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

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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 exploitative 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 the 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 parameters 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 share 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 the 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 directly 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 the same time it accordingly includes the several important actions.

- the primary diagnostics of the nominal values of the considered parameters by the 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 the means of using of the statistical methods – the revealing of significant statistical regularities with the using of the different mathematical methods.

A15.1. 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 of 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 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 the 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 researches by both the examinee and expert;
- the preliminary statistical processing of a posteriori data of the experiment – it 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 the various methods of statistical analysis (the correlation analysis, the regression analysis, the discriminant analysis, the multidimensional scaling, the cluster analysis and the 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 of astigmatism, myopia or hypermetropia);
- the anomalies of the 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 thr threshold tables (the revealing of achromates, abnormal trichromates, the 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 (are 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 the verbal intellect, abilities to 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 (are 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 the 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 the 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 of 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 technical specialist, carrying out the accompanying of the automated means of training in the traditional or innovative IEE.

The registration of a posteriori data of the automated testing (diagnostics) of the nominal values of each 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 procedure of automated testing of the contingent of trainees 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 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”, “Statistics” 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 necessity 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 necessity of the appropriate check with the using of the graphical (the quartile graphs and the graphs of accumulated frequencies), the analytical (asymmetry and excess) and criterion (the criterion λ – 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 sample of data. The error of representativeness of the given 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 speak 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 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 analysis of each sample of data. For the illustrative presentation of the deviation of nominal values in the samples from their average the z-transformation 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

A15.2. 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 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 tendence of changing of the average point (LRKT) and its average quadratic deviation (AQD) for 3 years (2006-2008 y.) 8 groups of examinees of the day and evening department, studying the discipline “Informatics” were used.

For the solving 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 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 further).

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 signs (the results of calculation are presented further), 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), 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 data 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.

A15.2.1. 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 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 can not be replaced by another.

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

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 replacing 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 in the different samples with a posteriori data were found (tabl. A15.2):

- in the sample *“Age”* it is not possible to replace all revealed abnormal values, but they do not act a significant influence on the measures of central tendency (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 of 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 is carried out;
- in the samples “K_{22}^1, K_{23}^1 and K_{24}^1” the *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 the 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 the 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 revealed visually, 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 asymmetricity 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 shows in all samples of data.

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

- the main measure and auxiliary measures 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 asymmetricity of the distribution of numbers – a positive number corresponds to the displacement of average arithmetic to the left (the left-hand asymmetricity);
    - 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 level 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 building 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 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 the 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 the deviation of 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 the deviation of 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 in the course of experimental researches are guaranteed to be filtered out;
    - the rule “three sigma” – reflects the ratio of the deviation of nominal values from the mathematical expectation in relation to the average quadratic deviation, at the same time about 10-20% of the measured values in the course of experimental researches are guaranteed to be filtered out.

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 asymmetricity and excess were calculated, and then the resulting tabl. 15.3 was formed.

Table A15.3

The critical values of asymmetricity 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: $А_{КР} = 3\sqrt{\frac{6(N-1)}{(N+1)(N+3)}}$ and $Э_{КР} = 5\sqrt{\frac{24N(N-2)(N-3)}{(N+1)^2(N+3)(N+5)}}$.

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 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 psychological 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 parameters of 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 the rough scale based on the quantity of valid answers after the studying of one chapter by means of the adaptive 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 the exact scale based on the analytical coefficients system after the studying of one chapter by means of the adaptive 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 the rough scale based on the quantity of valid 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 the 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 was not revealed analytically the 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 of 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 and 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 the occurrence of 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 the curve of 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 the rough scale based on the quantity of valid answers after the studying of one chapter by means of the adaptive 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 the exact scale based on the analytical coefficients system after the studying of one chapter by means of the adaptive 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 the rough scale based on the quantity of valid 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 the 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 the occurrence of 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 were 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 the 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 the following of 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 the occurrence of values in the sample with a posteriori data and the theoretical curve with the normal distribution the 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 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 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 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_{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 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 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_{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 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;
- 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.

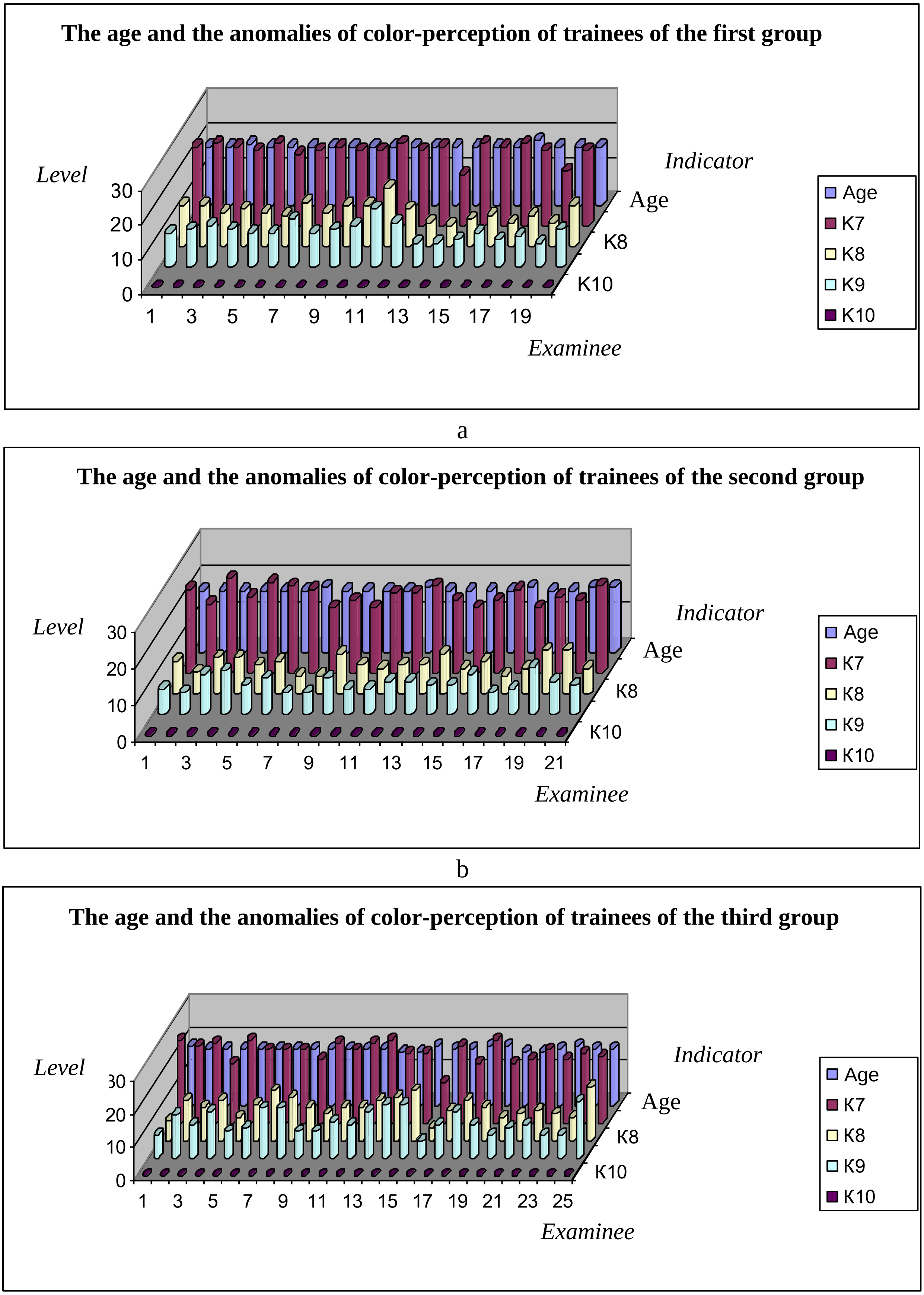
A row of features in the samples with a posteriori data need to be distinguished:

- for each difficult object, process or phenomenon the parametrical CM, which has the significant structural features is introduced into the consideration;
- the parametrical CM represents 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, therefore 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 (Возраст)* – the index of the age of examinee (the subject of training);
        - 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 with a posteriori data, which are subject to the deep statistical analysis;
        - K_{RU} *(RU)* – the index of the mark in the Russian language (the subject of studying);
        - K_{LIT} *(LIT)* – the index of the mark in the Russian literature (the subject of studying);
        - K_{NLG} *(NLG)* – the identifier of national or foreign language;
        - K_{LG} *(LG)* – the index of the mark in the foreign language (the subject of studying);
        - K_{HIS} *(HIS)* – the index of the mark in history (the subject of studying);
        - K_{GEO} *(GEO)* – the index of the mark in geography (the subject of studying);
        - K_{BIO} *(BIO)* – the index of the mark in biology (the subject of studying);
        - K_{ALG} *(ALG)* – the index of the mark in algebra (the subject of studying);
        - K_{GEOM} *(GEOM)* – the index of the mark in geometry (the subject of studying);
        - K_{FIZ} *(FIZ)* – the index of the mark in physics (the subject of studying);
        - K_{CHEM} *(CHEM)* – the index of the mark in chemistry (the subject of studying);
        - K_{SCH} *(SCH)* – the index of the mark in drawing (the subject of studying);
        - K_{AST} *(AST)* – the index of the mark in astronomy (the subject of studying);

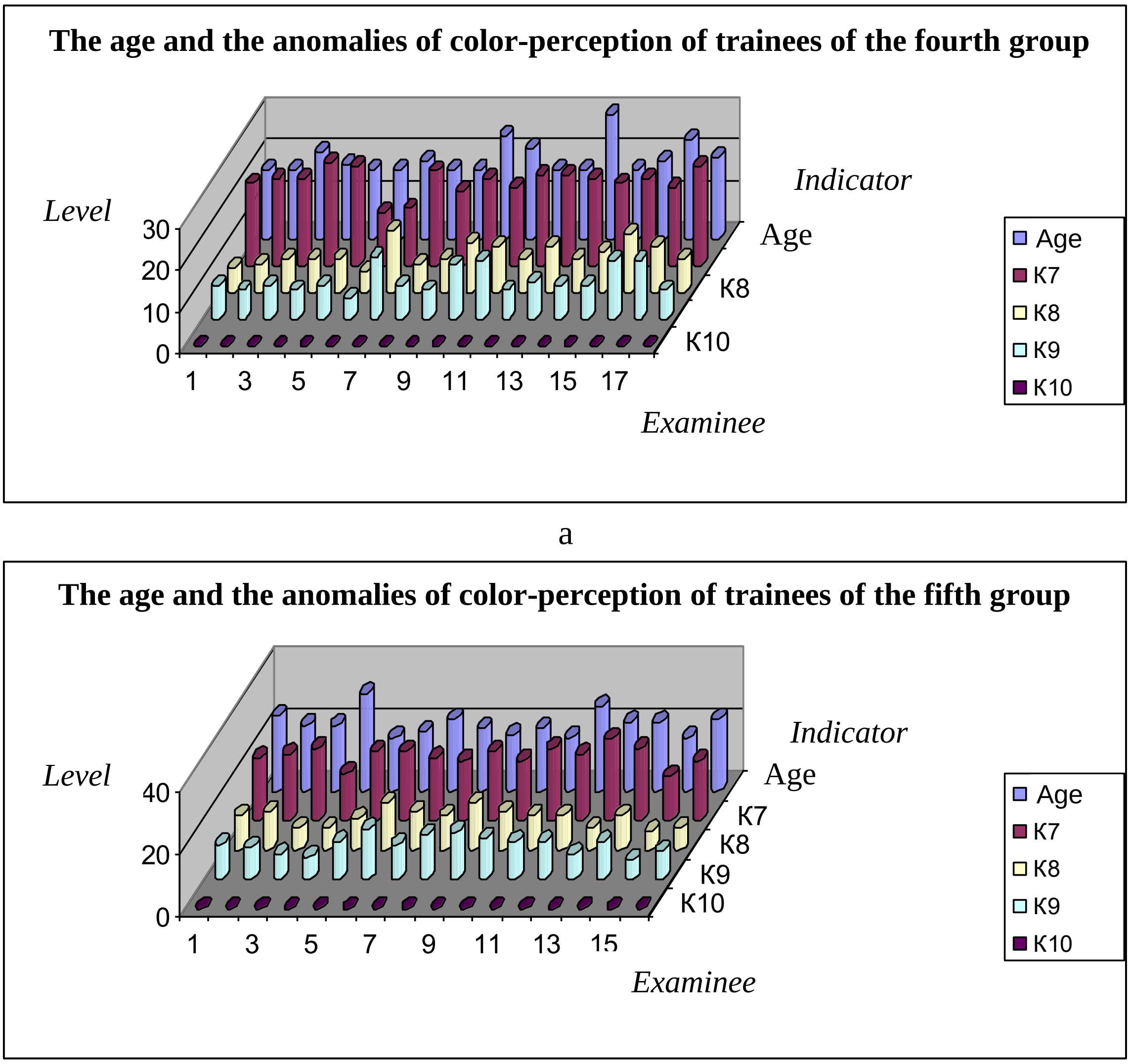
        - K_{14} – the index of convergent verbalization (the verbal intellect as the logical selection and the addition of sentences);
        - K_{15} – the index of convergent deduction (the deductive speech thinking as the searching of general signs and the exclusion of word);
        - K_{16} – the index 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 the divergent verbal associativity (the quantity of valid 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 valid 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 some features, which directly are the subject to the depth statistical analysis are distinguished;
    - 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 (of the information fragment);
        - $K_2 (L_{36N})$ – the index of the color of background (of the information fragment);
        - $K_3 (L_{36\,(36K)})$ – the index of the combination of colors (of the information fragment);
        - $K_4 (L_{40\,(37G)})$ – the index of the typeface of font (of the information fragment);
        - $K_5 (L_{37})$ – the index of the size of point-size of symbol (font) (of the information fragment);
        - $K_6 (L_{38N})$ – the index of the color of symbol (font) (of the information fragment);
        - K_7, K_8, K_9 *and* K_{10} – the indexes of the color scheme (of the information fragment);
        - $K_{11} (L_{11})$ – the index of volume (of the information fragment);
        - $K_{12} (L_{12})$ – the index of timbre (of the information fragment);
        - $K_{13} (L_{13})$ – the index of the type of flow (of the information fragment);
        - $K_{14} (L_{14})$ – the index of the sound scheme (of the information fragment);
    - 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 are presented.



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.

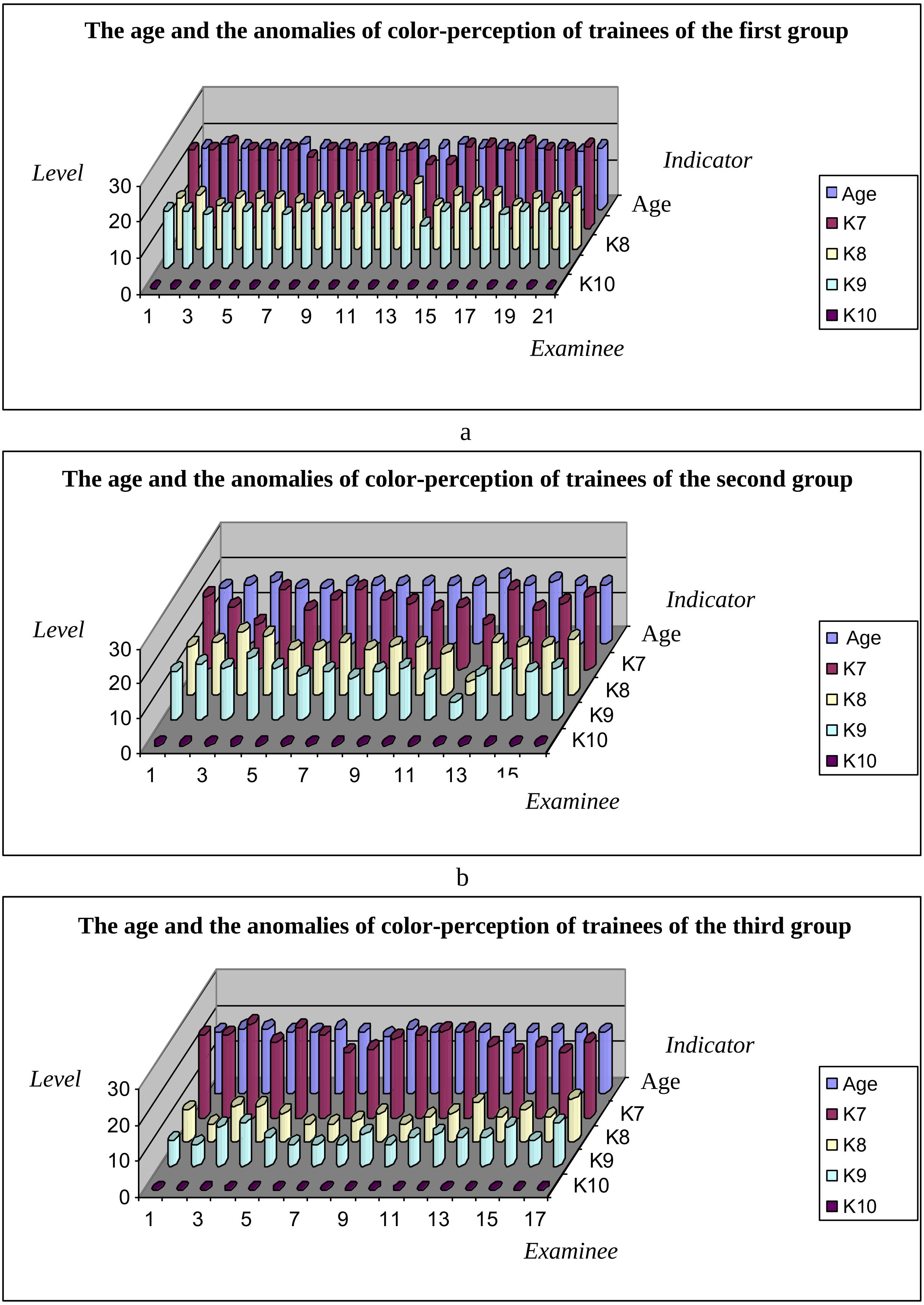
The primary statistical analysis of the samples with a posteriori data of research of color-perception allows to talk about the absence of significant heterogeneities in the view of obviously expressed emissions and artifacts, which act the significant influence on the form of curve, corresponding to 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. (was approved by “"IF" of "RAS"”);
- the field of vision – the independently developed computer variant of spherical perimeter of Forster K.F.R. (was 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. (was approved by “"IF" of "RAS"”).

