of the complete set of independent variables is presented directly in the formed table A15.133.

Table A15.133

The table of the steps of agglomeration of the complete set of variables

The stage	The cluster was merged with the cluster		The coef-ficients	The stage of the first appearance of cluster		The next stage
	The cluster 1	The cluster 2		The cluster 1	The cluster 2	
1	8	9	58,000	0	0	2
2	8	10	78,000	1	0	6
3	5	7	80,000	0	0	5
4	2	3	84,000	0	0	7
5	5	6	98,000	3	0	8
6	8	11	105,667	2	0	7
7	2	8	110,000	4	6	9
8	4	5	119,000	0	5	9
9	2	4	122,167	7	8	11
10	12	13	136,000	0	0	11
11	2	12	175,800	9	10	14
12	29	33	329,772	0	0	15
13	15	16	456,000	0	0	27
14	2	32	516,500	11	0	17
15	29	30	587,474	12	0	16
16	26	29	1431,254	0	15	19
17	2	34	1432,692	14	0	18
18	2	20	2245,786	17	0	19
19	2	26	2528,809	18	16	21
20	17	18	2654,000	0	0	27
21	2	31	3297,035	19	0	24
22	24	25	3609,000	0	0	23
23	19	24	4464,500	0	22	25
24	2	27	4820,227	21	0	28
25	19	22	5029,000	23	0	26
26	19	21	5477,250	25	0	30
27	15	17	5538,500	13	20	30
28	2	36	5660,870	24	0	35
29	1	14	6093,000	0	0	32
30	15	19	7073,600	27	26	33
31	23	35	8270,000	0	0	32
32	1	23	10887,500	29	31	33
33	1	15	18559,083	32	30	34
34	1	28	27607,902	33	0	35
35	1	2	34313,727	34	28	0

The presented coefficients in the table reflect the relative distance between the two clusters of data (the variables) with directly the given numbers at the consideration of a sequence of uniting of the initial independent variables.

Table A15.134

The vertical icicle diagram

The vertical icicle diagram

The observer

Кл.	L38N		K24		K29		K28		L31N		K27		K23		K17		L36N		K45		AST		SCH		GEO		BIO		HIS		LG		CHE		FIZ		GEOM		ALG		LIT		RU		K25		K18		K19		K22		K21		K16		K15		K14		K9		K8		L37		K20		K7		Age
1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X
7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X		X		X	X	X
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X		X		X		X
9	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X		X		X		X
10	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X		X	X	X		X	X	X		X		X		X		X
11	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X	X	X	X	X	X	X		X	X	X		X	X	X		X		X		X		X
12	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X	X	X	X	X		X	X	X		X	X	X		X		X		X		X
13	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X	X	X	X	X		X	X	X		X	X	X		X		X		X		X
14	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X	X	X		X		X	X	X		X	X	X		X		X		X		X
15	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X	X	X		X	X	X		X		X		X		X
16	X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X	X	X		X	X	X		X		X		X		X
17	X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X	X	X		X		X		X		X
18	X		X		X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X	X	X		X		X		X		X
19	X		X		X		X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X	X	X		X		X		X		X
20	X		X		X		X	X	X	X	X	X	X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X	X	X		X		X		X		X
21	X		X		X		X	X	X	X	X		X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X	X	X		X		X		X		X
22	X		X		X		X		X	X	X		X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X	X	X		X		X		X		X
23	X		X		X		X		X	X	X		X		X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X	X	X		X		X		X		X
24	X		X		X		X		X	X	X		X		X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
25	X		X		X		X		X		X		X		X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
26	X		X		X		X		X		X		X		X		X		X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
27	X		X		X		X		X		X		X		X		X		X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
28	X		X		X		X		X		X		X		X		X		X		X		X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
29	X		X		X		X		X		X		X		X		X		X		X		X		X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
30	X		X		X		X		X		X		X		X		X		X		X		X		X	X	X	X	X		X		X	X	X	X	X	X	X		X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
31	X		X		X		X		X		X		X		X		X		X		X		X		X	X	X	X	X		X		X		X	X	X	X	X		X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
32	X		X		X		X		X		X		X		X		X		X		X		X		X		X	X	X		X		X		X	X	X	X	X		X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
33	X		X		X		X		X		X		X		X		X		X		X		X		X		X	X	X		X		X		X	X	X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
34	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	X	X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
35	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	X	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X

The vertical plan of agglomeration directly reflects a set of the clusters of data, which are formed on the basis of the complete set of independent variables.

At the analysis of a sequence of formation of the clusters of data by the vertical plan of agglomeration it is necessary to take into account the logics and scientific justification, as the grouping acts as the statistically reliable, but not always scientifically justified.

The distance between the clusters is calculated based on the Euclidean distance by the means of the method of least squares, that allows to determine directly the distance between the two independent variables at the realization of unification.

The unification of clusters is carried out by the means of certain method:

- the method of nearest neighbor or the method of near linkage – the relative spread (scatter) between the independent variables proportionally decreasing;
- the method of far neighbor or the method of long linkage – the relative spread (scatter) between the independent variables proportionally increasing;
- the method of average or the method of average linkage – the spread (scatter) between the independent variables significantly increases at the considering the method of near linkage and relatively increases at the consideration of the method of far linkage;
- there are many other ways, which have the various accuracy.

At the unification of the two clusters of data with the various identifiers the unique cluster of data is created, which is assigned the unique united composite identifier, or the identification is carried out by the name of the last cluster of data.

A sequence of unification (merging) of the clusters of data is displayed by the several ways:

- the tabular way – the table reflects the number of iteration, the identifiers of clusters for the unification, the distance between the clusters, the final name of united cluster;
- the graphical way – the dendrogram directly displays a sequence of uniting of the clusters of data and the formation of the unique clusters of data.

The tabular method has the significantly low visibility relative to the graphical method, which visually reflects a sequence of unification of the clusters of data.

The analytical-numerical methods of statistical processing of a posteriori data in the basis of the packages of applied programs of the statistical appointment allow to generate the tables and dendrograms with a sequence of unification of the independent variables.

The unification of the reduced or complete set of independent variables is carried out directly in dependence from the selected method of unification (merging).

A15.8.3. The analysis of a sequence of the merging of variables

The dendrogram directly reflects the graphical interpretation of a sequence of unification (merging) of the reduced and complete set of independent variables into the clusters of data by the means of use of one from the available methods: the method of nearest neighbor, the method of far neighbor and the method of average linkage.

1. The reduced set of independent variables K_i.

In pic. A15.159 the dendrogram, which reflects the sequence of unification (merging) of independent variables into the unique cluster of data is presented directly.

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 * * * * * * H I E R A R C H I C A L   C L U S T E R   A N A L Y S I S * * * * * 
 *


  Dendrogram using Average Linkage (Between Groups)

                         Rescaled Distance Cluster Combine

    C A S E      0         5        10        15        20        25
   Label     Num  +---------+---------+---------+---------+---------+

   K8          3   ⇩×⇩⇩⇩⇩⇩⬂
   K9          4   ⇩⬃      ▫⇩⬂
   K14         5   ⇩⇩⇩×⇩⇩⇩⬃  ⇔
   K15         6   ⇩⇩⇩⬃       ⇔
   K21        12   ⇩⇩⇩⇩⇩⬂    ▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬂
   K22        13   ⇩⇩⇩⇩⇩⇳⇩⬂  ⇔                  ⇔
   K16         7   ⇩⇩⇩⇩⇩⬃  ⇔  ⇔                  ⇔
   K19        10   ⇩⇩⇩⇩⇩⇩⇩⇳⇩⬃                    ▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⬂
   K18         9   ⇩⇩⇩⇩⇩⇩⇩⬃                     ⇔        ⇔
   Age         1   ⇩⇩⇩⇩⇩⇩⇩×⇩⇩⇩⇩⇩⬂                 ⇔        ▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⬂
   K7          2   ⇩⇩⇩⇩⇩⇩⇩⬃    ▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃          ⇔        ⇔
   K20        11   ⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃                         ⇔        ⇔
   K25        16   ⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃
 ⇔
   K27        17   ⇩⬂                                            ⇔
   K28        18   ⇩▫                                           ⇔
   K23        14   ⇩⇳⇩⇩⇩⬂                                         ⇔
   K45        20   ⇩⬃   ▫⇩⬂                                       ⇔
   K17         8   ⇩⇩⇩⇩⇩⬃
 ▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃
   K24        15   ⇩⇩⇩⇩⇩×⇩⬃
   K29        19   ⇩⇩⇩⇩⇩⬃
```

Picture A15.159. The dendrogram of the sequence of unification of the reduced set of variables into the generalized classes

In pic. A15.159 the dendrogram is presented directly, which allows not only to track the sequence of unification (merging) of the reduced set of independent variables and the formation of the resulting clusters of data for the realization of statistical processing, but also to determine the optimal quantity of the clusters of data.

At the direct visual empirical-statistical determination of the optimal quantity of the clusters of data based on the variables it is necessary to take into account the corresponding scientific justification (cognitive informatics, psychophysiology of sensory systems, cognitive psychology and cognitive linguistics).

2. The complete set of independent variables K_i.

In pic. A15.160 the dendrogram is presented, which allows to determine directly the sequence of unification of the complete set of independent variables.

```
 * * * * * * H I E R A R C H I C A L  C L U S T E R   A N A L Y S I S * * * * * *

  Dendrogram using Average Linkage (Between Groups)

                         Rescaled Distance Cluster Combine

    C A S E      0         5        10        15        20        25
   Label     Num  +---------+---------+---------+---------+---------+

   ALG         8   ⇩⬂
   GEOM        9   ⇩▫
   FIZ        10   ⇩▫
   CHE        11   ⇩▫
   RU          2   ⇩▫
   LIT         3   ⇩▫
   HIS         5   ⇩▫
   BIO         7   ⇩▫
   GEO         6   ⇩▫
   LG          4   ⇩⇧⇩⬂
   SCH        12   ⇩▫ ⇔
   AST        13   ⇩▫ ⇔
   K45        32   ⇩⬃ ⇔
   L36N       34   ⇩⇩⇩▫
   K17        20   ⇩⇩⇩⇧⇩⬂
   K27        29   ⇩⬂ ⇔ ⇔
   L31N       33   ⇩⇧⇩▫ ▫⇩⬂
   K28        30   ⇩⬃ ⇔ ⇔ ⇔
   K23        26   ⇩⇩⇩⬃ ⇔ ▫⇩⬂
   K29        31   ⇩⇩⇩⇩⇩⬃ ⇔
▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬂
   K24        27   ⇩⇩⇩⇩⇩⇩⇩⬃ ⇔                                  ⇔
   L38N       36   ⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃                                  ⇔
   K21        24   ⇩⇩⇩⇩⇩×⇩⬂                                    ⇔
   K22        25   ⇩⇩⇩⇩⇩⬃ ⇔                                    ⇔
   K16        19   ⇩⇩⇩⇩⇩⇩⇩▫                                    ⇔
   K19        22   ⇩⇩⇩⇩⇩⇩⇩⇧⇩⇩⇩⬂                                 ⇔
   K18        21   ⇩⇩⇩⇩⇩⇩⇩⬃  ▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬂              ⇔
   K8         15   ⇩×⇩⇩⇩⇩⇩⬂  ⇔           ⇔                   ⇔
   K9         16   ⇩⬃     ▫⇩⇩⇩⬃          ⇔                   ⇔
   K14        17   ⇩⇩⇩×⇩⇩⇩⬃             ▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬂      ⇔
   K15        18   ⇩⇩⇩⬃                ⇔          ⇔        ⇔
   Age         1   ⇩⇩⇩⇩⇩⇩⇩⇩⇩×⇩⇩⇩⇩⇩⬂        ⇔          ⇔      ⇔
   K7         14   ⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃    ▫⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃      ▫⇩⇩⇩⇩⇩⇩⇩⬃
   K20        23   ⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩×⇩⇩⇩⬃                  ⇔
   L37        35   ⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃                      ⇔
   K25        28   ⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⇩⬃
```

Picture A15.160. The dendrogram of the sequence of unification of the complete set of variables into the generalized classes

At the corresponding scientific justification need to be considered at the visual empirical-statistical determination of the optimal quantity of the clusters of data. In the presented dendrogram 03 clusters are clearly distinguished in the process of calculation.

A15.9. The multidimensional scaling

The multidimensional scaling acts as the modern difficult statistical method of mathematical processing of a posteriori data of a series of experiments.

The purpose of the multidimensional scaling – the revealing of the structure (a set of signs or scales) of the researched signs, directly acts as the alternative to the conducting of factor and cluster analysis of a posteriori data from the experimental researches.

The scale is considered directly as the criterion of differentiation of the different stimuli, which geometrically represents the distance in the space of the scales: the closer the objects are located among themselves in the space of coordinates, the greater their similarity.

The multidimensional scaling directly allows to specify uniquely the position of a set of independent variables in the space of two or more scales.

There is a dual interpretation of the multidimensional scaling as the method of analysis:

- the several entered scales allow to determine the specified geometric position and the coordinates of a set of various independent variables;
- the independent variables act as the axes (scales), and the geometric place (point) corresponds to the entry by the string (a set of the nominal values of variables).

The multidimensional scaling allows to solve the several very important tasks:

- to display a set of independent variables in the space of several scales;
- to determine the allocated localities with the maximal densities of distribution of the independent variables for the subsequent depth statistical analysis;
- to form directly a set of groups of independent variables by the localities with the maximal density of distribution of the independent variables;
- to determine the degree of compliance of the individual profile of estimation to the group;
- directly to correlate the degree of correspondence of the location of individual profiles between each other in the space of two or more scales;
- directly to correlate the degree of correspondence of the location of the profiles of groups between each other in the space of two or more scales.

For the direct use of multidimensional scaling it is necessary to provide the preliminary processing of a posteriori data: the analysis of outliers and artifacts, the analysis of compliance to the normal law of distribution of the following of numbers by the means of use of the special analytical and graphical criteria.

A15.9.1. The determining of the quality of scales and the degrees of freedom

The quantity of scales and the degrees of freedom are determined directly in the computer program "SPSS for Windows", that allows to display a set of independent variables in the space of two or more scales at the multidimensional scaling.

1. The reduced set of independent variables K_i.

Table A15.135

The source data, distances and proximity of independent variables

	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
Age	.																			
K7	78,058	.																		
K8	129,553	165,979	.																	
K9	124,073	159,346	21,354	.																
K14	89,135	121,828	82,492	81,074	.															
K15	106,297	142,948	65,795	66,686	51,517	.														
K16	149,963	183,935	80,443	86,470	84,841	68,949	.													
K17	236,719	277,177	136,894	145,396	169,850	146,079	120,420	.												
K18	183,276	218,474	100,210	106,358	113,978	96,317	71,561	88,510	.											
K19	150,589	182,833	85,024	88,989	86,799	73,959	72,319	121,000	71,993	.										
K20	88,899	110,000	110,068	107,299	69,986	82,329	117,499	201,403	146,407	112,659	.									
K21	141,633	181,948	65,818	71,358	80,306	60,490	65,506	110,309	71,484	67,283	111,530	.								
K22	141,849	177,843	78,949	82,638	81,988	66,948	68,103	121,980	80,592	73,007	110,653	60,075	.							
K23	265,755	308,457	165,419	174,092	201,125	177,866	150,895	62,711	121,786	153,166	231,460	142,558	154,181	.						
K24	215,685	255,970	120,613	128,749	151,985	130,965	112,676	71,901	88,752	107,569	181,579	100,730	111,935	73,681	.					
K25	151,403	156,643	169,776	166,582	144,764	157,285	181,811	250,370	198,471	167,707	146,095	179,205	176,668	274,942	209,496	.				
K27	280,781	323,892	178,401	187,110	216,331	192,241	163,662	67,861	132,642	166,498	246,106	155,519	167,162	34,387	89,901	292,213	.			
K28	275,636	318,812	173,432	182,274	211,874	187,754	160,720	66,756	129,523	162,259	241,850	151,304	163,457	37,879	85,412	286,018	21,470	.		
K29	234,695	275,876	135,667	143,997	171,968	149,027	128,522	64,165	99,729	127,566	201,894	115,584	127,181	67,618	62,489	240,397	68,584	60,028	.	
K45	247,499	289,608	146,847	155,332	182,414	158,161	130,778	48,621	102,245	134,421	212,356	123,028	135,303	38,585	66,937	262,650	40,988	41,307	55,082	.

In tabl. A15.135 the degree of proximity between the independent variables is reflected.

Table A15.136

The nominal value of total stress

The normalized simple stress	0,01106
Stress-I	0,10515(a)
Stress II	0,21568(a)
S-Stress	0,01219(b)
The explained spread (D.A.F.)	0,98894
The coefficient of congruence of Tucker	0,99446

"PROXSCAL" minimizes the normalized simple stress.

a The factor of optimal scaling = 1,011.

b The factor of optimal scaling = 0.978.

The values of total stress at the given value of optimum in the limits of norm.

The values of final stress (minimized) are presented in tabl. 8.114.

2. The complete set of independent variables K_i.

Table A15.137

The source data, distances and proximity of independent variables

	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14
Age	.	241,193	239,027	237,487	237,148	235,693	236,493	238,516	238,126	238,946	239,595	233,135	231,784	78,058	129,553	124,073	89,135
RU		.	9,165	11,136	11,091	12,689	11,091	10,198	11,045	10,440	10,583	14,000	15,684	284,269	141,372	150,067	177,181
LIT			.	10,392	9,327	11,180	10,149	10,770	10,583	9,849	10,392	13,115	14,697	282,151	139,628	148,257	175,377
LG				.	9,539	11,958	11,091	11,136	11,314	11,269	11,489	13,266	13,266	280,401	137,586	146,212	173,254
HIS					.	10,000	8,944	11,000	10,149	9,695	10,344	11,446	12,450	280,321	137,735	146,366	173,378
GEO						.	9,798	12,845	11,958	11,225	12,042	11,180	12,369	278,833	136,261	144,959	172,012
BIO							.	11,269	10,817	10,296	10,630	10,909	12,610	279,528	137,314	145,983	172,638
ALG								.	7,616	9,000	10,583	13,038	14,353	281,363	138,651	147,262	174,279
GEOM									.	8,660	10,100	12,329	14,071	281,046	138,412	146,997	174,014
FIZ										.	10,149	12,845	13,892	281,943	139,345	147,936	174,980
CHE											.	13,416	15,100	282,569	140,136	148,755	175,519
SCH												.	11,662	276,317	134,037	142,681	169,838
AST													.	274,884	132,295	141,018	168,336
K7														.	165,979	159,346	121,828
K8															.	21,354	82,492
K9																.	81,074
K14																	.
K15																	
K16																	
K17																	
K18																	
K19																	
K20																	
K21																	
K22																	
K23																	
K24																	
K25																	
K27																	
K28																	
K29																	
K45																	
L31N																	
L36N																	
L37																	
L38N																	

The completion of tabl. A15.137

K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
106,297	149,963	236,719	183,276	150,589	88,899	141,633	141,849	265,755	215,685	151,403	280,781	275,636	234,695	247,499	286,493	220,325	97,206	244,810
152,941	127,409	47,032	100,558	131,252	207,531	117,516	131,282	40,684	65,129	259,712	43,746	42,166	53,311	20,688	48,249	38,562	209,153	69,828
151,106	125,829	47,812	99,639	129,773	205,507	115,871	129,888	42,661	64,484	258,302	45,827	44,219	52,812	22,672	50,557	38,066	207,545	69,785
149,168	123,317	45,935	97,417	127,534	203,772	114,140	127,801	42,951	62,778	256,170	47,070	45,068	51,661	20,736	52,230	37,563	205,828	69,584
149,097	123,709	46,098	97,760	127,609	203,814	114,066	127,969	42,612	62,826	256,473	46,975	45,278	52,432	22,428	51,952	36,986	205,431	69,130
147,574	122,727	46,054	97,000	126,807	202,559	112,521	126,238	44,104	62,005	255,132	48,516	46,733	51,881	23,259	53,432	35,665	204,265	68,782
148,432	123,539	45,989	97,411	127,185	203,185	113,239	126,799	43,183	62,767	256,050	47,777	46,019	52,303	23,000	52,583	36,277	205,051	68,840
150,097	124,824	46,065	98,020	128,191	204,653	114,508	128,433	43,037	64,159	257,457	46,581	44,373	51,666	22,136	51,284	38,380	206,395	69,007
149,723	124,214	46,022	97,857	127,738	204,355	114,377	128,254	43,476	64,076	257,249	46,863	44,992	52,461	22,361	51,633	37,987	205,998	69,253
150,758	125,348	46,400	98,757	128,919	205,334	115,243	129,190	42,626	64,508	258,188	46,029	44,002	52,826	22,650	50,606	38,314	207,109	69,836
151,483	126,115	47,645	99,539	129,549	206,245	116,404	130,035	41,952	64,410	258,474	45,250	43,396	52,720	22,045	50,040	38,613	207,661	69,957
145,544	121,017	46,368	95,760	124,904	200,517	109,927	123,931	45,815	61,766	253,789	50,736	48,475	51,682	24,536	55,426	34,307	202,037	68,557
143,865	119,629	45,760	94,763	123,600	198,894	108,904	123,033	45,761	60,101	252,236	52,093	49,981	51,356	25,729	56,833	33,630	200,691	69,484
142,948	183,935	277,177	218,474	182,833	110,000	181,948	177,843	308,457	255,970	156,643	323,892	318,812	275,876	289,608	330,056	263,146	118,735	286,833
65,795	80,443	136,894	100,210	85,024	110,068	65,818	78,949	165,419	120,613	169,776	178,401	173,432	135,667	146,847	184,472	125,032	107,401	153,343
66,686	86,470	145,396	106,358	88,989	107,299	71,358	82,638	174,092	128,749	166,582	187,110	182,274	143,997	155,332	193,106	133,218	105,190	160,904
51,517	84,841	169,850	113,978	86,799	69,986	80,306	81,988	201,125	151,985	144,764	216,331	211,874	171,968	182,414	223,108	158,101	84,546	185,232
.	68,949	146,079	96,317	73,959	82,329	60,490	66,948	177,866	130,965	157,285	192,241	187,754	149,027	158,161	198,275	134,157	93,402	163,251
	.	120,420	71,561	72,319	117,499	65,506	68,103	150,895	112,676	181,811	163,662	160,720	128,522	130,778	169,950	112,712	125,714	142,790
		.	88,510	121,000	201,403	110,309	121,980	62,711	71,901	250,370	67,861	66,756	64,165	48,621	72,622	56,577	202,961	80,635
			.	71,993	146,407	71,484	80,592	121,786	88,752	198,471	132,642	129,523	99,729	102,245	139,685	91,537	153,958	122,597
				.	112,659	67,283	73,007	153,166	107,569	167,707	166,498	162,259	127,566	134,421	173,364	118,296	124,724	146,762
					.	111,530	110,653	231,460	181,579	146,095	246,106	241,850	201,894	212,356	252,866	189,573	90,940	214,590
						.	60,075	142,558	100,730	179,205	155,519	151,304	115,584	123,028	161,629	100,623	116,606	131,689
							.	154,181	111,935	176,668	167,162	163,457	127,181	135,303	172,346	115,456	121,557	143,440
								.	73,681	274,942	34,387	37,879	67,618	38,585	40,945	64,036	233,401	79,339
									.	209,496	89,901	85,412	62,489	66,937	98,190	66,107	185,425	95,237
										.	292,213	286,018	240,397	262,650	301,047	244,511	154,703	267,872
											.	21,470	68,584	40,988	18,160	71,589	247,744	82,706
												.	60,028	41,307	26,721	68,872	242,860	81,609
													.	55,082	78,391	60,759	204,211	84,654
														.	46,390	46,249	214,958	71,736
															.	75,783	253,529	85,041
																.	191,431	79,202
																	.	214,800
																		.

In tabl. A15.137 the degree of proximity between the independent variables is reflected.

A15.9.2. The finite coordinates of variables in the space of the function of scaling

It is proposed to consider the finite coordinates of independent variables in the space of the two functions of scaling as the coordinates of two-dimensional Descartes space.

The reduced set of independent variables includes the 20 independent variables: Age – the age, K_7 – protanopia, K_8 – deuteranopia, K_9 – tritanopia, K_{14} – verbalization, K_{15} – generalization, K_{16} – classification, K_{17} – associativity, K_{18} – arithmetic counting, K_{19} – combinatorics, K_{20} – mnemonic abilities, K_{21} – planar thinking, K_{22} – volumetric thinking, K_{23} – verbal originality, K_{24} – verbal associativity, K_{25} – verbal selectivity, K_{27} – figurative originality, K_{28} – figurative associativity, K_{29} – figurative selectivity, K_{45} – the level of proficiency in the language of statement of the information.

The complete set of independent variables includes the 36 independent variables: Age – the age, RU – the mark in the Russian language, LIT – the mark in literature, LG -- the mark in foreign language, HIS – the mark in history, GEO – the mark in geography, BIO – the mark in biology, ALG – the mark in algebra, GEOM – the mark in geometry, FIZ – the mark in physics, CHE – the mark in chemistry, SCH – the mark in drawing, AST – the mark in astronomy, K_7 – protanopia, K_8 – deuteranopia, K_9 – tritanopia, K_{14} – verbalization, K_{15} – generalization, K_{16} – classification, K_{17} – associativity, K_{18} – arithmetic counting, K_{19} – combinatorics, K_{20} – mnemonic abilities, K_{21} – planar thinking, K_{22} – volumetric thinking, K_{23} – verbal originality, K_{24} – verbal associativity, K_{25} – verbal selectivity, K_{27} – figurative originality, K_{28} – figurative associativity, K_{29} – figurative selectivity, K_{45} – the level of proficiency in the language of statement of the information, L_{31N} – the kind of information, L_{36N} – the color of background, L_{37} – the color of font and L_{38N} – the size of font.

1. The reduced set of independent variables K_i.

In tabl. A15.138 the reduced set of independent variables K_i is presented.

Table A15.138

The final coordinates of the functions of scaling

The indicator	The measurement	
	1	2
Age	0,960	-0,188
K7	1,131	-0,490
K8	0,230	0,103
K9	0,293	0,167
K14	0,515	-0,054
K15	0,333	-0,164
K16	0,043	-0,355
K17	-0,587	-0,234
K18	-0,189	0,091
K19	0,068	0,323
K20	0,747	0,052
K21	0,040	-0,045
K22	0,103	-0,248
K23	-0,849	0,031
K24	-0,464	0,278
K25	0,822	0,802
K27	-0,938	-0,122
K28	-0,919	-0,048
K29	-0,632	0,189
K45	-0,708	-0,089

2. The complete set of independent variables K_i.

In tabl. A15.139 the complete set of independent variables K_i is presented.

Table A15.139

The final coordinates of the functions of scaling

The indicator	The mesurement	
	1	2
Age	1,314	-0,144
RU	-0,471	-0,034
LIT	-0,455	-0,062
LG	-0,425	0,001
HIS	-0,427	-0,053
GEO	-0,406	-0,031
BIO	-0,424	-0,074
ALG	-0,437	-0,015
GEOM	-0,436	-0,039
FIZ	-0,449	-0,074
CHE	-0,455	-0,024
SCH	-0,396	-0,080
AST	-0,376	-0,056
K7	1,475	-0,623
K8	0,533	0,079
K9	0,597	0,144
K14	0,828	0,000
K15	0,631	-0,151
K16	0,355	-0,351
K17	-0,363	0,222
K18	0,141	0,267
K19	0,383	0,374
K20	1,056	0,178
K21	0,341	-0,034
K22	0,415	-0,235
K23	-0,653	0,139
K24	-0,195	0,336
K25	1,145	0,932
K27	-0,751	-0,019
K28	-0,724	0,037
K29	-0,396	0,322
K45	-0,507	0,052
L31N	-0,795	-0,061
L36N	-0,273	-0,185
L37	1,049	-0,256
L38N	-0,448	-0,481

In tabl. A15.139 a set of coordinates of the several independent variables in the space of the two scales is presented, that allows to obtain the geometric place of points, which characterize the position of the complete set of variables in the Descartes rectangular space, defined by the two functions of scaling.

A15.9.3. The finite coordinates of variables in the space of functions of scaling

Directly after the inputting into the consideration of the two scales the relative and final distances of the reduced and complete set of independent variables were researched.

<u>1. The reduced set of independent variables K_i.</u>

In tabl. A15.140 the relative distance between the independent variables from the reduced set of independent variables K_i is presented directly.

Table A15.140

The relative distance (distances) of independent variables

	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
Age	0,000																			
K7	0,346	0,000																		
K8	0,786	1,078	0,000																	
K9	0,756	1,064	0,089	0,000																
K14	0,465	0,754	0,326	0,314	0,000															
K15	0,627	0,861	0,286	0,333	0,212	0,000														
K16	0,932	1,096	0,495	0,579	0,560	0,348	0,000													
K17	1,548	1,737	0,884	0,967	1,117	0,923	0,642	0,000												
K18	1,183	1,442	0,419	0,488	0,719	0,581	0,503	0,514	0,000											
K19	1,029	1,338	0,274	0,274	0,586	0,555	0,679	0,860	0,346	0,000										
K20	0,322	0,664	0,519	0,468	0,255	0,466	0,813	1,364	0,936	0,731	0,000									
K21	0,931	1,177	0,241	0,330	0,475	0,316	0,310	0,655	0,267	0,369	0,713	0,000								
K22	0,859	1,055	0,374	0,457	0,455	0,245	0,123	0,691	0,448	0,573	0,710	0,213	0,000							
K23	1,822	2,047	1,081	1,150	1,366	1,198	0,972	0,372	0,662	0,962	1,595	0,892	0,992	0,000						
K24	1,499	1,770	0,716	0,765	1,034	0,911	0,811	0,527	0,333	0,533	1,231	0,599	0,774	0,457	0,000					
K25	1,000	1,328	0,915	0,826	0,909	1,082	1,395	1,749	1,236	0,893	0,753	1,152	1,272	1,840	1,388	0,000				
K27	1,900	2,101	1,190	1,265	1,455	1,273	1,009	0,368	0,779	1,100	1,694	0,982	1,050	0,178	0,621	1,988	0,000			
K28	1,884	2,096	1,159	1,231	1,434	1,257	1,010	0,380	0,743	1,054	1,668	0,959	1,041	0,106	0,560	1,937	0,077	0,000		
K29	1,636	1,889	0,867	0,925	1,173	1,028	0,867	0,425	0,454	0,713	1,385	0,712	0,856	0,268	0,191	1,578	0,436	0,372	0,000	
K45	1,671	1,882	0,958	1,033	1,224	1,044	0,797	0,189	0,549	0,878	1,461	0,750	0,827	0,185	0,441	1,770	0,233	0,215	0,287	0,000

In tabl. A15.141 the relative transformed (final) distance between the independent variables from the reduced set of independent variables K_i is presented.

Table A15.141

The converted range (distances) of independent variables

	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
Age	0,000																			
K7	0,510	0,000																		
K8	0,846	1,084	0,000																	
K9	0,810	1,041	0,139	0,000																

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K14	0,582	0,796	0,539	0,529	0,000															
K15	0,694	0,933	0,430	0,435	0,336	0,000														
K16	0,979	1,201	0,525	0,565	0,554	0,450	0,000													
K17	1,546	1,810	0,894	0,949	1,109	0,954	0,786	0,000												
K18	1,197	1,427	0,654	0,695	0,744	0,629	0,467	0,578	0,000											
K19	0,983	1,194	0,555	0,581	0,567	0,483	0,472	0,790	0,470	0,000										
K20	0,580	0,718	0,719	0,701	0,457	0,538	0,767	1,315	0,956	0,736	0,000									
K21	0,925	1,188	0,430	0,466	0,524	0,395	0,428	0,720	0,467	0,439	0,728	0,000								
K22	0,926	1,161	0,516	0,540	0,535	0,437	0,445	0,797	0,526	0,477	0,723	0,392	0,000							
K23	1,735	2,014	1,080	1,137	1,313	1,161	0,985	0,409	0,795	1,000	1,511	0,931	1,007	0,000						
K24	1,408	1,671	0,788	0,841	0,992	0,855	0,736	0,470	0,580	0,702	1,186	0,658	0,731	0,481	0,000					
K25	0,989	1,023	1,109	1,088	0,945	1,027	1,187	1,635	1,296	1,095	0,954	1,170	1,154	1,795	1,368	0,000				
K27	1,833	2,115	1,165	1,222	1,413	1,255	1,069	0,443	0,866	1,087	1,607	1,016	1,092	0,225	0,587	1,908	0,000			
K28	1,800	2,082	1,132	1,190	1,384	1,226	1,049	0,436	0,846	1,060	1,579	0,988	1,067	0,247	0,558	1,868	0,140	0,000		
K29	1,533	1,801	0,886	0,940	1,123	0,973	0,839	0,419	0,651	0,833	1,318	0,755	0,830	0,442	0,408	1,570	0,448	0,392	0,000	
K45	1,616	1,891	0,959	1,014	1,191	1,033	0,854	0,317	0,668	0,878	1,387	0,803	0,884	0,252	0,437	1,715	0,268	0,270	0,360	0,000

Transformation: the conditional matrix and transformation for the scale of relationships.

In the presented tables with the reduced and complete set of independent variables the significant anomalies in a sequence of nominal values is not observed, therefore it is potentially possible to carry out the visual interpretation by the means of directly building of the dendrogram.

The considered distances between the reduced and complete set of independent variables allow to form directly the dendrogram, which actually graphically reflects the sequence of uniting (merging) of the clusters of data into one or several resulting generalized clusters of data for the analysis.

2. The complete set of independent variables K_i.

In tabl. A15.142 the relative distance between the independent variables from the complete set of independent variables K_i is presented.

Table A15.142

The relative range (distances) of independent variables

	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15
Age	,000	1,789	1,772	1,745	1,743	1,724	1,740	1,756	1,754	1,764	1,773	1,711	1,693	,504	,812	,773	,508	,683
RU		,000	,032	,058	,048	,065	,062	,039	,035	,047	,019	,089	,098	2,033	1,011	1,083	1,299	1,109
LIT			,000	,070	,030	,058	,034	,050	,029	,014	,038	,063	,079	2,010	,998	1,072	1,284	1,090
LG				,000	,054	,038	,075	,020	,042	,079	,039	,086	,075	2,000	,961	1,032	1,253	1,067
HIS					,000	,030	,021	,039	,016	,031	,040	,041	,051	1,985	,969	1,042	1,255	1,063
GEO						,000	,046	,035	,031	,061	,050	,050	,039	1,972	,946	1,018	1,234	1,044
BIO							,000	,060	,036	,025	,058	,029	,051	1,977	,969	1,044	1,254	1,058
ALG								,000	,025	,061	,020	,077	,073	2,006	,974	1,046	1,265	1,077
GEOM									,000	,037	,024	,057	,062	1,998	,977	1,049	1,265	1,074
FIZ										,000	,051	,053	,075	2,000	,994	1,068	1,278	1,083
CHE											,000	,082	,085	2,021	,993	1,065	1,283	1,094
SCH												,000	,031	1,948	,942	1,017	1,226	1,029
AST													,000	1,936	,919	,993	1,205	1,012
K7														,000	1,174	1,165	,898	,966
K8															,000	,091	,305	,250
K9																,000	,272	,297
K14																	,000	,248
K15																		,000
K16																		
K17																		
K18																		
K19																		
K20																		
K21																		
K22																		
K23																		
K24																		
K25																		
K27																		
K28																		
K29																		
K45																		
L31N																		
L36N																		
L37																		
L38N																		

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L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16
1,794	,288	1,588	2,111	1,832	1,773	2,046	2,069	1,089	1,584	1,988	,903	,979	,413	1,066	1,243	1,717	,981
,448	1,536	,249	,325	,093	,363	,263	,280	1,883	,461	,251	,909	,812	1,542	,947	,682	,278	,885
,420	1,517	,220	,340	,125	,388	,286	,299	1,884	,475	,282	,888	,797	1,530	,946	,681	,299	,861
,483	1,496	,240	,375	,097	,322	,301	,327	1,825	,406	,266	,873	,767	1,491	,890	,625	,230	,856
,429	1,489	,203	,369	,132	,376	,311	,326	1,855	,452	,297	,862	,768	1,500	,916	,651	,282	,837
,452	1,472	,203	,390	,131	,353	,325	,345	1,826	,423	,300	,846	,747	1,477	,888	,623	,257	,826
,408	1,484	,188	,371	,151	,396	,320	,332	1,864	,469	,312	,855	,766	1,501	,923	,660	,302	,827
,467	1,505	,236	,361	,097	,339	,292	,314	1,844	,426	,265	,880	,778	1,505	,908	,643	,249	,861
,442	1,501	,219	,359	,116	,364	,298	,315	1,856	,446	,281	,874	,777	1,508	,918	,654	,272	,851
,407	1,508	,208	,347	,139	,400	,297	,308	1,885	,482	,295	,879	,791	1,525	,946	,681	,309	,850
,457	1,522	,243	,342	,092	,351	,276	,296	1,864	,444	,256	,896	,796	1,524	,928	,663	,263	,874
,405	1,455	,161	,400	,173	,402	,349	,361	1,843	,461	,338	,826	,738	1,474	,902	,639	,304	,798
,432	1,439	,166	,419	,170	,378	,360	,377	1,814	,431	,338	,812	,718	1,451	,873	,610	,278	,789
1,928	,562	1,802	2,339	2,094	2,096	2,296	2,307	1,589	1,925	2,260	1,128	1,278	,904	1,478	1,604	2,023	1,152
1,130	,615	,848	1,336	1,041	,960	1,258	1,288	1,050	,772	1,188	,336	,223	,532	,331	,435	,907	,465
1,217	,603	,930	1,407	1,108	1,009	1,325	1,358	,960	,815	1,250	,420	,311	,460	,314	,472	,963	,551
1,363	,338	1,116	1,624	1,336	1,265	1,552	1,579	,984	1,076	1,487	,475	,488	,289	,581	,737	1,211	,589
1,129	,430	,905	1,429	1,157	1,131	1,369	1,389	1,199	,959	1,317	,232	,313	,537	,581	,645	1,062	,341
,814	,700	,650	1,186	,952	1,009	1,147	1,155	1,507	,880	1,121	,130	,317	,878	,726	,655	,919	,000
,709	1,490	,417	,517	,223	,105	,406	,457	1,667	,202	,302	,903	,749	1,419	,762	,506	,000	
,952	1,048	,613	,992	,683	,540	,895	,937	1,204	,343	,804	,573	,362	,919	,265	,000		
1,193	,916	,863	1,257	,947	,781	1,158	1,201	,944	,580	1,063	,611	,411	,700	,000			
1,642	,434	1,377	1,866	1,568	1,459	1,785	1,818	,759	1,261	1,709	,762	,746	,000				
,907	,742	,632	1,136	,853	,818	1,068	1,092	1,257	,651	1,009	,215	,000					
,897	,634	,690	1,223	,966	,984	1,172	1,186	1,377	,836	1,132	,000						
,653	1,747	,499	,245	,170	,316	,124	,186	1,966	,499	,000							
,855	1,377	,527	,719	,422	,201	,607	,660	1,467	,000								
2,130	1,191	1,805	2,180	1,872	1,658	2,072	2,122	,000									
,553	1,815	,506	,061	,254	,492	,063	,000										
,588	1,797	,503	,121	,217	,434	,000											
,805	1,556	,522	,553	,292	,000												
,537	1,586	,333	,309	,000													
,545	1,854	,537	,000														
,344	1,324	,000															
1,513	,000																
,000																	

The converted proximities

In tabl. A15.143 the relative transformed (final) distance between the independent variables from the reduced set of independent variables K_i. is presented.

Table A15.143

The converted ranges (distances) of independent variables

	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
Age	,000																																			
RU	1,721	,000																																		
LIT	1,706	,065	,000																																	
LG	1,695	,079	,074	,000																																
HIS	1,692	,079	,067	,068	,000																															
GEO	1,682	,091	,080	,085	,071	,000																														
BIO	1,688	,079	,072	,079	,064	,070	,000																													
ALG	1,702	,073	,077	,079	,079	,092	,080	,000																												
GEOM	1,699	,079	,076	,081	,072	,085	,077	,054	,000																											
FIZ	1,705	,075	,070	,080	,069	,080	,073	,064	,062	,000																										
CHE	1,710	,076	,074	,082	,074	,086	,076	,076	,072	,072	,000																									
SCH	1,664	,100	,094	,095	,082	,080	,078	,093	,088	,092	,096	,000																								
AST	1,654	,112	,105	,095	,089	,088	,090	,102	,100	,099	,108	,083	,000																							
K7	,557	2,029	2,014	2,001	2,000	1,990	1,995	2,008	2,006	2,012	2,017	1,972	1,962	,000																						
K8	,925	1,009	,996	,982	,983	,972	,980	,989	,988	,994	1,000	,957	,944	1,184	,000																					
K9	,885	1,071	1,058	1,043	1,045	1,034	1,042	1,051	1,049	1,056	1,062	1,018	1,006	1,137	,152	,000																				
K14	,636	1,264	1,252	1,236	1,237	1,228	1,232	1,244	1,242	1,249	1,253	1,212	1,201	,869	,589	,579	,000																			