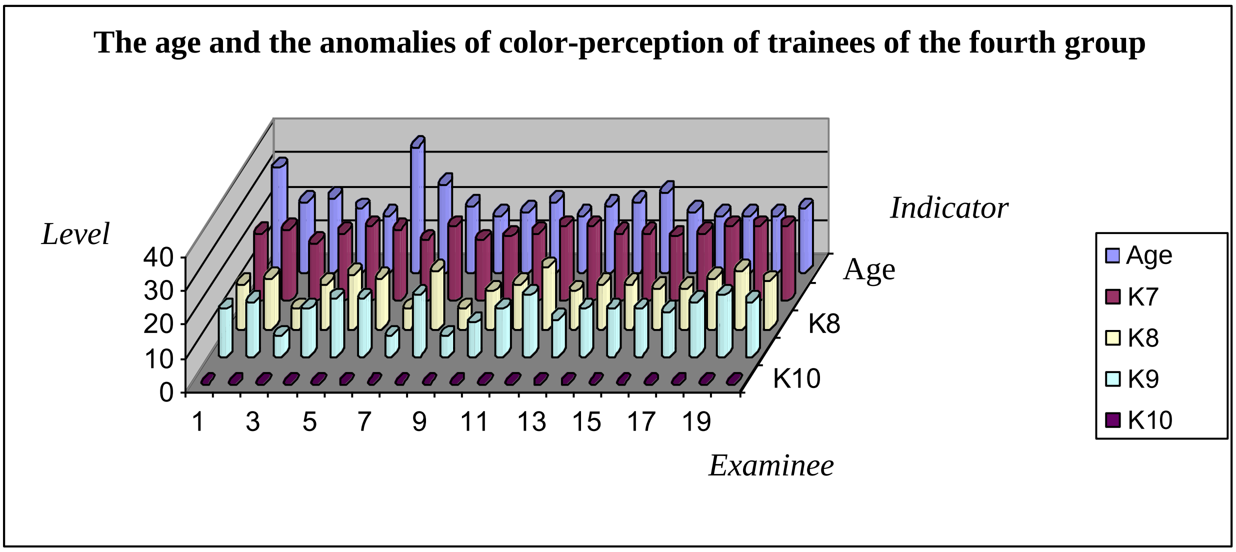
Tritanopia has not been revealed explicitly, as this is a very rare pathology of the different-type ganglion cells of conical apparatus of the retina of the visual sensory system, which provides the registration of the polychromatic spectrum of photon radiation.



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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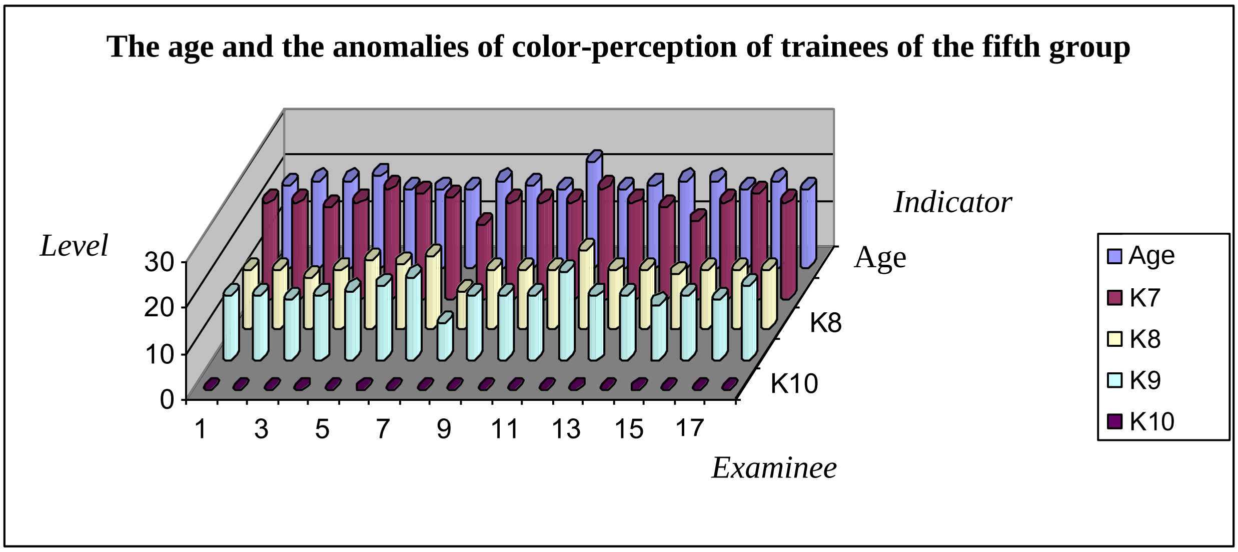


b

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.

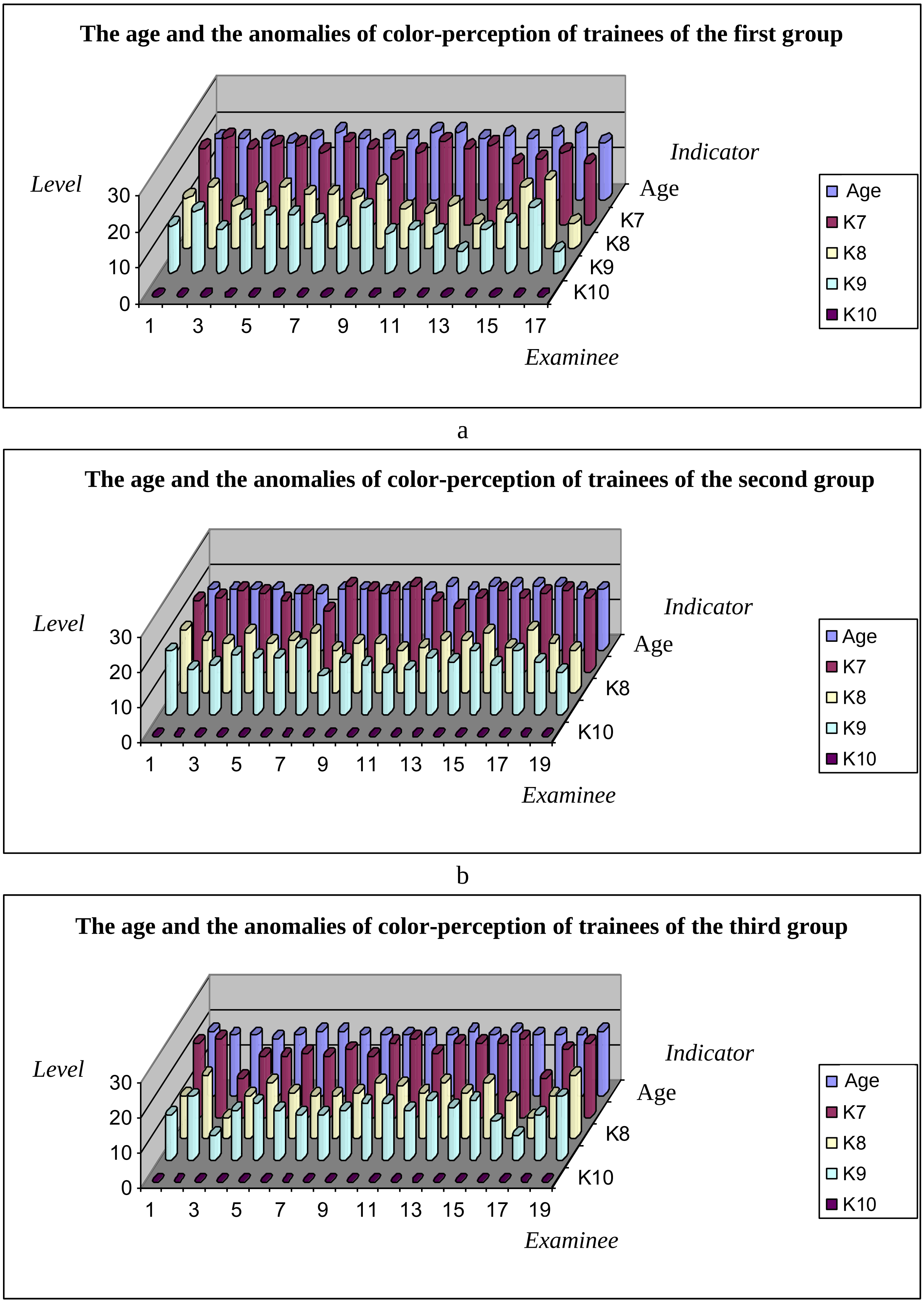
The normalization of indicators is not required, as a posteriori data are obtained by the means of use of the validated method of research of the color-perception.

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 (of 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.



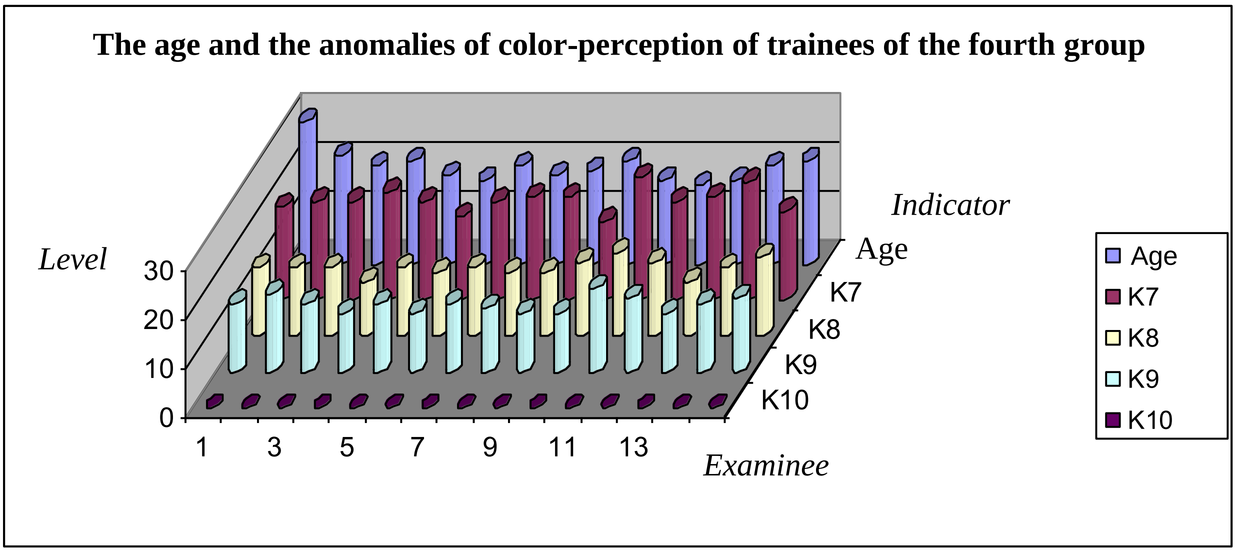
a

b

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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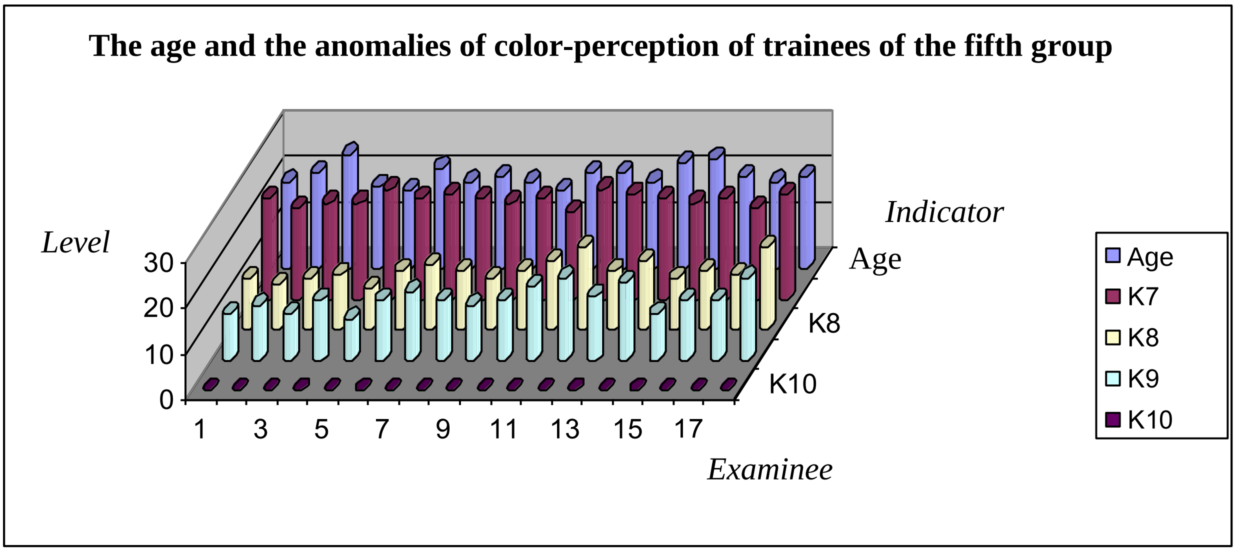


b

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 the using of the color schemes of displaying of a sequence of information fragments.

It is potentially possible to use of 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

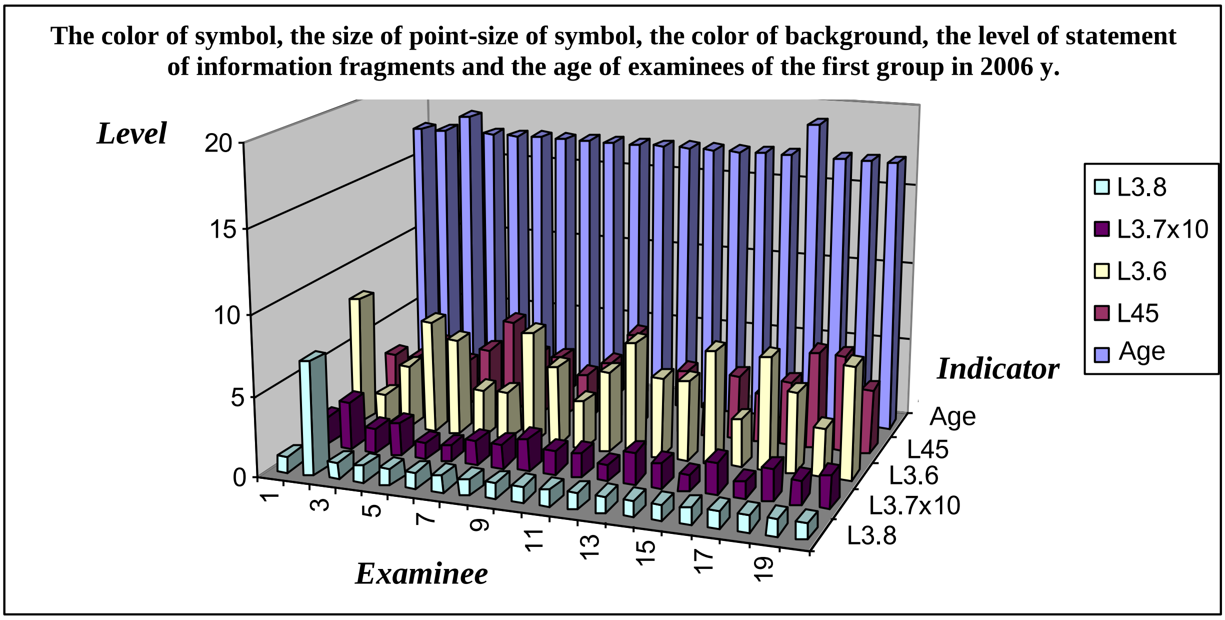
At the presenting of information in the view of the diverse information fragments of different kind and type the following parameters of visual representation were used:

- 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] and [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 not measured practically, 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]).

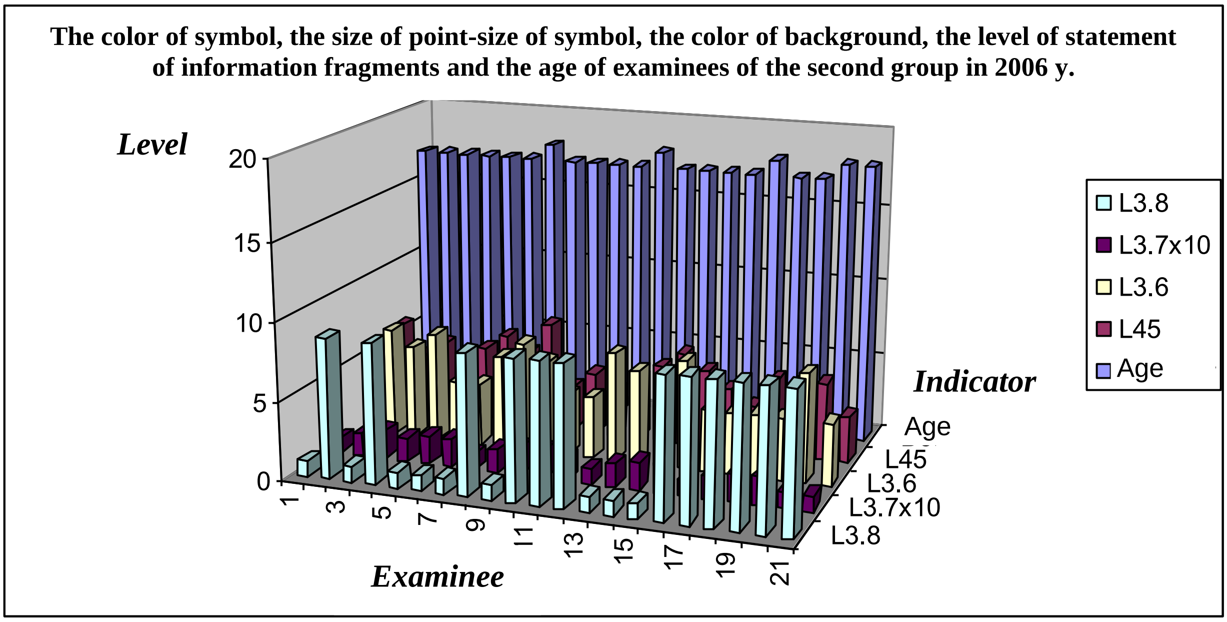
In pic. A15.7-A15.12 the diagrams with the results of research of the physiological parameters of the displaying of information by the means of training are presented directly.

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.

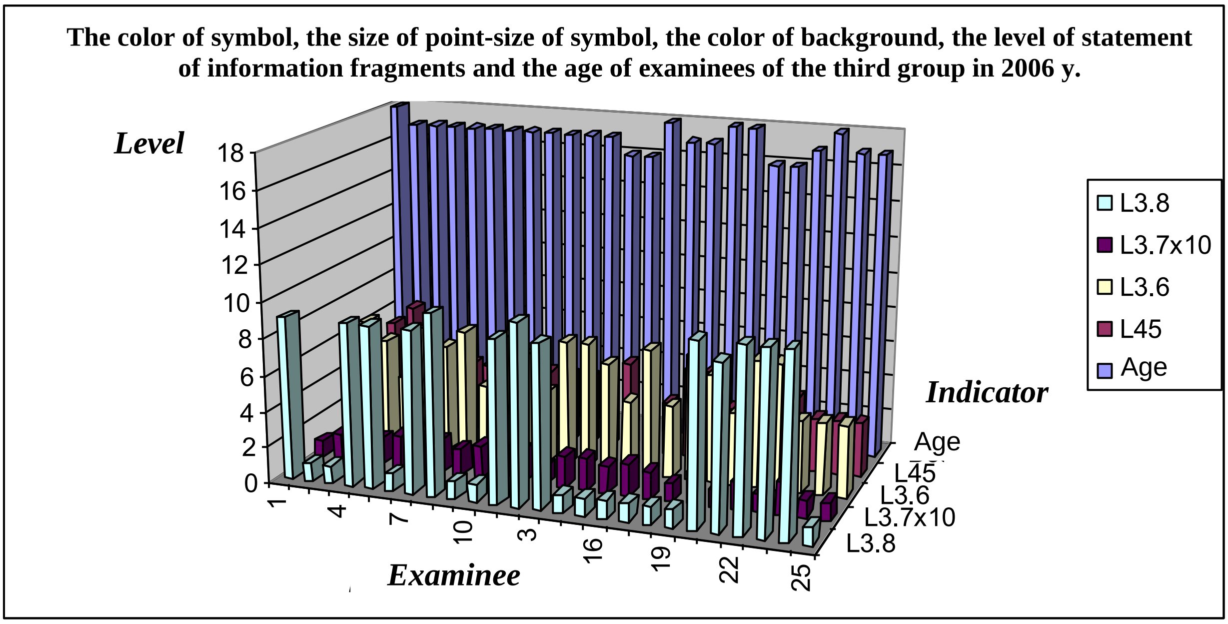
The codifiers of color are used: Navy (blue) – 0, Black (black) – 1, Green (green) – 2, Lime (lime) – 3, Aqua (bluish) – 4, Silver (silver) – 5, Fuchsia (fuchsite) – 6, Yellow (yellow) – 7, White (purple) – 8 and Purple (purple) – 9.


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 2006 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 2006 y.

b

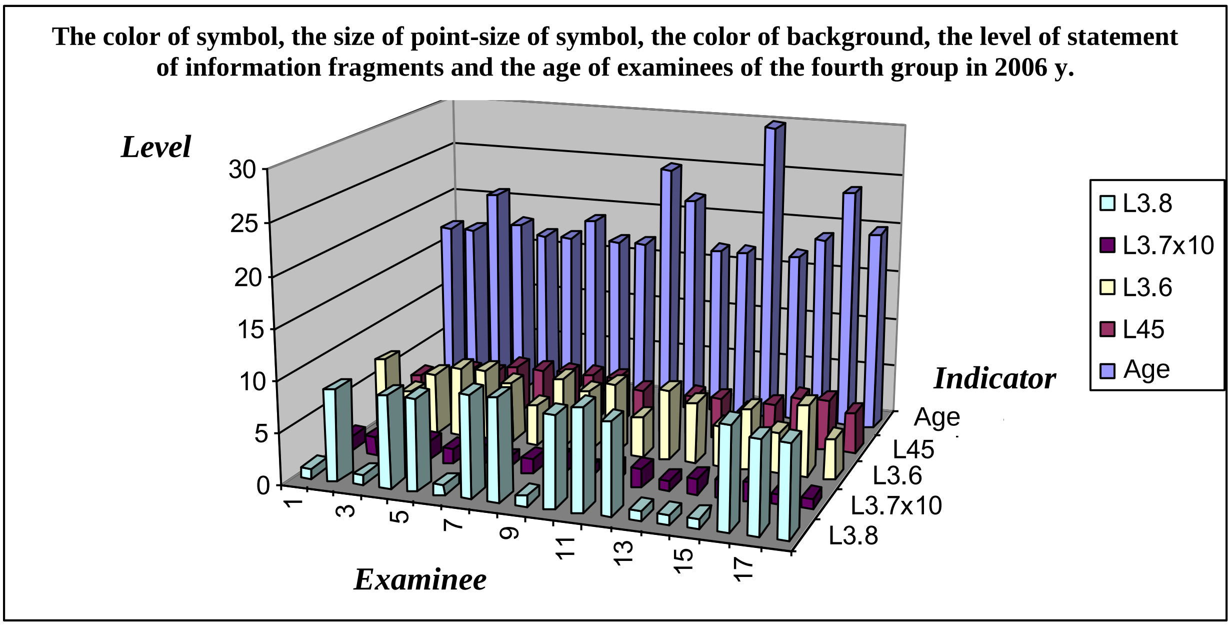


c

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 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. 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 (white) – 8 and Purple (Purple) – 9.



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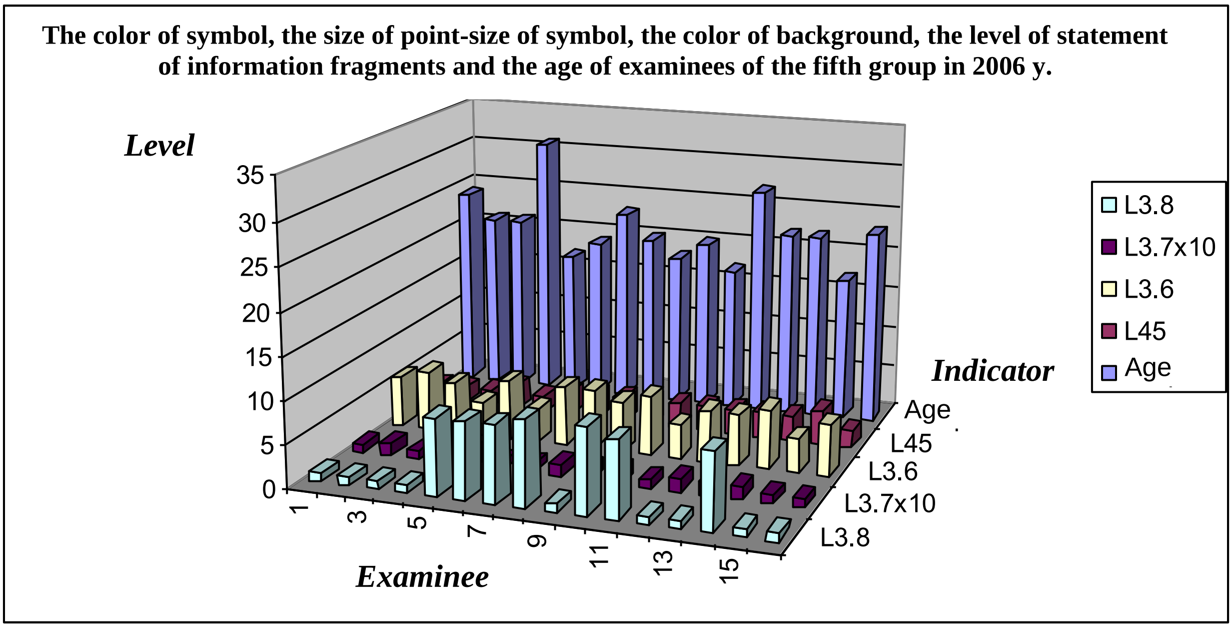


b

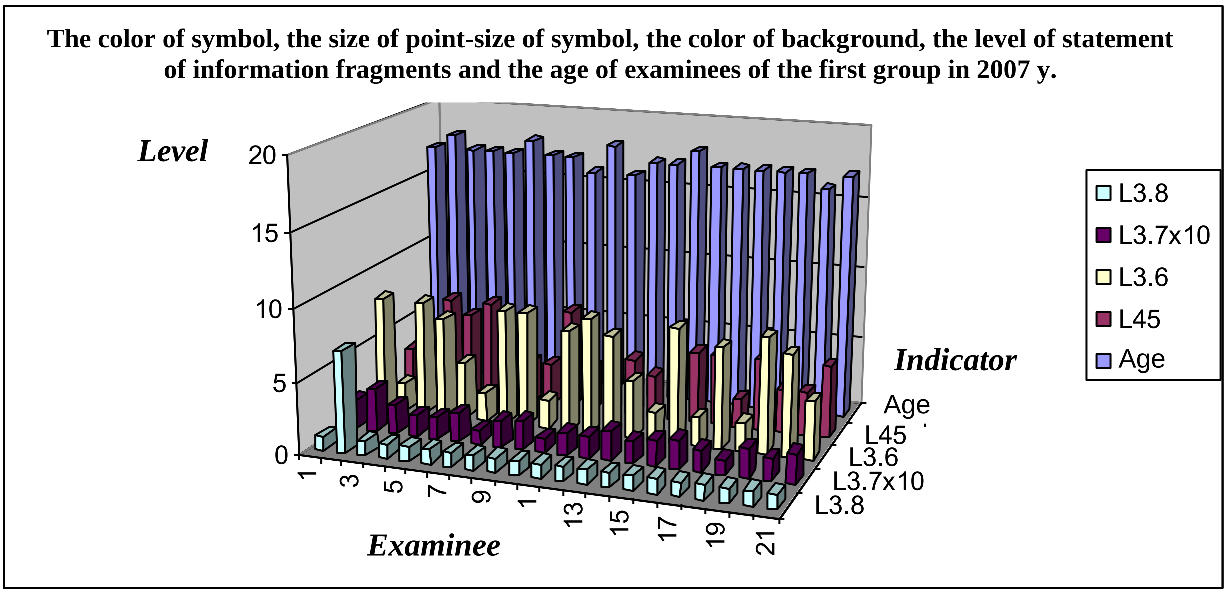
Picture A15.8. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the evening department in 2006 y.

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 “ACP” 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 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. 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 (white) – 8 and Purple (purple) – 9.



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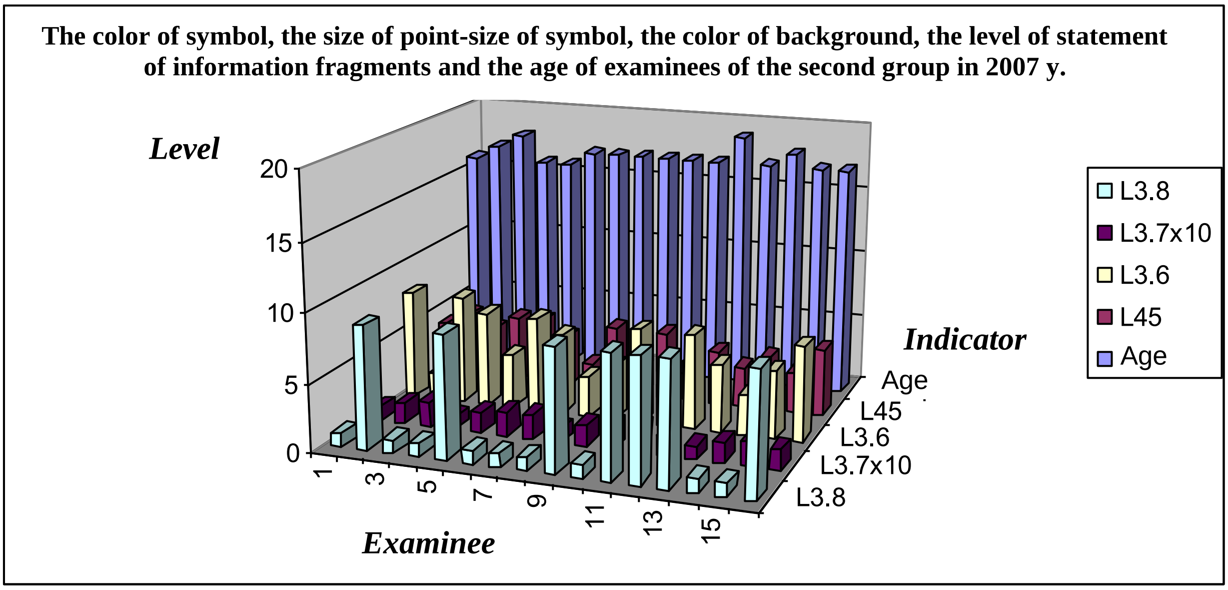
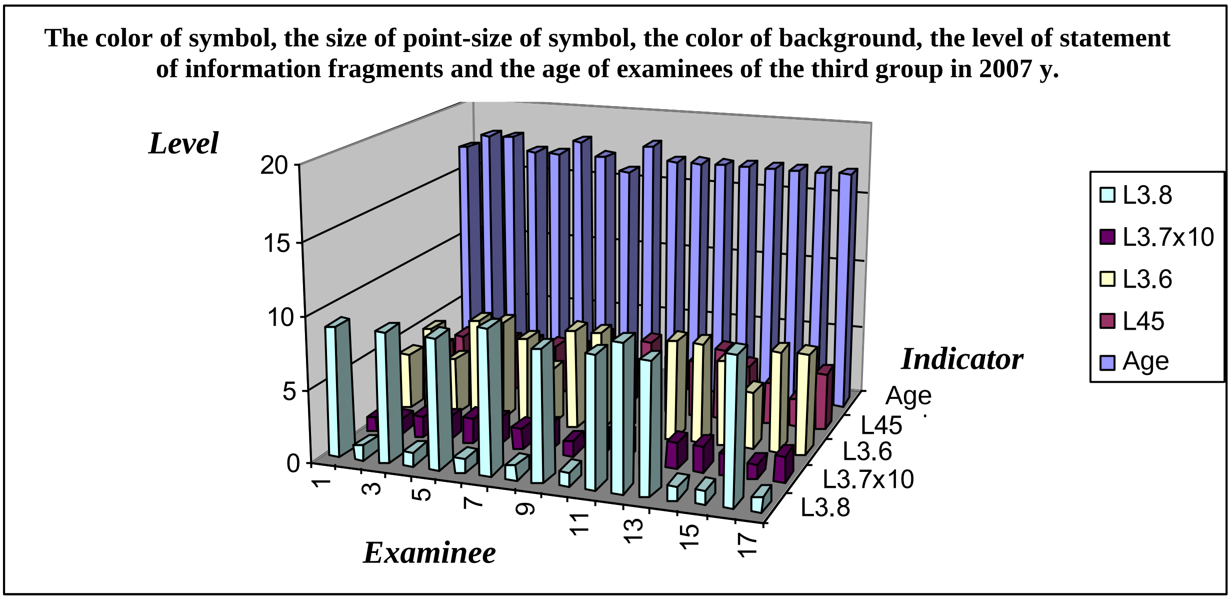


b

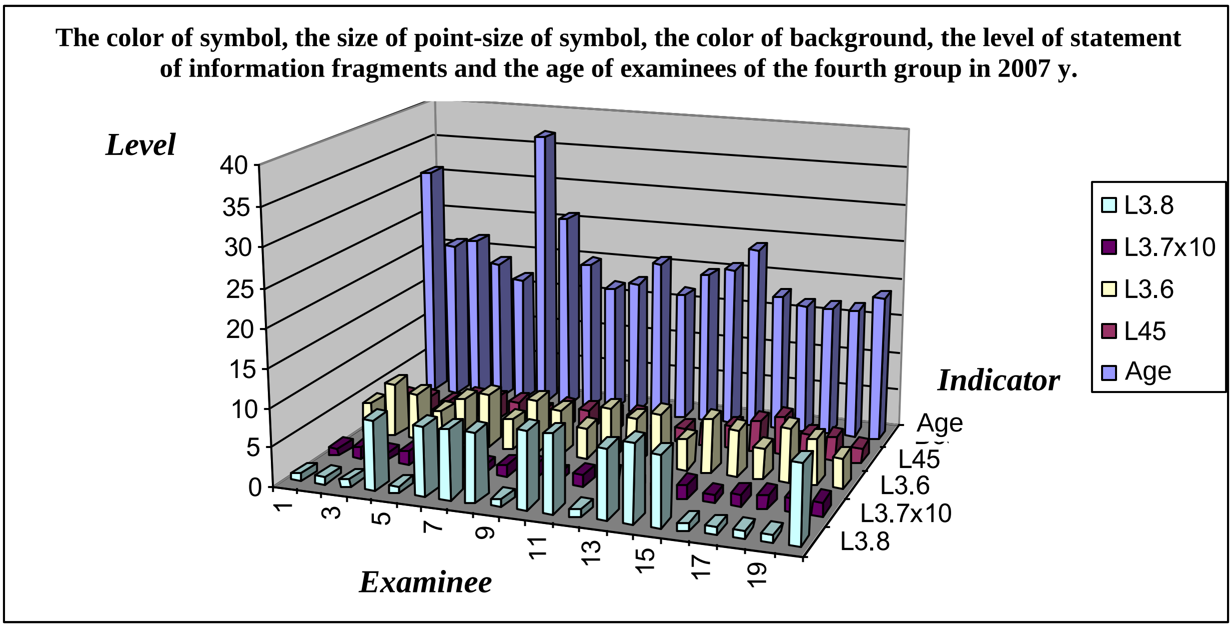


c

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 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. 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 (white) – 8 and Purple (purple) – 9.



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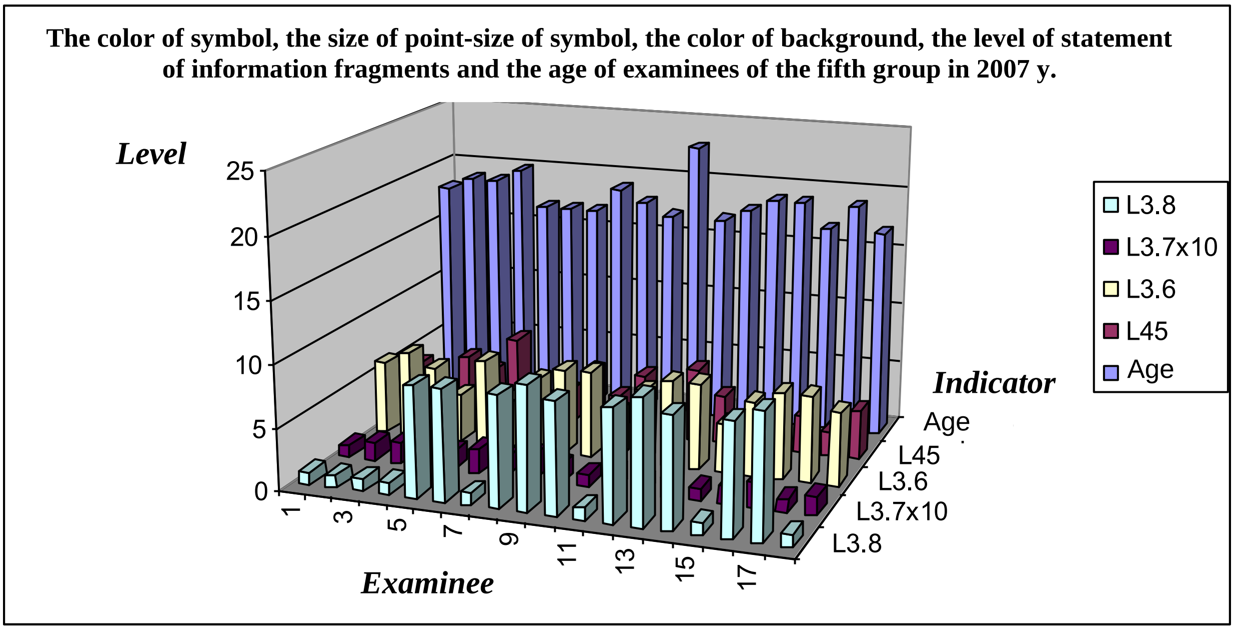


b

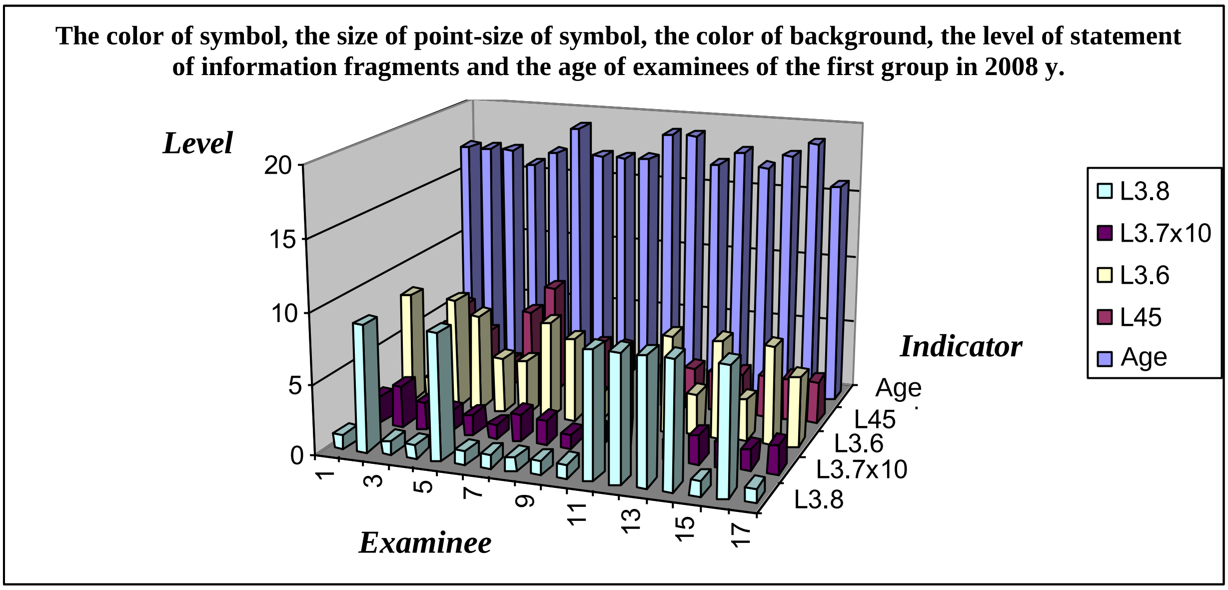
Picture A15.10. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the evening department in 2007 y.