K15	,759	1,091	1,078	1,065	1,064	1,053	1,059	1,071	1,068	1,076	1,081	1,039	1,027	1,020	,470	,476	,368	,000																		

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L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16
1,747	,694	1,572	2,045	1,766	1,675	1,967	2,004	1,080	1,539	1,897	1,012	1,011	,634	1,075	1,308	1,689	1,070
,498	1,493	,275	,344	,148	,380	,301	,312	1,853	,465	,290	,937	,839	1,481	,937	,718	,336	,909
,498	1,481	,272	,361	,162	,377	,316	,327	1,843	,460	,304	,927	,827	1,467	,926	,711	,341	,898
,497	1,469	,268	,373	,148	,369	,322	,336	1,828	,448	,307	,912	,815	1,454	,910	,695	,328	,880
,493	1,466	,264	,371	,160	,374	,323	,335	1,830	,448	,304	,913	,814	1,455	,911	,698	,329	,883
,491	1,458	,255	,381	,166	,370	,334	,346	1,821	,442	,315	,901	,803	1,446	,905	,692	,329	,876
,491	1,463	,259	,375	,164	,373	,328	,341	1,827	,448	,308	,905	,808	1,450	,908	,695	,328	,882
,492	1,473	,274	,366	,158	,369	,317	,332	1,837	,458	,307	,917	,817	1,460	,915	,700	,329	,891
,494	1,470	,271	,368	,160	,374	,321	,334	1,836	,457	,310	,915	,816	1,458	,912	,698	,328	,886
,498	1,478	,273	,361	,162	,377	,314	,328	1,843	,460	,304	,922	,822	1,465	,920	,705	,331	,895
,499	1,482	,276	,357	,157	,376	,310	,323	1,845	,460	,299	,928	,831	1,472	,925	,710	,340	,900
,489	1,442	,245	,396	,175	,369	,346	,362	1,811	,441	,327	,884	,784	1,431	,891	,683	,331	,864
,496	1,432	,240	,406	,184	,366	,357	,372	1,800	,429	,327	,878	,777	1,419	,882	,676	,327	,854
2,047	,847	1,878	2,355	2,067	1,969	2,275	2,311	1,118	1,827	2,201	1,269	1,298	,785	1,305	1,559	1,978	1,313
1,094	,766	,892	1,316	1,048	,968	1,238	1,273	1,212	,861	1,180	,563	,470	,785	,607	,715	,977	,574
1,148	,751	,951	1,378	1,109	1,028	1,301	1,335	1,189	,919	1,242	,590	,509	,766	,635	,759	1,038	,617
1,322	,603	1,128	1,592	1,302	1,227	1,512	1,544	1,033	1,085	1,435	,585	,573	,499	,619	,813	1,212	,605
1,165	,667	,957	1,415	1,129	1,064	1,340	1,372	1,122	,935	1,269	,478	,432	,588	,528	,687	1,042	,492
1,019	,897	,804	1,213	,933	,917	1,147	1,168	1,297	,804	1,077	,486	,467	,839	,516	,511	,859	,000
,575	1,448	,404	,518	,347	,458	,476	,484	1,787	,513	,448	,870	,787	1,437	,864	,632	,000	
,875	1,099	,653	,997	,730	,712	,924	,947	1,416	,633	,869	,575	,510	1,045	,514	,000		
1,047	,890	,844	1,237	,959	,910	1,158	1,188	1,197	,768	1,093	,521	,480	,804	,000			
1,531	,649	1,353	1,805	1,515	1,441	1,726	1,756	1,043	1,296	1,652	,790	,796	,000				
,940	,832	,718	1,153	,878	,825	1,080	1,110	1,279	,719	1,017	,429	,000					
1,024	,867	,824	1,230	,966	,908	1,166	1,193	1,261	,799	1,100	,000						
,566	1,666	,457	,292	,275	,483	,270	,245	1,962	,526	,000							
,680	1,323	,472	,701	,478	,446	,610	,642	1,495	,000								
1,912	1,104	1,745	2,148	1,874	1,716	2,041	2,085	,000									
,590	1,768	,511	,130	,293	,489	,153	,000										
,582	1,733	,492	,191	,295	,428	,000											
,604	1,457	,434	,559	,393	,000												
,512	1,534	,330	,331	,000													
,607	1,809	,541	,000														
,565	1,366	,000															
1,533	,000																
,000																	

Transformation: the conditional matrix and transformation for the scale of relationships.

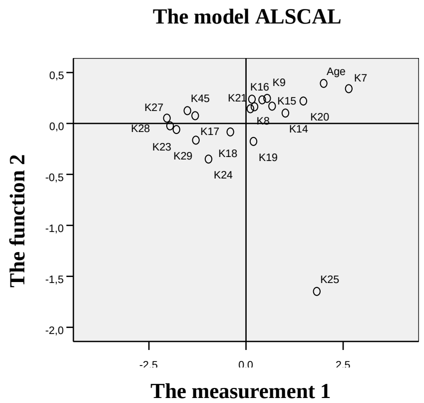
In the presented tables with the reduced and complete set of independent variables the significant anomalies in the sequence of following of nominal values is not observed, therefore it is potentially possible to carry out the visual interpretation by the means of directly building of the dendrogram.

A15.9.4. The position of a set of variables in the space of the functions of classification

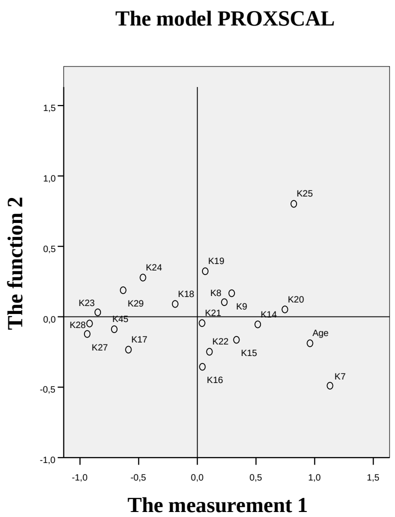
It is proposed to consider the geometric place of points, which characterize the relative position of independent variables K_i in the space of two scales.

<u>1. The reduced set of independent variables K_i.</u>

In pic. A15.161 the geometric interpretation of the position of the reduced set of independent variables in the space of two scales by the different algorithms of multidimensional scaling is presented: a – the algorithm or model “ALSCAL”; b – the algorithm or model “PROXSCAL”.



a



b

Picture A15.161. The position of independent variables in the space of two scales

The visual analysis of the obtained localities with the maximal density of distribution of the independent variables allows to distinguish directly the several groups of independent variables by the model (algorithm) “ALSCAL”:

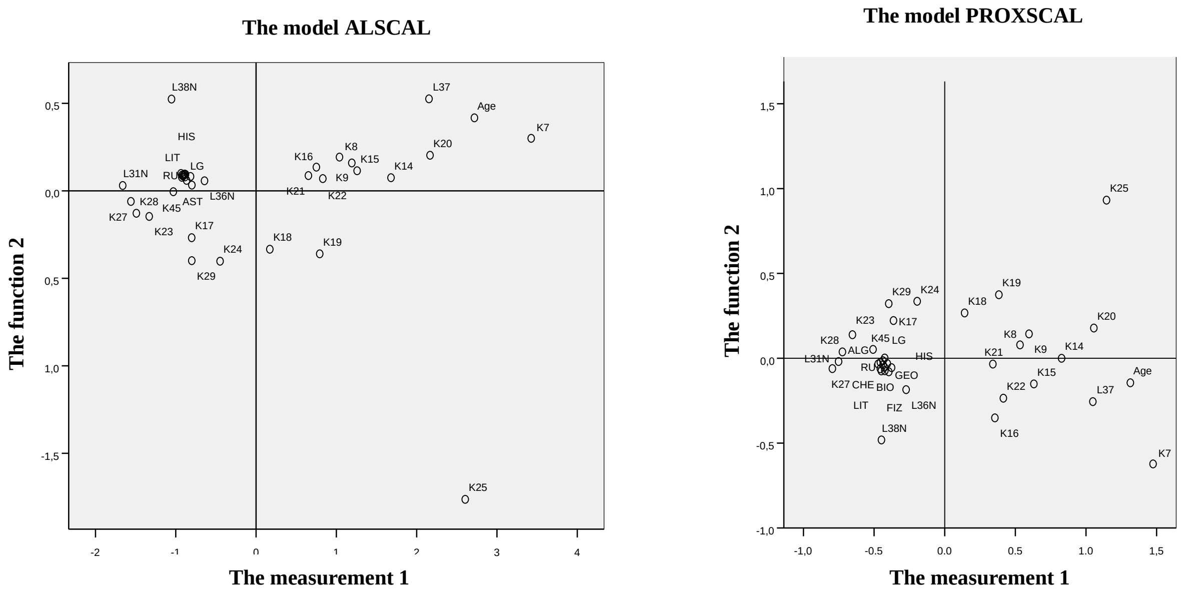
- the first group is formed by the variables K_{17}, K_{18}, K_{19}, K_{23}, K_{24}, K_{27}, K_{28}, K_{29} and K_{45};
- the second group is formed by the independent variables K_8, K_9, K_{14}, K_{15}, K_{16}, K_{20}, K_{21} and K_{22};
- the third group is formed by the independent variables Age and K_7;
- the fourth group is formed by the independent variable K_{25}.

The visual analysis of the obtained localities with the maximal density of distribution of the independent variables allows to distinguish directly the several groups of independent variables by the model (algorithm) “PROXSCAL”:

- the first group is formed by the variables K_{23}, K_{24}, K_{17}, K_{27}, K_{28}, K_{29} and K_{45};
- the second group of independent variables K_8, K_9, K_{14}, K_{15}, K_{16}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22};
- the third group is formed by the independent variables Age and K_7;
- the fourth group is formed by the independent variable K_{25}.

2. The complete set of independent variables K_i.

In pic. A15.162 the geometric interpretation of position of the complete set of independent variables in the space of two scales by the different algorithms of multidimensional scaling: a – the algorithm or model “ALSCAL”; b – the algorithm or model “PROXSCAL”.



a b

Picture A15.162. The position of independent variables in the space of two scales

The visual analysis of the obtained localities with the maximal density of distribution of the complete set of independent variables allows to distinguish directly the several groups of independent variables by the model (algorithm) “ALSCAL”:

- the first group is formed by the variables RU, LIT, LG, HIS, AST, GEO, BIO, ALG, GEOM, FIZ, CHE, SCH, K_{23}, K_{27}, K_{28}, K_{45}, L_{31N} and L_{36N};
- the second group is formed by the independent variables K_8, K_9, K_{14}, K_{15}, K_{16}, K_{21} and K_{22};
- the third group is formed by the independent variables K_{17}, K_{24} and K_{29};
- the fourth group is formed by the independent variables Age, K_7, K_{20} and L_{37};
- the fifth group is formed by the independent variables K_{18} and K_{19};
- the sixth group is formed by the independent variable K_{25};
- the seventh group is formed by the independent variable L_{38N}.

The visual analysis of the obtained localities with the maximal density of distribution of the independent variables allows to distinguish directly the several groups of independent variables by the model (algorithm) “PROXSCAL”:

- the first group is formed by the variables RU, HIS, GEOM, SCH, AST, LIT, LG, GEO, BIO, ALG, FIZ, CHE, K_{17}, K_{23}, K_{24}, K_{27}, K_{28}, K_{29}, K_{45}, L_{31N}, L_{36N} and L_{38N};
- the second group is formed by the variables K_8, K_9, K_{14}, K_{15}, K_{16}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22};
- the third group is formed by the independent variables Age and L_{37};
- the fourth group is formed by the independent variable K_{25};
- the fifth group is formed by the independent variable K_7.

A15.10. The factor analysis

The factor analysis allows to go to the new (transformed) factorized space of variable, at the same time the correlation between them is minimal.

From the point of view of the theory of probability the descriptive statistics directly characterize the main measures of central tendency of the given distribution of nominal values in the analytical samples with a posteriori data: the volume of sample, the average arithmetic (the mathematical expectation by the sample) and the standard deviation.

The main tasks, which are solved in the process of the factor analysis include:

- the studying of the structure of inter-relationships between the independent variables, at the same time the factor loads identifying the factors, which act the significant influence on the dynamics of a set of independent variables;
- the identifying of a set of the factors through the independent variables as the hidden reasons of change of the initial space of independent variables;
- the moving to the new factorized space and the calculating of the nominal values of factors, obtained on the basis of the initial set of independent variables.

In the basis of the statistical factor analysis additionally use the additional mathematical methods, which solve the problem of commonalities in-difference:

- the method of main components – it is oriented on the transition from the initial (possible) correlated set of independent variables to the new uncorrelated factorized space, that graphically (the graph of two-dimensional scattering) directly corresponds to the transition from the point with the certain coordinates in the space of initial conditionally independent variables to the identical point in the space of two axes or components (the main or main – the maximum variation and the density of distribution of the nominal values are observed; the second component – it is orthogonal to the inputted main component, directly reflecting the relative distance in relation to the main component);
- the method of non-weighted least squares – the statistical idea of method is based on the minimizing of difference between the initial and restored correlation matrixes: at-first, the commonalities are estimated through the square of the coefficient of multiple correlation (CMC); at-second, the factor loads are calculated in the basis of the factor structure, the elements of the restored correlation matrix, the difference between the squares of the original and restored coefficients is calculated.

In the process of the component analysis the basic equation of the factor analysis is solved:

$$R=A \cdot A', \text{ where}$$

R – the initial correlation matrix (contains the coefficients of correlation);
A – the matrix of component loads (contains the values of component loads);
A' – the transposed matrix of component loads directly.

$$r_{ij} = \sum_{k=1}^{M} a_{ik} a_{jk}, \text{ where}$$

i – the index of the number of variable in the correlation matrix by the line;
j – the index of the number of variable in the correlation matrix by the column;
k – the index of the number of component in the matrix of component loads (by the column);
M – the quantity of components in the matrix at the course of the factor analysis;
a_{ik} – the nominal value of component load in the ith line by the kth component;
a_{jk} – the nominal value of component load in the jth line by the kth component.

Each diagonal element of the correlation matrix is directly equal to the sum of squares of the component loads for the certain variable or one.

In the process of the factor analysis the calculation of the eigenvalues of matrix is realized:

- the sum of eigenvalues is directly equal to the quantity of initial variables;
- if any correlations between the initial variables are absent, directly all and each in individual eigenvalues are equal to one;
- the higher the correlation between the initial variables, then the greater the nominal value of the previous eigenvalues and the smaller – the subsequent values;
- all components exhaust 100% of the aggregate dispersion of independent variable;
- the eigenvalue correlated with the quantity of variables characterizes the aggregate dispersion of all variables caused by the given component (the informativity of a certain component at the carrying out of the factor analysis);
- the square of component (factor) load characterizes the share of dispersion the initial independent variable under the influence of the certain component;
- the sum of squares of the component (factor) loads is equal to one or the total dispersion of variable, which is caused by the action of all components.

For the direct calculation of the eigenvalues (the sum of factor loads by the column correlated with the quantity of variables) and commonalities (the sum of squares of the factor loads by the line) it is necessary to form the matrix of factor (component) loads.

In the process of the factor analysis the calculation of commonalities is realized directly:

- the sum of squares of the component loads by the line is equal to the commonality of variable, which directly designates the aggregative dispersion of the initial variable, caused by a certain set of all available components;
- the obtained nominal values of the recovered coefficients of correlation by the main components are less, than the initial ones on the absolute value, and on the diagonal of the formed (resulting) recovered correlation matrix there will be not ones, but the nominal values of corresponding generalities of the matrix;
- the factor structure a set of the nominal values of factor loads is presented, which are contained in the matrix of factor loads of a given size;
- the component loads (the method of analysis of the main components) differ from the factor loads (the component loads) in the coefficients of correlation of the recovered correlation matrix: $R_{recov} \rightarrow R_{init}$;

$$h_i^2 = \sum_{k=1}^{M} a_{ik}^2 \text{, where}$$

i – the number of the independent variable; k – the number of the main component.

Table A15.144

The table of factor loads of the factor analysis

The independent variables	The factors						The commonalities
	Y_1	Y_2	…	Y_k	…	Y_m	H
X_1	a_{11}	a_{12}	…	a_{1k}	…	a_{1m}	h_1
X_2	a_{21}	a_{22}	…	a_{2k}	…	a_{2m}	h_2
…	…	…	…	…	…	…	…
X_i	a_{i1}	a_{i2}	…	a_{ik}	…	a_{ik}	h_i
…	…	…	…	…	…	…	
X_n	a_{n1}	a_{n2}	…	a_{nk}	…	a_{nm}	h_n
The eigenvalue	λ_1	λ_2	…	λ_k	…	λ_m	

The presented table allows to calculate directly the degree of influence of the variation of certain factor on the dispersion of a set of independent variables.

A15.10.1. The determining of the quality of factors

The principal value has the quantity of factors, used for the factor analysis, so the several criteria of estimation of the optimal quantity of factors are distinguished:

- the criterion of Kaiser – the quantity of factors (components) is determined by the quantity of factors (components), the eigenvalue of which is greater or equal, than one;
- the criterion of Kettell – requires the building of the graph of two-dimensional scattering in the space of nominal values of the quantity of factors and the nominal values of eigenvalues, at the same time the quantity of factors (components) for the factor analysis is determined by the point of sharp inflection of the resulting curve (K-1, K, K + 1 – the resulting quantity of factors for the purposes of the factor analysis).

A15.10.2. The solving of the problem of commonality and characterization

The problem of analysis of the commonality and characterization of variable is came down to the consideration:

- the commonality – the aggregative one dispersion of certain independent variable it is explained by the presented set of common factors, at the same time the sum of squares of the factor loads explains the aggregative dispersion of variable;
- the characterization – caused by the systematic and other errors of measurement.

$$h_i^2 + e_i^2 = 1.$$

The total dispersion of all given independent variables, caused by the action of certain factor correlated with the total quantity of independent variables is called the informativity of factor, which directly characterizes the dispersion of a presented set of variables under the influence of factor.

A15.10.3. The completeness of factored space

Under the completeness of factorization means the total sum of squares of the factor loads, and also the sum of squares of the communities or the sum of squares of the eigenvalues, that allows to estimate directly the quality of carrying out of the factor analysis:

$$V = \sum_{k=1}^{M} V_k = \frac{1}{P}\sum_{k=1}^{M} \lambda_k = \frac{1}{P}\sum_{i=1}^{P} h_i^2 = \frac{1}{P}\sum_{k=1}^{M}\sum_{i=1}^{P} a_{ik}^2 \text{, where}$$

V_k – the power of factor with the number k (the quantity of explained independent variables);
λ_k – the eigenvalue of factor k (the decomposing of component loads by the column);
h_i^2 – the commonality of independent variable i (the decomposing of component loads by the line);
a_{ik}^2 – the influence of factor k on the independent variable i (the share of explained dispersion);
M – the quantity of factors (the completeness of final factorized space);
P – the quantity of independent variables (the completeness of initial space).

If the completeness of factorization is less than or equal to 0,7, then there is a necessity of reducing of a set of independent variables or the increasing of the quantity of factors.

A15.10.4. The descriptive statistics of the initial set of variables

The obtained descriptive statistics of the initial reduced and complete set of independent variables is presented directly in table A15.145.

Table A15.145

The descriptive statistics of source independent variables

The reduced set of independent variables K_i				The complete set of independent variables K_i			
	The average	The std. dev.	The analysis of N		The average	The std. dev.	The analysis of N
Age	18,2357	2,63043	280	Age	18,2357	2,63043	280
K_7	20,8750	2,58520	280	RU	4,0929	0,63242	280
K_8	11,8000	3,39344	280	LIT	4,2214	0,66740	280
K_9	12,2857	3,57367	280	LG	4,3286	0,64971	280
K_{14}	14,4393	2,27734	280	HIS	4,3321	0,56831	280
K_{15}	12,9893	2,07128	280	GEO	4,4250	0,61179	280
K_{16}	10,7821	3,70494	280	BIO	4,3750	0,58544	280
K_{17}	4,7357	2,70566	280	ALG	4,2714	0,68620	280
K_{18}	8,6643	3,99572	280	GEOM	4,2929	0,70326	280
K_{19}	10,9393	3,86973	280	FIZ	4,2321	0,66103	280
K_{20}	16,0107	3,53019	280	CHE	4,1929	0,69196	280
K_{21}	10,6643	2,46295	280	SCH	4,5643	0,53829	280
K_{22}	11,1107	3,46388	280	AST	4,6500	0,50694	280
K_{23}	2,7358	1,95114	280	K_7	20,8750	2,58520	280
K_{24}	6,1414	3,31835	280	K_8	11,8000	3,39344	280
K_{25}	17,2535	8,32087	280	K_9	12,2857	3,57367	280
K_{27}	1,7154	,93370	280	K_{14}	14,4393	2,27734	280
K_{28}	2,0413	1,35692	280	K_{15}	12,9893	2,07128	280
K_{29}	4,8426	3,05680	280	K_{16}	10,7821	3,70494	280
K_{45}	3,7929	1,16703	280	K_{17}	4,7357	2,70566	280
				K_{18}	8,6643	3,99572	280
				K_{19}	10,9393	3,86973	280
				K_{20}	16,0107	3,53019	280
				K_{21}	10,6643	2,46295	280
				K_{22}	11,1107	3,46388	280
				K_{23}	2,7358	1,95114	280
				K_{24}	6,1414	3,31835	280
				K_{25}	17,2535	8,32087	280
				K_{27}	1,7154	0,93370	280
				K_{28}	2,0413	1,35692	280
				K_{29}	4,8426	3,05680	280
				K_{45}	3,7929	1,16703	280
				L_{31N}	1,3214	0,46786	280
				L_{36N}	5,4536	1,79145	280
				L_{37}	15,83	4,340	280
				L_{38N}	4,4071	4,04082	280

A15.10.5. The common and reciprocal correlation matrix

The matrix of given component (factor) loads allows to go to the direct and reciprocal correlation matrix based on the reduced set of independent variables (tabl. A15.146, A15.147) and the complete set of independent variables (tabl. A15.148, A15.149).

1. The reduced set of independent variables K_i.

Table A15.146

The common correlation matrix of the reduced set of variables

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The correlation	Age	1,000	-0,092	-0,009	0,002	-0,159	-0,153	-0,216	-0,260	-0,265	-0,293	-0,214	-0,107	-0,124	-0,127	-0,115	-0,115	-0,180	-0,050	-0,071	-0,314
	K7	-0,092	1,000	0,120	0,135	0,020	0,013	0,072	0,003	0,058	0,046	-0,026	-0,100	0,056	-0,032	0,041	0,026	-0,010	0,028	0,076	0,045
	K8	-0,009	0,120	1,000	0,944	-0,045	0,122	0,123	0,095	0,050	0,050	-0,069	0,200	0,070	-0,023	0,112	0,129	0,059	0,122	0,167	-0,009
	K9	0,002	0,135	0,944	1,000	-0,058	0,109	0,074	0,079	0,047	0,043	-0,083	0,183	0,068	-0,038	0,095	0,123	0,043	0,088	0,155	0,005
	K14	-0,159	0,020	-0,045	-0,058	1,000	0,220	0,387	0,292	0,443	0,309	0,160	0,217	0,267	0,165	0,166	0,192	0,187	0,063	0,069	0,195
	K15	-0,153	0,013	0,122	0,109	0,220	1,000	0,382	0,312	0,349	0,242	0,111	0,261	0,262	0,027	0,065	0,090	0,067	0,012	0,050	0,180
	K16	-0,216	0,072	0,123	0,074	0,387	0,382	1,000	0,287	0,535	0,348	0,158	0,243	0,359	0,062	0,034	0,106	0,158	-0,034	-0,032	0,325
	K17	-0,260	0,003	0,095	0,079	0,292	0,312	0,287	1,000	0,495	0,403	0,103	0,379	0,361	0,099	0,099	0,203	0,167	0,065	0,116	0,174
	K18	-0,265	0,058	0,050	0,047	0,443	0,349	0,535	0,495	1,000	0,568	0,204	0,393	0,386	0,121	0,194	0,272	0,300	0,157	0,177	0,394
	K19	-0,293	0,046	0,050	0,043	0,309	0,242	0,348	0,403	0,568	1,000	0,284	0,257	0,295	0,148	0,297	0,364	0,259	0,182	0,139	0,313
	K20	-0,214	-0,026	-0,069	-0,083	0,160	0,111	0,158	0,103	0,204	0,284	1,000	0,151	0,191	0,080	0,130	0,115	0,202	0,052	0,041	0,243
	K21	-0,107	-0,100	0,200	0,183	0,217	0,261	0,243	0,379	0,393	0,257	0,151	1,000	0,312	0,012	0,076	0,092	0,135	0,071	0,102	0,098
	K22	-0,124	0,056	0,070	0,068	0,267	0,262	0,359	0,361	0,386	0,295	0,191	0,312	1,000	0,073	0,125	0,126	0,202	0,066	0,132	0,184
	K23	-0,127	-0,032	-0,023	-0,038	0,165	0,027	0,062	0,099	0,121	0,148	0,080	0,012	0,073	1,000	0,541	0,419	0,408	0,187	0,102	0,210
	K24	-0,115	0,041	0,112	0,095	0,166	0,065	0,034	0,099	0,194	0,297	0,130	0,076	0,125	0,541	1,000	0,849	0,415	0,397	0,397	0,239
	K25	-0,115	0,026	0,129	0,123	0,192	0,090	0,106	0,203	0,272	0,364	0,115	0,092	0,126	0,419	0,849	1,000	0,409	0,447	0,512	0,267
	K27	-0,180	-0,010	0,059	0,043	0,187	0,067	0,158	0,167	0,300	0,259	0,202	0,135	0,202	0,408	0,415	0,409	1,000	0,461	0,556	0,249
	K28	-0,050	0,028	0,122	0,088	0,063	0,012	-0,034	0,065	0,157	0,182	0,052	0,071	0,066	0,187	0,397	0,447	0,461	1,000	0,741	0,053
	K29	-0,071	0,076	0,167	0,155	0,069	0,050	-0,032	0,116	0,177	0,139	0,041	0,102	0,132	0,102	0,397	0,512	0,556	0,741	1,000	0,131
	K45	-0,314	0,045	-0,009	0,005	0,195	0,180	0,325	0,174	0,394	0,313	0,243	0,098	0,184	0,210	0,239	0,267	0,249	0,053	0,131	1,000
The value (one-sided)	Age		0,063	0,442	0,484	0,004	0,005	0,000	0,000	0,000	0,000	0,000	0,037	0,019	0,017	0,027	0,027	0,001	0,204	0,118	0,000
	K7	0,063		0,022	0,012	0,367	0,413	0,115	0,477	0,165	0,223	0,331	0,047	0,175	0,297	0,245	0,330	0,436	0,319	0,103	0,227
	K8	0,442	0,022		0,000	0,226	0,021	0,020	0,056	0,202	0,200	0,125	0,000	0,121	0,353	0,031	0,015	0,161	0,021	0,003	0,442
	K9	0,484	0,012	0,000		0,166	0,034	0,108	0,094	0,215	0,238	0,082	0,001	0,129	0,265	0,056	0,020	0,234	0,071	0,005	0,468
	K14	0,004	0,367	0,226	0,166		0,000	0,000	0,000	0,000	0,000	0,004	0,000	0,000	0,003	0,003	0,001	0,001	0,146	0,125	0,001
	K15	0,005	0,413	0,021	0,034	0,000		0,000	0,000	0,000	0,000	0,032	0,000	0,000	0,328	0,141	0,066	0,133	0,418	0,201	0,001
	K16	0,000	0,115	0,020	0,108	0,000	0,000		0,000	0,000	0,000	0,004	0,000	0,000	0,150	0,283	0,039	0,004	0,287	0,296	0,000
	K17	0,000	0,477	0,056	0,094	0,000	0,000	0,000		0,000	0,000	0,042	0,000	0,000	0,049	0,048	0,000	0,003	0,140	0,026	0,002
	K18	0,000	0,165	0,202	0,215	0,000	0,000	0,000	0,000		0,000	0,000	0,000	0,000	0,022	0,001	0,000	0,000	0,004	0,001	0,000
	K19	0,000	0,223	0,200	0,238	0,000	0,000	0,000	0,000	0,000		0,000	0,000	0,000	0,007	0,000	0,000	0,000	0,001	0,010	0,000
	K20	0,000	0,331	0,125	0,082	0,004	0,032	0,004	0,042	0,000	0,000		0,006	0,001	0,091	0,015	0,027	0,000	0,192	0,248	0,000
	K21	0,037	0,047	0,000	0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,006		0,000	0,419	0,103	0,062	0,012	0,117	0,044	0,051
	K22	0,019	0,175	0,121	0,129	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,000		0,110	0,018	0,018	0,000	0,134	0,014	0,001
	K23	0,017	0,297	0,353	0,265	0,003	0,328	0,150	0,049	0,022	0,007	0,091	0,419	0,110		0,000	0,000	0,000	0,001	0,044	0,000
	K24	0,027	0,245	0,031	0,056	0,003	0,141	0,283	0,048	0,001	0,000	0,015	0,103	0,018	0,000		0,000	0,000	0,000	0,000	0,000
	K25	0,027	0,330	0,015	0,020	0,001	0,066	0,039	0,000	0,000	0,000	0,027	0,062	0,018	0,000	0,000		0,000	0,000	0,000	0,000
	K27	0,001	0,436	0,161	0,234	0,001	0,133	0,004	0,003	0,000	0,000	0,000	0,012	0,000	0,000	0,000	0,000		0,000	0,000	0,000
	K28	0,204	0,319	0,021	0,071	0,146	0,418	0,287	0,140	0,004	0,001	0,192	0,117	0,134	0,001	0,000	0,000	0,000		0,000	0,191
	K29	0,118	0,103	0,003	0,005	0,125	0,201	0,296	0,026	0,001	0,010	0,248	0,044	0,014	0,044	0,000	0,000	0,000	0,000		0,014
	K45	0,000	0,227	0,442	0,468	0,001	0,001	0,000	0,002	0,000	0,000	0,000	0,051	0,001	0,000	0,000	0,000	0,000	0,191	0,014	

Table A15.147

The reciprocal correlation matrix of the reduced set of variables

	Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
Age	1,237	0,099	0,053	-0,071	0,005	0,029	0,065	0,218	-0,015	0,172	0,131	-0,023	-0,082	0,051	0,079	-0,168	0,067	-0,022	0,039	0,252
K7	0,099	1,083	0,075	-0,226	-0,010	0,033	-0,082	0,017	-0,079	-0,030	0,030	0,200	-0,056	0,041	-0,177	0,177	0,112	0,052	-0,181	0,008
K8	0,053	0,075	9,922	-9,237	0,108	0,010	-0,917	-0,259	0,447	0,035	-0,067	-0,226	0,206	0,000	-0,596	0,497	0,073	-0,472	-0,066	0,303
K9	-0,071	-0,226	-9,237	9,735	0,041	-0,086	0,744	0,221	-0,328	-0,041	0,182	-0,022	-0,192	0,073	0,488	-0,547	-0,048	0,484	-0,091	-0,264
K14	0,005	-0,010	0,108	0,041	10,361	-0,024	-0,289	-0,087	-0,321	-0,032	-0,049	-0,052	-0,063	-0,108	-0,063	-0,035	-0,005	0,028	-0,011	0,064
K15	0,029	0,033	0,010	-0,086	-0,024	1,286	-0,327	-0,180	-0,109	-0,019	-0,028	-0,099	-0,067	0,004	-0,118	0,121	0,127	0,049	-0,118	-0,027
K16	0,065	-0,082	-0,917	0,744	-0,289	-0,327	1,825	0,152	-0,576	-0,034	0,026	0,020	-0,283	0,025	0,461	-0,377	-0,196	0,034	0,388	-0,230
K17	0,218	0,017	-0,259	0,221	-0,087	-0,180	0,152	1,619	-0,416	-0,219	0,099	-0,269	-0,267	-0,132	0,474	-0,457	0,013	0,121	-0,033	0,097
K18	-0,015	-0,079	0,447	-0,328	-0,321	-0,109	-0,576	-0,416	2,391	-0,614	0,066	-0,342	-0,082	0,094	0,055	-0,043	-0,184	-0,136	-0,018	-0,337
K19	0,172	-0,030	0,035	-0,041	-0,032	-0,019	-0,034	-0,219	-0,614	1,778	-0,224	-0,003	-0,073	0,135	-0,026	-0,437	-0,086	-0,242	0,377	-0,052
K20	0,131	0,030	-0,067	0,182	-0,049	-0,028	0,026	0,099	0,066	-0,224	1,200	-0,109	-0,120	0,093	-0,078	0,034	-0,197	-0,021	0,133	-0,165
K21	-0,023	0,200	-0,226	-0,022	-0,052	-0,099	0,020	-0,269	-0,342	-0,003	-0,109	1,394	-0,168	0,062	-0,149	0,196	0,005	0,018	-0,064	0,084
K22	-0,082	-0,056	0,206	-0,192	-0,063	-0,067	-0,283	-0,267	-0,082	-0,073	-0,120	-0,168	1,377	0,013	-0,261	0,292	-0,051	0,101	-0,207	0,006
K23	0,051	0,041	0,000	0,073	-0,108	0,004	0,025	-0,132	0,094	0,135	0,093	0,062	0,013	1,721	-0,899	0,043	-0,622	-0,199	0,635	-0,137
K24	0,079	-0,177	-0,596	0,488	-0,063	-0,118	0,461	0,474	0,055	-0,026	-0,078	-0,149	-0,261	-0,899	4,586	-3,585	-0,249	-0,231	0,481	-0,045
K25	-0,168	0,177	0,497	-0,547	-0,035	0,121	-0,377	-0,457	-0,043	-0,437	0,034	0,196	0,292	0,043	-3,585	4,720	0,341	0,100	-1,219	-0,136
K27	0,067	0,112	0,073	-0,048	-0,005	0,127	-0,196	0,013	-0,184	-0,086	-0,197	0,005	-0,051	-0,622	-0,249	0,341	1,984	-0,024	-1,055	-0,043
K28	-0,022	0,052	-0,472	0,484	0,028	0,049	0,034	0,121	-0,136	-0,242	-0,021	0,018	0,101	-0,199	-0,231	0,100	-0,024	2,425	-1,728	0,227
K29	0,039	-0,181	-0,066	-0,091	-0,011	-0,118	0,388	-0,033	-0,018	0,377	0,133	-0,064	-0,207	0,635	0,481	-1,219	-1,055	-1,728	3,302	-0,178
K45	0,252	0,008	0,303	-0,264	0,064	-0,027	-0,230	0,097	-0,337	-0,052	-0,165	0,084	0,006	-0,137	-0,045	-0,136	-0,043	0,227	-0,178	1,411

The reciprocal correlation matrix is formed directly on the basis of the correlation matrix in the following order (the sequence of steps):

- the direct correlation matrix (polynom) is formed and written;
- the direct correlation matrix is formed directly based on the analytical coefficients system of Pearson, Kettel and Kendall;
- writing the complete attached matrix by the method of the direct correlation matrix and the attached (to the left) identity matrix;
- by the method of sequential permutations of Gauss J., a sequence of transformations is carried out for the obtaining of identity matrix (on the right): the multiplying on the certain number, the addition of linearly independent rows or columns (the linear dependence of the presented linear combination of rows or columns causes the degeneracy of the result of subtraction or addition – the rank or determinants as the number of linearly independent columns or rows is zero);
- it is permissible to convert the direct correlation matrix into the reciprocal by the means of using of the transposed correlation matrix.

2.The complete set of independent variables K_i.

Table A15.148

The common correlation matrix of the complete set of variables

		Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
The correlation	Age	1,000	-,136	-,089	-,207	-,110	-,123	-,127	-,226	-,196	-,139	-,124	-,008	-,056	-,092	-,009	,002	-,159	-,153	-,216	-,260	-,265	-,293	-,214	-,107	-,124	-,127	-,115	-,115	-,180	-,050	-,071	-,314	,029	,011	-,101	,017
	RU	-,136	1,000	,664	,527	,472	,398	,516	,611	,559	,557	,557	,309	,135	,029	-,025	-,040	,173	,107	,182	,060	,217	,137	,232	,098	,012	,050	,100	,162	,072	,054	,031	,216	-,029	,061	,136	-,127
	LIT	-,089	,664	1,000	,567	,618	,506	,566	,549	,579	,606	,582	,329	,166	,037	-,061	-,063	,056	,017	,125	-,045	,119	,068	,217	,015	-,085	-,021	,057	,089	,074	,027	,044	,096	-,091	-,006	,031	-,120
	LG	-,207	,527	,567	1,000	,567	,369	,429	,507	,502	,481	,496	,196	,231	,018	,025	,024	,207	,088	,299	,099	,239	,190	,222	,024	,009	,064	,140	,195	,170	,132	,117	,350	-,101	-,067	,039	-,114
	HIS	-,110	,472	,618	,567	1,000	,500	,572	,467	,563	,576	,557	,322	,218	,002	-,049	-,050	,111	,064	,225	,062	,191	,169	,193	-,002	-,066	,081	,125	,143	,148	,054	,022	,131	-,066	-,053	,126	-,103
	GEO	-,123	,398	,506	,369	,500	1,000	,524	,330	,434	,491	,458	,358	,216	-,012	-,018	-,036	,056	,086	,149	,057	,133	,064	,112	,043	,027	,031	,138	,144	,156	,054	,066	,139	,047	,039	,047	-,051
	BIO	-,127	,516	,566	,429	,572	,524	1,000	,459	,516	,543	,555	,384	,178	,064	-,099	-,111	,134	,057	,130	,067	,163	,129	,171	,050	,061	,071	,094	,107	,121	,037	,028	,109	,016	,001	,042	-,066
	ALG	-,226	,611	,549	,507	,467	,330	,459	1,000	,785	,682	,584	,321	,192	,021	-,007	-,005	,176	,100	,176	,108	,249	,219	,231	,164	,061	,002	,052	,111	,095	,132	,137	,191	-,005	-,080	,126	-,045
	GEOM	-,196	,559	,579	,502	,563	,434	,516	,785	1,000	,717	,635	,414	,238	,006	-,020	-,013	,145	,115	,227	,111	,234	,242	,217	,119	,038	-,015	,047	,095	,123	,088	,065	,192	,029	-,046	,142	-,062
	FIZ	-,139	,557	,606	,481	,576	,491	,543	,682	,717	1,000	,599	,346	,265	,053	-,037	-,030	,146	,083	,185	,083	,220	,193	,217	,129	,022	-,008	,044	,083	,058	,087	,038	,100	-,034	-,050	,100	-,128
	CHE	-,124	,557	,582	,496	,557	,458	,555	,584	,635	,599	1,000	,352	,183	,076	-,067	-,067	,194	,061	,151	-,011	,180	,182	,131	,002	-,021	,040	,094	,126	,133	,115	,067	,161	-,004	-,025	,118	-,123
	SCH	-,008	,309	,329	,196	,322	,358	,384	,321	,414	,346	,352	1,000	,122	,110	-,013	-,019	-,019	-,049	,082	-,023	,060	,032	,035	,146	,066	-,034	,035	,029	,080	,066	,042	,073	,103	,038	,051	-,047
	AST	-,056	,135	,166	,231	,218	,216	,178	,192	,238	,265	,183	,122	1,000	,117	,101	,073	,022	,075	,114	,029	,051	,044	,128	,046	-,031	,119	,165	,103	,047	-,019	,060	-,014	,038	,033	,050	-,161
	K7	-,092	,029	,037	,018	,002	-,012	,064	,021	,006	,053	,076	,110	,117	1,000	,120	,135	,020	,013	,072	,003	,058	,046	-,026	-,100	,056	-,032	,041	,026	-,010	,028	,076	,045	,066	,040	,023	,014
	K8	-,009	-,025	-,061	,025	-,049	-,018	-,099	-,007	-,020	-,037	-,067	-,013	,101	,120	1,000	,944	-,045	,122	,123	,095	,050	,050	-,069	,200	,070	-,023	,112	,129	,059	,122	,167	-,009	-,014	-,073	,181	-,058
	K9	,002	-,040	-,063	,024	-,050	-,036	-,111	-,005	-,013	-,030	-,067	-,019	,073	,135	,944	1,000	-,058	,109	,074	,079	,047	,043	-,083	,183	,068	-,038	,095	,123	,043	,088	,155	,005	-,006	-,061	,147	-,049
	K14	-,159	,173	,056	,207	,111	,056	,134	,176	,145	,146	,194	-,019	,022	,020	-,045	-,058	1,000	,220	,387	,292	,443	,309	,160	,217	,267	,165	,166	,192	,187	,063	,069	,195	-,146	-,020	,018	-,025
	K15	-,153	,107	,017	,088	,064	,086	,057	,100	,115	,083	,061	-,049	,075	,013	,122	,109	,220	1,000	,382	,312	,349	,242	,111	,261	,262	,027	,065	,090	,067	,012	,050	,180	,118	-,003	-,002	-,059
	K16	-,216	,182	,125	,299	,225	,149	,130	,176	,227	,185	,151	,082	,114	,072	,123	,074	,387	,382	1,000	,287	,535	,348	,158	,243	,359	,062	,034	,106	,158	-,034	-,032	,325	,072	-,008	,047	-,075
	K17	-,260	,060	-,045	,099	,062	,057	,067	,108	,111	,083	-,011	-,023	,029	,003	,095	,079	,292	,312	,287	1,000	,495	,403	,103	,379	,361	,099	,099	,203	,167	,065	,116	,174	,132	-,044	,089	,021
	K18	-,265	,217	,119	,239	,191	,133	,163	,249	,234	,220	,180	,060	,051	,058	,050	,047	,443	,349	,535	,495	1,000	,568	,204	,393	,386	,121	,194	,272	,300	,157	,177	,394	,096	-,036	,041	-,105
	K19	-,293	,137	,068	,190	,169	,064	,129	,219	,242	,193	,182	,032	,044	,046	,050	,043	,309	,242	,348	,403	,568	1,000	,284	,257	,295	,148	,297	,364	,259	,182	,139	,313	,084	-,128	,062	-,098

The continuation of tabl. A15.148

The value (one-sided)																								
CHE	FIZ	GEOM	ALG	BIO	GEO	HIS	LG	LIT	RU	Age	L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20
,019	,010	,000	,000	,017	,020	,033	,000	,069	,011		,017	-,101	,011	,029	-,314	-,071	-,050	-,180	-,115	-,115	-,127	-,124	-,107	-,214
,000	,000	,000	,000	,000	,000	,000	,000	,000		,011	-,127	,136	,061	-,029	,216	,031	,054	,072	,162	,100	,050	,012	,098	,232
,000	,000	,000	,000	,000	,000	,000	,000		,000	,069	-,120	,031	-,006	-,091	,096	,044	,027	,074	,089	,057	-,021	-,085	,015	,217
,000	,000	,000	,000	,000	,000	,000		,000	,000	,000	-,114	,039	-,067	-,101	,350	,117	,132	,170	,195	,140	,064	,009	,024	,222
,000	,000	,000	,000	,000	,000		,000	,000	,000	,033	-,103	,126	-,053	-,066	,131	,022	,054	,148	,143	,125	,081	-,066	-,002	,193
,000	,000	,000	,000	,000		,000	,000	,000	,000	,020	-,051	,047	,039	,047	,139	,066	,054	,156	,144	,138	,031	,027	,043	,112
,000	,000	,000	,000		,000	,000	,000	,000	,000	,017	-,066	,042	,001	,016	,109	,028	,037	,121	,107	,094	,071	,061	,050	,171
,000	,000	,000		,000	,000	,000	,000	,000	,000	,000	-,045	,126	-,080	-,005	,191	,137	,132	,095	,111	,052	,002	,061	,164	,231
,000	,000		,000	,000	,000	,000	,000	,000	,000	,000	-,062	,142	-,046	,029	,192	,065	,088	,123	,095	,047	-,015	,038	,119	,217
,000		,000	,000	,000	,000	,000	,000	,000	,000	,010	-,128	,100	-,050	-,034	,100	,038	,087	,058	,083	,044	-,008	,022	,129	,217
	,000	,000	,000	,000	,000	,000	,000	,000	,000	,019	-,123	,118	-,025	-,004	,161	,067	,115	,133	,126	,094	,040	-,021	,002	,131
,000	,000	,000	,000	,000	,000	,000	,001	,000	,000	,446	-,047	,051	,038	,103	,073	,042	,066	,080	,029	,035	-,034	,066	,146	,035
,001	,000	,000	,001	,001	,000	,000	,000	,003	,012	,174	-,161	,050	,033	,038	-,014	,060	-,019	,047	,103	,165	,119	-,031	,046	,128
,104	,190	,457	,362	,142	,423	,490	,381	,269	,314	,063	,014	,023	,040	,066	,045	,076	,028	-,010	,026	,041	-,032	,056	-,100	-,026
,130	,270	,367	,451	,049	,385	,207	,338	,154	,340	,442	-,058	,181	-,073	-,014	-,009	,167	,122	,059	,129	,112	-,023	,070	,200	-,069
,131	,310	,411	,464	,031	,274	,200	,343	,148	,251	,484	-,049	,147	-,061	-,006	,005	,155	,088	,043	,123	,095	-,038	,068	,183	-,083
,001	,007	,007	,002	,012	,176	,032	,000	,175	,002	,004	-,025	,018	-,020	-,146	,195	,069	,063	,187	,192	,166	,165	,267	,217	,160
,153	,083	,027	,047	,173	,076	,143	,071	,387	,036	,005	-,059	-,002	-,003	,118	,180	,050	,012	,067	,090	,065	,027	,262	,261	,111
,006	,001	,000	,002	,015	,006	,000	,000	,018	,001	,000	-,075	,047	-,008	,072	,325	-,032	-,034	,158	,106	,034	,062	,359	,243	,158
,428	,084	,032	,035	,131	,170	,151	,050	,227	,157	,000	,021	,089	-,044	,132	,174	,116	,065	,167	,203	,099	,099	,361	,379	,103
,001	,000	,000	,000	,003	,013	,001	,000	,023	,000	,000	-,105	,041	-,036	,096	,394	,177	,157	,300	,272	,194	,121	,386	,393	,204
,001	,001	,000	,000	,016	,143	,002	,001	,130	,011	,000	-,098	,062	-,128	,084	,313	,139	,182	,259	,364	,297	,148	,295	,257	,284
,014	,000	,000	,000	,002	,030	,001	,000	,000	,000	,000	-,040	,055	-,102	,015	,243	,041	,052	,202	,115	,130	,080	,191	,151	1,000
,484	,015	,023	,003	,201	,238	,487	,342	,402	,050	,037	-,024	,139	,027	,110	,098	,102	,071	,135	,092	,076	,012	,312	1,000	,151
,364	,359	,263	,154	,156	,328	,135	,439	,078	,423	,019	-,011	,008	-,036	,595	,184	,132	,066	,202	,126	,125	,073	1,000	,312	,191
,252	,445	,404	,486	,117	,305	,089	,142	,361	,204	,017	,024	-,028	-,038	,013	,210	,102	,187	,408	,419	,541	1,000	,073	,012	,080
,059	,233	,216	,192	,058	,010	,018	,009	,171	,048	,027	-,080	,030	-,081	-,003	,239	,397	,397	,415	,849	1,000	,541	,125	,076	,130
,018	,084	,055	,032	,037	,008	,008	,001	,069	,003	,027	-,089	,060	-,070	-,082	,267	,512	,447	,409	1,000	,849	,419	,126	,092	,115
,013	,167	,020	,055	,022	,005	,006	,002	,108	,114	,001	-,006	-,035	-,079	,074	,249	,556	,461	1,000	,409	,415	,408	,202	,135	,202
,027	,074	,071	,014	,268	,183	,185	,013	,329	,184	,204	-,008	,012	-,055	,017	,053	,741	1,000	,461	,447	,397	,187	,066	,071	,052
,131	,264	,141	,011	,319	,136	,359	,025	,231	,300	,118	,007	-,003	-,028	-,007	,131	1,000	,741	,556	,512	,397	,102	,132	,102	,041
,004	,048	,001	,001	,034	,010	,014	,000	,055	,000	,000	-,040	,004	-,078	-,002	1,000	,131	,053	,249	,267	,239	,210	,184	,098	,243
,474	,288	,316	,468	,393	,217	,136	,046	,064	,317	,317	,048	-,003	-,012	1,000	-,002	-,007	,017	,074	-,082	-,003	,013	,595	,110	,015
,341	,203	,221	,091	,491	,256	,186	,132	,458	,155	,424	-,128	-,077	1,000	-,012	-,078	-,028	-,055	-,079	-,070	-,081	-,038	-,036	,027	-,102
,024	,048	,009	,017	,243	,216	,018	,260	,300	,011	,045	,023	1,000	-,077	-,003	,004	-,003	,012	-,035	,060	,030	-,028	,008	,139	,055
,020	,016	,149	,226	,134	,196	,043	,028	,022	,017	,391	1,000	,023	-,128	,048	-,040	,007	-,008	-,006	-,089	-,080	,024	-,011	-,024	-,040

The completion of tabl. A15.148

L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16	K15	K14	K9	K8	K7	AST	SCH
,391	,045	,424	,317	,000	,118	,204	,001	,027	,027	,017	,019	,037	,000	,000	,000	,000	,000	,005	,004	,484	,442	,063	,174	,446
,017	,011	,155	,317	,000	,300	,184	,114	,003	,048	,204	,423	,050	,000	,011	,000	,157	,001	,036	,002	,251	,340	,314	,012	,000
,022	,300	,458	,064	,055	,231	,329	,108	,069	,171	,361	,078	,402	,000	,130	,023	,227	,018	,387	,175	,148	,154	,269	,003	,000
,028	,260	,132	,046	,000	,025	,013	,002	,001	,009	,142	,439	,342	,000	,001	,000	,050	,000	,071	,000	,343	,338	,381	,000	,001
,043	,018	,186	,136	,014	,359	,185	,006	,008	,018	,089	,135	,487	,001	,002	,001	,151	,000	,143	,032	,200	,207	,490	,000	,000
,196	,216	,256	,217	,010	,136	,183	,005	,008	,010	,305	,328	,238	,030	,143	,013	,170	,006	,076	,176	,274	,385	,423	,000	,000
,134	,243	,491	,393	,034	,319	,268	,022	,037	,058	,117	,156	,201	,002	,016	,003	,131	,015	,173	,012	,031	,049	,142	,001	,000
,226	,017	,091	,468	,001	,011	,014	,055	,032	,192	,486	,154	,003	,000	,000	,000	,035	,002	,047	,002	,464	,451	,362	,001	,000
,149	,009	,221	,316	,001	,141	,071	,020	,055	,216	,404	,263	,023	,000	,000	,000	,032	,000	,027	,007	,411	,367	,457	,000	,000
,016	,048	,203	,288	,048	,264	,074	,167	,084	,233	,445	,359	,015	,000	,001	,000	,084	,001	,083	,007	,310	,270	,190	,000	,000
,020	,024	,341	,474	,004	,131	,027	,013	,018	,059	,252	,364	,484	,014	,001	,001	,428	,006	,153	,001	,131	,130	,104	,001	,000
,218	,196	,261	,043	,113	,242	,135	,091	,312	,283	,286	,134	,007	,283	,297	,158	,352	,087	,206	,377	,376	,417	,033	,021	
,003	,203	,289	,264	,408	,160	,377	,214	,042	,003	,023	,303	,221	,016	,232	,195	,314	,029	,106	,358	,111	,046	,025		,021
,409	,353	,252	,136	,227	,103	,319	,436	,330	,245	,297	,175	,047	,331	,223	,165	,477	,115	,413	,367	,012	,022		,025	,033
,168	,001	,112	,411	,442	,003	,021	,161	,015	,031	,353	,121	,000	,125	,200	,202	,056	,020	,021	,226	,000		,022	,046	,417
,209	,007	,154	,461	,468	,005	,071	,234	,020	,056	,265	,129	,001	,082	,238	,215	,094	,108	,034	,166		,000	,012	,111	,376
,339	,384	,369	,007	,001	,125	,146	,001	,001	,003	,003	,000	,000	,004	,000	,000	,000	,000	,000		,166	,226	,367	,358	,377
,163	,488	,483	,024	,001	,201	,418	,133	,066	,141	,328	,000	,000	,032	,000	,000	,000	,000		,000	,034	,021	,413	,106	,206
,106	,217	,449	,116	,000	,296	,287	,004	,039	,283	,150	,000	,000	,004	,000	,000	,000		,000	,000	,108	,020	,115	,029	,087
,365	,069	,232	,013	,002	,026	,140	,003	,000	,048	,049	,000	,000	,042	,000	,000		,000	,000	,000	,094	,056	,477	,314	,352
,040	,250	,276	,054	,000	,001	,004	,000	,000	,001	,022	,000	,000	,000	,000		,000	,000	,000	,000	,215	,202	,165	,195	,158
,050	,151	,016	,080	,000	,010	,001	,000	,000	,000	,007	,000	,000	,000		,000	,000	,000	,000	,000	,238	,200	,223	,232	,297
,254	,179	,045	,400	,000	,248	,192	,000	,027	,015	,091	,001	,006		,000	,000	,042	,004	,032	,004	,082	,125	,331	,016	,283
,347	,010	,329	,034	,051	,044	,117	,012	,062	,103	,419	,000		,006	,000	,000	,000	,000	,000	,000	,001	,000	,047	,221	,007
,425	,446	,272	,000	,001	,014	,134	,000	,018	,018	,110		,000	,001	,000	,000	,000	,000	,000	,000	,129	,121	,175	,303	,134
,345	,318	,261	,412	,000	,044	,001	,000	,000	,000		,110	,419	,091	,007	,022	,049	,150	,328	,003	,265	,353	,297	,023	,286
,090	,310	,087	,477	,000	,000	,000	,000	,000		,000	,018	,103	,015	,000	,001	,048	,283	,141	,003	,056	,031	,245	,003	,283
,068	,159	,120	,085	,000	,000	,000	,000		,000	,000	,018	,062	,027	,000	,000	,000	,039	,066	,001	,020	,015	,330	,042	,312
,460	,278	,094	,109	,000	,000	,000		,000	,000	,000	,000	,012	,000	,000	,000	,003	,004	,133	,001	,234	,161	,436	,214	,091
,449	,420	,181	,391	,191	,000		,000	,000	,000	,001	,134	,117	,192	,001	,004	,140	,287	,418	,146	,071	,021	,319	,377	,135
,453	,478	,322	,455	,014		,000	,000	,000	,000	,044	,014	,044	,248	,010	,001	,026	,296	,201	,125	,005	,003	,103	,160	,242
,253	,471	,096	,484		,014	,191	,000	,000	,000	,000	,001	,051	,000	,000	,000	,002	,000	,001	,001	,468	,442	,227	,408	,113
,211	,478	,420		,484	,455	,391	,109	,085	,477	,412	,000	,034	,400	,080	,054	,013	,116	,024	,007	,461	,411	,136	,264	,043
,016	,099		,420	,096	,322	,181	,094	,120	,087	,261	,272	,329	,045	,016	,276	,232	,449	,483	,369	,154	,112	,252	,289	,261
,354		,099	,478	,471	,478	,420	,278	,159	,310	,318	,446	,010	,179	,151	,250	,069	,217	,488	,384	,007	,001	,353	,203	,196
	,354	,016	,211	,253	,453	,449	,460	,068	,090	,345	,425	,347	,254	,050	,040	,365	,106	,163	,339	,209	,168	,409	,003	,218

Table A15.149

The reciprocal correlation matrix of the complete set of variables

	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15	K16	K17	K18	K19
Age	1,304	-,078	-,027	,080	-,103	,109	,048	,254	,028	-,063	-,034	-,083	-,016	,121	,018	-,060	-,058	,037	,053	,216	-,019	,183
RU	-,078	2,531	-,949	-,279	,217	,032	-,266	-,718	,156	-,130	-,194	-,103	,127	,012	-,384	,346	-,147	-,125	,066	-,008	-,102	,157
LIT	-,027	-,949	2,933	-,501	-,504	-,348	-,199	,016	-,230	-,251	-,236	,008	,181	-,093	,022	,033	,243	,075	-,009	,177	-,096	,091
LG	,080	-,279	-,501	2,244	-,559	,040	-,032	-,277	,055	,044	-,144	,154	-,279	,081	,148	-,273	-,132	,112	-,290	-,120	,171	,071
HIS	-,103	,217	-,504	-,559	2,431	-,216	-,442	,143	-,242	-,311	-,193	-,126	,017	,091	,239	-,200	,088	-,027	-,247	-,111	-,114	-,059
GEO	,109	,032	-,348	,040	-,216	1,823	-,368	,307	-,011	-,425	-,170	-,211	-,126	,164	-,277	,231	,028	-,083	-,019	-,072	,001	,179
BIO	,048	-,266	-,199	-,032	-,442	-,368	2,079	,045	-,070	-,159	-,313	-,204	-,004	-,099	-,145	,274	-,021	-,005	,168	-,042	-,006	-,005
ALG	,254	-,718	,016	-,277	,143	,307	,045	3,507	-1,828	-,657	-,247	,033	,020	,030	-,083	,088	-,034	,051	,171	,095	-,142	,022
GEOM	,028	,156	-,230	,055	-,242	-,011	-,070	-1,828	3,825	-,780	-,439	-,421	-,182	,216	,300	-,357	,005	-,101	-,199	-,146	,169	-,226
FIZ	-,063	-,130	-,251	,044	-,311	-,425	-,159	-,657	-,780	2,906	-,201	,066	-,213	-,138	,398	-,332	,034	,056	,009	-,007	-,076	-,059
CHE	-,034	-,194	-,236	-,144	-,193	-,170	-,313	-,247	-,439	-,201	2,375	-,081	,009	-,106	,059	,001	-,332	-,052	,115	,231	,012	-,157
SCH	-,083	-,103	,008	,154	-,126	-,211	-,204	,033	-,421	,066	-,081	1,463	-,020	-,181	-,030	,074	,112	,177	-,050	,084	,091	,051
AST	-,016	,127	,181	-,279	,017	-,126	-,004	,020	-,182	-,213	,009	-,020	1,342	-,137	-,329	,252	,021	-,034	-,132	-,019	-,007	,052
K7	,121	,012	-,093	,081	,091	,164	-,099	,030	,216	-,138	-,106	-,181	-,137	1,165	,089	-,274	-,043	,015	-,099	-,014	-,076	-,039
K8	,018	-,384	,022	,148	,239	-,277	-,145	-,083	,300	,398	,059	-,030	-,329	,089	10,443	-9,633	,157	,008	-,983	-,258	,449	-,053
K9	-,060	,346	,033	-,273	-,200	,231	,274	,088	-,357	-,332	,001	,074	,252	-,274	-9,633	10,091	,037	-,097	,834	,243	-,350	,047
K14	-,058	-,147	,243	-,132	,088	,028	-,021	-,034	,005	,034	-,332	,112	,021	-,043	,157	,037	1,660	-,038	-,268	-,116	-,330	-,037
K15	,037	-,125	,075	,112	-,027	-,083	-,005	,051	-,101	,056	-,052	,177	-,034	,015	,008	-,097	-,038	1,332	-,349	-,178	-,087	-,010
K16	,053	,066	-,009	-,290	-,247	-,019	,168	,171	-,199	,009	,115	-,050	-,132	-,099	-,983	,834	-,268	-,349	1,992	,187	-,587	-,051
K17	,216	-,008	,177	-,120	-,111	-,072	-,042	,095	-,146	-,007	,231	,084	-,019	-,014	-,258	,243	-,116	-,178	,187	1,693	-,448	-,226
K18	-,019	-,102	-,096	,171	-,114	,001	-,006	-,142	,169	-,076	,012	,091	-,007	-,076	,449	-,350	-,330	-,087	-,587	-,448	2,459	-,619
K19	,183	,157	,091	,071	-,059	,179	-,005	,022	-,226	-,059	-,157	,051	,052	-,039	-,053	,047	-,037	-,010	-,051	-,226	-,619	1,878
K20	,104	-,143	-,192	,017	-,082	,068	-,005	-,054	,006	-,066	,173	,109	-,182	,028	-,015	,158	-,006	-,031	,091	,103	,110	-,243
K21	-,047	,011	-,073	,111	,186	,063	-,008	-,208	,160	-,170	,134	-,291	-,030	,261	-,175	-,078	-,070	-,145	-,006	-,297	-,342	-,032
K22	,020	,162	,050	-,025	,293	,043	-,250	-,112	,217	-,172	,172	-,115	,281	,019	,070	-,174	-,546	-,019	-,482	-,243	-,090	-,013
K23	,064	-,071	,047	,144	-,093	,186	-,109	-,144	,230	-,046	,003	,083	-,202	,077	,015	,045	-,105	,016	-,001	-,122	,105	,130
K24	,131	,215	-,138	,064	-,159	-,145	,036	,100	,052	,103	,107	-,048	-,350	-,149	-,547	,439	-,237	-,098	,517	,507	,050	-,030
K25	-,227	-,448	,133	-,071	,057	-,107	,002	,102	-,042	,052	-,064	,046	,215	,131	,629	-,634	,182	,108	-,371	-,489	-,013	-,494
K27	,106	,041	,050	-,038	-,121	-,167	-,008	,326	-,265	,184	-,110	-,059	,147	,091	,018	-,026	-,058	,142	-,175	,024	-,206	-,070
K28	-,018	-,032	,341	-,317	,060	,042	,085	,093	-,065	-,273	-,145	-,114	,387	,037	-,622	,616	,028	,033	,023	,119	-,157	-,190
K29	-,012	,268	-,342	,131	,074	,053	-,003	-,550	,251	,172	,109	,080	-,397	-,159	-,014	-,124	,037	-,131	,411	-,043	-,010	,341
K45	,225	-,181	,312	-,528	,177	-,138	,093	,048	-,165	,182	-,060	-,098	,234	-,044	,294	-,222	,153	-,045	-,192	,110	-,386	-,066
L31N	-,139	-,187	,157	,105	-,027	-,144	,092	,035	-,213	,237	-,199	-,021	-,200	-,093	,256	-,106	,676	-,081	,137	-,041	-,032	-,087
L36N	,072	-,263	,072	,069	,036	-,107	,005	,189	-,101	,116	,010	-,020	-,047	-,067	,245	-,135	-,001	,011	-,060	,028	-,021	,116
L37	,118	-,210	,206	,118	-,220	,014	,087	,044	-,138	,041	-,134	,037	-,009	-,027	-,416	,238	,018	,098	,011	-,043	,039	,035
L38N	-,005	,076	,061	,020	,025	-,108	-,041	-,115	-,113	,146	,114	,021	,179	-,079	,147	-,073	-,065	,038	-,038	-,092	,117	,079

The completion of tabl. A15.149

K20	,104	-,143	-,192	,017	-,082	,068	-,005	-,054	,006	-,066	,173	,109	-,182	,028	-,015	,158	-,006	-,031	,091	,103	,110	-,243	1,331	-,105	-,315	,114	-,077	,091	-,254	-,089	,209	-,194	,161	,077	-,041	-,025
K21	-,047	,011	-,073	,111	,186	,063	-,008	-,208	,160	-,170	,134	-,291	-,030	,261	-,175	-,078	-,070	-,145	-,006	-,297	-,342	-,032	-,105	1,537	-,152	,068	-,187	,213	-,060	,016	-,022	,053	,042	-,118	-,155	-,035
K22	,020	,162	,050	-,025	,293	,043	-,250	-,112	,217	-,172	,172	-,115	,281	,019	,070	-,174	-,546	-,019	-,482	-,243	-,090	-,013	-,315	-,152	2,588	,020	-,095	-,083	,041	,293	-,420	-,023	-1,527	,013	,010	,103
K23	,064	-,071	,047	,144	-,093	,186	-,109	-,144	,230	-,046	,003	,083	-,202	,077	,015	,045	-,105	,016	-,001	-,122	,105	,130	,114	,068	,020	1,817	-,878	-,014	-,687	-,267	,728	-,215	-,018	-,055	,045	-,131
K24	,131	,215	-,138	,064	-,159	-,145	,036	,100	,052	,103	,107	-,048	-,350	-,149	-,547	,439	-,237	-,098	,517	,507	,050	-,030	-,077	-,187	-,095	-,878	4,838	-3,788	-,197	-,332	,532	-,140	-,294	,095	,053	,055
K25	-,227	-,448	,133	-,071	,057	-,107	,002	,102	-,042	,052	-,064	,046	,215	,131	,629	-,634	,182	,108	-,371	-,489	-,013	-,494	,091	,213	-,083	-,014	-3,788	5,035	,320	,133	-1,293	-,024	,528	-,003	-,135	,082
K27	,106	,041	,050	-,038	-,121	-,167	-,008	,326	-,265	,184	-,110	-,059	,147	,091	,018	-,026	-,058	,142	-,175	,024	-,206	-,070	-,254	-,060	,041	-,687	-,197	,320	2,119	,027	-1,183	,004	-,126	,094	,100	,032
K28	-,018	-,032	,341	-,317	,060	,042	,085	,093	-,065	-,273	-,145	-,114	,387	,037	-,622	,616	,028	,033	,023	,119	-,157	-,190	-,089	,016	,293	-,267	-,332	,133	,027	2,644	-1,917	,362	-,226	,027	,002	,034
K29	-,012	,268	-,342	,131	,074	,053	-,003	-,550	,251	,172	,109	,080	-,397	-,159	-,014	-,124	,037	-,131	,411	-,043	-,010	,341	,209	-,022	-,420	,728	,532	-1,293	-1,183	-1,917	3,600	-,284	,258	-,122	,029	-,138
K45	,225	-,181	,312	-,528	,177	-,138	,093	,048	-,165	,182	-,060	-,098	,234	-,044	,294	-,222	,153	-,045	-,192	,110	-,386	-,066	-,194	,053	-,023	-,215	-,140	-,024	,004	,362	-,284	1,631	,075	,085	,032	,014
L31N	-,139	-,187	,157	,105	-,027	-,144	,092	,035	-,213	,237	-,199	-,021	-,200	-,093	,256	-,106	,676	-,081	,137	-,041	-,032	-,087	,161	,042	-1,527	-,018	-,294	,528	-,126	-,226	,258	,075	2,138	,024	-,007	-,099
L36N	,072	-,263	,072	,069	,036	-,107	,005	,189	-,101	,116	,010	-,020	-,047	-,067	,245	-,135	-,001	,011	-,060	,028	-,021	,116	,077	-,118	,013	-,055	,095	-,003	,094	,027	-,122	,085	,024	1,128	,085	,158
L37	,118	-,210	,206	,118	-,220	,014	,087	,044	-,138	,041	-,134	,037	-,009	-,027	-,416	,238	,018	,098	,011	-,043	,039	,035	-,041	-,155	,010	,045	,053	-,135	,100	,002	,029	,032	-,007	,085	1,160	-,048
L38N	-,005	,076	,061	,020	,025	-,108	-,041	-,115	-,113	,146	,114	,021	,179	-,079	,147	-,073	-,065	,038	-,038	-,092	,117	,079	-,025	-,035	,103	-,131	,055	,082	,032	,034	-,138	,014	-,099	,158	-,048	1,132

A15.10.6. The checking of adequacy of the factored space

The checking of adequacy of the factorized space allows to verify the quality of the formed space from the initial set of independent variables K_i.

Table A15.150

The adequacy of factorized space

The reduced set of independent variables K_i			The complete set of independent variables K_i		
The measure of adequacy and criterion of Bartlett			The measure of adequacy and criterion of Bartlett		
The measure of selective adequacy of Kaiser-Meyer-Olkin		0,745	Measure of selective adequacy Kaiser-Meyer-Olkin.		0,809
The criterion of sphericity of Bartlett	The approximate of chi-square	2417,952	The criterion of sphericity of Bartlett	The approximate of chi-square	4706,140
	The degrees of freedom	190		The degrees of freedom	630
	The value	0,000		The value	0,000

A15.10.7. The transposed matrixes of covariance and correlation

1. The reduced set of independent variables K_i.

Table A15.151

The antiimage of covariance matrix of the reduced set of independent variables

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The covariations in the antiimage	Age	,808	,074	,004	-,006	,003	,018	,029	,109	-,005	,078	,088	-,013	-,048	,024	,014	-,029	,027	-,007	,010	,144
	K7	,074	,923	,007	-,021	-,007	,024	-,042	,010	-,031	-,015	,023	,132	-,038	,022	-,036	,035	,052	,020	-,051	,005
	K8	,004	,007	,101	-,096	,008	,001	-,051	-,016	,019	,002	-,006	-,016	,015	2,27E-005	-,013	,011	,004	-,020	-,002	,022
	K9	-,006	-,021	-,096	,103	,003	-,007	,042	,014	-,014	-,002	,016	-,002	-,014	,004	,011	-,012	-,002	,021	-,003	-,019
	K14	,003	-,007	,008	,003	,735	-,014	-,116	-,040	-,099	-,013	-,030	-,027	-,034	-,046	-,010	-,005	-,002	,009	-,002	,033
	K15	,018	,024	,001	-,007	-,014	,778	-,139	-,086	-,035	-,008	-,018	-,055	-,038	,002	-,020	,020	,050	,016	-,028	-,015
	K16	,029	-,042	-,051	,042	-,116	-,139	,548	,051	-,132	-,010	,012	,008	-,113	,008	,055	-,044	-,054	,008	,064	-,089
	K17	,109	,010	-,016	,014	-,040	-,086	,051	,618	-,107	-,076	,051	-,119	-,120	-,047	,064	-,060	,004	,031	-,006	,042
	K18	-,005	-,031	,019	-,014	-,099	-,035	-,132	-,107	,418	-,145	,023	-,102	-,025	,023	,005	-,004	-,039	-,023	-,002	-,100
	K19	,078	-,015	,002	-,002	-,013	-,008	-,010	-,076	-,145	,562	-,105	-,001	-,030	,044	-,003	-,052	-,024	-,056	,064	-,021
	K20	,088	,023	-,006	,016	-,030	-,018	,012	,051	,023	-,105	,833	-,065	-,072	,045	-,014	,006	-,083	-,007	,033	-,097
	K21	-,013	,132	-,016	-,002	-,027	-,055	,008	-,119	-,102	-,001	-,065	,717	-,087	,026	-,023	,030	,002	,005	-,014	,042
	K22	-,048	-,038	,015	-,014	-,034	-,038	-,113	-,120	-,025	-,030	-,072	-,087	,726	,005	-,041	,045	-,019	,030	-,045	,003
	K23	,024	,022	2,27E-005	,004	-,046	,002	,008	-,047	,023	,044	,045	,026	,005	,581	-,114	,005	-,182	-,048	,112	-,056
	K24	,014	-,036	-,013	,011	-,010	-,020	,055	,064	,005	-,003	-,014	-,023	-,041	-,114	,218	-,166	-,027	-,021	,032	-,007
	K25	-,029	,035	,011	-,012	-,005	,020	-,044	-,060	-,004	-,052	,006	,030	,045	,005	-,166	,212	,036	,009	-,078	-,020
	K27	,027	,052	,004	-,002	-,002	,050	-,054	,004	-,039	-,024	-,083	,002	-,019	-,182	-,027	,036	,504	-,005	-,161	-,015
	K28	-,007	,020	-,020	,021	,009	,016	,008	,031	-,023	-,056	-,007	,005	,030	-,048	-,021	,009	-,005	,412	-,216	,066
	K29	,010	-,051	-,002	-,003	-,002	-,028	,064	-,006	-,002	,064	,033	-,014	-,045	,112	,032	-,078	-,161	-,216	,303	-,038
	K45	,144	,005	,022	-,019	,033	-,015	-,089	,042	-,100	-,021	-,097	,042	,003	-,056	-,007	-,020	-,015	,066	-,038	,709

Table A15.152

The reciprocal correlation matrix of the reduced set of independent variables

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The correlations in the antiimage	Age	,841(a)	,086	,015	-,020	,004	,023	,043	,154	-,009	,116	,108	-,017	-,063	,035	,033	-,069	,043	-,013	,019	,191
	K7	,086	,498(a)	,023	-,070	-,008	,028	-,059	,013	-,049	-,021	,026	,163	-,046	,030	-,080	,078	,077	,032	-,096	,006
	K8	,015	,023	,523(a)	-,940	,029	,003	-,216	-,065	,092	,008	-,019	-,061	,056	9,36E-005	-,088	,073	,016	-,096	-,012	,081
	K9	-,020	-,070	-,940	,521(a)	,011	-,024	,177	,056	-,068	-,010	,053	-,006	-,052	,018	,073	-,081	-,011	,100	-,016	-,071
	K14	,004	-,008	,029	,011	,917(a)	-,018	-,183	-,059	-,178	-,021	-,038	-,038	-,046	-,070	-,025	-,014	-,003	,016	-,005	,046
	K15	,023	,028	,003	-,024	-,018	,888(a)	-,213	-,124	-,062	-,013	-,023	-,074	-,050	,002	-,049	,049	,080	,028	-,057	-,020
	K16	,043	-,059	-,216	,177	-,183	-,213	,764(a)	,088	-,276	-,019	,018	,012	-,179	,014	,159	-,128	-,103	,016	,158	-,143
	K17	,154	,013	-,065	,056	-,059	-,124	,088	,819(a)	-,211	-,129	,071	-,179	-,178	-,079	,174	-,165	,007	,061	-,014	,064
	K18	-,009	-,049	,092	-,068	-,178	-,062	-,276	-,211	,854(a)	-,298	,039	-,187	-,045	,047	,016	-,013	-,084	-,056	-,006	-,183
	K19	,116	-,021	,008	-,010	-,021	-,013	-,019	-,129	-,298	,877(a)	-,154	-,002	-,047	,077	-,009	-,151	-,046	-,117	,156	-,033
	K20	,108	,026	-,019	,053	-,038	-,023	,018	,071	,039	-,154	,811(a)	-,084	-,093	,065	-,033	,014	-,128	-,012	,067	-,127
	K21	-,017	,163	-,061	-,006	-,038	-,074	,012	-,179	-,187	-,002	-,084	,851(a)	-,121	,040	-,059	,076	,003	,010	-,030	,060
	K22	-,063	-,046	,056	-,052	-,046	-,050	-,179	-,178	-,045	-,047	-,093	-,121	,865(a)	,008	-,104	,115	-,031	,055	-,097	,004
	K23	,035	,030	9,36E-005	,018	-,070	,002	,014	-,079	,047	,077	,065	,040	,008	,715(a)	-,320	,015	-,336	-,098	,266	-,088
	K24	,033	-,080	-,088	,073	-,025	-,049	,159	,174	,016	-,009	-,033	-,059	-,104	-,320	,688(a)	-,771	-,082	-,069	,123	-,018
	K25	-,069	,078	,073	-,081	-,014	,049	-,128	-,165	-,013	-,151	,014	,076	,115	,015	-,771	,708(a)	,111	,029	-,309	-,053
	K27	,043	,077	,016	-,011	-,003	,080	-,103	,007	-,084	-,046	-,128	,003	-,031	-,336	-,082	,111	,806(a)	-,011	-,412	-,026
	K28	-,013	,032	-,096	,100	,016	,028	,016	,061	-,056	-,117	-,012	,010	,055	-,098	-,069	,029	-,011	,738(a)	-,611	,123
	K29	,019	-,096	-,012	-,016	-,005	-,057	,158	-,014	-,006	,156	,067	-,030	-,097	,266	,123	-,309	-,412	-,611	,645(a)	-,083
	K45	,191	,006	,081	-,071	,046	-,020	-,143	,064	-,183	-,033	-,127	,060	,004	-,088	-,018	-,053	-,026	,123	-,083	,849(a)

a The measures of selective adequacy

2. The complete set of independent variables K_i.

Table A15.153

The antiimage of covariance matrix of the complete set of independent variables

	The covariations in the antiimage																
	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14
Age	,767	-,024	-,007	,027	-,032	,046	,018	,056	,006	-,016	-,011	-,044	-,009	,080	,001	-,005	-,027
RU	-,024	,395	-,128	-,049	,035	,007	-,051	-,081	,016	-,018	-,032	-,028	,037	,004	-,015	,014	-,035
LIT	-,007	-,128	,341	-,076	-,071	-,065	-,033	,002	-,021	-,029	-,034	,002	,046	-,027	,001	,001	,050
LG	,027	-,049	-,076	,446	-,102	,010	-,007	-,035	,006	,007	-,027	,047	-,093	,031	,006	-,012	-,036
HIS	-,032	,035	-,071	-,102	,411	-,049	-,087	,017	-,026	-,044	-,033	-,035	,005	,032	,009	-,008	,022
GEO	,046	,007	-,065	,010	-,049	,549	-,097	,048	-,002	-,080	-,039	-,079	-,052	,077	-,015	,013	,009
BIO	,018	-,051	-,033	-,007	-,087	-,097	,481	,006	-,009	-,026	-,063	-,067	-,002	-,041	-,007	,013	-,006
ALG	,056	-,081	,002	-,035	,017	,048	,006	,285	-,136	-,064	-,030	,006	,004	,007	-,002	,002	-,006
GEOM	,006	,016	-,021	,006	-,026	-,002	-,009	-,136	,261	-,070	-,048	-,075	-,035	,048	,008	-,009	,001