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:

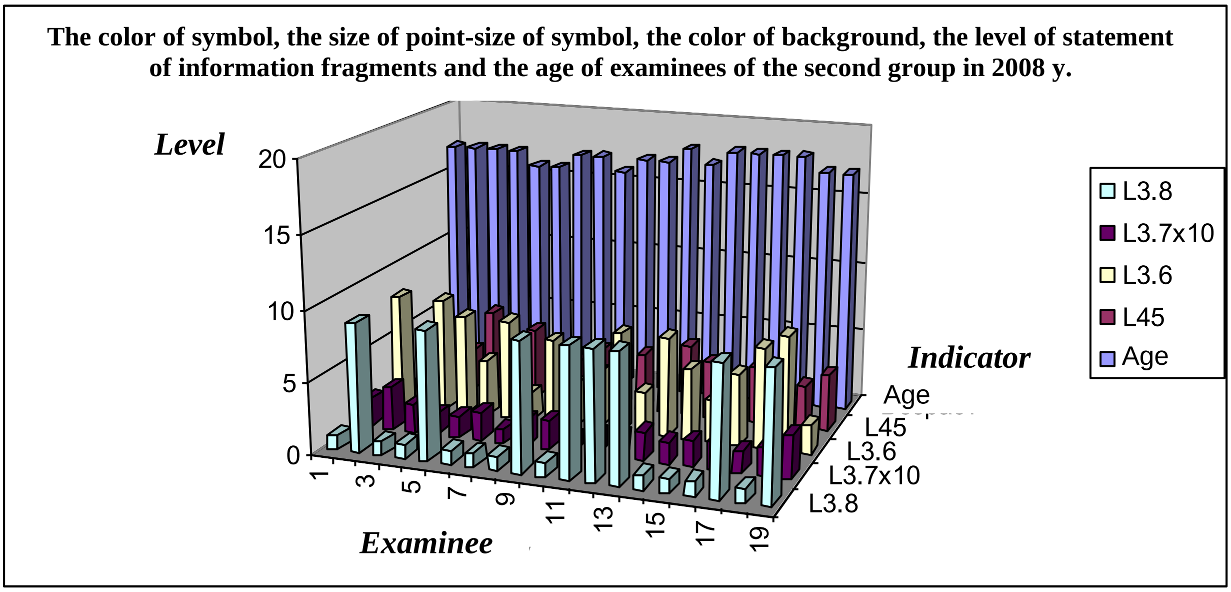
- there are no the significant anomalies in the three groups of day department of the chair “ACP”;
  - the sample $L_{3.8}$ (the color of font) – also has the heterogeneities of nominal values, that is caused by the specifics of the coding of color and the features of functioning of the adaptive representation of information fragments processor;
  - the sample $L_{3.6}$ (the color of background) – also has the unexpressed heterogeneities 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 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. 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.

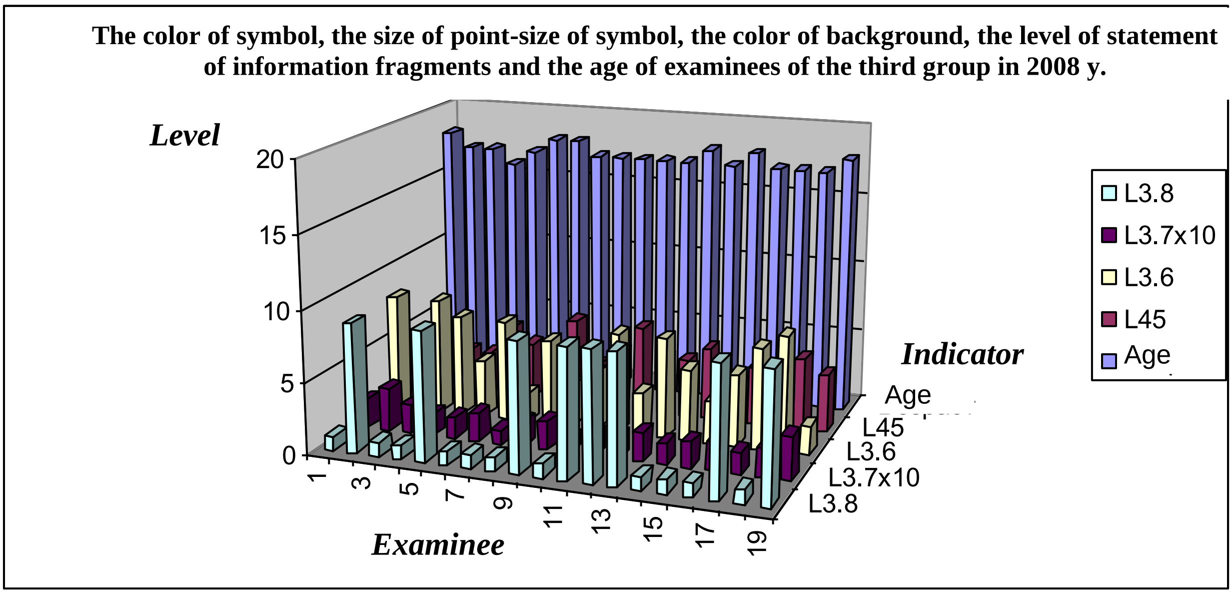
The codifiers of color are used: Navy (blue) – 0, Black (black) – 1, Green (green) – 2, Lime (lime) – 3, Aqua (bluish) – 4, Silver (silver) – 5, Fuchsia (fuchsite) – 6, Yellow (yellow) – 7, White (white) – 8 and Purple (purple) – 9.


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 2008 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 2008 y.

b



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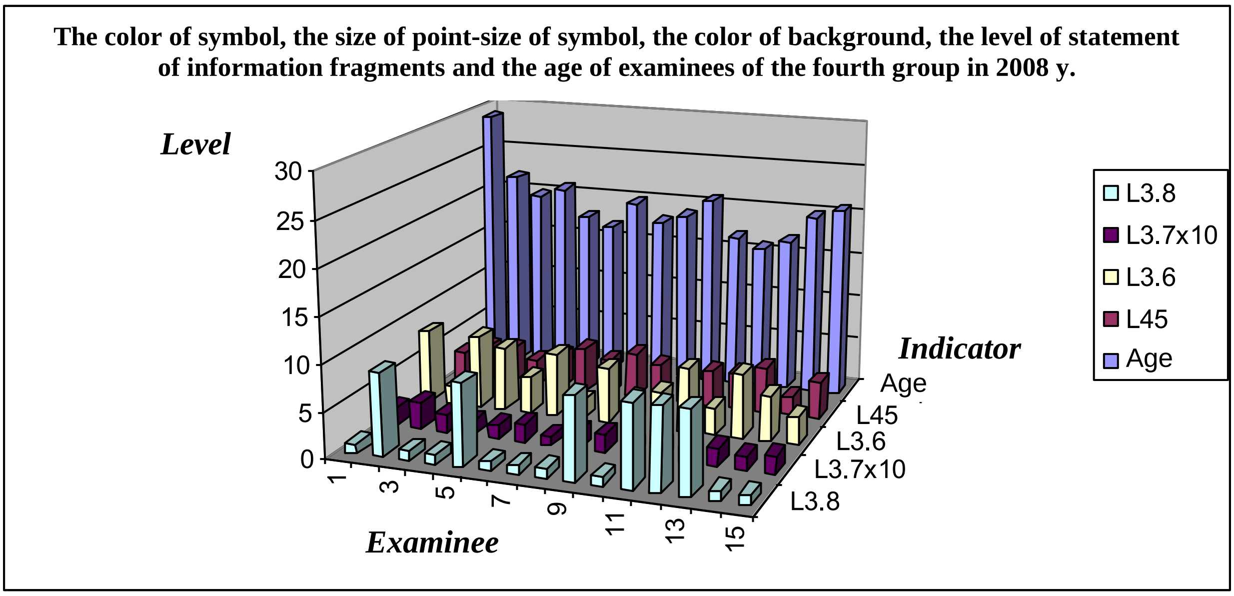
Picture A15.11. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2008 y.

In the pic A15.12 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. 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 (white) – 8, Purple (purple) – 9.



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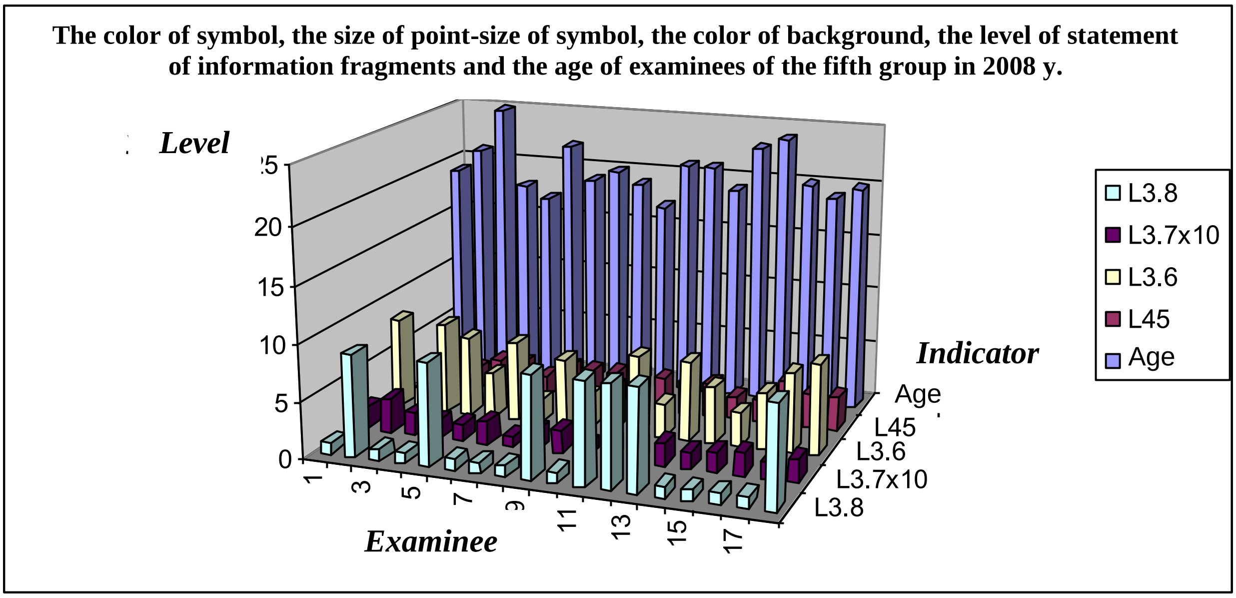


b

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 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) – 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.

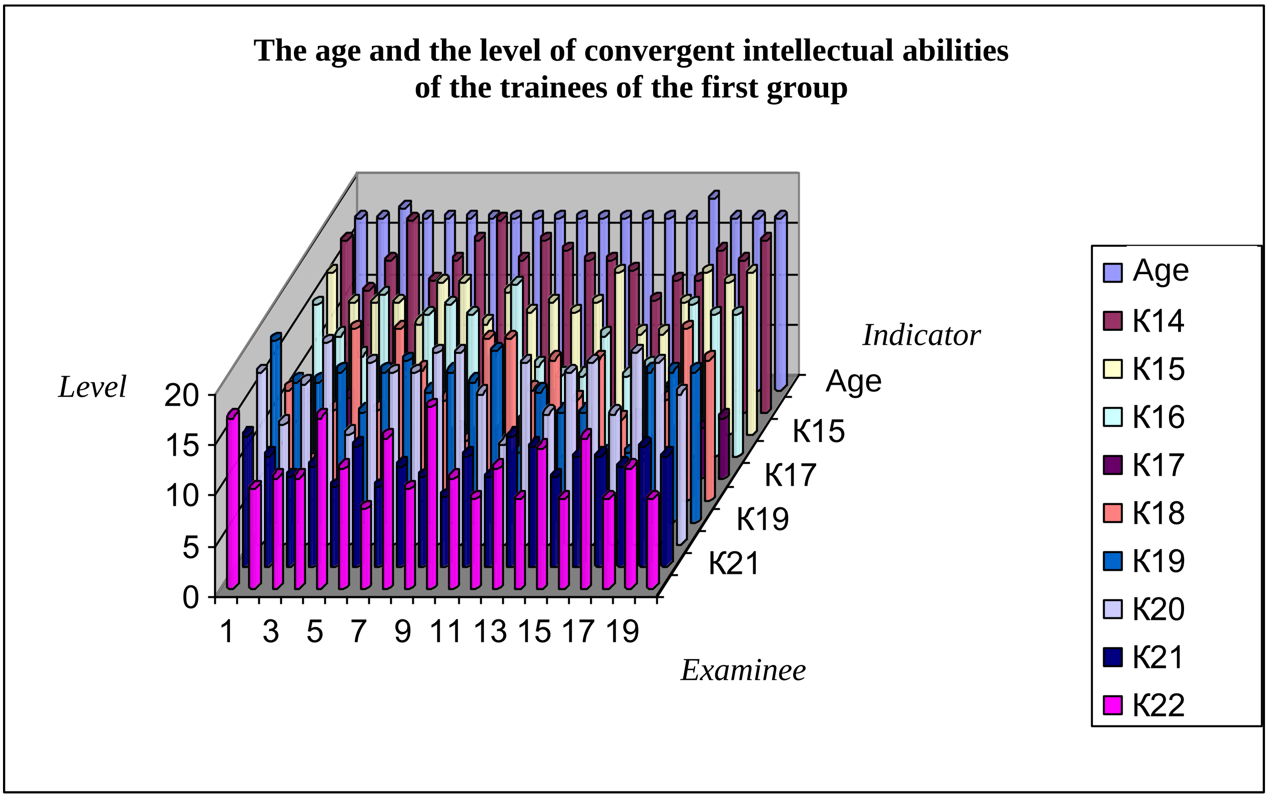
At the research of parameters of the psychological portrait of the parametrical CM of the examinee is carried out the diagnostics of convergent and divergent intellectual abilities by means of the applied DM, which acts as the basic component of the automated training system with the properties of adaptation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

The convergent intellectual abilities determine the potential ability to choose the normative single or several valid variants of answer to the question among a set of proposed with the minimal time 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 the diagrams with a posteriori results of research of the convergent intellectual abilities in the groups of day and evening departments are presented.

In pic. A15.13 the columnar 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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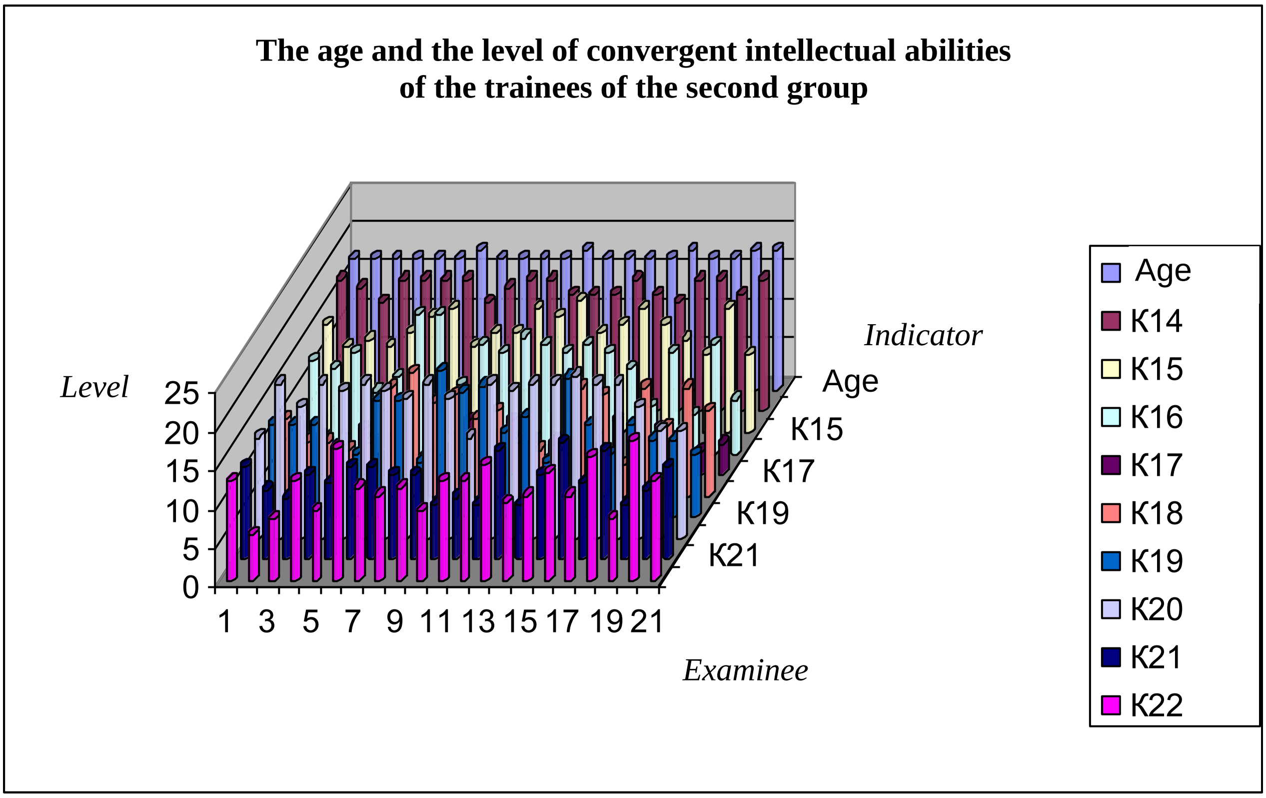

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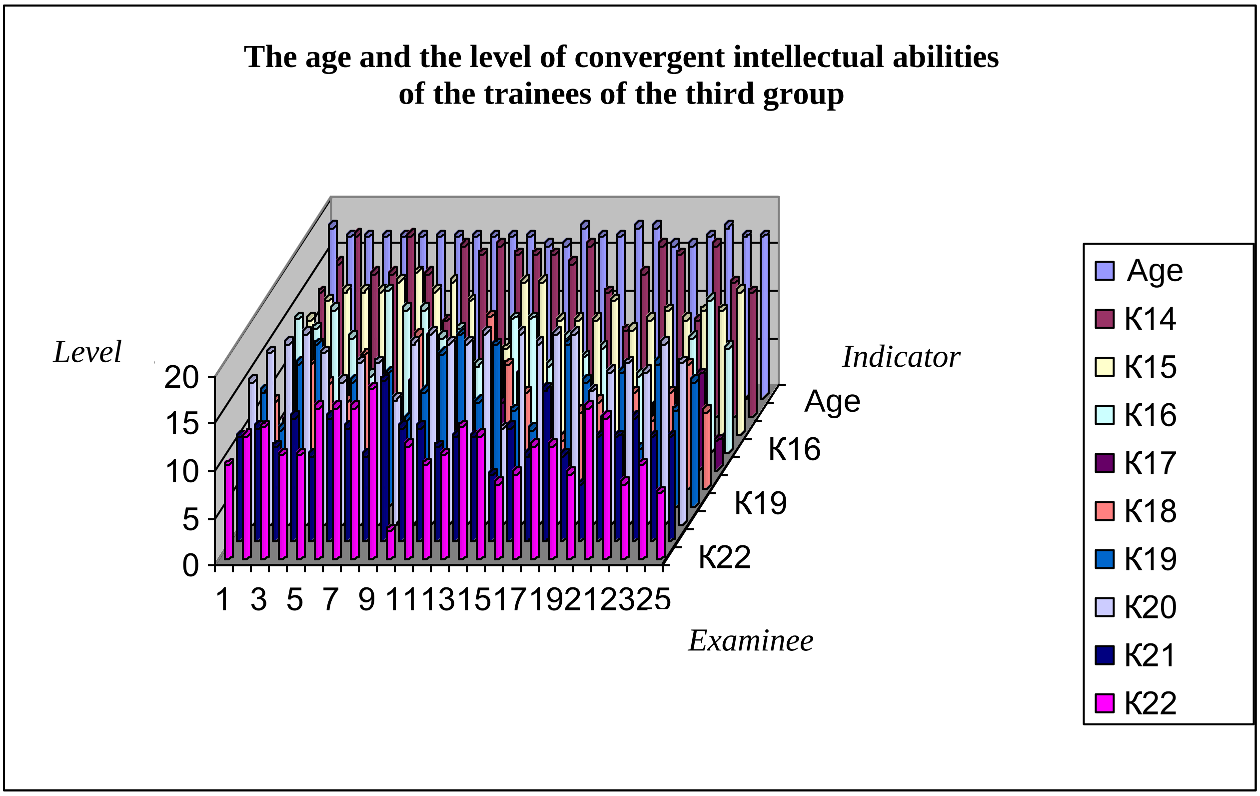
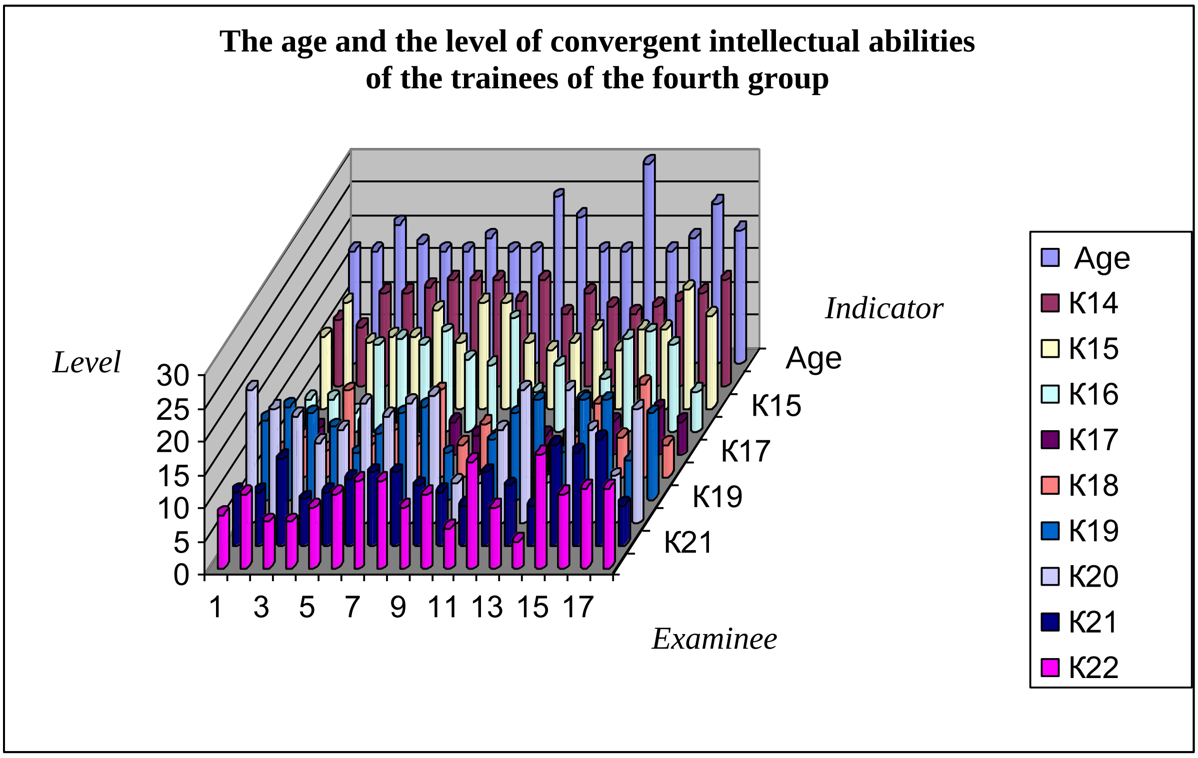


c

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 the columnar diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the two groups of evening department for 2006 y. is presented.



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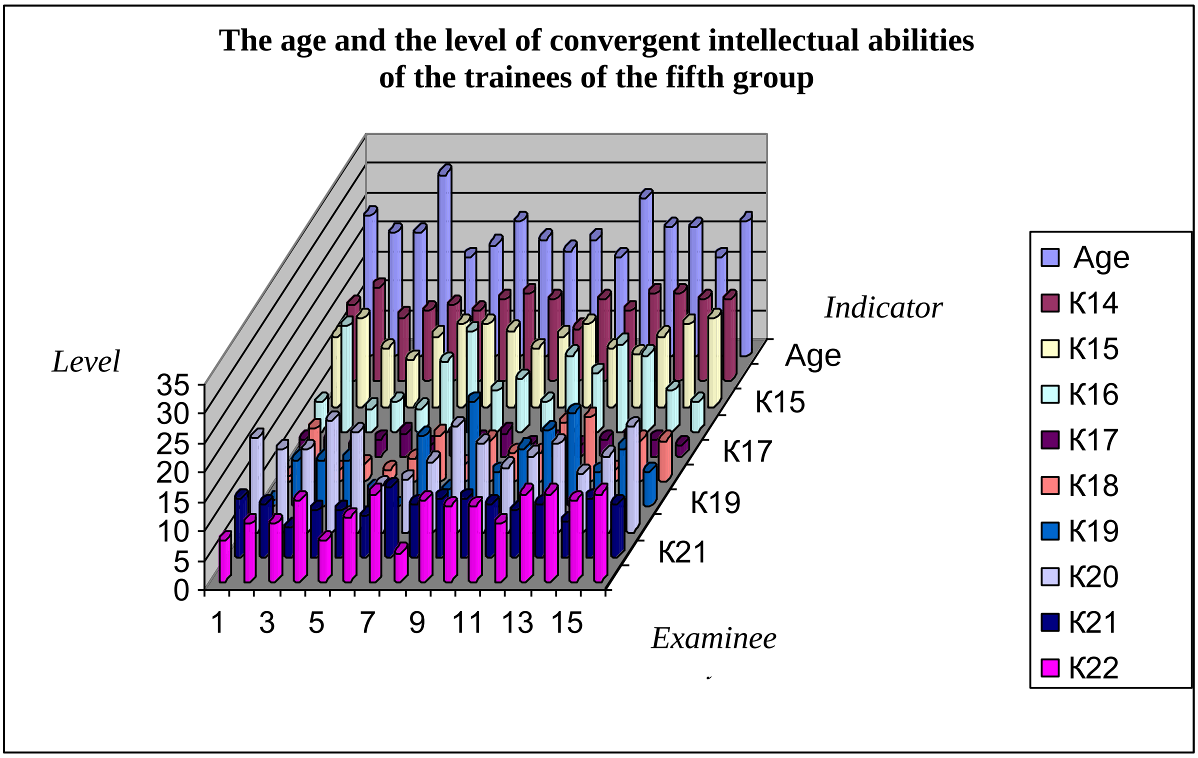


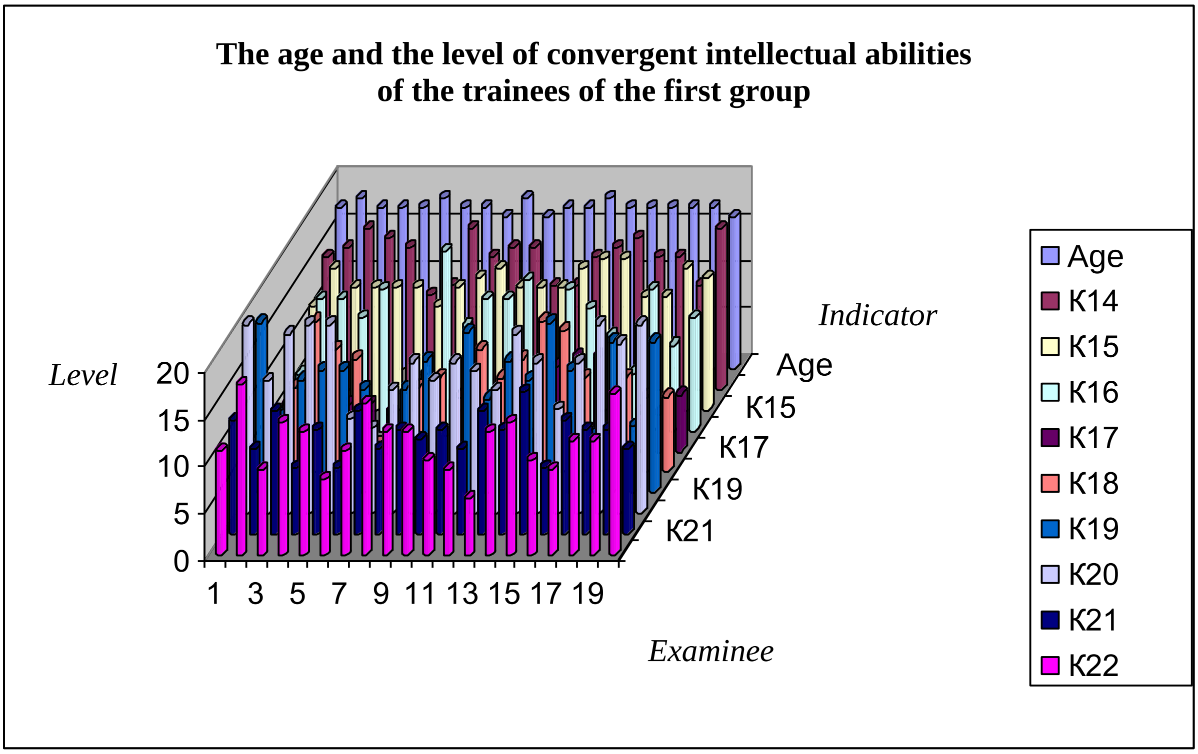
b

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

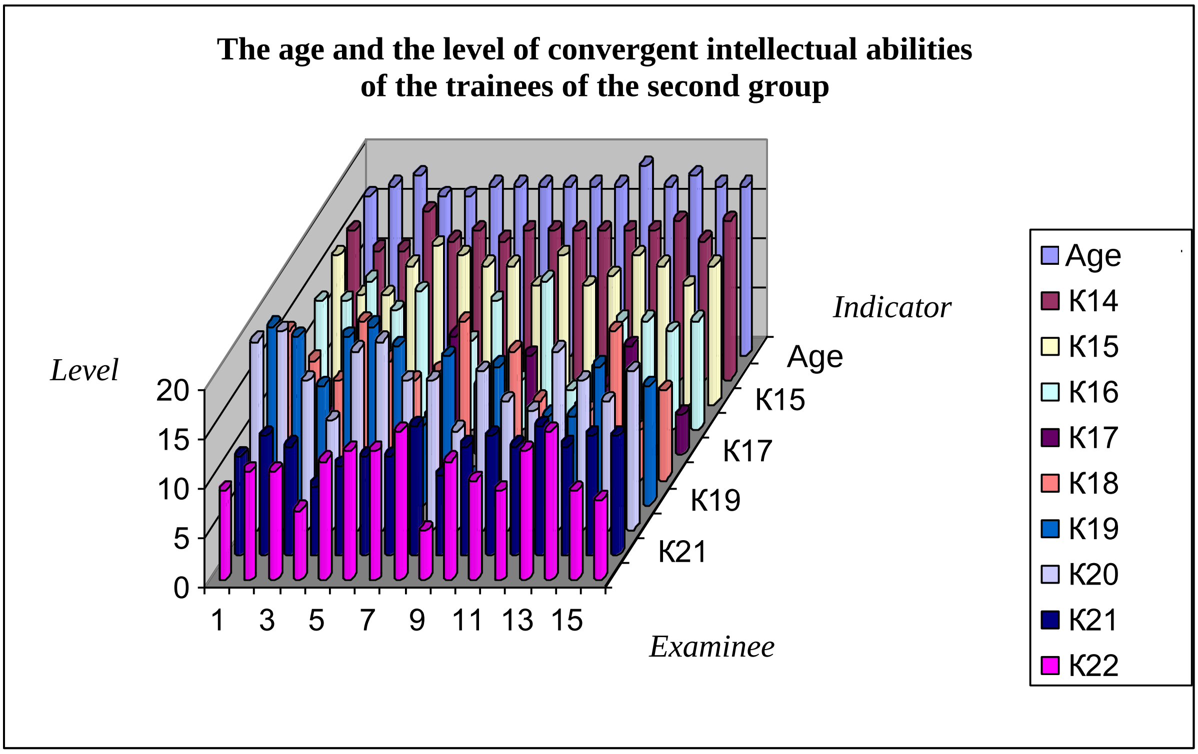
In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (Age, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the two groups of evening department the essential heterogeneities were not revealed.

In pic. A15.15 the columnar diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the three groups of day department for 2007 y., that 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 thinking or spatial imagination.



a



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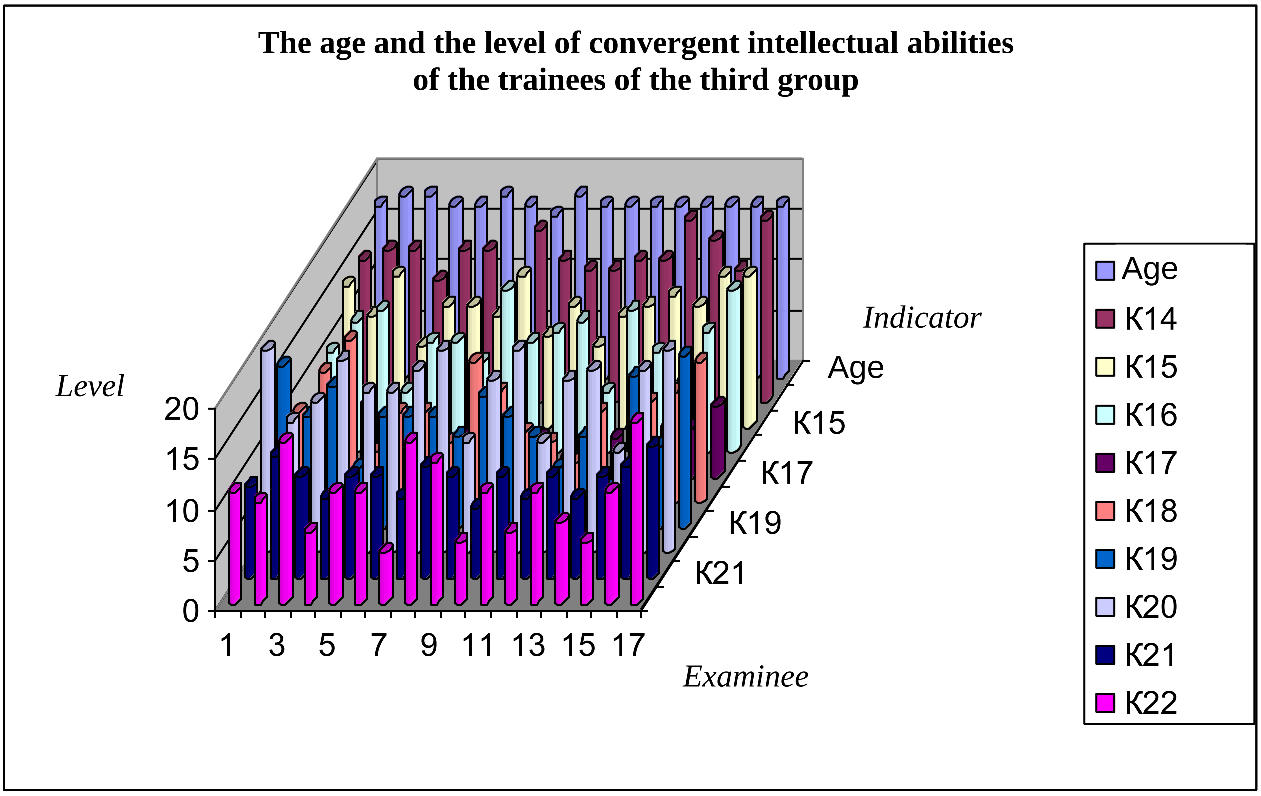


c

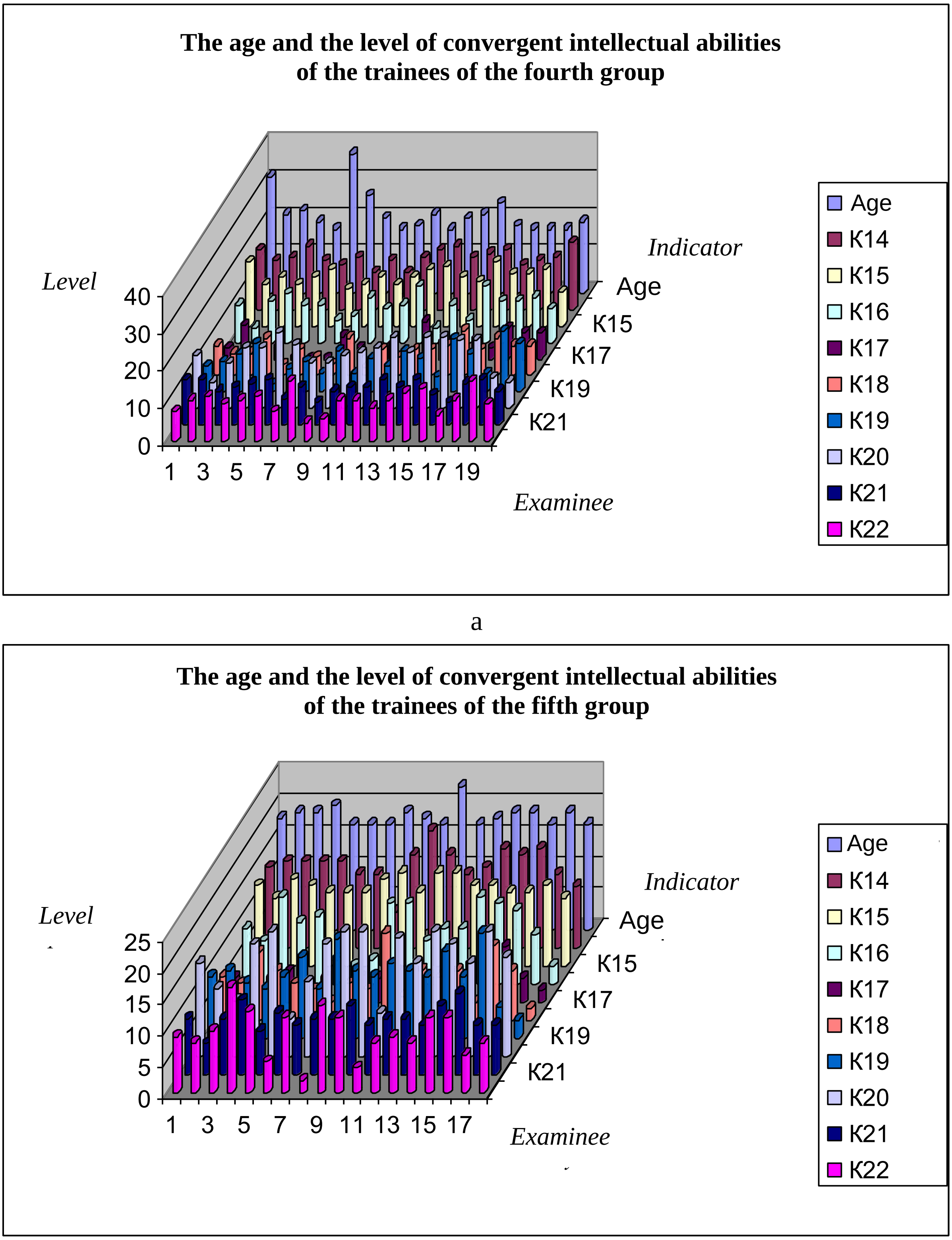
Picture A15.15. The convergent abilities of trainees of the day department in 2007 y.