FIZ	-,016	-,018	-,029	,007	-,044	-,080	-,026	-,064	-,070	,344	-,029	,016	-,055	-,041	,013	-,011	,007
CHE	-,011	-,032	-,034	-,027	-,033	-,039	-,063	-,030	-,048	-,029	,421	-,023	,003	-,038	,002	2,18E 005	-,084
SCH	-,044	-,028	,002	,047	-,035	-,079	-,067	,006	-,075	,016	-,023	,684	-,010	-,106	-,002	,005	,046
AST	-,009	,037	,046	-,093	,005	-,052	-,002	,004	-,035	-,055	,003	-,010	,745	-,087	-,023	,019	,009
K7	,080	,004	-,027	,031	,032	,077	-,041	,007	,048	-,041	-,038	-,106	-,087	,858	,007	-,023	-,022
K8	,001	-,015	,001	,006	,009	-,015	-,007	-,002	,008	,013	,002	-,002	-,023	,007	,096	-,091	,009
K9	-,005	,014	,001	-,012	-,008	,013	,013	,002	-,009	-,011	2,18E 005	,005	,019	-,023	-,091	,099	,002
K14	-,027	-,035	,050	-,036	,022	,009	-,006	-,006	,001	,007	-,084	,046	,009	-,022	,009	,002	,603
K15	,021	-,037	,019	,037	-,008	-,034	-,002	,011	-,020	,014	-,017	,091	-,019	,010	,001	-,007	-,017
K16	,020	,013	-,002	-,065	-,051	-,005	,040	,025	-,026	,002	,024	-,017	-,049	-,042	-,047	,042	-,081
K17	,098	-,002	,036	-,032	-,027	-,023	-,012	,016	-,022	-,001	,057	,034	-,009	-,007	-,015	,014	-,041
K18	-,006	-,016	-,013	,031	-,019	,000	-,001	-,016	,018	-,011	,002	,025	-,002	-,027	,017	-,014	-,081
K19	,075	,033	,017	,017	-,013	,052	-,001	,003	-,032	-,011	-,035	,018	,021	-,018	-,003	,002	-,012
K20	,060	-,043	-,049	,006	-,025	,028	-,002	-,012	,001	-,017	,055	,056	-,102	,018	-,001	,012	-,003
K21	-,023	,003	-,016	,032	,050	,022	-,003	-,039	,027	-,038	,037	-,129	-,015	,146	-,011	-,005	-,027
K22	,006	,025	,007	-,004	,047	,009	-,046	-,012	,022	-,023	,028	-,030	,081	,006	,003	-,007	-,127
K23	,027	-,016	,009	,035	-,021	,056	-,029	-,023	,033	-,009	,001	,031	-,083	,036	,001	,002	-,035
K24	,021	,018	-,010	,006	-,014	-,016	,004	,006	,003	,007	,009	-,007	-,054	-,026	-,011	,009	-,030
K25	-,035	-,035	,009	-,006	,005	-,012	,000	,006	-,002	,004	-,005	,006	,032	,022	,012	-,012	,022
K27	,038	,008	,008	-,008	-,024	-,043	-,002	,044	-,033	,030	-,022	-,019	,052	,037	,001	-,001	-,017
K28	-,005	-,005	,044	-,053	,009	,009	,016	,010	-,006	-,036	-,023	-,030	,109	,012	-,023	,023	,006
K29	-,002	,029	-,032	,016	,008	,008	,000	-,044	,018	,016	,013	,015	-,082	-,038	,000	-,003	,006
K45	,106	-,044	,065	-,144	,045	-,046	,027	,008	-,027	,038	-,015	-,041	,107	-,023	,017	-,014	,056
L31N	-,050	-,035	,025	,022	-,005	-,037	,021	,005	-,026	,038	-,039	-,007	-,070	-,037	,011	-,005	,191
L36N	,049	-,092	,022	,027	,013	-,052	,002	,048	-,023	,035	,004	-,012	-,031	-,051	,021	-,012	-,001
L37	,078	-,071	,061	,046	-,078	,007	,036	,011	-,031	,012	-,049	,022	-,005	-,020	-,034	,020	,009
L38N	-,004	,026	,018	,008	,009	-,052	-,018	-,029	-,026	,044	,043	,013	,118	-,060	,012	-,006	-,035

The completion of tabl. A15.153

L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16	K15
-,004	,078	,049	-,050	,106	-,002	-,005	,038	-,035	,021	,027	,006	-,023	,060	,075	-,006	,098	,020	,021
,026	-,071	-,092	-,035	-,044	,029	-,005	,008	-,035	,018	-,016	,025	,003	-,043	,033	-,016	-,002	,013	-,037
,018	,061	,022	,025	,065	-,032	,044	,008	,009	-,010	,009	,007	-,016	-,049	,017	-,013	,036	-,002	,019
,008	,046	,027	,022	-,144	,016	-,053	-,008	-,006	,006	,035	-,004	,032	,006	,017	,031	-,032	-,065	,037
,009	-,078	,013	-,005	,045	,008	,009	-,024	,005	-,014	-,021	,047	,050	-,025	-,013	-,019	-,027	-,051	-,008
-,052	,007	-,052	-,037	-,046	,008	,009	-,043	-,012	-,016	,056	,009	,022	,028	,052	,000	-,023	-,005	-,034
-,018	,036	,002	,021	,027	,000	,016	-,002	,000	,004	-,029	-,046	-,003	-,002	-,001	-,001	-,012	,040	-,002
-,029	,011	,048	,005	,008	-,044	,010	,044	,006	,006	-,023	-,012	-,039	-,012	,003	-,016	,016	,025	,011
-,026	-,031	-,023	-,026	-,027	,018	-,006	-,033	-,002	,003	,033	,022	,027	,001	-,032	,018	-,022	-,026	-,020
,044	,012	,035	,038	,038	,016	-,036	,030	,004	,007	-,009	-,023	-,038	-,017	-,011	-,011	-,001	,002	,014
,043	-,049	,004	-,039	-,015	,013	-,023	-,022	-,005	,009	,001	,028	,037	,055	-,035	,002	,057	,024	-,017
,013	,022	-,012	-,007	-,041	,015	-,030	-,019	,006	-,007	,031	-,030	-,129	,056	,018	,025	,034	-,017	,091
,118	-,005	-,031	-,070	,107	-,082	,109	,052	,032	-,054	-,083	,081	-,015	-,102	,021	-,002	-,009	-,049	-,019
-,060	-,020	-,051	-,037	-,023	-,038	,012	,037	,022	-,026	,036	,006	,146	,018	-,018	-,027	-,007	-,042	,010
,012	-,034	,021	,011	,017	,000	-,023	,001	,012	-,011	,001	,003	-,011	-,001	-,003	,017	-,015	-,047	,001
-,006	,020	-,012	-,005	-,014	-,003	,023	-,001	-,012	,009	,002	-,007	-,005	,012	,002	-,014	,014	,042	-,007
-,035	,009	-,001	,191	,056	,006	,006	-,017	,022	-,030	-,035	-,127	-,027	-,003	-,012	-,081	-,041	-,081	-,017
,025	,063	,008	-,028	-,021	-,027	,009	,050	,016	-,015	,006	-,005	-,071	-,017	-,004	-,027	-,079	-,132	,751
-,017	,005	-,027	,032	-,059	,057	,004	-,041	-,037	,054	,000	-,094	-,002	,034	-,014	-,120	,055	,502	-,132
-,048	-,022	,015	-,011	,040	-,007	,027	,007	-,057	,062	-,040	-,055	-,114	,046	-,071	-,108	,591	,055	-,079
,042	,014	-,007	-,006	-,096	-,001	-,024	-,039	-,001	,004	,023	-,014	-,090	,034	-,134	,407	-,108	-,120	-,027
,037	,016	,055	-,022	-,022	,050	-,038	-,017	-,052	-,003	,038	-,003	-,011	-,097	,532	-,134	-,071	-,014	-,004
-,017	-,027	,051	,057	-,089	,044	-,025	-,090	,014	-,012	,047	-,092	-,051	,751	-,097	,034	,046	,034	-,017
-,020	-,087	-,068	,013	,021	-,004	,004	-,018	,027	-,025	,024	-,038	,651	-,051	-,011	-,090	-,114	-,002	-,071
,035	,003	,004	-,276	-,006	-,045	,043	,007	-,006	-,008	,004	,386	-,038	-,092	-,003	-,014	-,055	-,094	-,005
-,064	,021	-,027	-,005	-,072	,111	-,056	-,179	-,002	-,100	,550	,004	,024	,047	,038	,023	-,040	,000	,006
,010	,009	,017	-,028	-,018	,031	-,026	-,019	-,155	,207	-,100	-,008	-,025	-,012	-,003	,004	,062	,054	-,015
,014	-,023	-,001	,049	-,003	-,071	,010	,030	,199	-,155	-,002	-,006	,027	,014	-,052	-,001	-,057	-,037	,016
,013	,041	,039	-,028	,001	-,155	,005	,472	,030	-,019	-,179	,007	-,018	-,090	-,017	-,039	,007	-,041	,050
,011	,001	,009	-,040	,084	-,201	,378	,005	,010	-,026	-,056	,043	,004	-,025	-,038	-,024	,027	,004	,009
-,034	,007	-,030	,034	-,048	,278	-,201	-,155	-,071	,031	,111	-,045	-,004	,044	,050	-,001	-,007	,057	-,027
,008	,017	,046	,021	,613	-,048	,084	,001	-,003	-,018	-,072	-,006	,021	-,089	-,022	-,096	,040	-,059	-,021
-,041	-,003	,010	,468	,021	,034	-,040	-,028	,049	-,028	-,005	-,276	,013	,057	-,022	-,006	-,011	,032	-,028
,124	,065	,886	,010	,046	-,030	,009	,039	-,001	,017	-,027	,004	-,068	,051	,055	-,007	,015	-,027	,008
-,037	,862	,065	-,003	,017	,007	,001	,041	-,023	,009	,021	,003	-,087	-,027	,016	,014	-,022	,005	,063
,883	-,037	,124	-,041	,008	-,034	,011	,013	,014	,010	-,064	,035	-,020	-,017	,037	,042	-,048	-,017	,025

Table A15.154

The reciprocal correlation matrix of the complete set of independent variables

	The correlations in the antiimage																	
	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14	K15
Age	,849(a)	-,043	-,014	,047	-,058	,071	,029	,119	,013	-,032	-,019	-,060	-,012	,098	,005	-,017	-,039	,028
RU	-,043	,898(a)	-,348	-,117	,088	,015	-,116	-,241	,050	-,048	-,079	-,054	,069	,007	-,075	,069	-,072	-,068
LIT	-,014	-,348	,904(a)	-,195	-,189	-,150	-,081	,005	-,069	-,086	-,089	,004	,091	-,050	,004	,006	,110	,038
LG	,047	-,117	-,195	,902(a)	-,239	,020	-,015	-,099	,019	,017	-,063	,085	-,161	,050	,031	-,057	-,069	,065
HIS	-,058	,088	-,189	-,239	,920(a)	-,102	-,197	,049	-,079	-,117	-,080	-,067	,009	,054	,048	-,040	,044	-,015
GEO	,071	,015	-,150	,020	-,102	,903(a)	-,189	,121	-,004	-,185	-,082	-,129	-,081	,112	-,063	,054	,016	-,053
BIO	,029	-,116	-,081	-,015	-,197	-,189	,942(a)	,016	-,025	-,065	-,141	-,117	-,003	-,064	-,031	,060	-,011	-,003
ALG	,119	-,241	,005	-,099	,049	,121	,016	,880(a)	-,499	-,206	-,086	,015	,009	,015	-,014	,015	-,014	,024
GEOM	,013	,050	-,069	,019	-,079	-,004	-,025	-,499	,892(a)	-,234	-,146	-,178	-,080	,102	,047	-,057	,002	-,045
FIZ	-,032	-,048	-,086	,017	-,117	-,185	-,065	-,206	-,234	,934(a)	-,076	,032	-,108	-,075	,072	-,061	,016	,028
CHE	-,019	-,079	-,089	-,063	-,080	-,082	-0,141	-,086	-,146	-,076	,945(a)	-,043	,005	-,064	,012	,000	-,167	-,029
SCH	-,060	-,054	,004	,085	-,067	-,129	-,117	,015	-,178	,032	-,043	,866(a)	-,014	-,138	-,008	,019	,072	,126
AST	-,012	,069	,091	-,161	,009	-,081	-,003	,009	-,080	-,108	,005	-,014	,649(a)	-,109	-,088	,069	,014	-,025
K7	,098	,007	-,050	,050	,054	,112	-,064	,015	,102	-,075	-,064	-,138	-,109	,423(a)	,026	-,080	-,031	,012
K8	,005	-,075	,004	,031	,048	-,063	-,031	-,014	,047	,072	,012	-,008	-,088	,026	,528(a)	-,938	,038	,002
K9	-,017	,069	,006	-,057	-,040	,054	,060	,015	-,057	-,061	,000	,019	,069	-,080	-,938	,525(a)	,009	-,026
K14	-,039	-,072	,110	-,069	,044	,016	-,011	-,014	,002	,016	-,167	,072	,014	-,031	,038	,009	,773(a)	-,026
K15	,028	-,068	,038	,065	-,015	-,053	-,003	,024	-,045	,028	-,029	,126	-,025	,012	,002	-,026	-,026	,859(a)
K16	,033	,030	-,004	-,137	-,112	-,010	,082	,065	-,072	,004	,053	-,029	-,081	-,065	-,215	,186	-,147	-,214
K17	,145	-,004	,079	-,061	-,055	-,041	-,022	,039	-,057	-,003	,115	,053	-,013	-,010	-,061	,059	-,069	-,118
K18	-,011	-,041	-,036	,073	-,047	,000	-,003	-,048	,055	-,028	,005	,048	-,004	-,045	,089	-,070	-,163	-,048
K19	,117	,072	,039	,035	-,027	,097	-,002	,008	-,084	-,025	-,074	,031	,033	-,027	-,012	,011	-,021	-,007
K20	,079	-,078	-,097	,010	-,046	,043	-,003	-,025	,003	-,034	,097	,078	-,136	,023	-,004	,043	-,004	-,023
K21	-,033	,006	-,034	,060	,096	,038	-,005	-,090	,066	-,081	,070	-,194	-,021	,195	-,044	-,020	-,044	-,101
K22	,011	,063	,018	-,010	,117	,020	-,108	-,037	,069	-,063	,069	-,059	,151	,011	,013	-,034	-,263	-,010
K23	,041	-,033	,020	,072	-,044	,102	-,056	-,057	,087	-,020	,002	,051	-,129	,053	,004	,010	-,061	,010
K24	,052	,061	-,037	,020	-,046	-,049	,011	,024	,012	,027	,031	-,018	-,137	-,063	-,077	,063	-,084	-,038
K25	-,089	-,126	,035	-,021	,016	-,035	,001	,024	-,010	,014	-,019	,017	,083	,054	,087	-,089	,063	,042
K27	,064	,018	,020	-,017	-,053	-,085	-,004	,120	-,093	,074	-,049	-,034	,087	,058	,004	-,006	-,031	,085
K28	-,010	-,012	,122	-,130	,024	,019	,036	,031	-,020	-,099	-,058	-,058	,206	,021	-,118	,119	,013	,017
K29	-,005	,089	-,105	,046	,025	,021	-,001	-,155	,068	,053	,037	,035	-,181	-,078	-,002	-,021	,015	-,060
K45	,154	-,089	,142	-,276	,089	-,080	,050	,020	-,066	,083	-,030	-,063	,158	-,032	,071	-,055	,093	-,031
L31N	-,083	-,080	,063	,048	-,012	-,073	,044	,013	-,075	,095	-,088	-,012	-,118	-,059	,054	-,023	,359	-,048
L36N	,059	-,155	,039	,043	,022	-,075	,003	,095	-,049	,064	,006	-,016	-,038	-,058	,071	-,040	-,001	,009
L37	,096	-,122	,112	,073	-,131	,010	,056	,022	-,065	,023	-,081	,029	-,007	-,023	-,120	,070	,013	,079
L38N	-,004	,045	,034	,013	,015	-,075	-,027	-,058	-,054	,081	,070	,017	,146	-,068	,043	-,022	-,047	,031

The completion of tabl. A15.154

L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16
-,004	,096	,059	-,083	,154	-,005	-,010	,064	-,089	,052	,041	,011	-,033	,079	,117	-,011	,145	,033
,045	-,122	-,155	-,080	-,089	,089	-,012	,018	-,126	,061	-,033	,063	,006	-,078	,072	-,041	-,004	,030
,034	,112	,039	,063	,142	-,105	,122	,020	,035	-,037	,020	,018	-,034	-,097	,039	-,036	,079	-,004
,013	,073	,043	,048	-,276	,046	-,130	-,017	-,021	,020	,072	-,010	,060	,010	,035	,073	-,061	-,137
,015	-,131	,022	-,012	,089	,025	,024	-,053	,016	-,046	-,044	,117	,096	-,046	-,027	-,047	-,055	-,112
-,075	,010	-,075	-,073	-,080	,021	,019	-,085	-,035	-,049	,102	,020	,038	,043	,097	,000	-,041	-,010
-,027	,056	,003	,044	,050	-,001	,036	-,004	,001	,011	-,056	-,108	-,005	-,003	-,002	-,003	-,022	,082
-,058	,022	,095	,013	,020	-,155	,031	,120	,024	,024	-,057	-,037	-,090	-,025	,008	-,048	,039	,065
-,054	-,065	-,049	-,075	-,066	,068	-,020	-,093	-,010	,012	,087	,069	,066	,003	-,084	,055	-,057	-,072
,081	,023	,064	,095	,083	,053	-,099	,074	,014	,027	-,020	-,063	-,081	-,034	-,025	-,028	-,003	,004
,070	-,081	,006	-,088	-,030	,037	-,058	-,049	-,019	,031	,002	,069	,070	,097	-,074	,005	,115	,053
,017	,029	-,016	-,012	-,063	,035	-,058	-,034	,017	-,018	,051	-,059	-,194	,078	,031	,048	,053	-,029
,146	-,007	-,038	-,118	,158	-,181	,206	,087	,083	-,137	-,129	,151	-,021	-,136	,033	-,004	-,013	-,081
-,068	-,023	-,058	-,059	-,032	-,078	,021	,058	,054	-,063	,053	,011	,195	,023	-,027	-,045	-,010	-,065
,043	-,120	,071	,054	,071	-,002	-,118	,004	,087	-,077	,004	,013	-,044	-,004	-,012	,089	-,061	-,215
-,022	,070	-,040	-,023	-,055	-,021	,119	-,006	-,089	,063	,010	-,034	-,020	,043	,011	-,070	,059	,186
-,047	,013	-,001	,359	,093	,015	,013	-,031	,063	-,084	-,061	-,263	-,044	-,004	-,021	-,163	-,069	-,147
,031	,079	,009	-,048	-,031	-,060	,017	,085	,042	-,038	,010	-,010	-,101	-,023	-,007	-,048	-,118	-,214
-,025	,007	-,040	,066	-,106	,153	,010	-,085	-,117	,167	-,001	-,212	-,004	,056	-,026	-,265	,102	,789(a)
-,066	-,031	,021	-,022	,066	-,017	,056	,012	-,168	,177	-,069	-,116	-,184	,068	-,127	-,220	,814(a)	,102
,070	,023	-,012	-,014	-,193	-,003	-,062	-,090	-,004	,015	,050	-,036	-,176	,061	-,288	,872(a)	-,220	-,265
,054	,024	,079	-,043	-,038	,131	-,085	-,035	-,160	-,010	,071	-,006	-,019	-,153	,886(a)	-,288	-,127	-,026
-,021	-,033	,063	,096	-,132	,096	-,047	-,151	,035	-,031	,074	-,170	-,074	,809(a)	-,153	,061	,068	,056
-,027	-,116	-,090	,023	,034	-,009	,008	-,033	,076	-,069	,041	-,076	,793(a)	-,074	-,019	-,176	-,184	-,004
,060	,006	,007	-,649	-,011	-,138	,112	,017	-,023	-,027	,009	,654(a)	-,076	-,170	-,006	-,036	-,116	-,212
-,091	,031	-,039	-,009	-,125	,285	-,122	-,350	-,005	-,296	,679(a)	,009	,041	,074	,071	,050	-,069	-,001
,023	,022	,041	-,091	-,050	,128	-,093	-,061	-,767	,697(a)	-,296	-,027	-,069	-,031	-,010	,015	,177	,167
,034	-,056	-,001	,161	-,008	-,304	,036	,098	,718(a)	-,767	-,005	-,023	,076	,035	-,160	-,004	-,168	-,117
,021	,064	,061	-,059	,002	-,428	,011		,098	-,061	-,350	,017	-,033	-,151	-,035	-,090	,012	-,085
,020	,001	,016	-,095	,175	-,621	,690(a)	,011	,036	-,093	-,122	,112	,008	-,047	-,085	-,062	,056	,010
-,068	,014	-,060	,093	-,117	,614(a)	-,621	-,428	-,304	,128	,285	-,138	-,009	,096	,131	-,003	-,017	,153
,011	,023	,063	,040	,785(a)	-,117	,175	,002	-,008	-,050	-,125	-,011	,034	-,132	-,038	-,193	,066	-,106
-,063	-,004	,016	,417(a)	,040	,093	-,095	-,059	,161	-,091	-,009	-,649	,023	,096	-,043	-,014	-,022	,066
,140	,074	,493(a)	,016	,063	-,060	,016	,061	-,001	,041	-,039	,007	-,090	,063	,079	-,012	,021	-,040
-,042	,624(a)	,074	-,004	,023	,014	,001	,064	-,056	,022	,031	,006	-,116	-,033	,024	,023	-,031	,007
,631(a)	-,042	,140	-,063	,011	-,068	,020	,021	,034	,023	-,091	,060	-,027	-,021	,054	,070	-,066	-,025

a The measures of selective adequacy

A15.10.8. The initial and final nominal values of variables

The initial (before rotation) and final (after rotation) nominal values of the complete and reduced set of variables are presented in tabl. A15.155.

Table A15.155

The reduced set of independent variables K_i

The commonalities

	The initial	The extracted
Age	1,000	0,521
K7	1,000	0,765
K8	1,000	0,950
K9	1,000	0,949
K14	1,000	0,468
K15	1,000	0,359
K16	1,000	0,562
K17	1,000	0,484
K18	1,000	0,687
K19	1,000	0,497
K20	1,000	0,584
K21	1,000	0,583
K22	1,000	0,402
K23	1,000	0,672
K24	1,000	0,827
K25	1,000	0,777
K27	1,000	0,571
K28	1,000	0,782
K29	1,000	0,863
K45	1,000	0,519

The method of selection: The analysis of main components.

The complete set of independent variables K_i

The commonalities

	The initial	The extracted
Age	1,000	0,500
RU	1,000	0,584
LIT	1,000	0,697
LG	1,000	0,635
HIS	1,000	0,630
GEO	1,000	0,525
BIO	1,000	0,607
ALG	1,000	0,703
GEOM	1,000	0,731
FIZ	1,000	0,693
CHE	1,000	0,629
SCH	1,000	0,456
AST	1,000	0,489
K7	1,000	0,759
K8	1,000	0,933
K9	1,000	0,920
K14	1,000	0,536
K15	1,000	0,397
K16	1,000	0,621
K17	1,000	0,534
K18	1,000	0,692
K19	1,000	0,529
K20	1,000	0,561
K21	1,000	0,613
K22	1,000	0,750
K23	1,000	0,663
K24	1,000	0,822
K25	1,000	0,768
K27	1,000	0,578
K28	1,000	0,780
K29	1,000	0,841
K45	1,000	0,517
L31N	1,000	0,821
L36N	1,000	0,599
L37	1,000	0,608
L38N	1,000	0,645

The method of selection: The analysis of main components.

A15.10.9. The initial and final eigenvalues

The initial (before rotation) and final (after rotation) eigenvalues the complete and reduced set of variables are presented in tabl. A15.156.

1. The reduced set of independent variables K_i.

Table A15.156

The complete explained dispersion of independent variables

The component	The initial eigenvalues			The sums of squares of the loads of extraction			The sums of squares of the loads of extraction		
	The sum	% of dispersion	The cumulative %	The sum	% of dispersion	The cumulative %	The sum	% of dispersion	The cumulative %
1	4,785	23,926	23,926	4,785	23,926	23,926	3,371	16,857	16,857
2	2,588	12,942	36,869	2,588	12,942	36,869	2,365	11,825	28,681
3	2,079	10,394	47,262	2,079	10,394	47,262	2,252	11,260	39,942
4	1,241	6,205	53,467	1,241	6,205	53,467	2,040	10,201	50,143
5	1,120	5,602	59,070	1,120	5,602	59,070	1,682	8,410	58,553
6	1,008	5,038	64,107	1,008	5,038	64,107	1,111	5,554	64,107
7	0,853	4,266	68,374						
8	0,831	4,155	72,529						
9	0,776	3,880	76,408						
10	0,753	3,765	80,173						
11	0,698	3,491	83,664						
12	0,613	3,063	86,727						
13	0,587	2,937	89,665						
14	0,533	2,665	92,329						
15	0,449	2,243	94,572						
16	0,400	1,998	96,570						
17	0,320	1,599	98,169						
18	0,201	1,003	99,171						
19	0,114	0,570	99,741						
20	0,052	0,259	100,000						

The method of selection: The analysis of main components.

The computational procedure directly is provided the selection of five components for the factor analysis by the method of main components, as the nominal value of eigenvalue is decreased significantly (it became less than one).

The five components directly cause the appearance of five component loads, which allow to calculate the commonalities and eigenvalues.

The commonality is equal to the sum of squares of the component loads on the line, which directly explains the variation of certain independent variable.

The eigenvalue is equal to the sum of squares of the component loads on the column, which explain the influence of factor on the dispersion of a set of independent variables.

The commonality and eigenvalue allows to explain the share of dispersion of the certain independent variables under the influence of given components, and also to estimate the quality of the formed matrix of component loads for the interpretation.

2. The complete set of independent variables K_i.

Table A15.157

The complete explained dispersion of independent variables

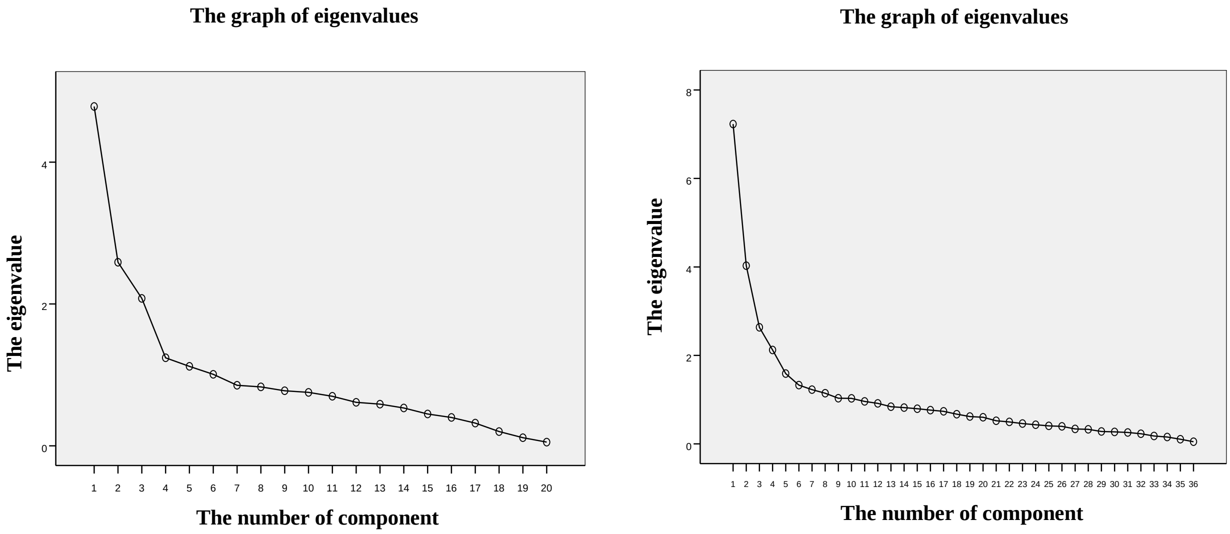
The component	The initial eigenvalues			The sums of squares of the loads of extraction			The sums of squares of the loads of extraction		
	The sum	% of dispersion	The cumulative %	The sum	% of dispersion	The cumulative %	The sum	% of dispersion	The cumulative %
1	7,230	20,082	20,082	7,230	20,082	20,082	6,248	17,355	17,355
2	4,028	11,189	31,272	4,028	11,189	31,272	3,571	9,920	27,275
3	2,635	7,319	38,591	2,635	7,319	38,591	2,419	6,719	33,994
4	2,122	5,896	44,486	2,122	5,896	44,486	2,295	6,376	40,370
5	1,590	4,416	48,902	1,590	4,416	48,902	2,069	5,748	46,117
6	1,329	3,690	52,593	1,329	3,690	52,593	1,674	4,649	50,767
7	1,226	3,405	55,997	1,226	3,405	55,997	1,499	4,165	54,932
8	1,146	3,182	59,179	1,146	3,182	59,179	1,233	3,426	58,358
9	1,032	2,867	62,047	1,032	2,867	62,047	1,190	3,306	61,664
10	1,029	2,858	64,904	1,029	2,858	64,904	1,167	3,240	64,904
11	0,960	2,665	67,570						
12	0,916	2,544	70,114						
13	0,841	2,337	72,451						
14	0,820	2,279	74,730						
15	0,795	2,209	76,939						
16	0,764	2,121	79,060						
17	0,736	2,044	81,105						
18	0,671	1,865	82,969						
19	0,619	1,718	84,688						
20	0,601	1,670	86,358						
21	0,522	1,451	87,809						
22	0,496	1,379	89,188						
23	0,460	1,277	90,464						
24	0,433	1,203	91,668						
25	0,407	1,132	92,799						
26	0,396	1,101	93,900						
27	0,339	0,940	94,841						
28	0,330	0,915	95,756						
29	0,281	0,779	96,536						
30	0,271	0,753	97,288						
31	0,258	0,718	98,006						
32	0,229	0,636	98,643						
33	0,178	0,496	99,138						
34	0,155	0,432	99,570						
35	0,105	0,293	99,863						
36	0,049	0,137	100,000						

The method of selection: The analysis of main components.

The computational procedure directly is provided the selection of ten components for the factor analysis by the method of main components, as the nominal value of eigenvalue is decreased significantly (it became less than one).

A15.10.10. The graph of two-dimensional scattering of eigenvalues and factors

The presented graphs of two-dimensional scattering of eigenvalues relative to the numbers of components directly allow to estimate the optimal quantity of factors necessary and sufficient for the realization of the factor analysis at the consideration of the reduced and complete set of independent variables K_i.



a b

Picture A15.163. The graph of two-dimensional scattering of eigenvalues and factors

a – the reduced set of independent variables

b – the complete set of independent variables

The optimal quantity of components to the carrying out of the factor analysis is determined by means of one from the analytical or graphical criteria:

- by the criterion of Kaiser – the quantity of components corresponds to the quantity of components, which have eigenvalue greater than one;
- by the criterion of Kettel – the quantity of components corresponds to K-1, K, K+1, where K – the quantity of components, which corresponds to the point of inflection on the graph of the two dimensional scattering of components relative to the eigenvalues.

1. The reduced set of independent variables K_i.

The factor load reflects the degree of influence of the variation of the nominal value of certain factor on the dispersion of the selected independent variable.

The matrix of component (factor) loads contains a set of factor loads, located on the intersection of lines (the independent variables) and columns (the factors), which reflect the relative influence of variation of the nominal values of certain factors on the dispersion of a set of independent variables.

Table A15.158

The matrix of component (factor) loads

	The component					
	1	2	3	4	5	6
Age	-0,394	0,195	0,123	0,309	0,339	0,319
K_7	0,076	0,018	0,191	-0,348	-0,617	0,470
K_8	0,217	0,130	0,911	-0,187	0,076	-0,125
K_9	0,193	0,130	0,913	-0,205	0,067	-0,122
K_{14}	0,493	-0,294	-0,163	0,042	0,107	0,313
K_{15}	0,409	-0,378	0,156	0,065	0,074	0,121
K_{16}	0,511	-0,499	0,062	-0,113	-0,038	0,184
K_{17}	0,547	-0,351	0,080	0,199	0,099	0,069
K_{18}	0,721	-0,376	-0,030	0,091	-0,056	0,113
K_{19}	0,661	-0,211	-0,087	-0,054	-0,046	-0,053
K_{20}	0,340	-0,162	-0,242	-0,084	-0,149	-0,596
K_{21}	0,435	-0,304	0,250	0,363	0,261	-0,199
K_{22}	0,496	-0,314	0,063	0,208	0,003	0,101
K_{23}	0,413	0,331	-0,283	-0,366	0,414	0,075
K_{24}	0,604	0,542	-0,133	-0,256	0,275	0,098
K_{25}	0,662	0,510	-0,085	-0,145	0,192	0,118
K_{27}	0,609	0,370	-0,140	0,137	-0,101	-0,123
K_{28}	0,456	0,593	0,023	0,393	-0,258	0,004
K_{29}	0,504	0,584	0,092	0,395	-0,322	0,001
K_{45}	0,506	-0,136	-0,186	-0,381	-0,163	-0,196

The method of selection: The analysis of main components.

a The extracted components: 6

According to the analysis of the nominal values of component loads the first component describes to the greatest degree of influence on the set of independent variables K_i.

2. The complete set of independent variables K_i.

Table A15.159

The matrix of component (factor) loads

The var.	The component									
	1	2	3	4	5	6	7	8	9	10
Age	-0,334	-0,215	0,162	0,112	0,224	0,086	-0,196	0,279	0,359	-0,007
RU	0,702	-0,290	0,001	0,024	-0,048	-0,009	-0,057	0,026	-0,012	0,004
LIT	0,685	-0,444	0,103	0,032	-0,023	0,003	-0,044	-0,011	0,113	-0,063
LG	0,694	-0,156	0,056	0,009	-0,222	-0,006	0,016	-0,153	0,186	-0,136
HIS	0,695	-0,317	0,081	0,001	-0,068	0,057	0,063	0,076	0,141	0,046
GEO	0,584	-0,253	0,086	0,029	0,159	0,182	0,015	0,080	0,174	0,128
BIO	0,661	-0,322	0,037	-0,055	0,142	0,099	0,029	0,035	0,083	0,153
ALG	0,739	-0,248	-0,036	0,083	0,035	-0,257	-0,006	-0,014	-0,122	-0,068
GEOM	0,770	-0,302	-0,053	0,085	0,072	-0,154	0,022	0,017	-0,075	-0,027
FIZ	0,740	-0,346	-0,027	0,085	0,043	-0,066	-0,034	0,065	-0,072	-0,036
CHE	0,709	-0,331	0,081	0,007	0,038	-0,016	-0,019	-0,055	0,013	0,074
SCH	0,419	-0,254	0,039	0,122	0,383	0,079	-0,017	-0,012	-0,038	0,212
AST	0,297	-0,066	0,079	0,180	-0,038	0,470	0,122	0,123	-0,274	-0,173
K7	0,073	0,040	0,007	0,208	0,073	0,251	0,146	-0,677	-0,294	0,275
K8	0,033	0,307	0,047	0,884	-0,148	0,034	0,073	-0,006	0,155	-0,029
K9	0,017	0,288	0,045	0,882	-0,143	0,031	0,076	-0,034	0,167	-0,033
K14	0,358	0,312	-0,246	-0,222	-0,261	-0,033	-0,225	0,022	0,077	0,272
K15	0,254	0,316	-0,392	0,074	-0,050	0,122	-0,152	0,019	0,173	-0,051
K16	0,426	0,292	-0,472	0,007	-0,156	0,163	-0,061	-0,145	0,229	0,055
K17	0,288	0,470	-0,384	-0,007	0,022	-0,101	-0,071	0,144	-0,101	0,191
K18	0,516	0,487	-0,367	-0,098	-0,065	-0,027	-0,178	-0,054	0,018	0,055
K19	0,455	0,467	-0,205	-0,120	-0,106	-0,079	0,049	0,000	-0,147	-0,075
K20	0,370	0,113	-0,115	-0,197	-0,084	-0,109	0,251	0,052	-0,199	-0,485
K21	0,256	0,352	-0,349	0,206	0,135	-0,142	-0,218	0,392	-0,127	0,057
K22	0,215	0,483	-0,416	-0,033	0,508	0,101	0,118	-0,016	0,076	-0,091
K23	0,193	0,374	0,341	-0,284	-0,105	0,304	0,299	0,223	0,081	0,200
K24	0,333	0,517	0,541	-0,104	-0,061	0,256	0,163	0,191	-0,028	0,085
K25	0,392	0,540	0,512	-0,064	-0,099	0,127	0,022	0,141	-0,029	0,092
K27	0,364	0,489	0,361	-0,151	0,165	-0,070	-0,026	-0,069	0,110	-0,064
K28	0,252	0,403	0,553	0,043	0,245	-0,292	-0,274	-0,126	-0,061	-0,083
K29	0,254	0,463	0,540	0,099	0,243	-0,253	-0,294	-0,196	-0,059	-0,096
K45	0,400	0,306	-0,095	-0,203	-0,236	0,016	0,196	-0,303	0,130	-0,099
L31N	0,027	0,173	-0,273	0,019	0,756	0,184	0,291	-0,010	0,034	-0,153
L36N	-0,068	-0,104	-0,042	-0,024	0,078	0,417	-0,536	-0,060	-0,286	0,171
L37	0,145	0,011	-0,056	0,304	-0,091	-0,238	0,281	0,277	-0,454	0,253
L38N	-0,155	0,016	-0,005	-0,087	0,157	-0,439	0,344	-0,091	0,207	0,476

The method of selection: The analysis of main components.

a The extracted components: 10

A15.10.11. The analysis of recovered correlation matrix

The recovered correlation matrix is formed directly for the reduced and complete set of independent variables is presented in tabl. A15.160.

1. The reduced set of independent variables K_i.

Table A15.160

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The replicated correlation	Age	,521(b)	-,170	-,020	-,018	-,123	-,132	-,280	-,157	-,316	-,362	-,462	-,063	-,151	-,082	-,103	-,114	-,216	-,026	-,060	-,485
	K7	-,170	,765(b)	,152	,163	,067	,042	,191	-,047	,098	,052	-,182	-,305	,017	-,110	-,004	,031	-,017	,074	,128	,142
	K8	-,020	,152	,950(b)	,949	-,119	,160	,098	,107	,044	,049	-,089	,259	,072	-,035	,137	,159	,034	,103	,171	,006
	K9	-,018	,163	,949	,949(b)	-,132	,149	,088	,090	,026	,034	-,096	,240	,057	-,043	,124	,144	,017	,088	,155	,001
	K14	-,123	,067	-,119	-,132	,468(b)	,336	,438	,401	,505	,378	,049	,244	,368	,205	,210	,242	,170	,037	,044	,225
	K15	-,132	,042	,160	,149	,336	,359(b)	,419	,398	,448	,323	,074	,351	,357	,015	,037	,084	,074	-,027	,002	,168
	K16	-,280	,191	,098	,088	,438	,419	,562(b)	,446	,567	,436	,145	,302	,409	,068	,067	,109	,083	-,095	-,060	,328
	K17	-,157	-,047	,107	,090	,401	,398	,446	,484(b)	,545	,410	,151	,449	,436	,060	,113	,175	,201	,097	,125	,204
	K18	-,316	,098	,044	,026	,505	,448	,567	,545	,687(b)	,550	,246	,416	,504	,134	,208	,277	,308	,156	,195	,374
	K19	-,362	,052	,049	,034	,378	,323	,436	,410	,550	,497(b)	,323	,308	,372	,225	,292	,330	,340	,165	,196	,418
	K20	-,462	-,182	-,089	-,096	,049	,074	,145	,151	,246	,323	,584(b)	,185	,126	,080	,072	,076	,258	,057	,069	,412
	K21	-,063	-,305	,259	,240	,244	,351	,302	,449	,416	,308	,185	,583(b)	,383	-,032	,024	,085	,164	,098	,124	,073
	K22	-,151	,017	,072	,057	,368	,357	,409	,436	,504	,372	,126	,383	,402(b)	,016	,078	,145	,192	,123	,153	,182
	K23	-,082	-,110	-,035	-,043	,205	,015	,068	,060	,134	,225	,080	-,032	,016	,672(b)	,681	,607	,312	,127	,097	,274
	K24	-,103	-,004	,137	,124	,210	,037	,067	,113	,208	,292	,072	,024	,078	,681	,827(b)	,788	,512	,423	,419	,290
	K25	-,114	,031	,159	,144	,242	,084	,109	,175	,277	,330	,076	,085	,145	,607	,788	,777(b)	,550	,496	,504	,282
	K27	-,216	-,017	,034	,017	,170	,074	,083	,201	,308	,340	,258	,164	,192	,312	,512	,550	,571(b)	,574	,596	,272
	K28	-,026	,074	,103	,088	,037	-,027	-,095	,097	,156	,165	,057	,098	,123	,127	,423	,496	,574	,782(b)	,817	,037
	K29	-,060	,128	,171	,155	,044	,002	-,060	,125	,195	,196	,069	,124	,153	,097	,419	,504	,596	,817	,863(b)	,060
	K45	-,485	,142	,006	,001	,225	,168	,328	,204	,374	,418	,412	,073	,182	,274	,290	,282	,272	,037	,060	,519(b)

Table A15.161

The error of compliance of the reduced set of independent variables

		Age	K7	K8	K9	K14	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45
The residue(s)	Age		,078	,011	,020	-,036	-,021	,065	-,103	,051	,069	,248	-,044	,028	-,045	-,012	-,001	,036	-,024	-,011	,170
	K7	,078		-,032	-,029	-,047	-,029	-,119	,051	-,039	-,006	,156	,205	,039	,078	,045	-,005	,007	-,046	-,052	-,097
	K8	,011	-,032		-,006	,074	-,039	,025	-,012	,006	,001	,020	-,058	-,002	,013	-,025	-,030	,025	,019	-,004	-,014
	K9	,020	-,029	-,006		,074	-,040	-,014	-,011	,021	,008	,013	-,057	,011	,005	-,029	-,021	,026	,001	,001	,004
	K14	-,036	-,047	,074	,074		-,116	-,051	-,109	-,062	-,069	,111	-,027	-,101	-,040	-,044	-,050	,017	,026	,025	-,030
	K15	-,021	-,029	-,039	-,040	-,116		-,037	-,086	-,099	-,081	,037	-,089	-,095	,011	,027	,006	-,007	,039	,048	,011
	K16	,065	-,119	,025	-,014	-,051	-,037		-,159	-,032	-,087	,013	-,059	-,050	-,006	-,032	-,004	,075	,062	,028	-,003
	K17	-,103	,051	-,012	-,011	-,109	-,086	-,159		-,050	-,007	-,047	-,070	-,074	,039	-,013	,028	-,034	-,032	-,009	-,030
	K18	,051	-,039	,006	,021	-,062	-,099	-,032	-,050		,018	-,042	-,024	-,118	-,013	-,015	-,006	-,008	,001	-,018	,020
	K19	,069	-,006	,001	,008	-,069	-,081	-,087	-,007	,018		-,039	-,052	-,077	-,077	,004	,034	-,081	,016	-,056	-,104
	K20	,248	,156	,020	,013	,111	,037	,013	-,047	-,042	-,039		-,034	,065	-7,74E-005	,058	,038	-,056	-,005	-,028	-,169
	K21	-,044	,205	-,058	-,057	-,027	-,089	-,059	-,070	-,024	-,052	-,034		-,071	,044	,052	,007	-,030	-,027	-,022	,025
	K22	,028	,039	-,002	,011	-,101	-,095	-,050	-,074	-,118	-,077	,065	-,071		,058	,047	-,019	,009	-,056	-,021	,002
	K23	-,045	,078	,013	,005	-,040	,011	-,006	,039	-,013	-,077	-7,74E-005	,044	,058		-,140	-,188	,095	,059	,005	-,065
	K24	-,012	,045	-,025	-,029	-,044	,027	-,032	-,013	-,015	,004	,058	,052	,047	-,140		,060	-,097	-,026	-,022	-,051
	K25	-,001	-,005	-,030	-,021	-,050	,006	-,004	,028	-,006	,034	,038	,007	-,019	-,188	,060		-,141	-,049	,007	-,015
	K27	,036	,007	,025	,026	,017	-,007	,075	-,034	-,008	-,081	-,056	-,030	,009	,095	-,097	-,141		-,113	-,041	-,023
	K28	-,024	-,046	,019	,001	,026	,039	,062	-,032	,001	,016	-,005	-,027	-,056	,059	-,026	-,049	-,113		-,076	,015
	K29	-,011	-,052	-,004	,001	,025	,048	,028	-,009	-,018	-,056	-,028	-,022	-,021	,005	-,022	,007	-,041	-,076		,071
	K45	,170	-,097	-,014	,004	-,030	,011	-,003	-,030	,020	-,104	-,169	,025	,002	-,065	-,051	-,015	-,023	,015	,071	

The method of selection: The analysis of main components.
a The residues are calculated between the observed and reproduced correlations.
There are 67 (35.0%) residues with the absolute values greater than 0,05.
b The reproduced commonalities

2. The complete set of independent variables K_i.

Table A15.162

The recovered correlation matrix of the complete set of variables

	The replicated correlation																
	Age	RU	LIT	LG	HIS	GEO	BIO	ALG	GEOM	FIZ	CHE	SCH	AST	K7	K8	K9	K14
Age	,500(b)	-,167	-,071	-,216	-,102	,009	-,079	-,250	-,215	-,164	-,152	,012	-,107	-,296	,040	,045	-,237
RU	-,167	,584(b)	,612	,536	,580	,475	,547	,595	,628	,625	,592	,353	,229	,018	-,044	-,051	,182
LIT	-,071	,612	,697(b)	,586	,636	,529	,592	,605	,649	,654	,638	,382	,222	-,011	-,061	-,063	,082
LG	-,216	,536	,586	,635(b)	,560	,416	,468	,533	,552	,538	,540	,213	,184	,043	,053	,051	,213
HIS	-,102	,580	,636	,560	,630(b)	,530	,583	,551	,604	,606	,600	,355	,234	-,023	-,033	-,039	,157
GEO	,009	,475	,529	,416	,530	,525(b)	,547	,421	,493	,502	,515	,410	,224	,028	-,023	-,028	,102
BIO	-,079	,547	,592	,468	,583	,547	,607(b)	,520	,585	,584	,591	,444	,210	,058	-,131	-,136	,142
ALG	-,250	,595	,605	,533	,551	,421	,520	,703(b)	,706	,670	,603	,364	,169	,024	-,011	-,018	,151
GEOM	-,215	,628	,649	,552	,604	,493	,585	,706	,731(b)	,703	,643	,420	,215	,034	-,020	-,027	,144
FIZ	-,164	,625	,654	,538	,606	,502	,584	,670	,703	,693(b)	,634	,413	,253	,007	-,029	-,037	,129
CHE	-,152	,592	,638	,540	,600	,515	,591	,603	,643	,634	,629(b)	,414	,206	,090	-,076	-,080	,144
SCH	,012	,353	,382	,213	,355	,410	,444	,364	,420	,413	,414	,456(b)	,159	,170	-,022	-,024	-,010
AST	-,107	,229	,222	,184	,234	,224	,210	,169	,215	,253	,206	,159	,489(b)	,140	,145	,134	-,072
K7	-,296	,018	-,011	,043	-,023	,028	,058	,024	,034	,007	,090	,170	,140	,759(b)	,158	,169	-,032
K8	,040	-,044	-,061	,053	-,033	-,023	-,131	-,011	-,020	-,029	-,076	-,022	,145	,158	,933(b)	,925	-,075
K9	,045	-,051	-,063	,051	-,039	-,028	-,136	-,018	-,027	-,037	-,080	-,024	,134	,169	,925	,920(b)	-,088
K14	-,237	,182	,082	,213	,157	,102	,142	,151	,144	,129	,144	-,010	-,072	-,032	-,075	-,088	,536(b)
K15	-,111	,096	,026	,150	,068	,073	,055	,080	,090	,081	,040	-,005	,041	-,029	,181	,173	,313
K16	-,249	,217	,145	,314	,205	,174	,185	,184	,207	,185	,175	,046	,057	,108	,146	,140	,437
K17	-,247	,075	-,074	,033	,013	,018	,042	,134	,120	,080	,026	,030	-,021	-,014	,095	,077	,407
K18	-,339	,231	,105	,277	,167	,131	,167	,267	,254	,213	,183	,054	,022	,044	,060	,045	,522
K19	-,392	,186	,068	,238	,133	,061	,105	,258	,229	,183	,140	-,008	,093	,027	,038	,021	,374
K20	-,320	,215	,183	,276	,181	,050	,111	,313	,285	,251	,167	-,043	,186	-,117	-,123	-,131	,063
K21	-,071	,102	-,026	-,018	,022	,045	,042	,181	,169	,150	,031	,086	,037	-,197	,217	,195	,275
K22	-,124	-,024	-,114	-,032	-,054	,067	,050	,040	,059	,008	-,031	,126	,029	,069	,058	,051	,156
K23	-,088	,012	-,024	,072	,124	,140	,105	-,096	-,062	-,053	,028	-,020	,163	-,035	-,062	-,078	,180
K24	-,127	,079	,035	,148	,155	,168	,119	,016	,026	,031	,094	,028	,248	,013	,124	,102	,167
K25	-,159	,124	,070	,198	,169	,160	,124	,091	,081	,078	,133	,030	,185	,007	,158	,136	,240
K27	-,129	,102	,079	,198	,118	,134	,118	,138	,115	,080	,133	,065	,008	,005	,036	,026	,182
K28	-,050	,066	,057	,106	,020	,044	,031	,170	,108	,074	,110	,092	-,064	,033	,123	,114	,048
K29	-,070	,050	,035	,110	-,003	,030	,008	,153	,089	,054	,093	,084	-,050	,097	,192	,184	,057
K45	-,365	,177	,143	,362	,194	,096	,133	,188	,176	,132	,172	-,053	,039	,154	-,002	-,004	,301
L31N	,050	-,087	-,102	-,159	-,084	,092	,064	-,028	,018	-,018	-,051	,225	,088	,110	-,016	-,014	-,181
L36N	,073	,008	-,025	-,129	-,070	,030	,025	-,102	-,075	-,011	,001	,113	,148	,190	-,143	-,145	,068
L37	-,210	,111	,018	-,036	,072	,008	,056	,223	,206	,175	,090	,102	,133	,063	,220	,204	,010
L38N	,013	-,142	-,143	-,151	-,083	-,058	-,028	-,066	-,075	-,141	-,067	,034	-,384	,054	-,071	-,063	,009

The completion of tabl. A15.162

L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16	K15
,013	-,210	,073	,050	-,365	-,070	-,050	-,129	-,159	-,127	-,088	-,124	-,071	-,320	-,392	-,339	-,247	-,249	-,111
-,142	,111	,008	-,087	,177	,050	,066	,102	,124	,079	,012	-,024	,102	,215	,186	,231	,075	,217	,096
-,143	,018	-,025	-,102	,143	,035	,057	,079	,070	,035	-,024	-,114	-,026	,183	,068	,105	-,074	,145	,026
-,151	-,036	-,129	-,159	,362	,110	,106	,198	,198	,148	,072	-,032	-,018	,276	,238	,277	,033	,314	,150
-,083	,072	-,070	-,084	,194	-,003	,020	,118	,169	,155	,124	-,054	,022	,181	,133	,167	,013	,205	,068
-,058	,008	,030	,092	,096	,030	,044	,134	,160	,168	,140	,067	,045	,050	,061	,131	,018	,174	,073
-,028	,056	,025	,064	,133	,008	,031	,118	,124	,119	,105	,050	,042	,111	,105	,167	,042	,185	,055
-,066	,223	-,102	-,028	,188	,153	,170	,138	,091	,016	-,096	,040	,181	,313	,258	,267	,134	,184	,080
-,075	,206	-,075	,018	,176	,089	,108	,115	,081	,026	-,062	,059	,169	,285	,229	,254	,120	,207	,090
-,141	,175	-,011	-,018	,132	,054	,074	,080	,078	,031	-,053	,008	,150	,251	,183	,213	,080	,185	,081
-,067	,090	,001	-,051	,172	,093	,110	,133	,133	,094	,028	-,031	,031	,167	,140	,183	,026	,175	,040
,034	,102	,113	,225	-,053	,084	,092	,065	,030	,028	-,020	,126	,086	-,043	-,008	,054	,030	,046	-,005
-,384	,133	,148	,088	,039	-,050	-,064	,008	,185	,248	,163	,029	,037	,186	,093	,022	-,021	,057	,041
,054	,063	,190	,110	,154	,097	,033	,005	,007	,013	-,035	,069	-,197	-,117	,027	,044	-,014	,108	-,029
-,071	,220	-,143	-,016	-,002	,192	,123	,036	,158	,124	-,062	,058	,217	-,123	,038	,060	,095	,146	,181
-,063	,204	-,145	-,014	-,004	,184	,114	,026	,136	,102	-,078	,051	,195	-,131	,021	,045	,077	,140	,173
,009	,010	,068	-,181	,301	,057	,048	,182	,240	,167	,180	,156	,275	,063	,374	,522	,407	,437	,313
-,143	-,068	,033	,124	,226	-,001	-,037	,102	,075	,032	,017	,354	,321	,104	,301	,448	,345	,457	,397(b)
-,090	-,078	,001	,086	,399	-,062	-,105	,123	,096	,049	,074	,374	,265	,144	,389	,567	,392	,621(b)	,457
,046	,202	-,001	,137	,200	,094	,076	,177	,195	,140	,110	,414	,485	,131	,433	,534	,534(b)	,392	,345
-,087	,024	,019	,084	,404	,196	,161	,307	,280	,198	,130	,443	,426	,238	,543	,692(b)	,534	,567	,448
-,083	,136	-,106	,073	,391	,205	,183	,314	,332	,287	,202	,352	,329	,364	,529(b)	,543	,433	,389	,301
-,193	,088	-,243	,113	,307	,045	,055	,171	,128	,133	,081	,192	,101	,561(b)	,364	,238	,131	,144	,104
-,076	,264	,046	,163	-,016	,118	,110	,102	,127	,061	-,030	,371	,613(b)	,101	,329	,426	,485	,265	,321
,030	-,049	-,065	,656	,209	,121	,085	,259	,086	,101	,087	,750(b)	,371	,192	,352	,443	,414	,374	,354
,043	,024	-,103	,005	,228	,120	,130	,353	,574	,661	,663(b)	,087	-,030	,081	,202	,130	,110	,074	,017
-,086	,069	-,070	-,019	,241	,434	,423	,531	,771	,822(b)	,661	,101	,061	,133	,287	,198	,140	,049	,032
-,088	,075	-,053	-,099	,261	,522	,506	,557	,768(b)	,771	,574	,086	,127	,128	,332	,280	,195	,096	,075
,009	-,099	-,128	,112	,288	,577	,557	,578(b)	,557	,531	,353	,259	,102	,171	,314	,307	,177	,123	,102
-,007	-,035	-,028	-,010	,086	,803	,780(b)	,557	,506	,423	,130	,085	,110	,055	,183	,161	,076	-,105	-,037
-,035	-,055	-,007	,008	,114	,841(b)	,803	,577	,522	,434	,120	,121	,118	,045	,205	,196	,094	-,062	-,001
-,009	-,090	-,202	-,011	,517(b)	,114	,086	,288	,261	,241	,228	,209	-,016	,307	,391	,404	,200	,399	,226
,072	-,061	-,064	,821(b)	-,011	,008	-,010	,112	-,099	-,019	,005	,656	,163	,113	,073	,084	,137	,086	,124
-,317	-,117	,599(b)	-,064	-,202	-,007	-,028	-,128	-,053	-,070	-,103	-,065	,046	-,243	-,106	,019	-,001	,001	,033
,140	,608(b)	-,117	-,061	-,090	-,055	-,035	-,099	,075	,069	,024	-,049	,264	,088	,136	,024	,202	-,078	-,068
,645(b)	,140	-,317	,072	-,009	-,035	-,007	,009	-,088	-,086	,043	,030	-,076	-,193	-,083	-,087	,046	-,090	-,143

Table A15.163

The inconsistencies between the independent variables

	The residue(s)																	
K15	K14	K9	K8	K7	AST	SCH	CHE	FIZ	GEOM	ALG	BIO	GEO	HIS	LG	LIT	RU	Age	
-,042	,078	-,043	-,049	,204	,051	-,020	,029	,026	,018	,024	-,049	-,131	-,008	,009	-,018	,031		Age
,012	-,009	,010	,019	,011	-,094	-,045	-,035	-,068	-,069	,016	-,031	-,077	-,107	-,008	,052		,031	RU
-,009	-,026	,000	,000	,048	-,056	-,052	-,056	-,048	-,070	-,055	-,026	-,023	-,018	-,019		,052	-,018	LIT
-,062	-,005	-,027	-,028	-,025	,046	-,018	-,044	-,057	-,049	-,026	-,039	-,047	,007		-,019	-,008	,009	LG
-,005	-,045	-,011	-,016	,025	-,016	-,033	-,044	-,030	-,041	-,084	-,011	-,030		,007	-,018	-,107	-,008	HIS
,012	-,046	-,008	,005	-,040	-,008	-,053	-,057	-,012	-,058	-,091	-,023		-,030	-,047	-,023	-,077	-,131	GEO
,002	-,007	,024	,032	,007	-,032	-,060	-,036	-,041	-,070	-,061		-,023	-,011	-,039	-,026	-,031	-,049	BIO
,021	,025	,013	,004	-,003	,023	-,043	-,019	,013	,079		-,061	-,091	-,084	-,026	-,055	,016	,024	ALG
,025	,001	,013	-,001	-,028	,023	-,006	-,008	,014		,079	-,070	-,058	-,041	-,049	-,070	-,069	,018	GEOM
,002	,017	,007	-,008	,046	,012	-,068	-,034		,014	,013	-,041	-,012	-,030	-,057	-,048	-,068	,026	FIZ
,021	,050	,012	,009	-,014	-,023	-,063		-,034	-,008	-,019	-,036	-,057	-,044	-,044	-,056	-,035	,029	CHE
-,044	-,009	,005	,009	-,059	-,037		-,063	-,068	-,006	-,043	-,060	-,053	-,033	-,018	-,052	-,045	-,020	SCH
,033	,094	-,061	-,044	-,023		-,037	-,023	,012	,023	,023	-,032	-,008	-,016	,046	-,056	-,094	,051	AST
,042	,052	-,035	-,038		-,023	-,059	-,014	,046	-,028	-,003	,007	-,040	,025	-,025	,048	,011	,204	K7
-,060	,030	,018		-,038	-,044	,009	,009	-,008	-,001	,004	,032	,005	-,016	-,028	,000	,019	-,049	K8
-,063	,030		,018	-,035	-,061	,005	,012	,007	,013	,013	,024	-,008	-,011	-,027	,000	,010	-,043	K9
-,093		,030	,030	,052	,094	-,009	,050	,017	,001	,025	-,007	-,046	-,045	-,005	-,026	-,009	,078	K14
	-,093	-,063	-,060	,042	,033	-,044	,021	,002	,025	,021	,002	,012	-,005	-,062	-,009	,012	-,042	K15
-,075	-,050	-,066	-,023	-,036	,057	,036	-,024	7,34E-005	,020	-,009	-,054	-,025	,020	-,015	-,019	-,036	,033	K16
-,033	-,115	,002	5,01E-005	,017	,050	-,053	-,037	,003	-,009	-,026	,025	,039	,048	,066	,029	-,014	-,013	K17
-,099	-,080	,003	-,010	,015	,029	,006	-,003	,006	-,019	-,018	-,004	,002	,024	-,038	,015	-,014	,074	K18
-,059	-,064	,021	,013	,018	-,049	,040	,043	,011	,014	-,038	,024	,003	,036	-,048	,000	-,048	,099	K19
,007	,097	,048	,054	,091	-,057	,078	-,036	-,034	-,069	-,082	,061	,062	,012	-,054	,033	,018	,106	K20
-,059	-,058	-,012	-,017	,096	,009	,060	-,029	-,020	-,050	-,016	,008	-,003	-,024	,043	,041	-,003	-,036	K21
-,092	,111	,017	,012	-,013	-,060	-,059	,010	,013	-,021	,022	,011	-,040	-,012	,041	,028	,036	,001	K22
,010	-,015	,040	,039	,003	-,043	-,014	,012	,045	,048	,098	-,034	-,109	-,043	-,008	,002	,038	-,039	K23
,032	-,001	-,007	-,012	,028	-,084	,007	,000	,013	,022	,036	-,025	-,029	-,030	-,008	,022	,021	,012	K24
,015	-,049	-,013	-,029	,019	-,082	,000	-,007	,005	,014	,020	-,017	-,016	-,026	-,003	,019	,037	,044	K25
-,036	,005	,018	,023	-,015	,040	,015	3,74E-005	-,022	,008	-,043	,003	,022	,031	-,028	-,004	-,029	-,051	K27
,050	,015	-,026	-,001	-,004	,045	-,025	,005	,012	-,020	-,038	,006	,010	,034	,027	-,031	-,012	,000	K28
,051	,012	-,029	-,025	-,021	,110	-,043	-,026	-,016	-,024	-,016	,020	,036	,025	,007	,009	-,019	-,001	K29
-,046	-,106	,008	-,006	-,109	-,053	,126	-,011	-,033	,016	,003	-,024	,043	-,063	-,012	-,047	,038	,051	K45
-,006	,035	,009	,003	-,044	-,050	-,122	,047	-,016	,010	,023	-,047	-,045	,018	,058	,011	,059	-,022	L31N
-,036	-,088	,084	,070	-,149	-,115	-,075	-,026	-,039	,029	,022	-,024	,009	,017	,062	,018	,053	-,062	L36N
,066	,008	-,057	-,040	-,041	-,084	-,051	,029	-,075	-,064	-,097	-,014	,039	,054	,075	,014	,026	,108	L37
,084	-,034	,014	,013	-,040	,223	-,081	-,056	,013	,013	,021	-,039	,007	-,019	,037	,023	,015	,003	L38N

The completion of tabl. A15.163

L38N	L37	L36N	L31N	K45	K29	K28	K27	K25	K24	K23	K22	K21	K20	K19	K18	K17	K16
,003	,108	-,062	-,022	,051	-,001	,000	-,051	,044	,012	-,039	,001	-,036	,106	,099	,074	-,013	,033
,015	,026	,053	,059	,038	-,019	-,012	-,029	,037	,021	,038	,036	-,003	,018	-,048	-,014	-,014	-,036
,023	,014	,018	,011	-,047	,009	-,031	-,004	,019	,022	,002	,028	,041	,033	,000	,015	,029	-,019
,037	,075	,062	,058	-,012	,007	,027	-,028	-,003	-,008	-,008	,041	,043	-,054	-,048	-,038	,066	-,015
-,019	,054	,017	,018	-,063	,025	,034	,031	-,026	-,030	-,043	-,012	-,024	,012	,036	,024	,048	,020
,007	,039	,009	-,045	,043	,036	,010	,022	-,016	-,029	-,109	-,040	-,003	,062	,003	,002	,039	-,025
-,039	-,014	-,024	-,047	-,024	,020	,006	,003	-,017	-,025	-,034	,011	,008	,061	,024	-,004	,025	-,054
,021	-,097	,022	,023	,003	-,016	-,038	-,043	,020	,036	,098	,022	-,016	-,082	-,038	-,018	-,026	-,009
,013	-,064	,029	,010	,016	-,024	-,020	,008	,014	,022	,048	-,021	-,050	-,069	,014	-,019	-,009	,020
,013	-,075	-,039	-,016	-,033	-,016	,012	-,022	,005	,013	,045	,013	-,020	-,034	,011	,006	,003	7,34E-005
-,056	,029	-,026	,047	-,011	-,026	,005	3,74E-005	-,007	,000	,012	,010	-,029	-,036	,043	-,003	-,037	-,024
-,081	-,051	-,075	-,122	,126	-,043	-,025	,015	,000	,007	-,014	-,059	,060	,078	,040	,006	-,053	,036
,223	-,084	-,115	-,050	-,053	,110	,045	,040	-,082	-,084	-,043	-,060	,009	-,057	-,049	,029	,050	,057
-,040	-,041	-,149	-,044	-,109	-,021	-,004	-,015	,019	,028	,003	-,013	,096	,091	,018	,015	,017	-,036
,013	-,040	,070	,003	-,006	-,025	-,001	,023	-,029	-,012	,039	,012	-,017	,054	,013	-,010	5,01E-005	-,023
,014	-,057	,084	,009	,008	-,029	-,026	,018	-,013	-,007	,040	,017	-,012	,048	,021	,003	,002	-,066
-,034	,008	-,088	,035	-,106	,012	,015	,005	-,049	-,001	-,015	,111	-,058	,097	-,064	-,080	-,115	-,050
,084	,066	-,036	-,006	-,046	,051	,050	-,036	,015	,032	,010	-,092	-,059	,007	-,059	-,099	-,033	-,075
,015	,125	-,009	-,015	-,074	,030	,071	,035	,010	-,015	-,011	-,015	-,022	,014	-,041	-,032	-,105	
-,025	-,114	-,043	-,005	-,026	,022	-,011	-,010	,008	-,041	-,011	-,052	-,106	-,028	-,029	-,039		-,105
-,018	,016	-,055	,013	-,010	-,020	-,005	-,007	-,008	-,004	-,009	-,057	-,033	-,034	,025		-,039	-,032
-,015	-,074	-,022	,011	-,078	-,065	-,002	-,055	,031	,010	-,054	-,058	-,072	-,080		,025	-,029	-,041
,154	-,033	,141	-,098	-,064	-,005	-,003	,031	-,013	-,002	,000	-,001	,050		-,080	-,034	-,028	,014
,052	-,125	-,019	-,054	,114	-,016	-,039	,032	-,035	,015	,042	-,059		,050	-,072	-,033	-,106	-,022
-,041	,058	,029	-,061	-,025	,011	-,018	-,057	,039	,024	-,014		-,059	-,001	-,058	-,057	-,052	-,015
-,020	-,052	,065	,008	-,019	-,018	,057	,055	-,154	-,121		-,014	,042	,000	-,054	-,009	-,011	-,011
,006	-,040	-,011	,015	-,003	-,037	-,026	-,116	,077		-,121	,024	,015	-,002	,010	-,004	-,041	-,015
-,001	-,015	-,017	,017	,006	-,010	-,058	-,148		,077	-,154	,039	-,035	-,013	,031	-,008	,008	,010
-,015	,063	,049	-,038	-,039	-,022	-,096		-,148	-,116	,055	-,057	,032	,031	-,055	-,007	-,010	,035
,000	,047	-,026	,027	-,033	-,063		-,096	-,058	-,026	,057	-,018	-,039	-,003	-,002	-,005	-,011	,071
,042	,051	-,021	-,014	,017		-,063	-,022	-,010	-,037	-,018	,011	-,016	-,005	-,065	-,020	,022	,030
-,031	,095	,124	,008		,017	-,033	-,039	,006	-,003	-,019	-,025	,114	-,064	-,078	-,010	-,026	-,074
-,024	,058	,052		,008	-,014	,027	-,038	,017	,015	,008	-,061	-,054	-,098	,011	,013	-,005	-,015
,189	,040		,052	,124	-,021	-,026	,049	-,017	-,011	,065	,029	-,019	,141	-,022	-,055	-,043	-,009
-,117		,040	,058	,095	,051	,047	,063	-,015	-,040	-,052	,058	-,125	-,033	-,074	,016	-,114	,125
	-,117	,189	-,024	-,031	,042	,000	-,015	-,001	,006	-,020	-,041	,052	,154	-,015	-,018	-,025	,015

The method of selection: The analysis of main components.

a The residues are calculated between the observed and reproduced correlations.

There are 157 (24.0%) residues with the absolute values greater than 0,05.

b Te reproduced commonalities

A15.10.12. The matrix of components after the rotation

After the carrying out of the Varimax-rotation the matrix of component loads was formed directly for the interpretation and scientific justification.

1. The reduced set of independent variables K_i.

Table A15.164

The matrix of component loads after the varimax-rotation at the reduced set of independent variables

The var.	The component					
	1	2	3	4	5	6
Age	-0,171	-0,029	-0,028	-0,019	-0,684	-0,147
K7	0,055	0,074	-0,066	0,118	0,047	0,858
K8	0,075	0,069	0,033	0,968	-0,029	0,037
K9	0,055	0,053	0,027	0,969	-0,030	0,052
K14	0,618	-0,006	0,217	-0,181	0,004	0,081
K15	0,582	-0,048	-0,004	0,125	0,047	-0,004
K16	0,683	-0,137	0,048	0,055	0,204	0,176
K17	0,672	0,092	0,029	0,058	0,080	-0,116
K18	0,768	0,148	0,103	-0,023	0,249	0,050
K19	0,537	0,146	0,210	0,002	0,377	0,009
K20	0,092	0,086	-0,013	-0,074	0,706	-0,255
K21	0,555	0,116	-0,087	0,237	0,040	-0,443
K22	0,615	0,132	-0,019	0,022	0,070	-0,039
K23	0,037	0,004	0,808	-0,062	0,093	-0,065
K24	0,071	0,331	0,836	0,085	0,080	0,011
K25	0,158	0,429	0,743	0,097	0,070	0,029
K27	0,163	0,601	0,340	-0,022	0,251	-0,066
K28	0,020	0,869	0,158	0,036	-0,015	0,018
K29	0,057	0,911	0,124	0,101	0,014	0,062
K45	0,245	-0,003	0,268	-0,009	0,606	0,138

The method of selection: The analysis by the method of main components.

The method of rotation: Varimax with the normalization of Kaiser.

a The rotation is converged in 6 iterations.

Table A15.165

The matrix of the transformation of components

	1	2	3	4	5	6
1	0,683	0,429	0,446	0,135	0,364	0,004
2	-0,606	0,603	0,468	0,115	-0,190	0,039
3	0,088	0,025	-0,250	0,931	-0,236	0,079
4	0,234	0,545	-0,473	-0,229	-0,412	-0,450
5	0,105	-0,390	0,510	0,093	-0,391	-0,645
6	0,305	-0,054	0,190	-0,199	-0,673	0,612

The method of selection: The analysis by the method of main components.

The method of rotation: Varimax with the normalization of Kaiser.

2. The complete set of independent variables K_i.

Table A15.166

The matrix of component loads after varimax-rotation with the complete set of independent variables

The var.	The component									
	1	2	3	4	5	6	7	8	9	10
Age	-0,097	-0,313	-0,043	-0,053	0,098	0,092	-0,394	-0,024	-0,203	-0,415
RU	0,737	0,131	0,022	0,005	-0,025	-0,082	0,072	0,096	0,043	0,008
LIT	0,817	-0,034	0,012	-0,021	-0,005	-0,092	0,066	0,072	-0,096	-0,034
LG	0,659	0,174	0,058	0,071	0,101	-0,176	0,265	0,040	-0,215	0,056
HIS	0,766	0,057	-0,060	0,154	0,016	-0,072	0,063	0,008	-0,046	-0,041
GEO	0,668	0,034	-0,027	0,181	0,016	0,128	-0,140	0,017	-0,079	-0,022
BIO	0,749	0,059	-0,035	0,121	-0,101	0,090	-0,079	-0,017	-0,014	0,037
ALG	0,743	0,136	0,160	-0,143	-0,009	-0,023	0,220	0,005	0,194	0,016
GEOM	0,805	0,124	0,077	-0,094	-0,005	0,033	0,157	0,020	0,162	0,016
FIZ	0,800	0,091	0,038	-0,070	-0,011	-0,002	0,095	0,105	0,134	-0,019
CHE	0,780	0,052	0,067	0,028	-0,051	-0,041	0,023	0,012	0,011	0,085
SCH	0,535	-0,046	0,068	-0,010	-0,019	0,270	-0,252	-0,019	0,110	0,118
AST	0,260	-0,071	-0,130	0,254	0,140	0,117	0,078	0,514	0,126	0,125
K7	0,037	-0,013	0,037	-0,019	0,124	0,092	-0,095	0,023	0,001	0,850
K8	-0,055	0,083	0,091	0,016	0,947	-0,004	-0,034	0,047	0,107	0,043
K9	-0,058	0,066	0,085	-0,003	0,945	-0,003	-0,033	0,036	0,084	0,057
K14	0,116	0,653	0,026	0,145	-0,133	-0,220	-0,052	-0,080	-0,011	0,009
K15	0,042	0,566	-0,048	-0,022	0,162	0,122	0,021	0,106	-0,123	-0,063
K16	0,190	0,690	-0,145	0,029	0,139	0,067	0,080	0,015	-0,207	0,118
K17	-0,011	0,654	0,069	0,065	0,009	0,135	0,012	-0,057	0,274	-0,020
K18	0,158	0,783	0,162	0,068	-0,013	0,065	0,117	0,034	0,005	0,059
K19	0,101	0,558	0,174	0,170	-0,032	0,057	0,339	0,060	0,143	0,068
K20	0,180	0,141	0,050	0,043	-0,130	0,109	0,655	0,189	0,084	-0,069
K21	0,042	0,531	0,122	-0,072	0,136	0,188	-0,089	0,096	0,396	-0,284
K22	-0,047	0,480	0,094	0,034	0,016	0,705	0,092	-0,023	-0,025	0,020
K23	-0,005	0,085	0,021	0,802	-0,083	0,018	0,046	-0,044	-0,015	-0,006
K24	0,055	0,083	0,347	0,817	0,071	0,000	0,068	0,106	0,051	0,012
K25	0,091	0,181	0,456	0,699	0,091	-0,093	0,054	0,082	0,061	0,003
K27	0,100	0,193	0,571	0,388	-0,011	0,123	0,137	-0,069	-0,128	-0,006
K28	0,065	0,003	0,867	0,143	0,048	-0,002	0,005	-0,025	0,015	-0,005
K29	0,037	0,043	0,896	0,134	0,113	0,014	-0,001	0,008	-0,020	0,059
K45	0,146	0,386	0,052	0,212	-0,001	-0,047	0,417	-0,086	-0,243	0,237
L31N	-0,024	0,032	-0,004	-0,021	-0,015	0,903	0,031	-0,014	-0,017	0,039
L36N	-0,030	0,082	0,015	-0,101	-0,209	-0,064	-0,522	0,475	-0,007	0,189
L37	0,109	0,010	-0,082	0,054	0,166	-0,055	0,085	-0,083	0,733	0,068
L38N	-0,077	-0,062	-0,026	0,019	-0,054	0,068	-0,066	-0,774	0,128	0,081

The method of selection: The analysis by the method of main components.

The method of rotation: Varimax with the normalization of Kaiser.

a The rotation is converged in 10 iterations.

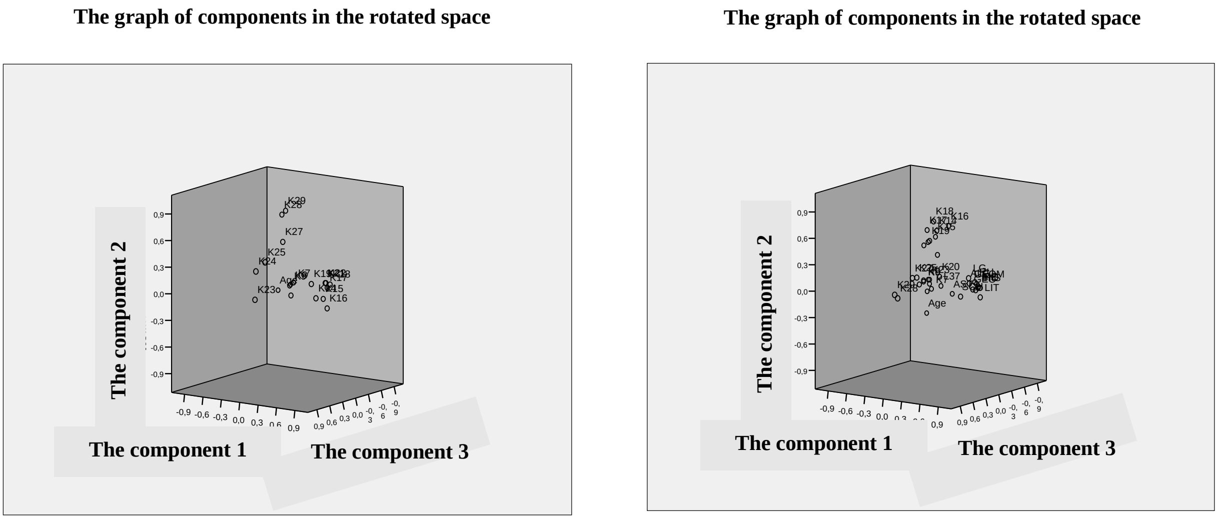
Table A15.167

The matrix of the transformation of components

The comp.	1	2	3	4	5	6	7	8	9	10
1	0,848	0,390	0,193	0,195	0,022	0,037	0,195	0,084	0,054	0,064
2	-0,499	0,567	0,422	0,400	0,198	0,166	0,146	-0,022	0,043	0,038
3	0,073	-0,606	0,552	0,490	0,049	-0,263	-0,079	0,008	-0,074	-0,006
4	0,075	-0,101	0,032	-0,230	0,904	0,046	-0,173	0,111	0,250	0,074
5	0,086	-0,176	0,309	-0,144	-0,167	0,852	-0,283	-0,098	0,037	-0,033
6	-0,011	-0,006	-0,384	0,436	0,049	0,217	-0,297	0,607	-0,312	0,242
7	0,005	-0,283	-0,400	0,375	0,142	0,311	0,533	-0,376	0,182	0,207
8	0,020	0,009	-0,202	0,296	-0,016	0,044	-0,122	0,133	0,441	-0,801
9	0,100	0,089	-0,111	0,090	0,287	0,045	-0,120	-0,444	-0,717	-0,389
10	0,063	0,174	-0,152	0,249	-0,078	-0,163	-0,650	-0,496	0,294	0,305

The method of selection: The analysis by the method of main components.

The method of rotation: Varimax with the normalization of Kaiser.



a b

Picture A15.164. The geometric position of independent variables in the space of three components

a – the reduced set of independent variables;

b – the complete set of independent variables

The groupings of independent variables at the visual analysis are distinguished:

- at the analysis of the reduced set of independent variables the several groupings of variables in the space of three components are distinguished, that directly follows from pic. A15.164, a (the groupings of variables are not expressed);
- at the analysis of the complete set of independent variables the several groupings of variables in the space of three components are distinguished, that directly follows from pic. A15.164, b (with the increasing of the quantity of variables increases the expressiveness of the density of distribution of the groupings of variables).

A15.10. The dynamics of results of the statistical analysis of a posteriori data

The collection of results of the automated testing of LRKT and diagnostics of IFPST was carried out respectively by means of the main DM and the applied DM, providing the registration of a posteriori data into the specialized DB.

For the verification of the used algorithms in the basis of the components of the complex of programs, in particular for the subsequent revealing and correction of possible errors the special cards (forms) have been developed for the parallel registration of answers of the contingent of examinees and the final values of target indicators (coefficients), calculated by the automated way (directly into the databank).

The results of statistical processing of a posteriori data are presented in tabl. A15.168.

Table A15.168

The results of primary statistical processing of the data of experiment

The name of indicator	The number of the experimental group of examinees Y3							
The number of group	1	2	3	4	5	6	7	8
The quantity of examinees	26	28	22	25	27	23	21	24
The experiment №1 (without the using of technology, the total testing in the discipline)								
The average point Y_1	3,850	3,414	3,224	3,678	4,036	3,643	3,790	3,645
ASD of average point	0,867	0,178	1,958	0,879	0,577	0,783	1,679	1,047
The experiment №2 (with the using of technology, the total testing in the discipline								
The average point Y_2	4,041	3,674	3,357	3,786	4,157	3,853	3,821	3,743
ASD of average point	0,723	0,127	1,743	0,743	0,446	0,654	1,538	0,986
The results of research								
$k_1 = Y_2 - Y_1$	0,191	0,26	0,133	0,108	0,121	0,21	0,031	0,098
$k_2 = Y_2 / Y_1$	1,049	1,076	1,041	1,029	1,029	1,057	1,008	1,026
$k_3 = \frac{Y_2 - Y_1}{Y_1} \cdot 100\%$	4,96	7,62	4,13	2,94	3,0	5,77	0,82	2,69
The change of ASD	-0,144	-0,051	-0,215	-0,136	-0,131	-0,129	-0,141	-0,061

The values of indicators in tabl. A15.167 indicate about the increasing of average point on 0,82-7.62% and the decreasing of ASD of average point after the using of CMT.

For the exclusion of the factor of randomness in the process of mathematical processing by means of a set of statistical methods there was the necessity of additional researches, including the analysis of dynamics of the changing of the indicator of the resultativity of training for the several years, and also the setting up and conducting of a series of the experiments with the purpose of influence of the various factors (parameters) on the efficiency of the technological process of the controlled formation of knowledge of the trainee.

The analysis of dynamics of the changing of indicator of the resultativity of training (LRKT) for the past 3 years was carried out preliminary and the efficiency of using of CMT for the realization of the system analysis of IEE of automated training (2006 y., the groups 1, 2 and 3) was estimated, the results of which are presented in tabl. A15.169.

Table A15.169

The results of the preliminary statistical analysis of the resultativity of training

The name of indicator	The number of the group of examinees							
	1	2	3	4	5	6	7	8
The indicators of the resultativity of training for 2004 y. (without CMT in the three groups, the private estimation on the fourth section of the discipline “Informatics”)								
The quantity of trainees	20	21	25	18	18	15	0	0
The average point of Y_1	4,05	4,286	4,24	4,611	4,056	4,4	-	-
ASD of average point	0,686	0,845	0,779	0,502	0,802	0,507	-	-
The indicators of the resultativity of training for 2005 y. (without CMT in the three groups, the private estimation on the fourth section of the discipline “Informatics”)								
The quantity of trainees	24	22	24	25	24	22	23	21
The average point of Y_2	4,333	4,046	4,375	4,16	4,042	4,091	4,696	4
ASD of average point	0,817	0,785	0,824	0,8	0,859	0,811	0,559	0,894
The indicators of the resultativity of training for 2006 y. (with CMT in the three groups, the private estimation on the fourth section of the discipline “Informatics”)								
The quantity of trainees	26	23	29	24	25	22	22	22
The average point of Y_3	4,5	4,609	4,379	3,708	3,92	3,773	4,455	3,818
ASD of average point	0,707	0,656	0,775	0,751	0,572	0,612	0,858	0,853
The indicators of the resultativity of training for 2007 y. (with CMT in the three groups, the private estimation on the fourth section of the discipline “Informatics”)								
The quantity of trainees	21	16	17	23	21	16	20	18