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} – volumetric thinking” – has the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator “K_{21} – planar thinking” – 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} – combinatorial abilities” – has the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator “K_{18} – 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 columnar 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

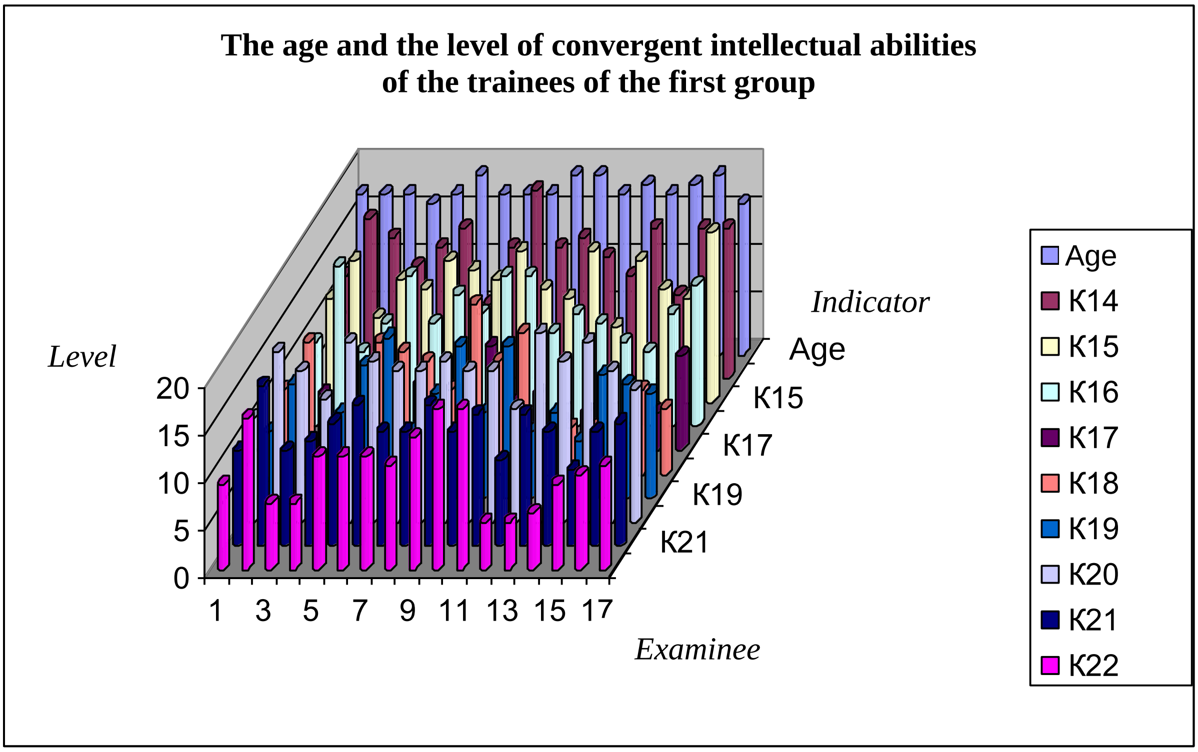
b

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

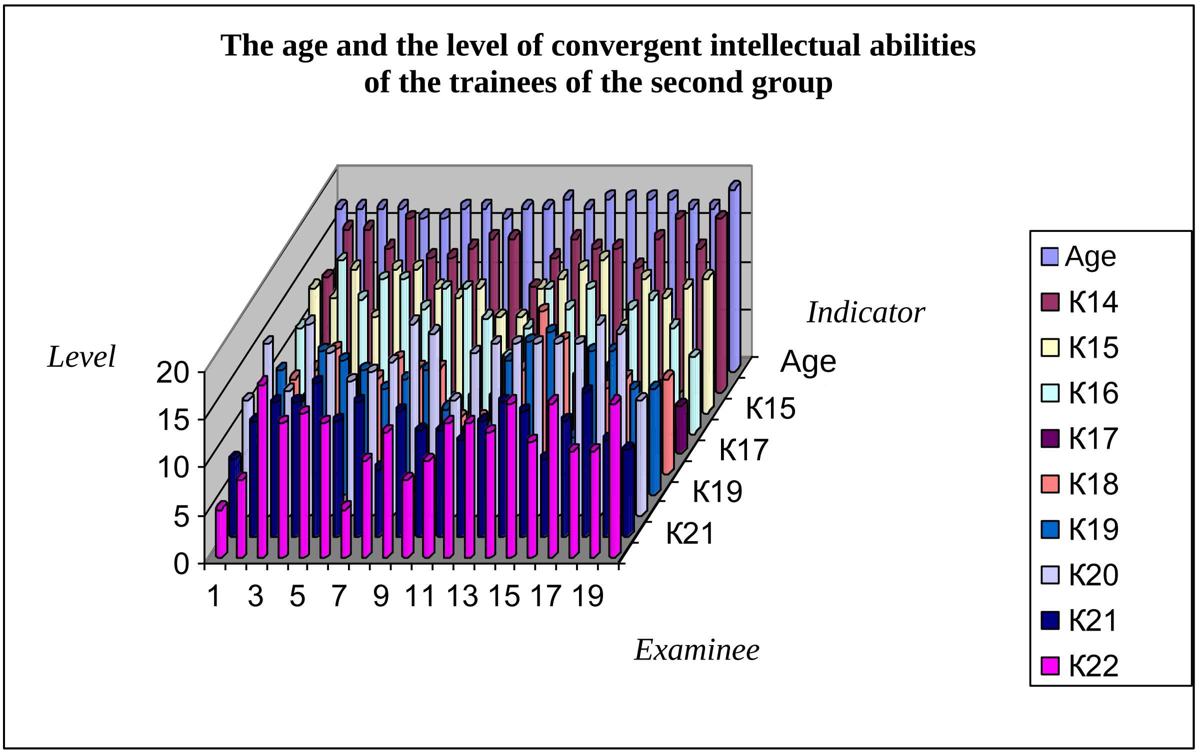
In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (*Age*, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the two groups of evening department the significant heterogeneities were not revealed. There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

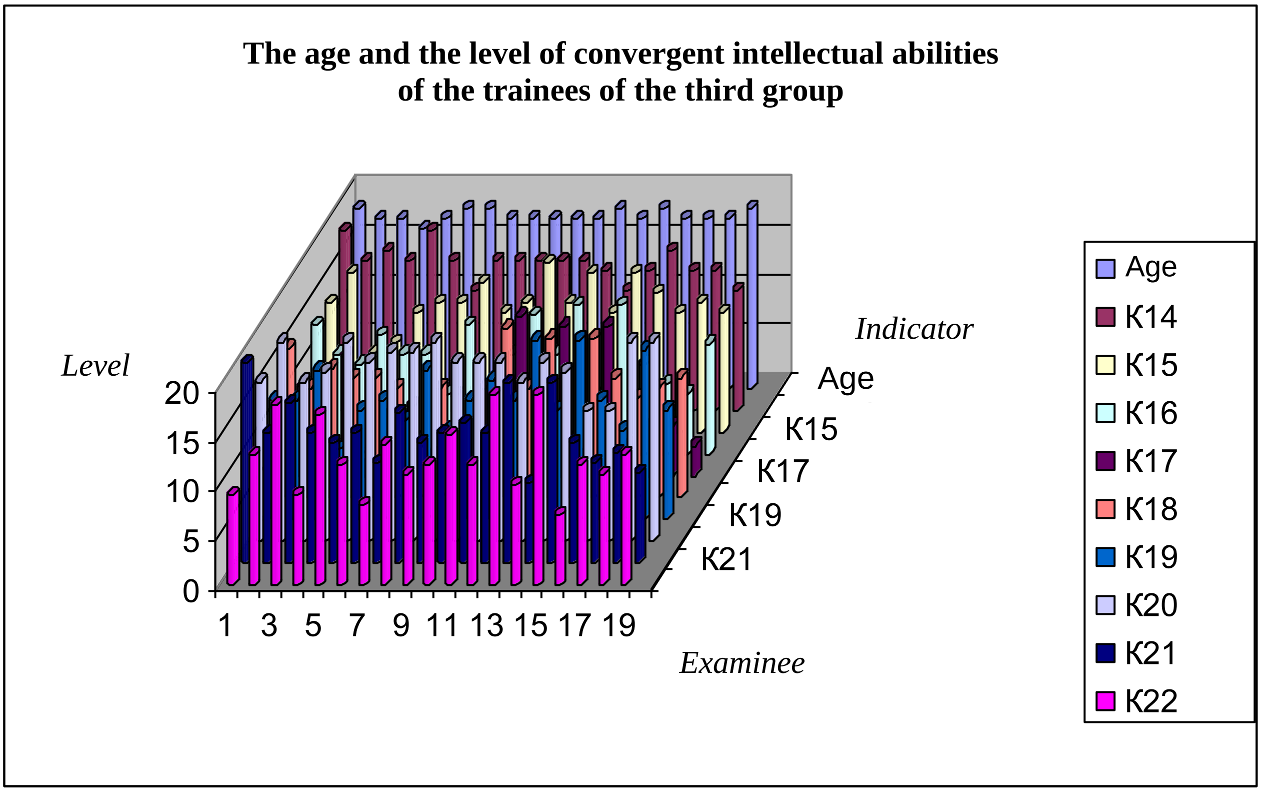
The following designations in the presented diagrams are used directly: K_{14} – verbalization, K_{15} – generalization, K_{16} – analyticity, K_{17} – classification, K_{18} – arithmetic abilities, K_{19} – combinatorics, K_{20} – mnemonics, K_{21} – planar thinking and K_{22} – volumetric thinking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



a



b



c

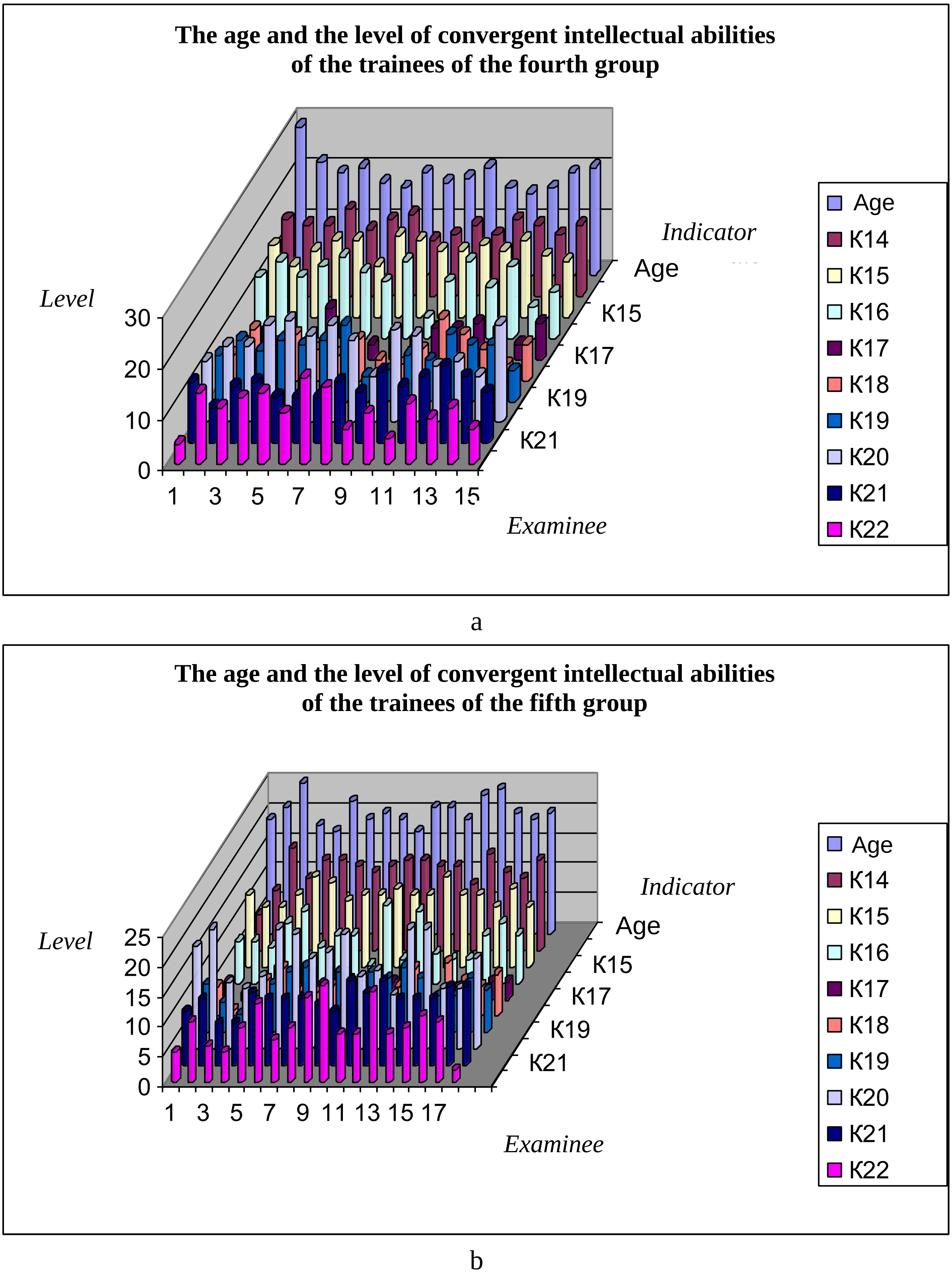
Picture A15.17. The convergent abilities of trainees of the day department in 2008 y.

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} – volumetric thinking” – there are the insignificant fluctuations of nominal values (the anomalies of examinees);
- in the three groups of examinees the indicator “K_{21} – planar thinking” – 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} – 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 columnar diagram with a posteriori data of diagnostics of the convergent intellectual abilities of the two groups of evening department for 2008 y. is presented.



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

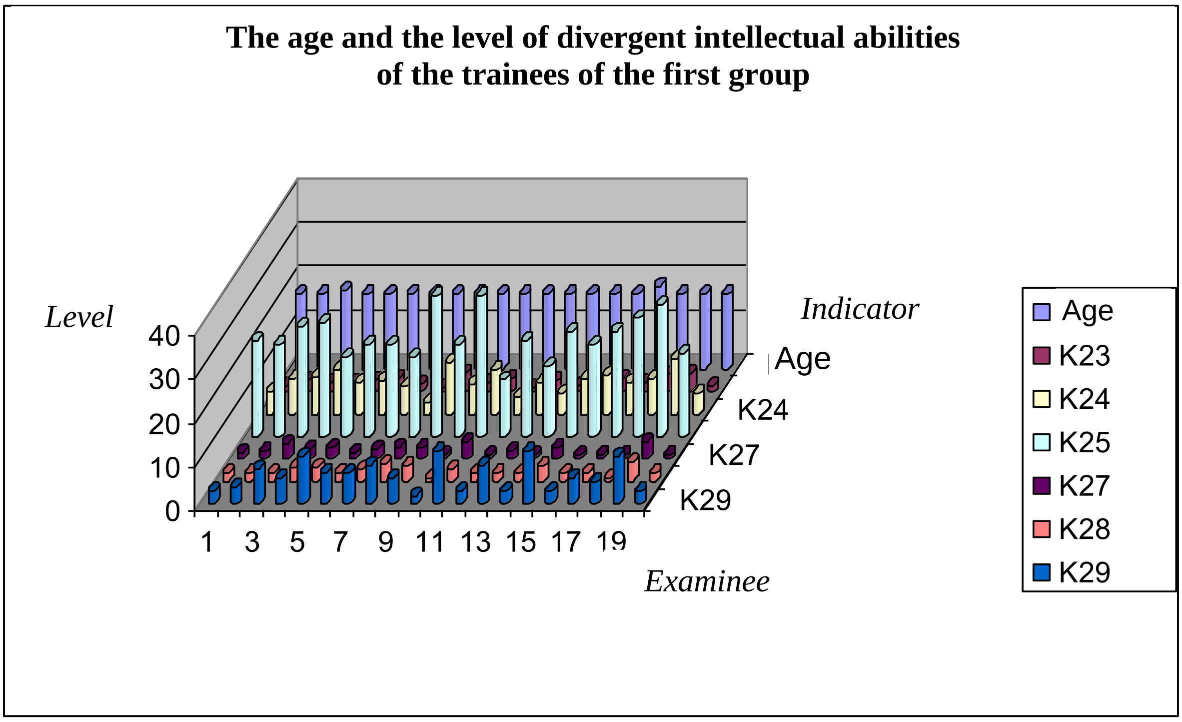
In the result of the analysis of the obtained diagrams with the results of research of the convergent intellectual abilities (Age, K_{14}, K_{15}, K_{16}, K_{17}, K_{18}, K_{19}, K_{20}, K_{21} and K_{22}) in the two groups of evening department the essential heterogeneities were not revealed.

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

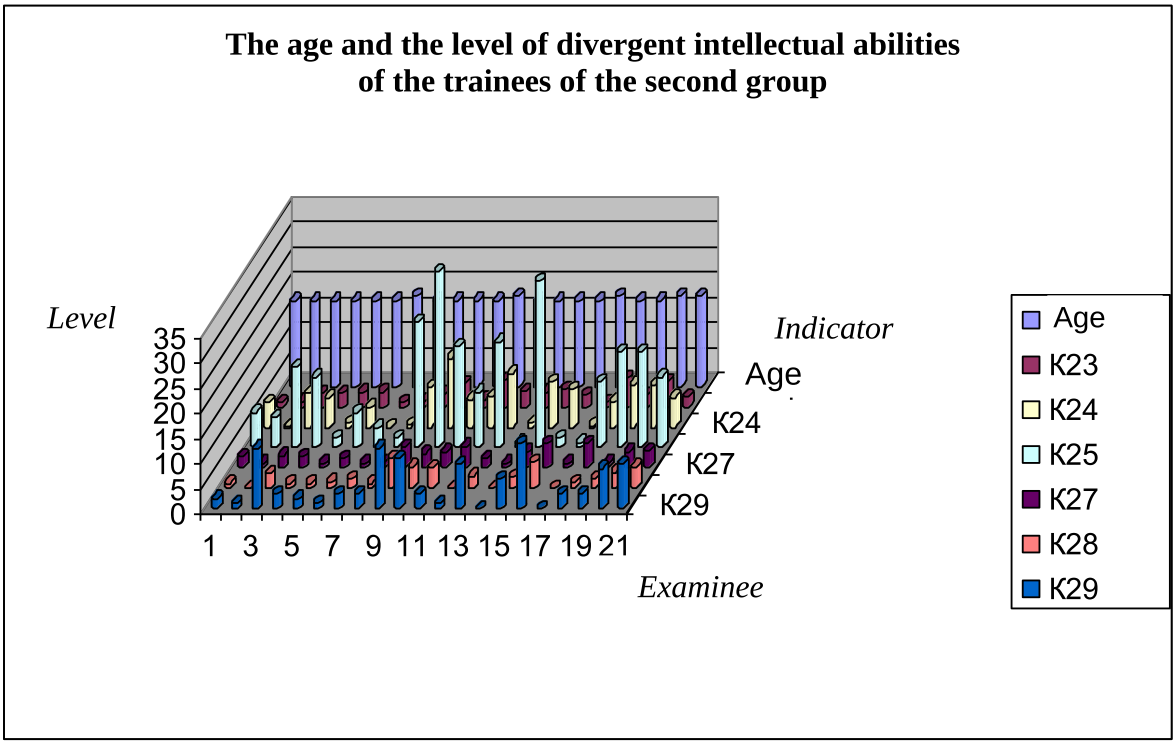
The divergent intellectual abilities determine the features of displaying of the diverse information fragments by the components of the automated (remote) training system based on the innovative PCMB, and also the interval of time on the development of the normative single or several variants of answer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

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

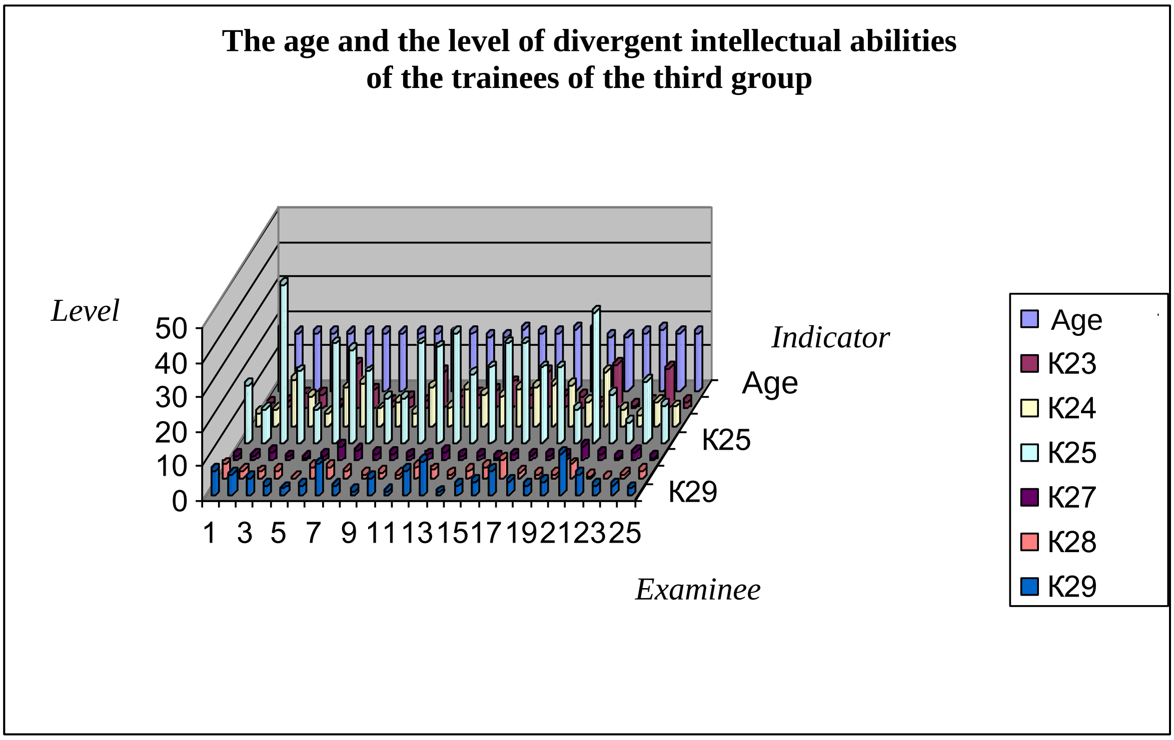
In pic. A15.19 the columnar diagram with a posteriori data of diagnostics of the divergent intellectual abilities of the three groups of day department for 2006 y. is presented.



a



b



c

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

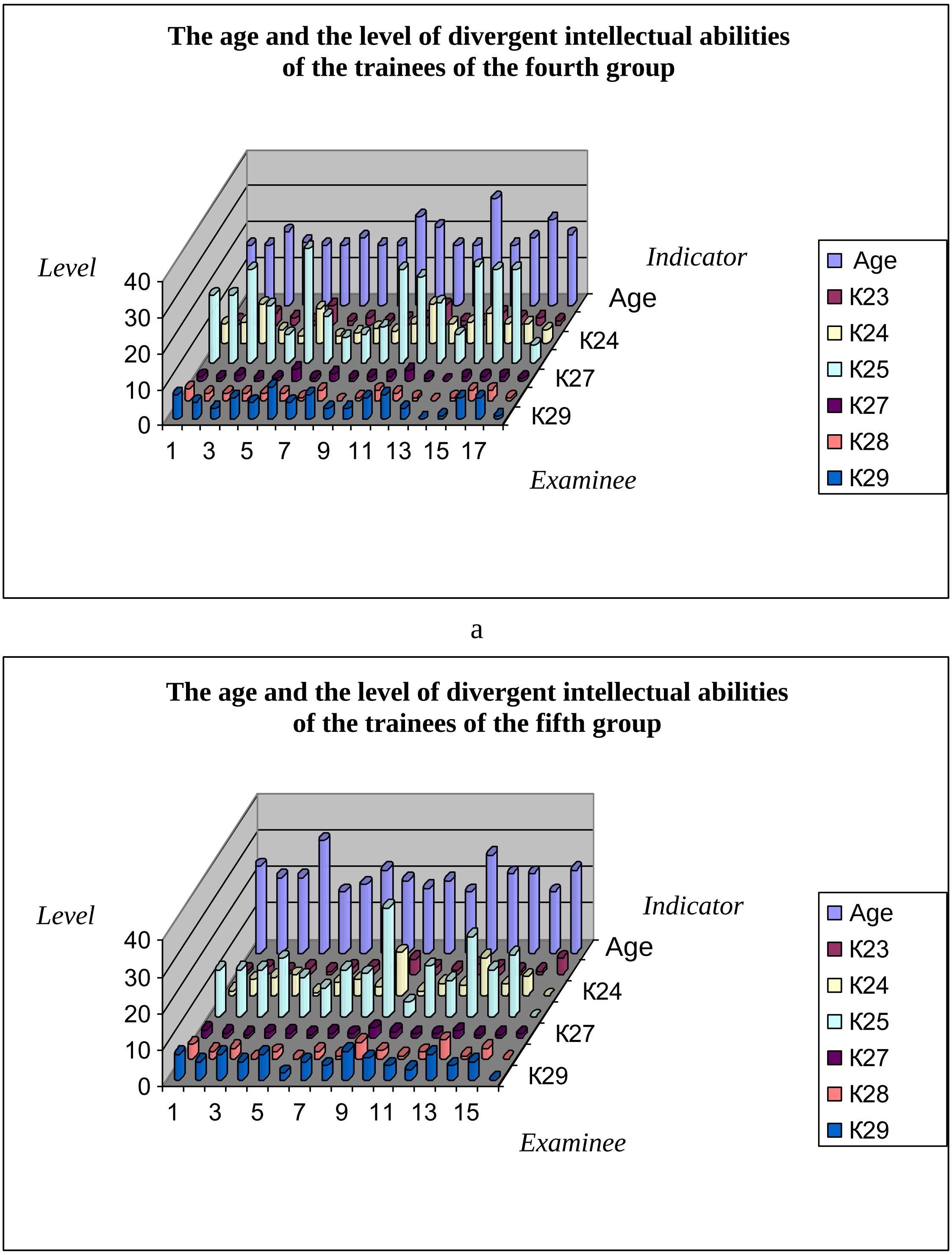
In the result of the analysis of the obtained diagrams with the results of research of the divergent intellectual abilities of examinees (*Age*, K_{23}, K_{24}, K_{25}, K_{27}, K_{28} and K_{29}) in the three groups of day department the essential heterogeneities were not revealed.

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 figurative 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 figurative selectivity of the process of thinking” there is directly the relatively insignificant fluctuation of nominal values, which do not influence on 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

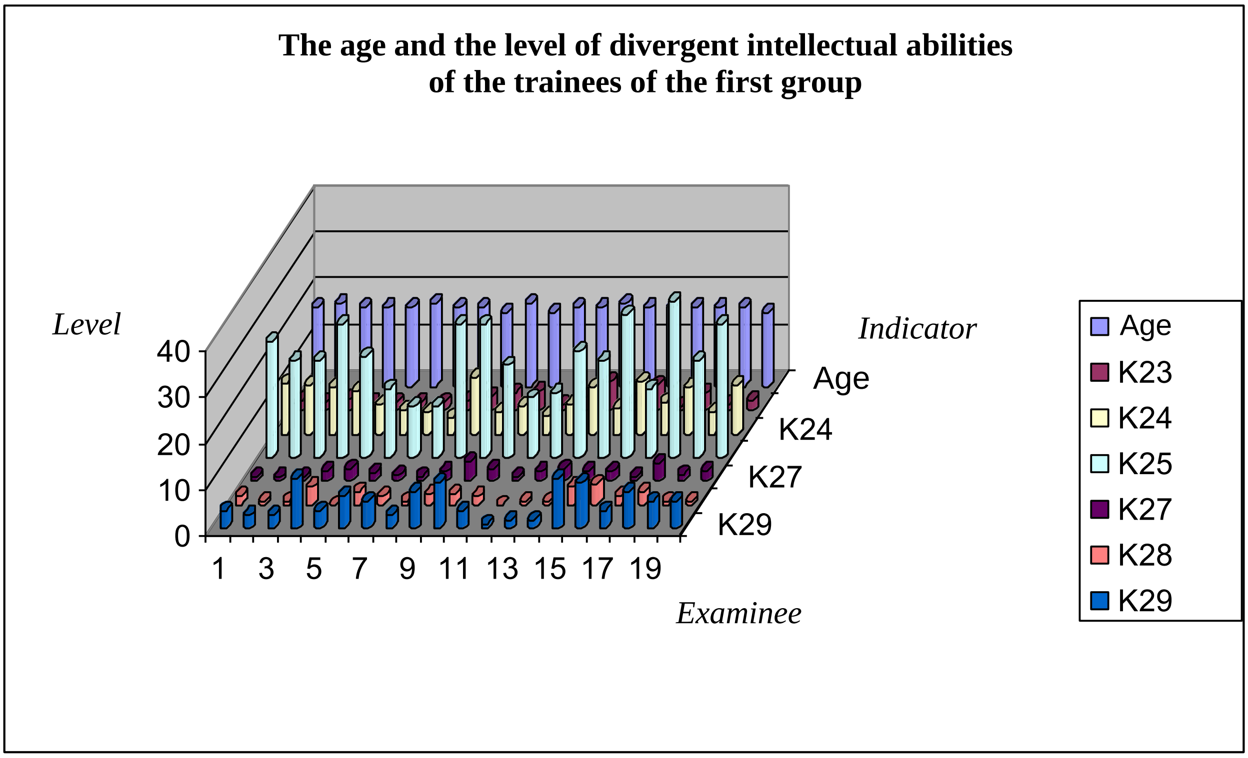
Picture A15.20. The divergent abilities of trainees of the evening department in 2006 y.

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.

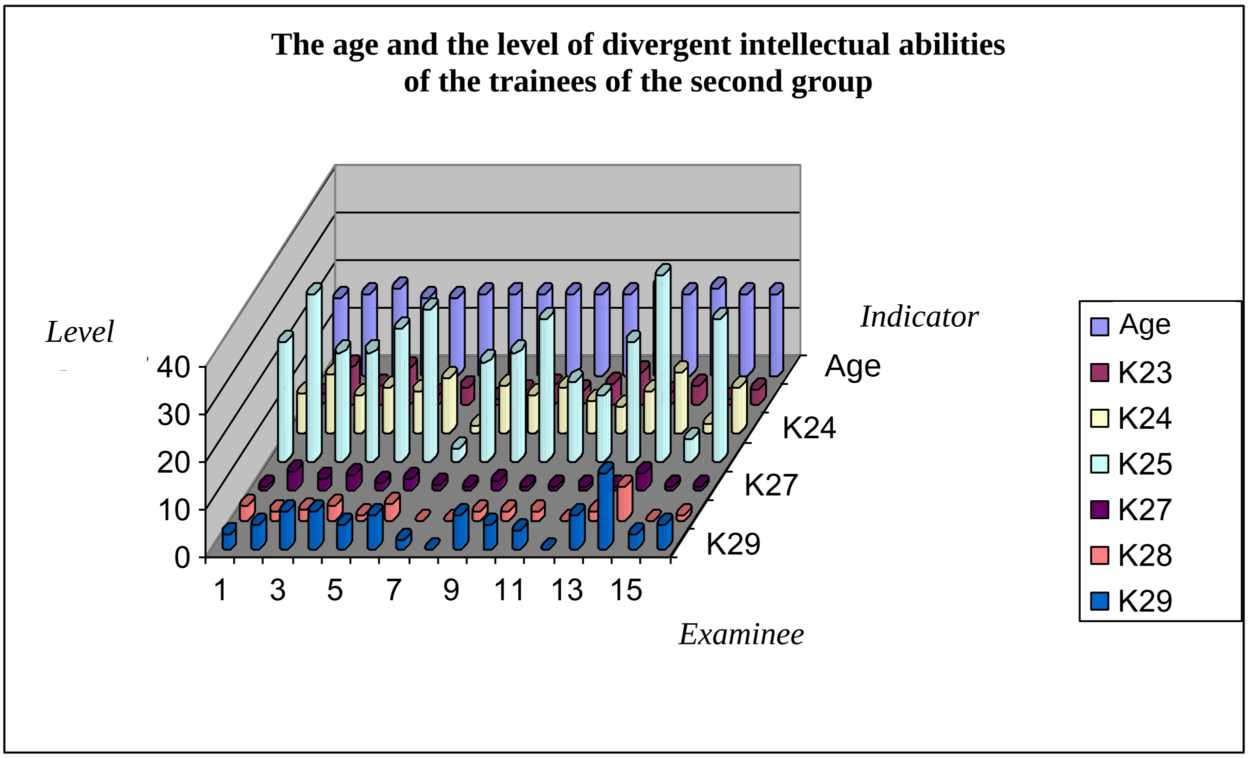
There are the several insignificant emissions in the variables *Age* and K_{25}, which do not influence on the measures of central tendency of a sequence of nominal values.

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.

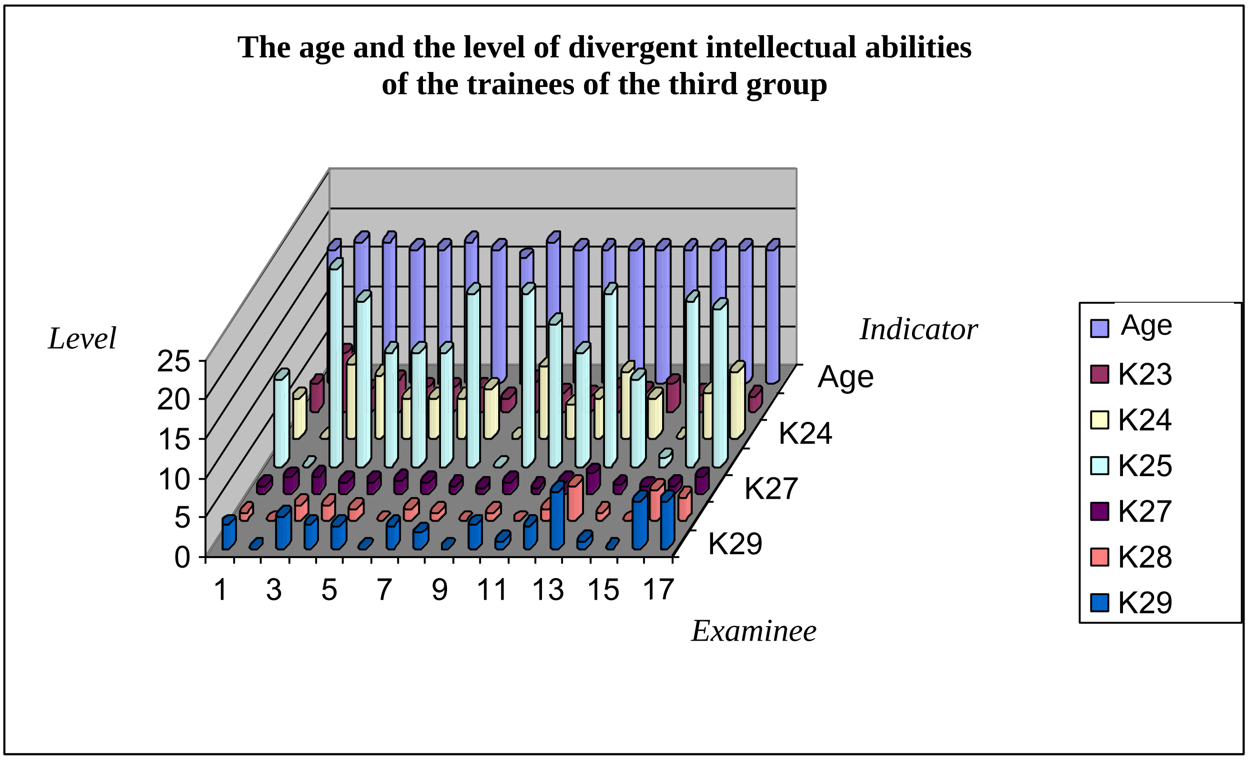
The following designations in the presented diagrams are used directly: *Age* – the age, K_{23} – the verbal originality, K_{24} – the verbal associativity, K_{25} – the verbal selectivity, K_{27} – the figurative originality, K_{28} – the figurative associativity and K_{29} – the figurative selectivity.