The average point of Y_3	4,524	4,5	4,588	4,174	4,571	4,375	3,9	3,167
ASD of average point	0,680	0,633	0,507	0,778	0,507	0,619	0,968	0,384
The indicators of the resultativity of training for 2008 y. (with CMT in the three groups, the private estimation on the fourth section of the discipline “Informatics”)								
The quantity of trainees	17	20	19	18	20	18	15	18
The average point of Y_3	4,588	4,550	4,684	4,167	4,45	4,778	3,933	4,111
ASD of average point	0,507	0,759	0,582	0,707	0,686	0,428	0,799	0,758
The indicators of the resultativity of training for 2009 y. (with CMT in the three groups, the private estimation on the fourth section of the discipline “Informatics”)								
The quantity of trainees	15	14	14	14	14	14	18	-
The average point of Y_3	4,6	4,571	4,714	4	4,357	4,786	3,944	-
ASD of average point	0,507	0,756	0,469	0,679	0,633	0,426	0,725	-

The completion of tabl. A15.169

The results of the statistical analysis								
The indicators, reflecting the changing of efficiency of training for 2004-2005 y. (without the using of CMT)								
k_1	0,283	-0,240	0,135	-0,451	-0,014	-0,309	-	-
k_2	1,07	0,944	1,032	0,902	0,997	0,93	-	-
k_3, %	6,996	-5,606	3,184	-9,783	-0,343	-7,025	-	-
The changing of ASD	0,13	-0,06	0,045	0,298	0,056	0,304		
The indicators, reflecting the changing of efficiency of training for 2005-2006 y. (with the using of CMT)								
k_1	0,167	0,563	0,004	-0,452	-0,122	-0,318	-0,241	-0,182
k_2	1,039	1,1392	1,001	0,891	0,970	0,922	0,949	0,955
k_3, %	**3,846**	**13,923**	0,099	-10,857	-3,01	-7,778	-5,135	-4,546
The changing of ASD	-0,109	-0,129	-0,049	-0,049	-0,287	-0,199	0,299	-0,042
The indicators, reflecting the changing of efficiency of training for 2006-2007 y. (with the using of CMT)								
k_1	0,024	-0,109	0,209	0,466	0,651	0,602	-0,555	-0,652
k_2	1,005	0,976	1,048	1,126	1,166	1,160	0,876	0,829
k_3, %	0,529	-2,359	**4,771**	12,555	16,618	15,964	**-12,449**	**-17,064**
The changing of ASD	-0,028	-0,024	-0,268	0,027	-0,065	0,007	0,110	-0,469
The indicators, reflecting the changing of efficiency of training for 2007-2008 y. (with the using of CMT)								
k_1	0,064	0,050	0,096	-0,007	-0,121	0,403	0,033	0,944
k_2	1,014	1,011	1,021	0,998	0,973	1,092	1,009	1,298
k_3, %	**1,424**	**1,111**	**2,092**	-0,174	-2,656	**9,206**	0,855	**29,825**
The changing of ASD	-0,172	0,127	0,075	-0,071	0,179	-0,191	-0,169	0,375
The indicators, reflecting the changing of efficiency of training for 2008-2009 y. (with the using of CMT)								
k_1	0,012	0,021	0,030	-0,167	-0,093	0,008	0,011	-4,111
k_2	1,003	1,005	1,006	0,960	0,979	1,002	1,003	0,000
k_3, %	0,256	0,471	0,642	-4,000	-2,087	0,166	0,283	**-100 [∞]**
The changing of ASD	0,000	-0,003	-0,114	-0,028	-0,053	-0,002	-0,074	-0,758

In tabl. A15.169 reflects the resultativity (efficiency) of training for 2004-2006 y., characterizing the LRKT of day (the groups 1-6) and evening department (the groups 7-8). The values of indicators for 2004-2005 y. in the table indicate both about the increasing on 3-7% (the groups 1 and 3) and the decreasing on 5-10% (the groups 2, 4, 5 and 6) of the resultativity of training without the using of CMT in IEE.

In 2006 y. at the statement of the content of discipline “Informatics” CMT was used, on the basis of which the statement and conducting of a series of experiments was carried out, and also the statistical processing of a posteriori results (data) of testing was carried out.

The experimental researches were carried out in the context of the separate sections of discipline, the information fragments on which were presented to the contingent of trainees by the means of use of the innovative adaptive means of training (ET).

For the increasing of visibility of the changing of the indicators of the efficiency of training at the using of CMT in 2006 y. (the groups 1-3) the increasing of the level of difficulty at the statement of content of the studied material was provided directly. The received data (2005-2006 y.) indicate about the sharp decreasing of the resultativity of training on 3-10% (the groups 4-8) and its significant increasing on 3-14% (the groups 1-3).

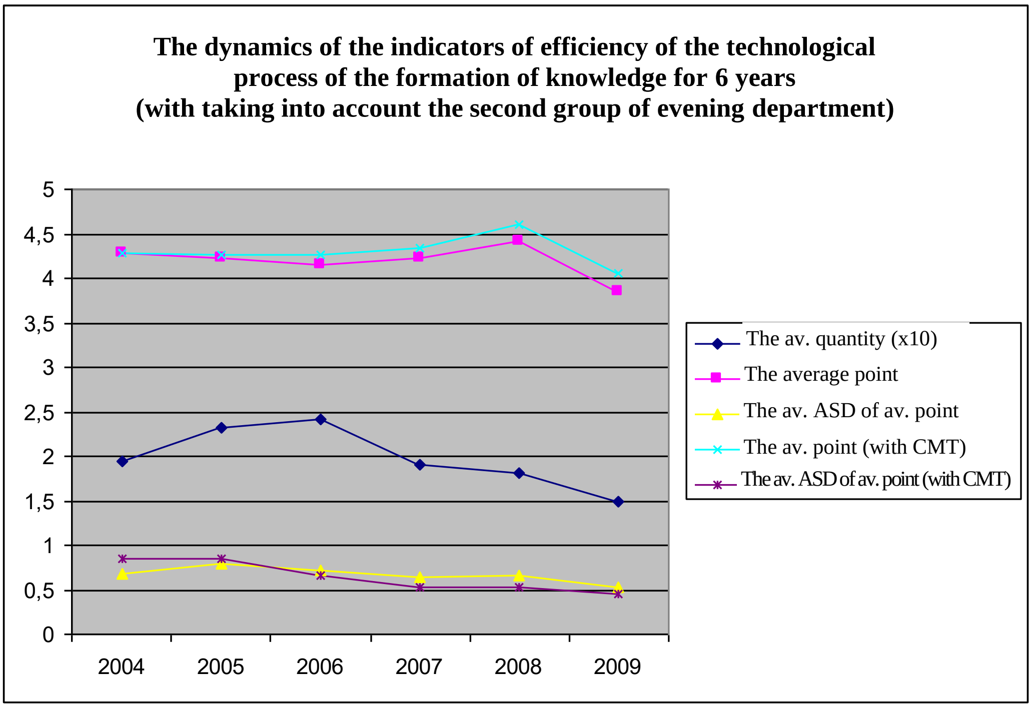
According to the method of research of the parameters of CM of the subject of training (pic. 4.2) at the stage of testing of IFPST the vectors of parameters of the physiological (the acuity of vision, field of vision, color-perception), psychological (the convergent and divergent intellectual abilities of trainee) and linguistic (the level of proficiency in language) portraits were diagnosed by means of the applied DM with the using of methods, presented in pic. 6.1.

At the stage of the analysis of the nominal values of parameters of the physiological portrait of CM among the contingent of examinees were not revealed the subjects of training (examinees) with the various anomalies of perception of the information by the visual sensory system. The research of the linguistic portrait of CM is directed on the revealing of correspondence between the level of statement of the material (adaptive) means of tinning and the level of proficiency in the language of statement of the subject of training (examinee). The statement of material was carried out in the English language to the native-speakers of the Russian language.

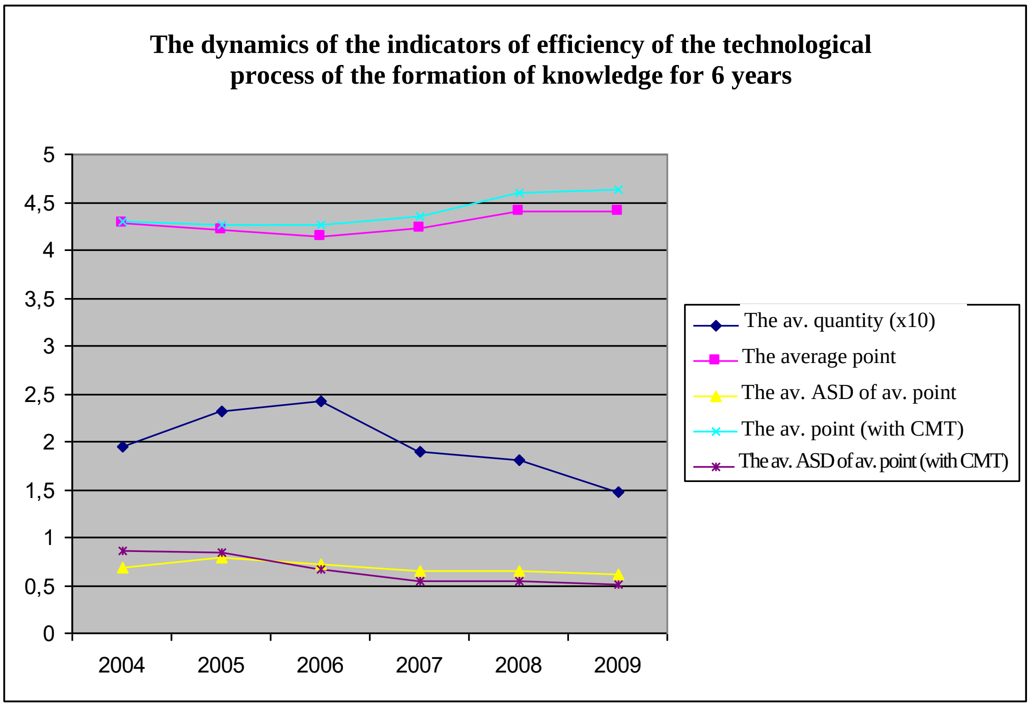
At the stage of the adaptive training the automated representation of information fragments was carried out by means of the adaptive means of training (ET), taking into account the parameters of IFPST, contained directly in CM of the subject of training. At the representation of the learning material the information-educational influences of the several various kinds were used in the quality of the main ones: verbal (textual), tabular (tables) and schematic (the flat schemes).

At the final stage the automated diagnostics of LRKT is carried out with the using of the basic DM, containing in their basis of the two scales of estimation. There is the significant necessity of mathematical processing of a posteriori data by the means of use of a set of mathematical methods of the statistical analysis.

In pic. A15.165 the dynamics of the indicators of efficiency of the process of the formation of knowledge of the trainees of the three groups of day department (with CMT), the three groups of day department (without the using of CMT), the two groups of evening department (with the using of CMT) is presented, and also in pic. A15.166 the similar diagram without the second group of evening department is presented, as it was not included into the learning plan by the management of the chair "ACP" in 2009 y.



Picture A15.165. The dynamics of changing of the indicators of resultativity of functioning of the automated training system based on the cognitive models for 2004-2009 y.



Picture A15.166. The dynamics of changing of the indicators of resultativity of functioning of the automated training system based on the cognitive models for 2004-2009 y.

The exclusion of the second group of evening department affected on the results of testing.

The analysis of the first diagram itself allows to make a row of important conclusions directly:

- the quantity of trainees without the using of CMT is changing: from 2004 y. to 2006 y. there is the increasing, and from 2006 y. to 2009 y. there is the decline, which is explained by the demographic decline directly;
- the average point of the contingent of trainees without CMT changes: from 2004 y. to 2006 y. there is the insignificant decreasing, from 2006 y. to 2008 y. there is the relative increasing, from 2008 to2009 there is the intensive decreasing in the indicator;
- the average average square deviation of average point with the using of CMT: from 2004 y. to 2008 y. there is the increasing, from 2008 y. to 2009 y. there is the decreasing;
- the average point of the contingent of trainees with the using of CMT: from 2004 y. to 2008 y. there is the increasing, from 2008 y. to 2009 y. there is the decreasing of indicator.

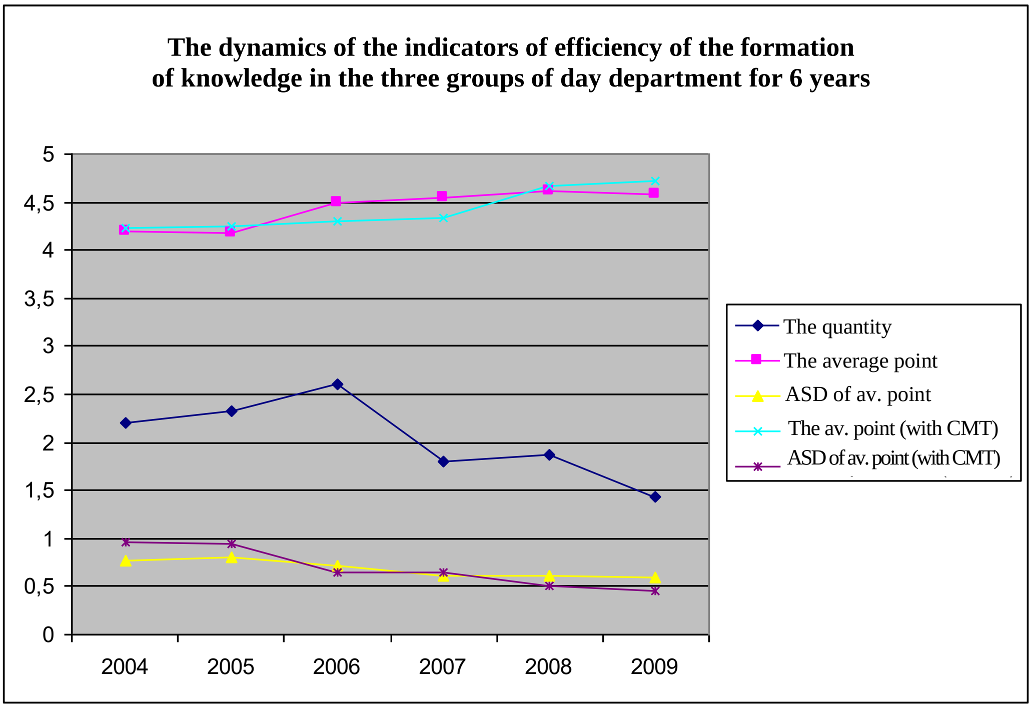
The analysis of the second diagram allows to make a row of important conclusions directly:

- the quantity of trainees without CMT is changing: from 2004 y. to 2006 y. there is the increasing, and from 2006 y. to 2009 y. there is the significant decline of indicator, that is explained by the demographic decline directly;
- the average average square deviation of average point without CMT: from 2004 y. to 2005 y. there is the increasing of indicator [as the samples are expanded], from 2005 y. to 2007 y. there is the decreasing, from 2007 y. to 2009 y. the indicator without changes;
- the average point of the contingent of trainees without CMT changes: from 2004 y. to 2006 y. there is the insignificant decreasing, from 2006 y. to 2008 y. there is the increasing, from 2008 y. to 2009 y. the significant changes of indicator is not observed;
- the average average square deviation of average point with CMT: from 2004 y. to 2005 y. the indicator is remaining without changes, from 2005 y. to 2007 y. there is the decreasing of indicator [the samples are expanded], from 2007 y. to 2009 y. the indicator without changes;
- the average point of the contingent of trainees with the using of CMT: from 2004 y. to 2006 y. there is the insignificant increasing, from 2006 y. to 2008 y. there is the increasing, from 2008 y. to 2009 y. the insignificant increasing of indicator is observed.

It is proposed to explain the dynamics of changing of the indicators of resultativity of functioning of the automated training system based on CM for 2004-2009 y. by means of comparing of a posteriori data of research of the contingent of trainees.

- the day department of “FCTI” of “SPbSETU "LETI"” in the discipline “Informatics”;
  - from 2004 y. to the present time the three groups of the chair “ACP” of “SPbSETU "LETI"” with the using of CMT in the form of the traditional and automated testing;
  - from 2004 y. to the present time the three groups of the chair “ASIPC” of “SPbSETU "LETI"” without the using of CMT in the form of the traditional and automated testing;
- the evening department of “OF” of “SPbSETU "LETI"” in the discipline “Informatics”;
  - from 2005 y. to the present time the two groups of the chair “ACP” of “SPbSETU "LETI"” with the using of CMT in the form of the traditional and automated testing.

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the three groups of day department of the chair “ACP” with the using of the automated (computerized) testing by the means of use of the rough scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.167.

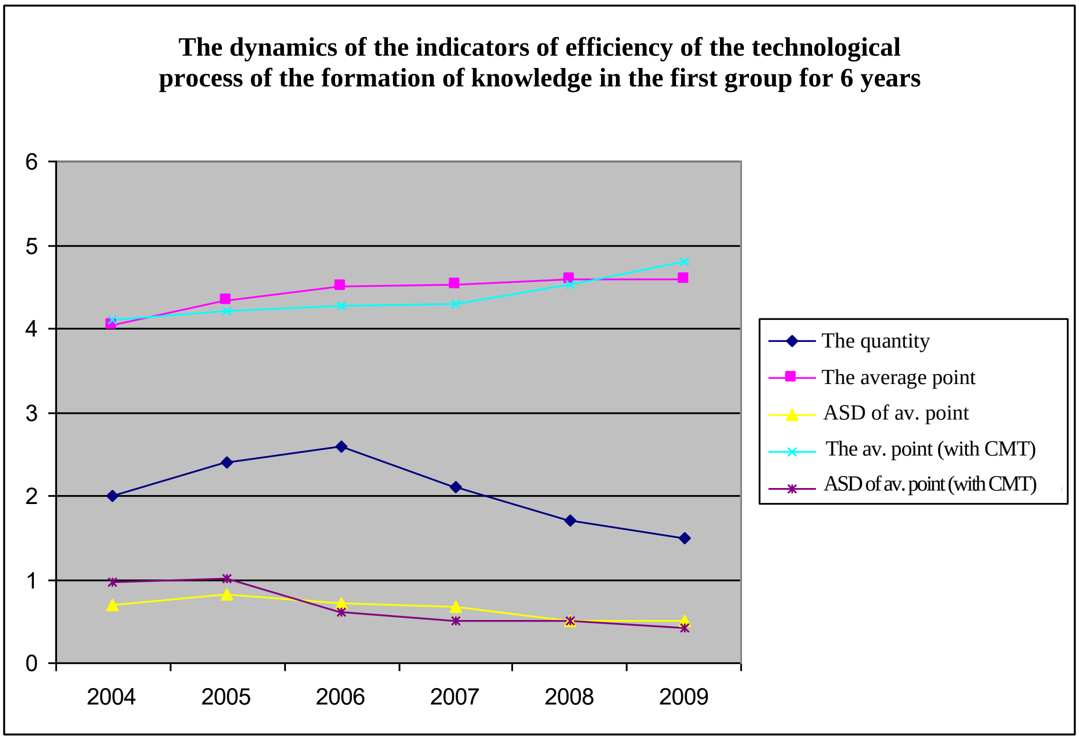


Picture A15.167. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the three groups of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees without CMT is changing: from 2004 y. to 2006 y. the increasing is observed, and from 2006 y. to 2009 y. the significant declining of indicator is observed, that is explained by the demographic decline directly;
- the average average square deviation of average point without CMT: from 2004 y. to 2005 y. the insignificant decreasing is observed, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the indicator does not change, from 2007 y. to 2009 y. the decreasing is observed;
- the average point of the contingent of trainees without the using of CMT changes: from 2004 y. to 2005 y. the indicator does not change, from 2005 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing is observed;
- the average average square deviation of average point with the using of CMT: from 2004 y. to 2005 y. the insignificant increasing of indicator is observed, from 2005 y. to 2007 y. the decreasing is observed, from 2007 y. to 2009 y. the indicator does not change;
- the average point of the contingent of trainees with the using of CMT: from 2004 y. to 2005 y. the insignificant increasing is observed, from 2005 y. to 2009 y. the increasing is observed.

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the first group of day department of the chair "ACP" with the using of the automated (computerized) testing by means of application of the rough scale on the basis of the quantity of correct answers and the accurate (point) scale on the basis of the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.168.

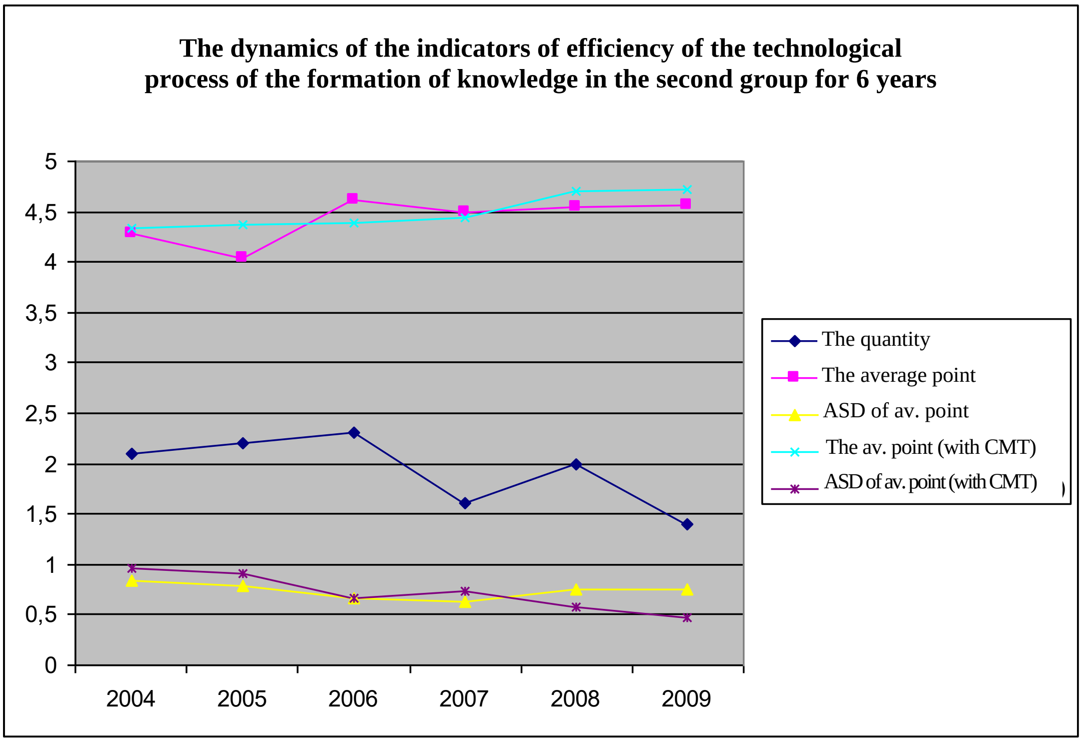


Picture A15.168. The dynamics of changing of the indicators of the resultativity of the formation of knowledge of the contingent of trainees in the first group of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees without CMT is changing: from 2004 y. to 2006 y. the increasing is observed, and from 2006 y. to 2009 y. the significant decline of indicator is observed, that is explained by the demographic decline directly;
- the average average square deviation of average point without the use of CMT: from 2004 y. to 2005 y. the increasing is observed, from 2005 y. to 2008 y. the decreasing is observed, from 2008 y. to 2009 y. the indicator practically does not change [established];
- the average point of the contingent of trainees without CMT changes: from 2004 y. to 2006 y. the increasing is observed, from 2006 y. to 2007 y. the indicator does not change, from 2007 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the indicator does not change [established];
- the average average square deviation of average point with the using of CMT: from 2004 y. to 2005 y. the insignificant increasing of indicator, from 2005 y. to 2007 y. the decreasing of indicator is observed, from 2007 y. to 2008 y. the indicator did not change, from 2008 y. to 2009 y. the insignificant decreasing of indicator is observed [established];
- the average point of CMT of the contingent of trainees with CMT: from 2004 y. to 2007 y. the insignificant increasing is observed, from 2007 y. to 2009 y. the increasing of indicator is observed.

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the second group of day department of the chair “ACP” with the using of the automated (computerized) testing by the means of application of the rough scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.169.

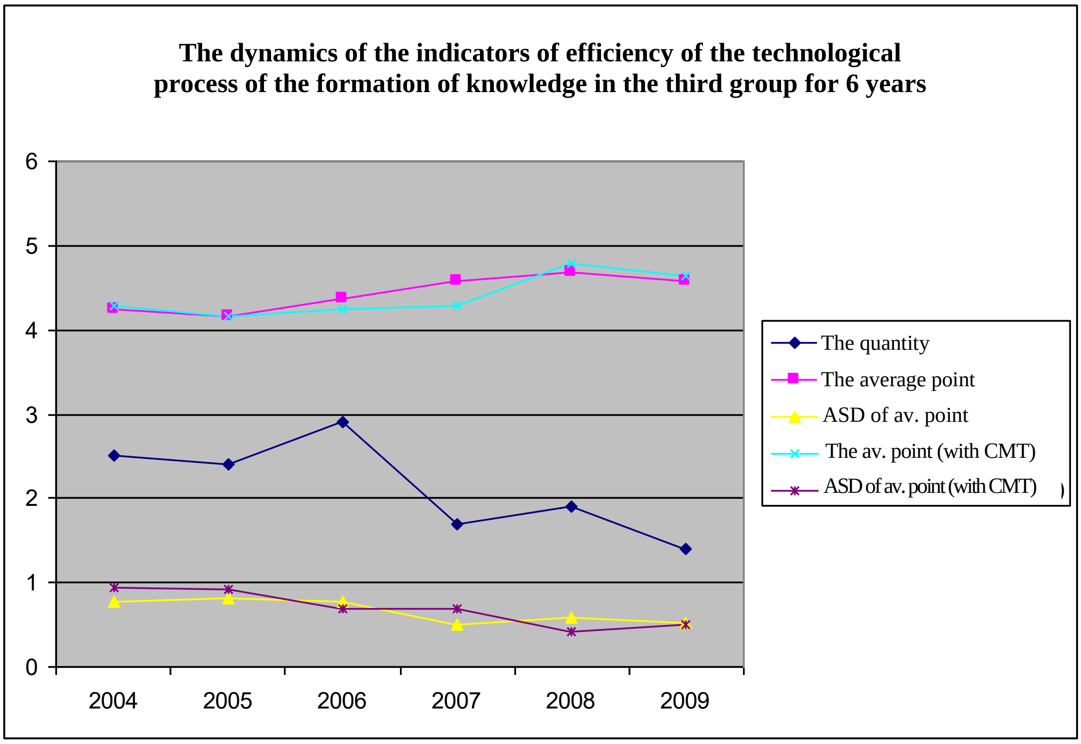


Picture A15.169. The dynamics of changing of the indicators of the resultativity of the formation of knowledge of the contingent of trainees in the second group of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees without the using of CMT is changing: from 2004 y. to 2006 y. the increasing is observed, from 2006 y. to 2007 y. the declining is observed, from 2007 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the declining is observed, that in the end count causes the decreasing of indicator and it is explained by the demographic decline;
- the average average square deviation of average point without the using of CMT: from 2004 y. to 2007 y. the decreasing is observed, from 2007 y. to 2008 y. the increasing of indicator is observed, from 2008 y. to 2009 y. the indicator does not change [established];
- the average point of the contingent of trainees without CMT changes: from 2004 y. to 2005 y. the decreasing is observed, from 2005 y. to 2006 y. the increasing is observed, from 2006 y. to 2007 y. the decreasing is observed, from 2007 y. to 2008 y. the insignificant increasing is observed, from 2008 y. to 2009 y. the indicator practically does not change [established];
- the average aversge quadratic deviation of average point with CMT: from 2004 y. to 2005 y. the insignificant decreasing is observed, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the increasing is observed, from 2007 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the decreasing of indicator is observed [established];
- the average point of the contingent of trainees with CMT: from 2004 y. to 2008 y. the increasing of indicator is observed, from 2008 y. to 2009 y. the indicator does not change [established].

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the third group of day department of the chair “ACP” with the using of the automated (computerized) testing by the means of application of the rough scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.170.

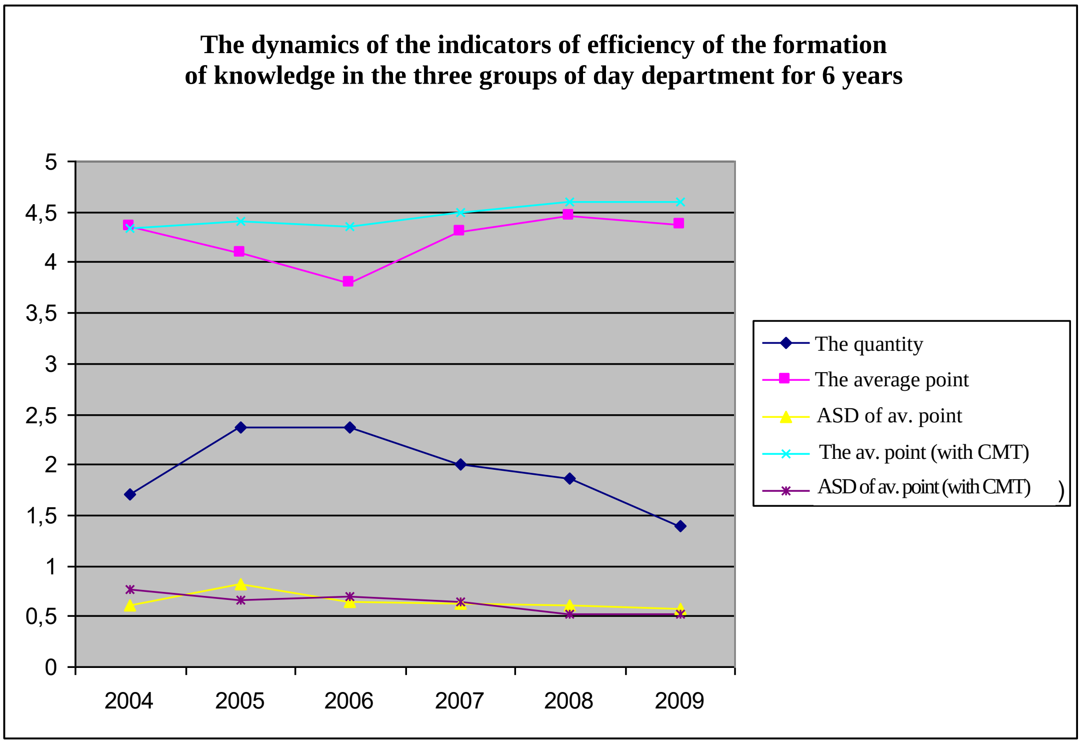


Picture A15.170. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the third group of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees without CMT is changing: from 2004 y. to 2005 y. the decreasing is observed, from 2005 y. to 2006 y. the increasing is observed, from 2006 to 2007 the decreasing is observed, from 2007 y. to 2008 y. the increasing, from 2008 y. to 2009 y. the decreasing is observed, that causes the decreasing of indicator and it is explained by the demographic decline;
- the average average quadratic deviation of average point without CMT: from 2004 y. to 2005 y. the insignificant increasing is observed, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the decreasing is observed, from 2007 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing is observed [established];
- the average point of the contingent of trainees without CMT changes: from 2004 y. to 2005 y. the insignificant decreasing is observed, from 2005 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing is observed [established];
- the average average square deviation of average point with CMT: from 2004 y. to 2005 y. the insignificant decreasing, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the indicator does not change, from 2007 y. to 2008 y. the decreasing is observed, from 2008 y. to 2009 y. the insignificant increasing of indicator is observed [established];
- the average point of the contingent of trainees with CMT: from 2004 y. to 2005 y. the insignificant decreasing is observed, from 2005 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing of indicator is observed [established].

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the three groups of day department of the chair "ASIPC" with the using of the traditional (classical) testing on the basis of the rough scale and the blanks with the testing tasks for 2004-2009 y. is presented in pic. A15.171.

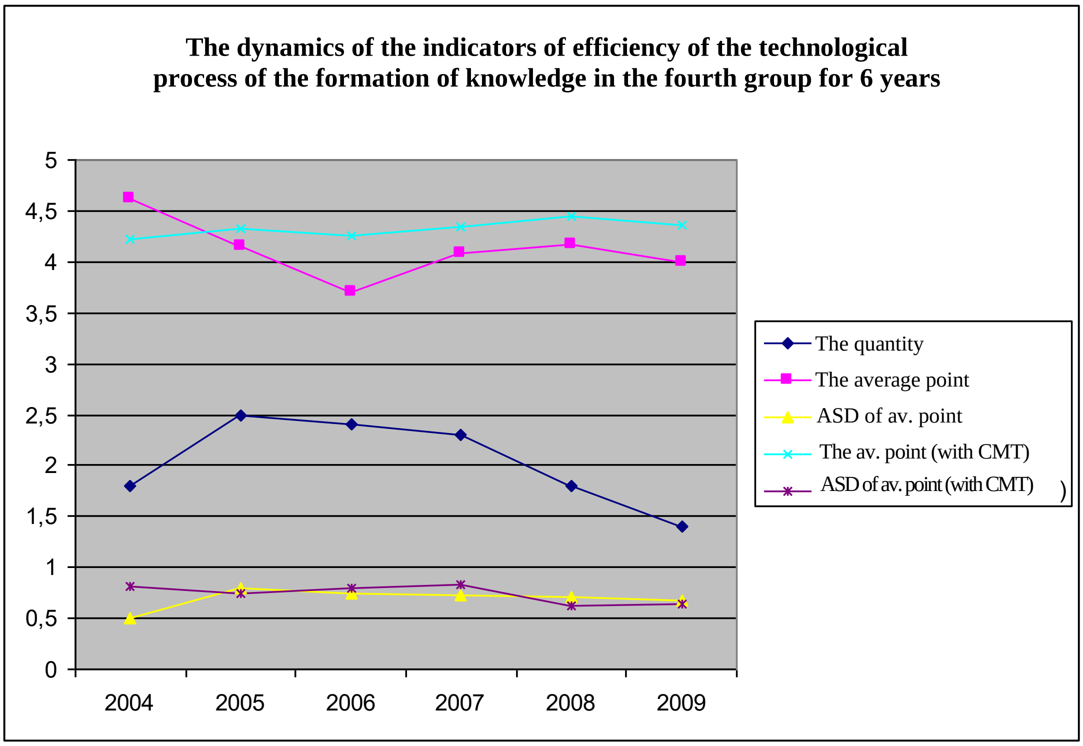


Picture A15.171. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the three groups of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees changes: from 2004 y. to 2005 y. the increasing is observed, from 2005 y. to 2006 y. the indicator does not change, from 2006 y. to 2009 y. the decreasing is observed, that causes the decreasing of indicator and it is explained by the demographic decline;
- the average average quadratic deviation of average point without CMT: from 2004 y. to 2005 y. the insignificant increasing is observed, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the insignificant decreasing is observed, from 2007 y, to 2008 y. the insignificant decreasing is observed, from 2008 y. to 2009 y. it does not change [established];
- the average point of the contingent of trainees without CMT changes: from 2004 y. to 2006 y. the decreasing is observed, from 2006 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing of indicator is observed [established];
- the average average square deviation of average point with CMT: from 2004 y. to 2005 y. the insignificant decreasing, from 2005 y. to 2006 y. the insignificant increasing is observed, from 2006 y. to 2007 y. the insignificant decrease is observed, from 2007 y. to 2008 y. the decreasing is observed, from 2008 y. to 2009 y. the indicator does not change [established];
- the average point of the contingent of trainees with the using of CMT: from 2004 y. to 2005 y. the insignificant increasing is observed, from 2005 y. to 2006 y. the indicator does not change, from 2006 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the indicator does not change.

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the fourth group of day department of the chair "ACP" with the using of the automated (computerized) testing by the means of application of the coarse scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.172.

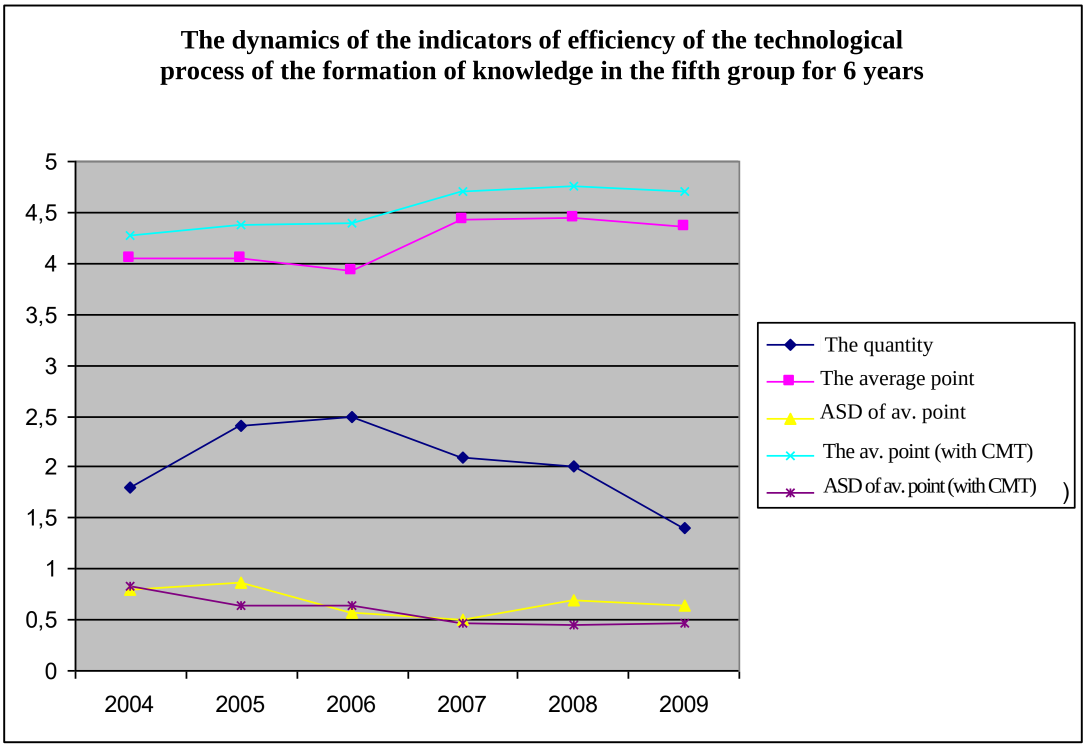


Picture A15.172. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the fourth group of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees changes: from 2004 y. to 2005 y. the increasing is observed, from 2005 y. to 2009 y. the decreasing is observed, that in the end count causes the decreasing of indicator and it is explained by the demographic decline of population;
- the average average quadratic deviation of average point without CMT: from 2004 y. to 2005 y. the increasing is observed, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the insignificant decreasing is observed, from 2007 y. to 2008 y. the decreasing is observed, from 2008 y. to 2009 y. the indicator does not change [established];
- the average point of the contingent of trainees without CMT changes: from 2004 y. to 2006 y. the decreasing is observed, from 2006 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing of indicator is observed [established];
- the average average quadratic deviation of average point CMT: from 2004 y. to 2005 y. the insignificant decreasing, from 2005 y. to 2007 y. the insignificant increasing is observed, from 2007 y. to 2008 y. the decreasing is observed, from 2008 y. to 2009 y. it does not change [established];
- the average point of the contingent of trainees with the using of CMT: from 2004 y. to 2005 y. the insignificant increasing is observed, from 2005 y. to 2006 y. the insignificant decreasing, from 2006 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing.

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the fifth group of day department of the chair "ACP" with the using of the automated (computerized) testing by the means of application of the rough scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blank for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.173.

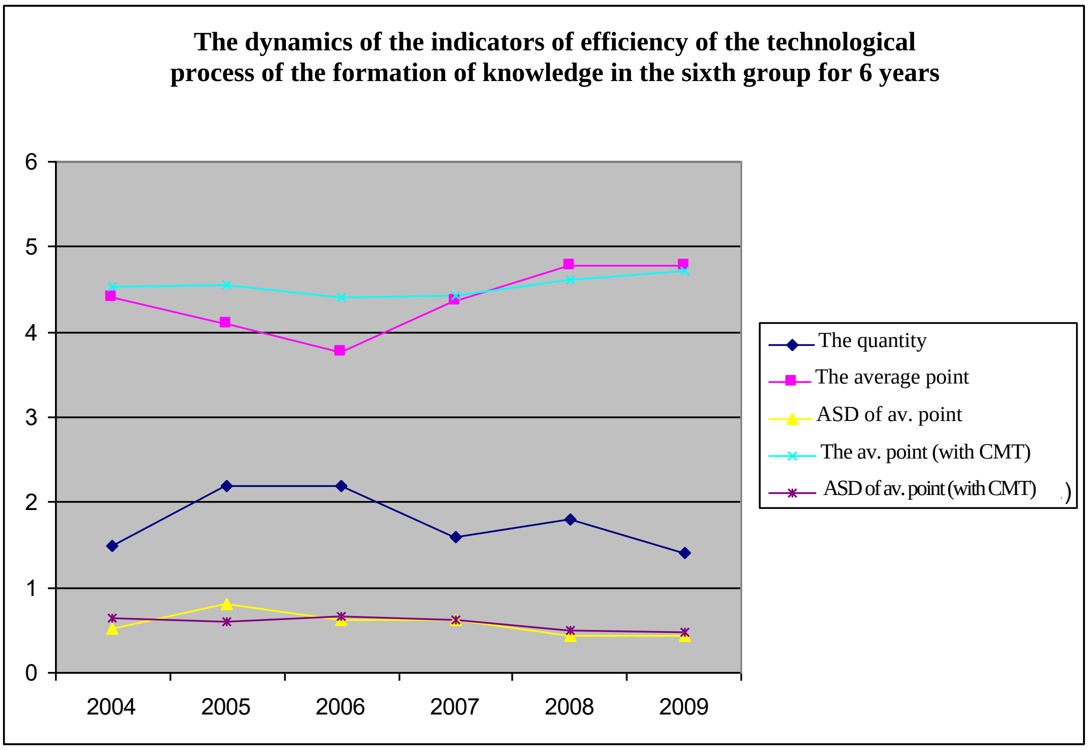


Picture A15.173. The dynamics of changing of the indicators of resultativity of the formation knowledge of the contingent of trainees in the fifth group of day department for 2004-2009 y..

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees changes: from 2004 y. to 2006 y. the increasing is observed, from 2006 y. to 2009 y. the decreasing is observed, that in the end count causes the decreasing of indicator and it is explained by the demographic decline of population;
- the average average quadratic deviation of average point without the using of CMT: from 2004 y. to 2005 y. the increasing is observed, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the indicator does not change, from 2007 y. to 2008 y. the insignificant increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing [established];
- the average point of the contingent of trainees without CMT changes: from 2004 y. to 2005 y. the indicator does not change, from 2005 y. to 2006 y. the insignificant decreasing is observed, from 2006 y. to 2007 y. the increasing is observed, from 2007 y. to 2008 y. the indicator does not change, from 2008 y. to 2009 y. the insignificant decreasing of indicator is observed [established];
- the average average quadratic deviation of average point with the using of CMT: from 2004 y. to 2005 y. the decreasing of indicator, from 2005 y. to 2006 y. the indicator does not change, from 2006 y. to 2007 y. the insignificant decreasing of indicator is observed, from 2007 y. to 2009 y. the indicator does not change [established];
- the average point of the contingent of trainees with CMT: from 2004 y. to 2007 y. the insignificant increasing is observed, from 2007 y. to 2008 y. the insignificant increasing is observed, from 2008 y. to 2009 y. the insignificant decreasing of indicator is observed [established].

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge with the using of the automated (computerized) testing by the means of application of the rough scale based on the quantity of correct answers and the exact (point) scale based on the formed weights coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.174.

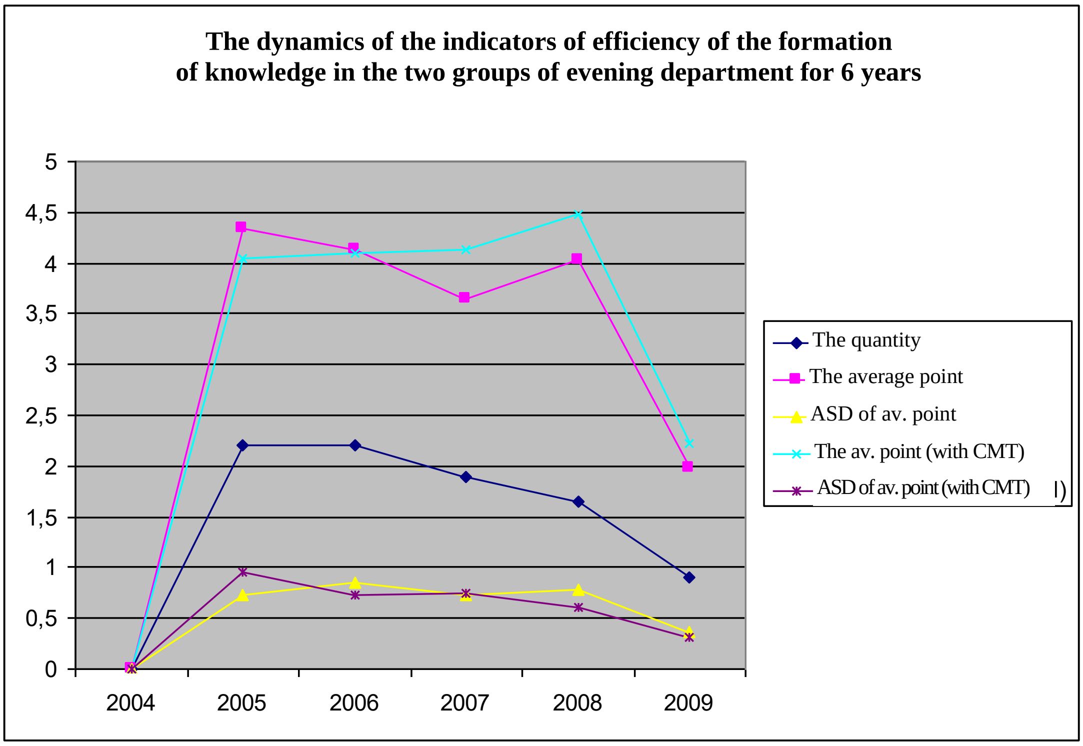


Picture A15.174. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the sixth group of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees changes: from 2004 y. to 2005 y. the increasing is observed, from 2005 y. to 2006 y. the indicator does not change, from 2006 y. to 2007 y. the decreasing is observed, from 2007 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the decreasing is observed, that in the end count causes the decreasing of indicator, - the demographic decline;
- the average average square deviation of average point without the using of CMT: from 2004 y. to 2005 y. the increasing is observed, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the indicator does not change, from 2007 y. to 2008 y. the insignificant decreasing is observed, from 2008 y. to 2009 y. the indicator does not change [established];
- the average point of trainees without CMT changes: from 2004 y. to 2006 y. the decreasing of indicator, from 2006 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. it does not change [established];
- the average average quadratic deviation of average point of CMT: from 2004 y. to 2005 y. the insignificant decreasing, from 2005 y. to 2006 y. the insignificant increasing, from 2006 y. to 2008 y. the insignificant decreasing is observed, from 2008 y. to 2009 y. it does not change [established];
- the average point of the contingent of trainees with CMT: from 2004 y. to 2005 y., the indicator does not change, from 2005 y. to 2006 y. the insignificant decreasing, from 2006 y. to 2007 y. it does not change, from 2007 y. to 2009 y. the insignificant increasing is observed [established].

The dynamics of changes of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the two groups of evening department of the chair "ACP" with the using of the automated (computerized) testing by the means of application of the rough scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.175.

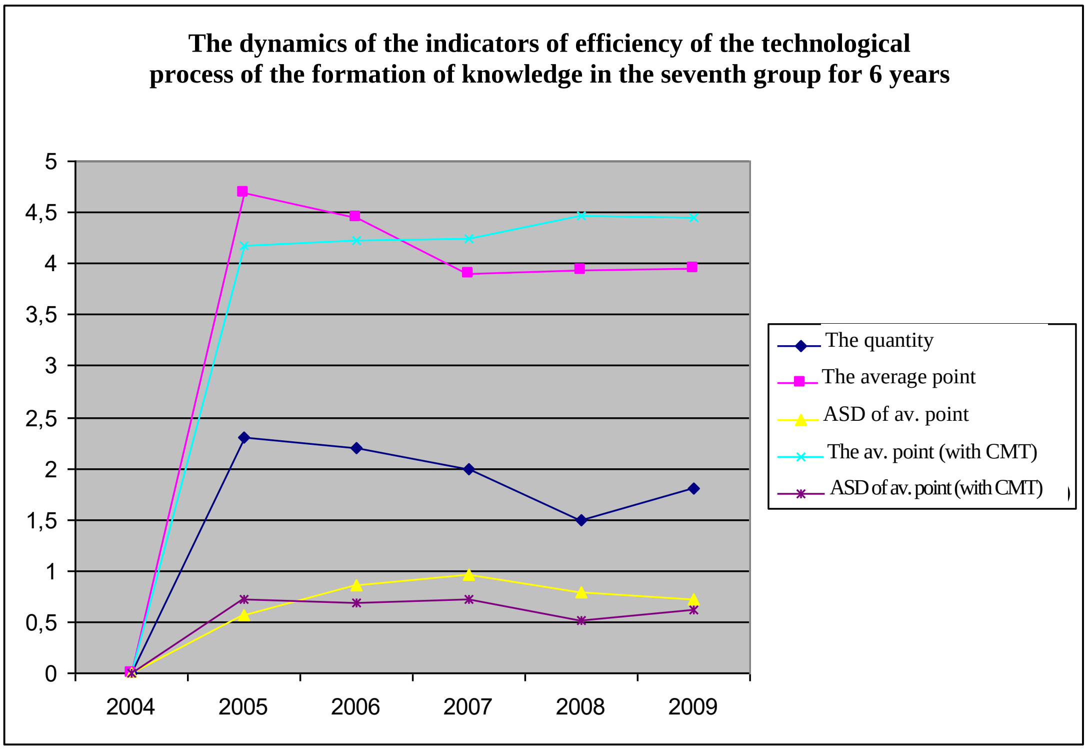


Picture A15.175. The dynamics of changing of the indicators of resultativity of the formation knowledge of the contingent of trainees in the two groups of evening department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees changes: in 2004 y. the classes in the evening department are absent, from 2005 y. to 2006 y. the indicator does not change, from 2006 y. to 2009 y. the decreasing is observed, that causes the decreasing of indicator and it is explained by the demographic decline;
- the average average quadratic deviation of average point without CMT: in 2004 y. the classes in the evening department are absent, from 2005 y. to 2006 y. the insignificant increasing is observed, from 2006 y. to 2007 y. the insignificant decreasing is observed, from 2007 y. to 2008 y. the insignificant increasing is observed, from 2008 y. to 2009 y. the decreasing of indicator is observed;
- the average point of the contingent of trainees without the using of CMT changes: in 2004 y. the classes in the evening department are absent, from 2005 y. to 2007 y. the decreasing is observed, from 2007 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the decreasing of the nominal value of indicator is observed;
- the average average quadratic deviation of average point with the using of CMT: in 2004 y. the classes in the evening department are absent, from 2005 y. to 2006 y. the insignificant decreasing, from 2006 y. to 2007 y. the insignificant increasing, from 2007 y. to 2009 y. the decreasing of the nominal value of indicator is observed;
- the average point of the continent of trainees with the using of CMT: in 2004 y. the classes in the evening department of trainees are absent, from 2005 y. to 2007 y. the insignificant increasing, from 2007 y. to 2008 y. the increasing, from 2008 y. to 2009 y. the decreasing of indicator is observed [established].

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the seventh group of day department of the chair “ACP” with the using of the automated (computerized) testing by the means of application of the rough scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.176.

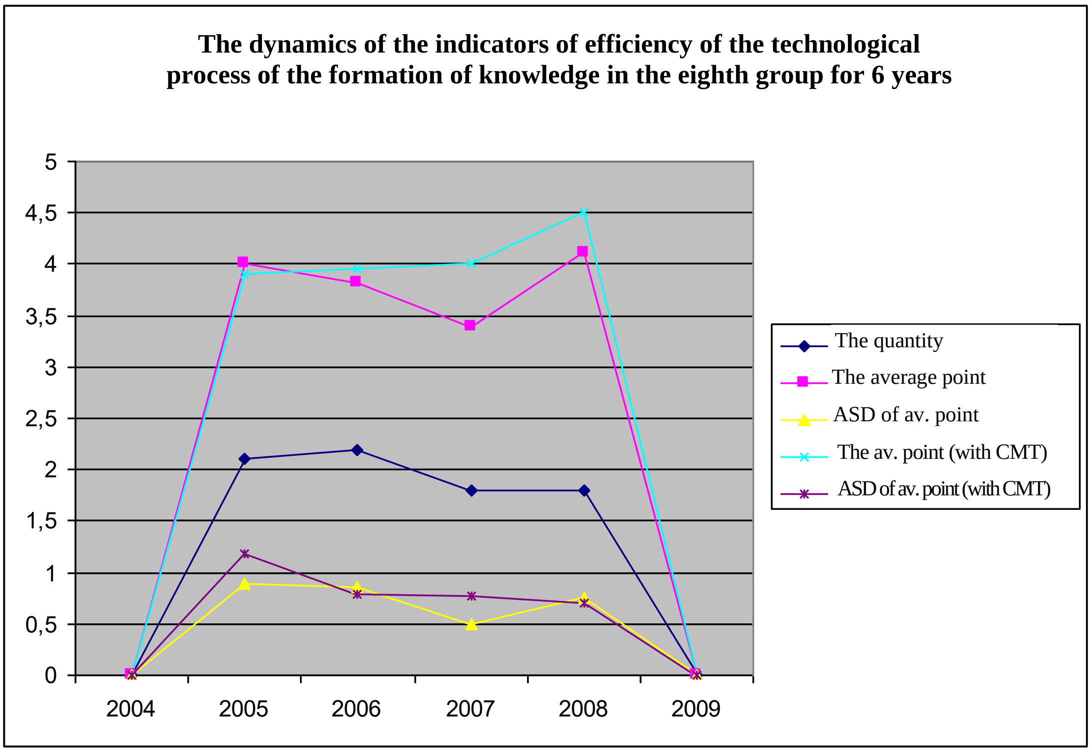


Picture A15.176. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees of in the seventh group of evening department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees changes: in 2004 y. the classes in the evening department are absent, from 2005 y. to 2008 y. the decreasing is observed, from 2008 y. to 2009 y. the increasing is observed, that causes the decreasing of indicator and it is explained by the demographic decline;
- the average average quadratic deviation of average point without the use of CMT: in 2004 y. the classes in the evening department of trainees are absent, from 2005 y. to 2007 y. the increasing of indicator is observed directly, from 2008 y. to 2009 y. the relative increasing is observed [established];
- the average point of the contingent of trainees without the using of CMT changes: in 2004 y. the classes in the evening department of trainees are absent, from 2005 y. to 2007 y. the decreasing of indicator is observed, from 2007 y. to 2008 y. the insignificant increasing is observed, from 2008 y. to 2009 y. the indicator does not change directly;
- the average average quadratic deviation of average point with the using of CMT: in 2004 y. the classes in the evening department of trainees are absent, from 2005 y. to 2006 y. the indicator does not change directly, from 2006 y. to 2007 y. the insignificant increasing, from 2007 y. to 2008 y. the decreasing, from 2008 y. to 2009 y. the insignificant increasing is observed [established];
- the average point of the contingent of trainees with the using of CMT: in 2004 y. the classes in the evening department of trainees are absent, from 2005 y. to 2007 y. the insignificant increasing, from 2007 y. to 2008 y. the increasing, from 2008 y. to 2009 y. the indicator does not change directly [established].

The dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the eighth group of day department of the chair “ACP” with the using of the automated (computerized) testing by the means of application of the rough scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2009 y. is presented in pic. A15.177.



Picture P15.177. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the eighth group of evening department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees changes: in 2004 y. the classes in the evening department are absent, from 2005 y. to 2008 y. the decreasing is absent, in 2009 y. the second group is absent, that causes the decreasing of indicator and it is explained by the demographic decline;
- the average average quadratic deviation of average point without the using of CMT: in 2004 y. the classes in the evening department are absent, from 2005 y. to 2007 y. the decreasing is observed, from 2007 y. to 2008 y. the increasing is observed, in 2009 y. the second group is absent;
- the average point of the contingent of trainees without the using of CMT changes: in 2004 y. the classes in the evening department of trainees are absent, from 2005 y. to 2007 y. the decreasing of indicator is observed, from 2007 y. to 2008 y. the increasing of indicator is observed, in 2009 y. the second group is absent;
- the average average quadratic deviation of average point with the using of CMT: in 2004 y. the classes in the evening department is observed, from 2005 y. to 2006 y. the decreasing is observed, from 2006 y. to 2007 y. the indicator does not change, from 2007 y. to 2008 y. the insignificant decreasing, in 2009 y. the second group is absent;
- the average point of the contingent of trainees with the using of CMT: in 2004 y. the classes in the evening department is absent, from 2005 y. to 2007 y. the insignificant increasing, from 2007 y. to 2008 y. the increasing of indicator, in 2009 y. the second group is absent [no the eighth group of evening department].

A15.11. The conclusions and observations on the statistical justification

In the result of work under my dissertation and the second report on SRW for 2006-2008 y.:

- the conception of statistical justification for the increasing of the efficiency of functioning of the environment of automated training with the properties of adaptation based on the parametrical CM was formed, the plan of carrying out of the primary and secondary mathematical processing was developed by means of a set of statistical methods;
- the primary mathematical processing of a posteriori data was realized;
  - the searching, verification and insignificant correction of abnormal outliers and artifacts in a posteriori data of diagnostics of LRKT and IFPST was performed (the sample “Age” contains a row of artifacts, the outliers in the limits of norm);
  - the analysis of compliance to the analytical and graphical criteria of compliance to the normal law of distribution of a sequence of numbers was carried out;
  - the features of samples with a posteriori data were revealed, the list of statistical methods for the realization of mathematical processing was determined, the insignificant discrepancy to the homogeneity of dispersions by the samples was determined;
- the theoretical and experimental structure of the parametrical CM of the subject of training based on PCMB was verified, which directly characterizes IFPST;
  - the parameters of the physiological portrait of CM of the subject of training – 04 samples;
  - the parameters of the psychological portrait of CM of the subject of training – 28 samples;
  - the parameters of the linguistic portrait of CM of the subject of training – 01 sample;
- the theoretical and experimental structure of the parametrical CM of the means of training based on PCMB was verified, which reflects the technical characteristics of ET;
  - the parameters of the physiological portrait of CM of the means of training – 03 samples;
  - the parameters of the psychological portrait of CM of the means of training – 04 samples;
  - the parameters of the linguistic portrait of CM of the means of training – 01 sample;
- the selection of a set of methods of statistical processing of a posterior data for the four formed final analytical samples was justified;
  - the reduced set of independent variables K_i and dependent variable Y_2;
  - the reduced set of independent variables K_i and dependent variable Y_4;
  - the complete set of independent variables K_i and dependent variable Y_2;
  - the complete set of independent variables K_i and dependent variable Y_4;
- the correlation analysis of the reduced and complete set of variables was performed;
  - the insignificant relationships of parameters of the physiological portrait were revealed, which are directly related with the features of the primary sensory perception of information by the ganglion cells of retina of the visual sensory system of the human and their need to be taken into account in the process of research of IEE;
  - the insignificant relationships of parameters of the psychological portrait were revealed, which are directly related with the features of the processing of information by the psychodynamic construct of the head brain of the human and their need to be taken into account in the process of the system analysis and increasing of efficiency of IEE;
  - the insignificant relationships of parameters of the linguistic portrait were revealed, which are directly related with the understanding of the content of information fragments by the subject of training and their need to be taken into account in the process of research of IEE for the increasing of the efficiency of functioning of ART system;

- the regression analysis of the reduced and complete set of independent variables was performed, the four linear equations of multiple regression were formed;
  - the four sets of independent variables were defined, included in the analysis (the reduced set of independent variables K_i and dependent variable Y_2, the reduced set of independent variables K_i and dependent variable Y_4, the complete set of independent variables K_i and dependent variable Y_2, the complete set of independent variables K_i and dependent variable Y_4);
  - the (non)standardized coefficients were calculated and in the four linear equations of multiple regression with taking into account the procedure of standardization by means of using of Z-normalization based on the rule $X_{cp}\pm\sigma$, $X_{cp}\pm2\sigma$, $X_{cp}\pm3\sigma$;
  - the consistent change and interrelationship of four sets of independent variables was researched by means of the correlation tables and covariance tables;
  - the analysis of the revealed dependencies between the predictors – the four linear regression equations by the two sets of independent variables (the reduced and complete) and the two dependent variables (Y_2 and Y_4);
  - the features and characteristics of the obtained models for the reduced and complete set of independent variables and dependent variables were highlighted;
  - the analysis of residues of the four linear models of multiple regression was performed;
  - the probabilistic graphs for the four models of multiple regression were build;
- the discriminant analysis was performed, the canonical discriminant functions were obtained, which are similar to the linear equation of multiple regression;
  - the descriptive statistics were formed for all the selected centroids of class, the significant statistical heterogeneities were not revealed in the samples;
  - the test of the equality of average indicators by the group was carried out for the revealing of the inclusion of variables with using of the method of sequential inclusion;
  - the research of covariance as the measure of consistent change of the values in the reduced and complete sample of independent variables was carried out;
  - the research of correlation was conducted as the measure of the matched dependence (relationship) in the reduced and complete sample of independent variables;
  - the ranks of the centroids of class, which were obtained during the analysis was determined;
  - the eigenvalues of the canonical discriminant functions were computed, which characterize the share of dispersion of the dependent variable under the influence of factors;
  - the features of the functions of classification of the discriminant analysis were highlighted;
  - the direct geometric location of the centroids of class in the space of the canonical discriminant functions was reflected;
  - the analysis of the presence of ambiguously of the classified values was carried out, which impossible to assign directly to one from the centroids of classes in the space of the considered canonical discriminant functions;
  - the analysis of the quality of classification of the canonical discriminant functions of the centroids of class showed the high prognostic ability: the analysis of residues showed, that the exact point scale based on the analytical coefficients system allows to obtain directly the more accurate estimation of LRKT in relation to the coarse scale of estimation, at the reduced set of independent variables and the complete set of independent variables the exactness of prediction (analysis) practically does not change significantly;

- the cluster analysis, which allows to estimate the quality of clustering was carried out;
  - the researching of the relationships of independent variables by the cluster analysis;
  - the analysis of the plan of agglomeration variables in the view of the table, which characterizes the sequence of combining of the independent variables into the clusters;
  - the dendrogram in the view of the horizontal or vertical picture, which allows to reveal directly the sequence of uniting the reduced and complete set of independent variables into the clusters of data;
- the multidimensional scaling for the analysis of the density of distribution of the variables was carried out;
  - the quantity of scales and the degrees of freedom were determined based on the variables;
  - the final coordinates of variables in the space of the functions of scaling were calculated;
  - the position of the four sets of independent variables in the space of the two canonical discriminant functions of classification was constructed directly;
- the factor analysis of the creation and estimation of quality of the factorized space was carried out;
  - directly by the criterion of Kaiser and the criterion of Kettel the optimal quantity of factors is determined, which are used in the factor analysis;
  - the method of varimax rotation, the criterion of Kaiser and the criterion of Kettel was used directly at the solving of the problem of generality and characterization;
  - the completeness of factorized space follows from the analysis of structural matrix for the structural decomposition of factors and variables relative to the factor loads;
  - the descriptive statistics of the source set of variables reflects the absence of abnormal outliers, artifacts and the deviations from the measure of central tendency;
  - the conventional and inverse correlation matrix was formed for the research of the coefficients of correlation between the different independent variables;
  - the checking of adequacy of the factorized space was successfully performed and the results of compliance of the factorized space to the norm were presented;
  - the transposed matrixes of covariance and correlation are obtained for the estimation of covariance and correlation of the reduced and complete set of independent variables, that allows visually to analyze the rotation of the factorized space;
  - the initial and final nominal values of variables were verified, that allows to estimate the shift of independent variables at the factor analysis, and also directly to introduce into the consideration of the value of stress at the analysis;
  - the initial and final eigenvalues of the factorial matrix are calculated, that allows to estimate directly the initial and final variation of a set of independent variables, which is caused by the certain factor;
  - the graph of the two-dimensional scattering of eigenvalues and factors is formed, that allows to reveal the relative change and the correlation of eigenvalues of the reduced and complete set of independent variables;
  - the analysis of the recovered correlation matrix allows to speak about the recovery and interpretation of the coefficients of correlation of the independent variables;
  - the matrix of components after the rotation allows to speak about the high level of interpretation of a set of independent variables, that allows to explain the dispersion of the reduced and complete set of independent variables under the influence of certain factor, and also the dispersion of certain variable, which is caused directly by the action of factors;

- the results of preliminary statistical analysis of the resultativity of training;
  - for 2004 y. the indicators of changing of the efficiency of technological process of the formation of knowledge (without CMT in the three groups, the private estimation in the fourth section of the discipline “Informatics”) indicate about the increasing of efficiency on 7%;
  - for 2005 y. (without CMT in the three groups, the private estimation in the fourth section of the discipline “Informatics”) indicate about the increasing of efficiency on 7%;
  - for 2006 y. (with CMT in the three groups, the private estimation in the fourth section of the discipline “Informatics”) indicate about the increasing of efficiency on 13%;
  - for 2007 y. (with CMT in the three groups, the private estimation in the fourth section of the discipline “Informatics”) indicate about the increasing of efficiency on 5%;
  - for 2008 y. (with CMT in the three groups, the private estimation in the fourth section of the discipline “Informatics”) indicate about the increasing of efficiency on 2%;
  - for 2009 y. (with CMT in the three groups, the private estimation in the fourth section of the discipline “Informatics”) indicate about the increasing of efficiency on 1%;
- in 2005 y. at the statement of the content of the fourth section of the discipline “Informatics” CMT was practically complexly used, on the basis of which the stating and conducting of a series of experiments was carried out by means of the (created by me) complex of programs, and also the statistical processing of a posteriori results, which confirmed the significant increasing of efficiency of the formation of knowledge of the contingent of trainees;
  - the efficiency of practical use of the apparatus of CMT for the system analysis of IEE and the increasing of the efficiency of functioning of the automated training system with the properties of adaptation based PCMB was substantiated;
    - the successfully applied the technique of its use for the system analysis of IEE and the increasing of the efficiency of functioning of the automated training system (at distance) with the properties of adaptation based on the parametric CM;
    - the algorithm of formation of the structure of CM based on the traditional and innovative ways of presentation of the structured data was successfully used, the two ways of representation structured data were proposed: the oriented graph, combining the theory of sets and the multi-level structured scheme;
    - the technique of research of the parameters of CM of the subject of training was successfully applied for the formation and parametrical identification of CM of the subject of training;
    - the technique of research of the parameters of CM of the means of training was successfully applied for the formation and parametrical identification of CM of the means of training;
    - the algorithm of processing of a posteriori data of testing of LRKT and the research of IFPST was successfully applied for the estimation of the resultativity (efficiency) of technological process of the formation of knowledge of the contingent of trainees;
  - the efficiency of practical use of the complex of programs is substantiated for the automation of the system analysis of IEE and the automated training system;
    - the means of training (ET) based on the adaptive representation of information fragments processor and PCMB is successfully used, which in the process of functioning provides the adaptive generation of information fragments with taking into account of the individual features of the contingent of trainees and the potential technical capabilities of the means of training;
    - the basic DM is successfully applied for the testing of LRKT by means of the formed set of tests in one or several subjects of studying;
    - the applied DM was successfully used for the research of IFPST by means of a set of the applied methods of diagnostics from the area of the physiology of sensory systems, cognitive psychology and applied linguistics;

- the dynamics of changing of the indicators of efficiency (resultativity) of the formation of knowledge of the contingent of trainees for 2003-2008 y. was researched – takes place the relative increasing of the indicator of estimation of LRKT in the experimental groups of the contingent of examinees, but in 2009 y. takes place the decreasing of the indicator of estimation of LRKT due to means of the reduction of the second group of evening department of trainees by the fault of the management of the chair "ACP", and if at the same time the reduction of the second group of evening department is not taken into account: takes place the slowdown of the growth of LRKT, as the indicator goes into the saturation;
- the dynamics of the indicators of efficiency (resultativity) of the technological process of the controlled formation of knowledge of the trainees of the three groups of day department of the chair "ACP" (with CMT), the three groups of day department of the chair "ASIPC" (without CMT) and the two groups of evening department of the chair "ACP" (with CMT) was studied;
- the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the trainees in the three groups of day department of the chair "ACP" with the using of the automated (computerized) testing is studied by means of the coarse scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y. – takes place the significant increasing of the speed of growth of the estimation of LRKT, but in 2009 y. the slowdown of the growth of indicator of the estimation of LRKT is observed, as the considered indicators go into the saturation (do not change);
  - the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the trainees in the first group of day department of the chair "ACP" with the using of the automated (computerized) testing by means of the coarse scale based on the quantity of correct answers and the exact (point) scale based on the weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y., indicates about the steady growth of the estimation of LRKT (with CMT and final), but in 2009 y. the slowdown of the growth of indicator of the estimation of LRKT is observed;
  - the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the trainees in the second group of day department of the chair "ACP" with the using of the automated (computerized) testing by means of the coarse scale based on the quantity of correct answers and the exact (point) scales based on the weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y. indicates about the steady growth of estimation of LRKT (with CMT in the fourth section), the insignificant fluctuation of indicator of the estimation of LRKT (final), but in 2009 y. the slowdown of growth of the indicator of estimation of LRKT was observed;
  - the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the trainees in the third group of day department of the chair "ACP" with the using of the automated (computerized) testing by means of the coarse scale based on the quantity of correct answers and the exact (point) scale based on the weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y., indicate about the steady growth of estimation of LRKT (with CMT and final), but in 2009 y. the slowdown of growth of the indicator of estimation of LRKT was observed;

- the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the trainees in the three groups of day department of the chair "ASIPC" with the using of the traditional testing based on the rough scale and the blanks with the test tasks for the examinees for 2004-2008 y. – takes place the significant increasing of the speed of growth of the estimation of LRKT (the testing on the paper carrier), the relative decline of estimation of LRKT (final) [the difference of program of the theoretical lectures and practical classes, the different teachers], but in 2009 y. the slowdown of growth of LRKT (the testing on the paper carrier) is observed and the very insignificant decline of LRKT (final), as the indicator goes into the saturation;
    - the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the fourth group of day department of the chair "ASIPC" with the using of the automated (computerized) testing by means of the coarse scale based on the quantity of correct answers and the exact (point) scale based on the weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y. indicates about the steady growth of estimation of LRKT (the testing on the paper carrier) and the relative decline of LRKT (final) [the difference of program of the theoretical lectures and practical classes], but in 2009 y. there is the decline of growth of the estimation of LRKT (the testing on the paper carrier) and directly the insignificant slowdown of estimation of LRKT (final), as the presented indicator goes into the saturation;
    - the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the fifth group of day department of the chair "ASIPC" with the using of the automated (computerized) testing by means of the coarse scale based on the quantity of correct answers and the exact (point) scale based on the weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y. indicates about the steady growth of estimation of LRKT (the testing on the paper carrier) and the relative growth of LRKT (final) [the difference of program of the theoretical lectures and practical classes], but in 2009 y. there is the slowdown of growth of the estimation of LRKT (the testing on the paper carrier) and directly the intensification of slowdown of the estimation of LRKT (final), as the presented indicator goes into the saturation;
    - the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the sixth group of day department of the chair "ASIPC" with the using of the automated (computerized) testing by the coarse scale based on the quantity of correct answers and the exact (point) scale based on the weighting coefficients system, and also the blank for the registration of a posteriori data for 2004-2008 y. indicates about the relative fluctuation and the growth of estimation of LRKT (the testing on the paper carrier) and the relative decline and growth of LRKT (final) [the difference of the program of theoretical lecture and practical classes], but in 2009 y. there was the slowdown of growth of the estimation of LRKT (the testing on the paper carrier) and the insignificant decline of estimation of LRKT (final), as the presented indicator goes into the saturation;

- the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the trainees in the two groups of evening department of the chair "ACP" with the using of the automated (computerized) testing by means of application of the coarse scale based on the quantity of correct answers and the exact (point) scale based on the formed weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y. – takes place the significant increasing of the speed of growth of the estimation of LRKT (the testing on the paper carrier) [the two groups of evening department in 2004 y. were absent], the relative growth of indicator of the estimation of LRKT (the automated testing), the relative decline of indicator of the estimation of LRKT (the final attestation) [the very significant influence of act the classes in the evening time], but in 2009 y. the significant decreasing of indicator of the estimation of LRKT (the automated testing) and the significant decline of estimation of LRKT (final) is observed [the very significant influence act the classes in the evening time], as only one group of trainees of the evening department at the chair "ACP" was formed directly by the management of the chair "ACP";
    - the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the seventh group of evening department of the chair "ACP" with the using of the automated (computerized) testing by means of the coarse scale based on the quantity of correct answers and the exact (point) scale based on the weight coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y. indicates about the relative growth of estimation of LRKT (the automated testing) and the relative decline and insignificant growth of LRKT (final) [the classes in the evening time], but in 2009 y. there is the insignificant decline of estimation of LRKT (the automated testing) and the slowdown of growth of the estimation of LRKT (final) [the classes in the evening time], as the presented indicator directly goes into the saturation;
    - the dynamics of changing of the indicators of resultativity (efficiency) of the formation of knowledge of the contingent of trainees in the eighth group of evening department of the chair "ACP" with the using of the automated (computerized) testing by means of the coarse scale based on the quantity of correct answers and the exact (point) scales based on the weighting coefficients system, and also the blanks for the registration of a posteriori data for 2004-2008 y., indicates about the relative growth of estimation of LRKT (the automated testing) and the relative decline and insignificant growth of LRKT (final) [the classes in the evening time], but in 2004 y. there is the intensification of growth of the indicator of estimation of LRKT (the automated testing) and the intensification of growth of the estimation of LRKT (final), in 2009 y. there is the very significant decline of indicator of the estimation of LRKT (the automated testing) [the classes in the evening time], and the very significant decline of estimation of LRKT (final) [the classes in the evening time], as the management of the chair "ACP" is formed directly only one group of trainees of the evening department on the chair "ACP", that acts the significant of influence on the nominal value of indicator.