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.

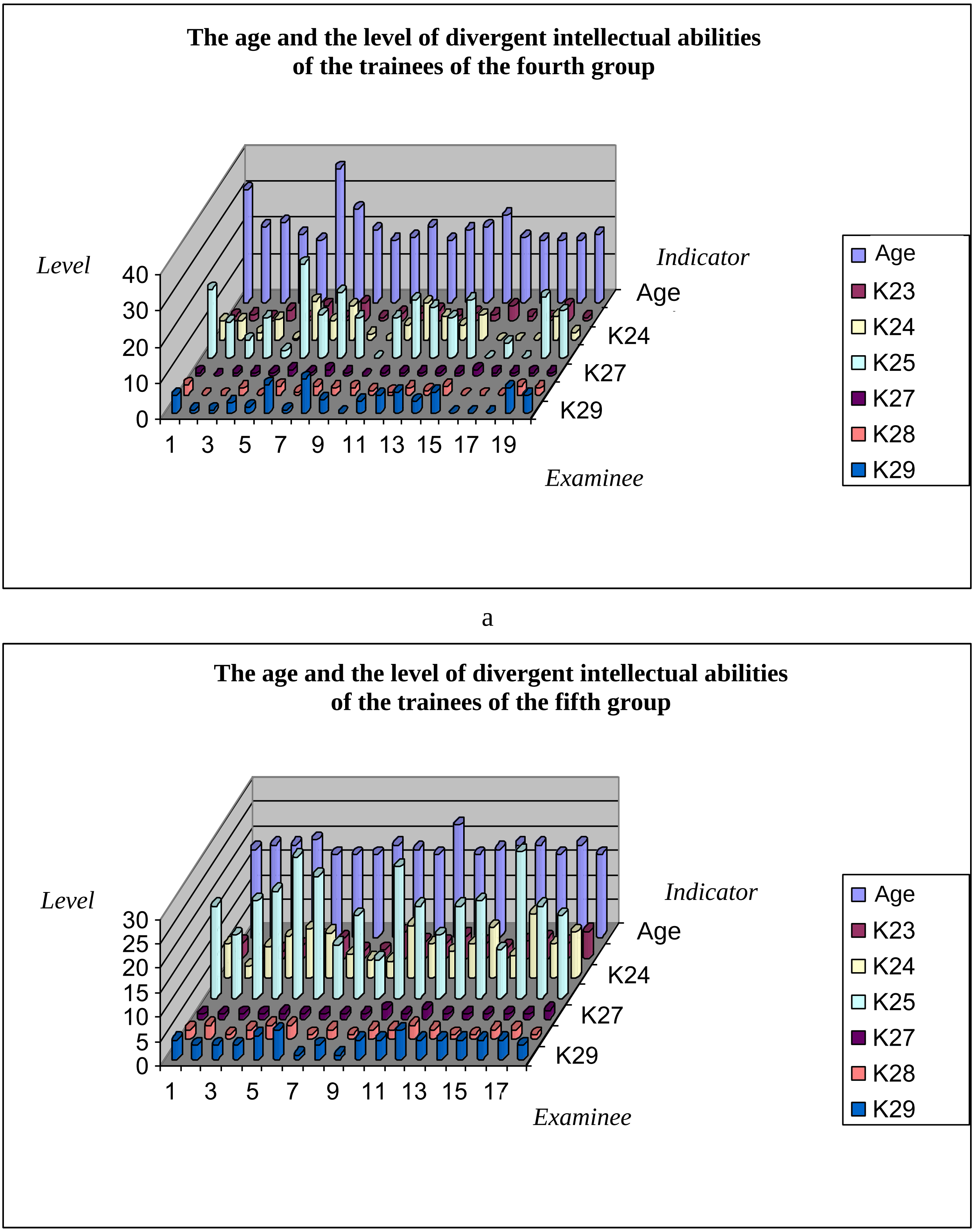
In the result of the analysis of the distribution of nominal values in the samples with a posteriori data the insignificant heterogeneities in the values are revealed:

- 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 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 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

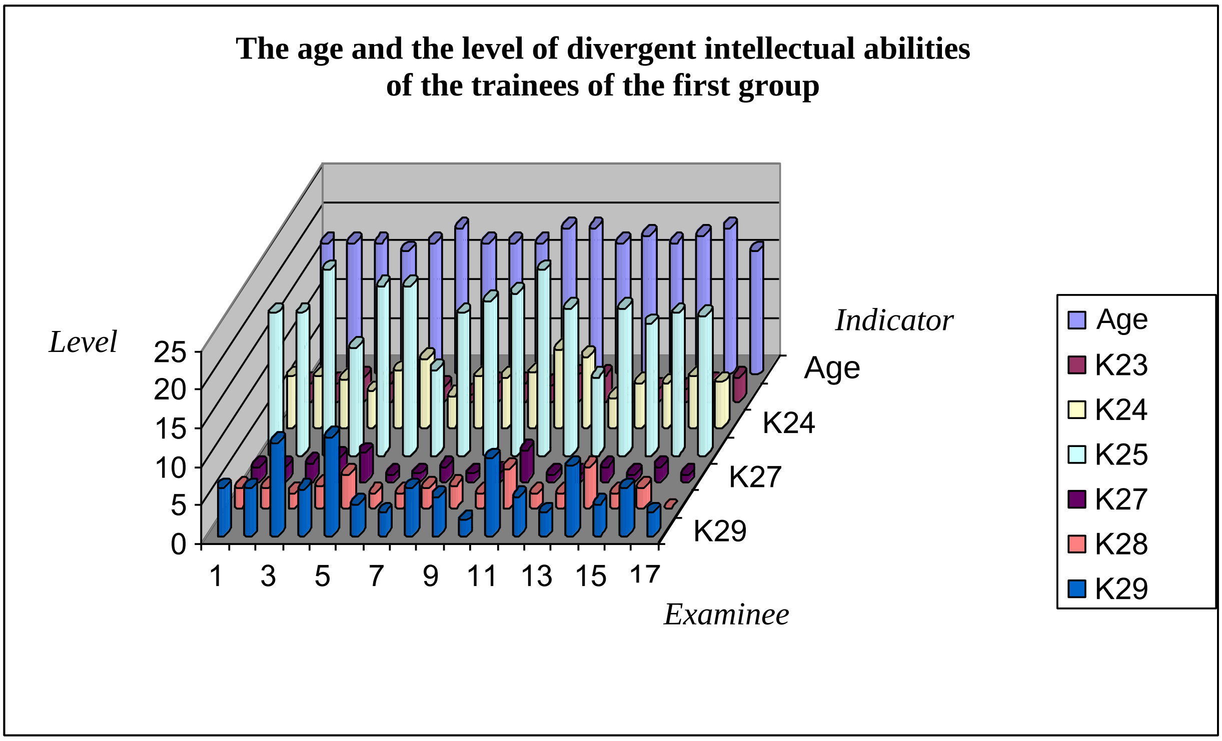
b

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

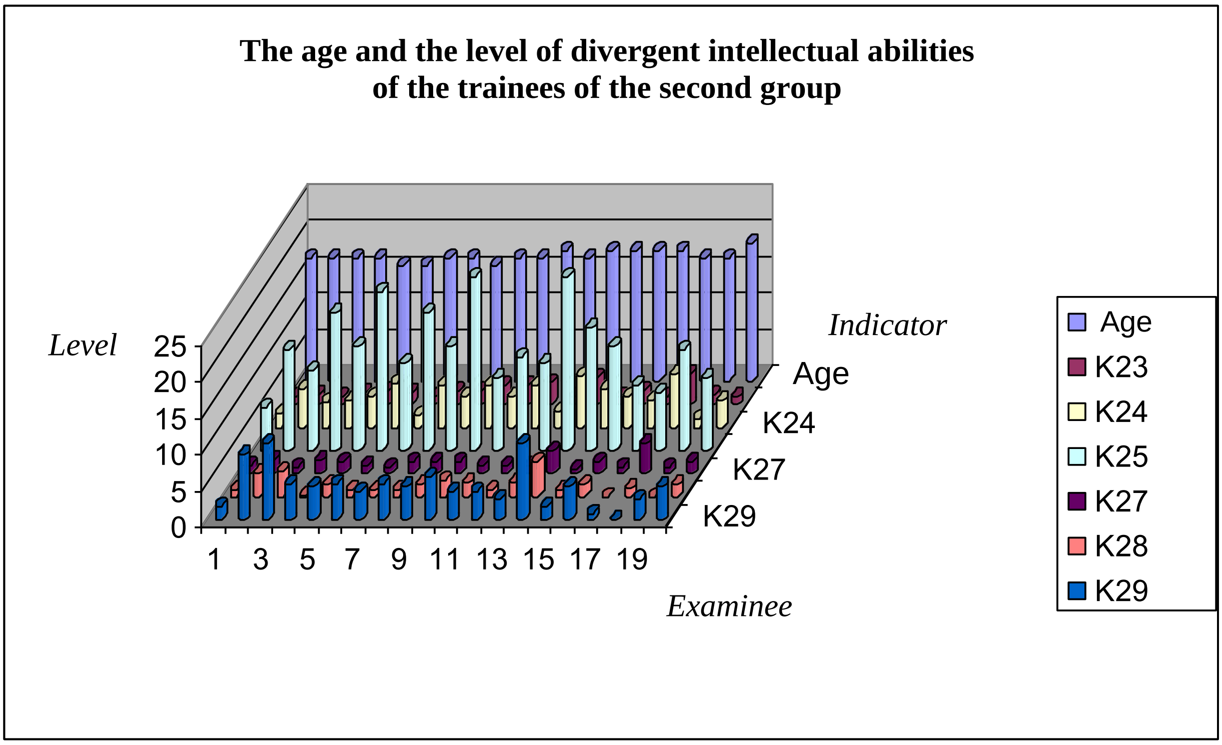
In the result of the analysis of the obtained diagrams with a posterior data of research of the divergent intellectual abilities of examinees (*Age*, K_{23}, K_{24}, K_{25}, K_{27}, K_{28} and K_{29}) in the two groups of evening department the significant heterogeneities were not revealed.

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.

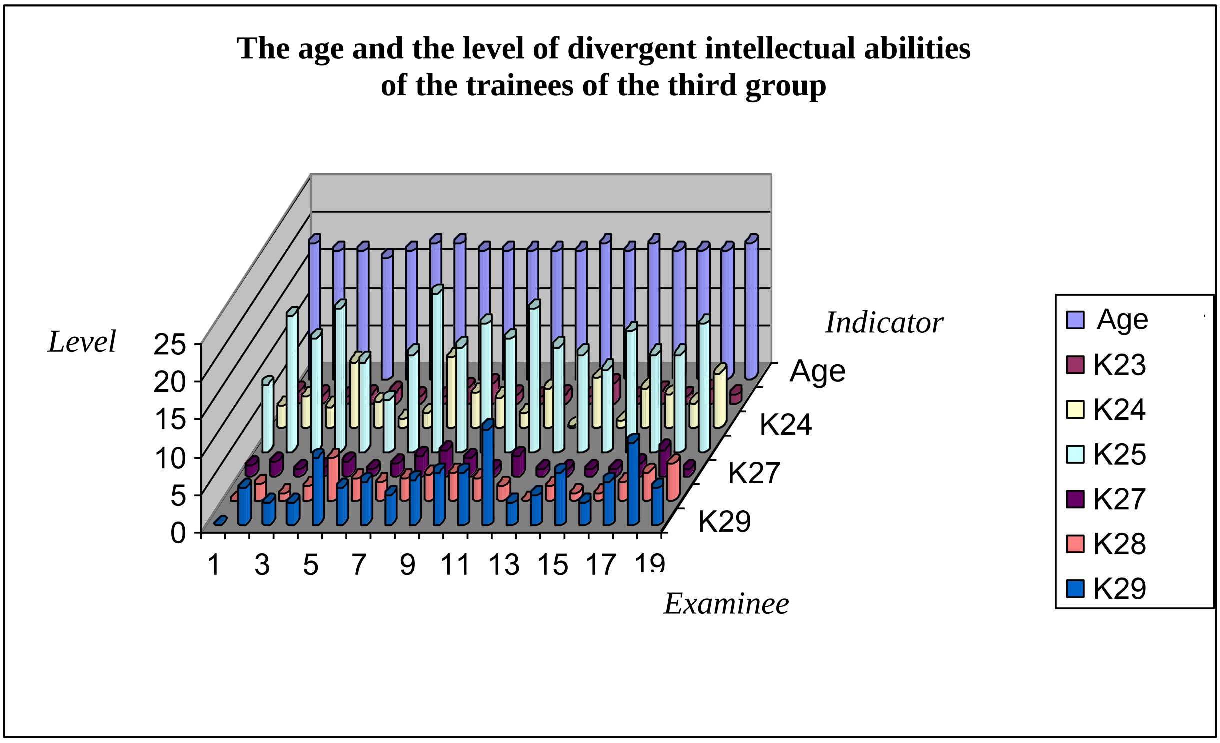
The following designations in the presented diagrams are used directly: *Age* – the age, K_{23} – the verbal originality, K_{24} – the verbal associativity, K_{25} – the verbal selectivity, K_{27} – the figurative originality, K_{28} – the figurative associativity and K_{29} – the figurative selectivity.


The age and the level of divergent intellectual abilities of the trainees of the first group

a


The age and the level of divergent intellectual abilities of the trainees of the second group

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:

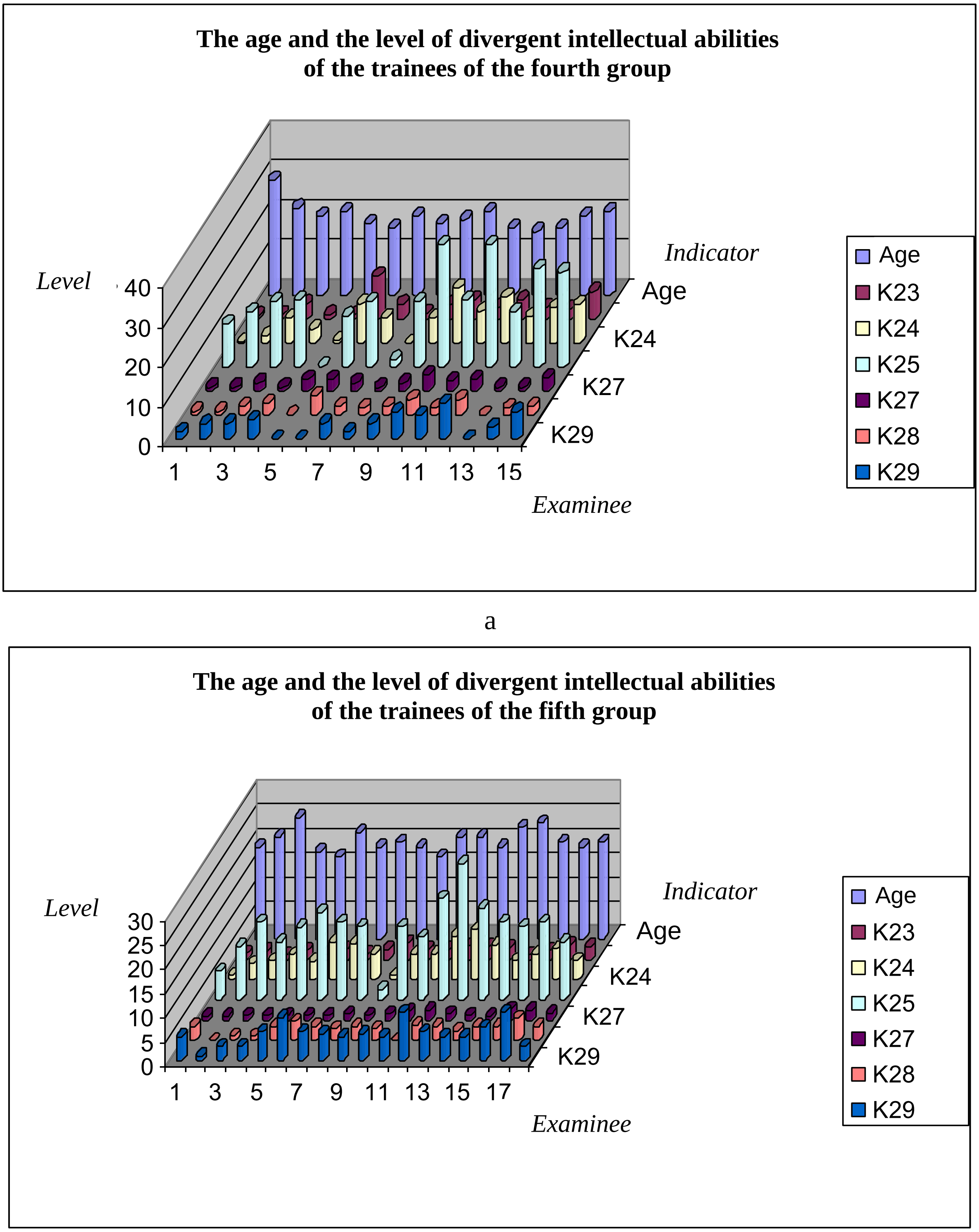
- in the sample “K_{25} – the verbal selectivity of the process of thinking” – there is directly the relatively average fluctuation of nominal values;
- in the sample “K_{29} – the figurative selectivity of the process of thinking” – there is directly the relatively insignificant fluctuation of nominal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

The significant anomalies in the distribution of values were not 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.


The age and the level of divergent intellectual abilities of the trainees of the fourth group

a

The age and the level of divergent intellectual abilities of the trainees of the fifth group

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, representing the emissions and artifacts are revealed;
  - 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, which are represented the emissions and artifacts were revealed;
  - 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 related directly 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, that 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 of 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 applied methods of research:

- the convergent abilities – the method of research of Amthauer R. (in the adaptation and localization of Voronina T.A., “"IP" of "RAS"”);
- the divergent abilities – the several methods of research, approved by “"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 different kind and type the following parameters of displaying are used:

- the psychological parameters (are calculated and fulfilled by the algorithm);
    - the kind of information (textual – L_{14} [used], tabular – L_{15} [used], schematic planar – L_{16} [used], schematic volumetric – L_{17} [not used], sound as main – L_{18} [not used], sound as accompaniment – L_{19} [not used], combined – L_{20} [not used] and special scheme – L_{21} [not used]);
- the psychological parameters (by default, if the processor is switched 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] and 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 difficulty 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] and 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.

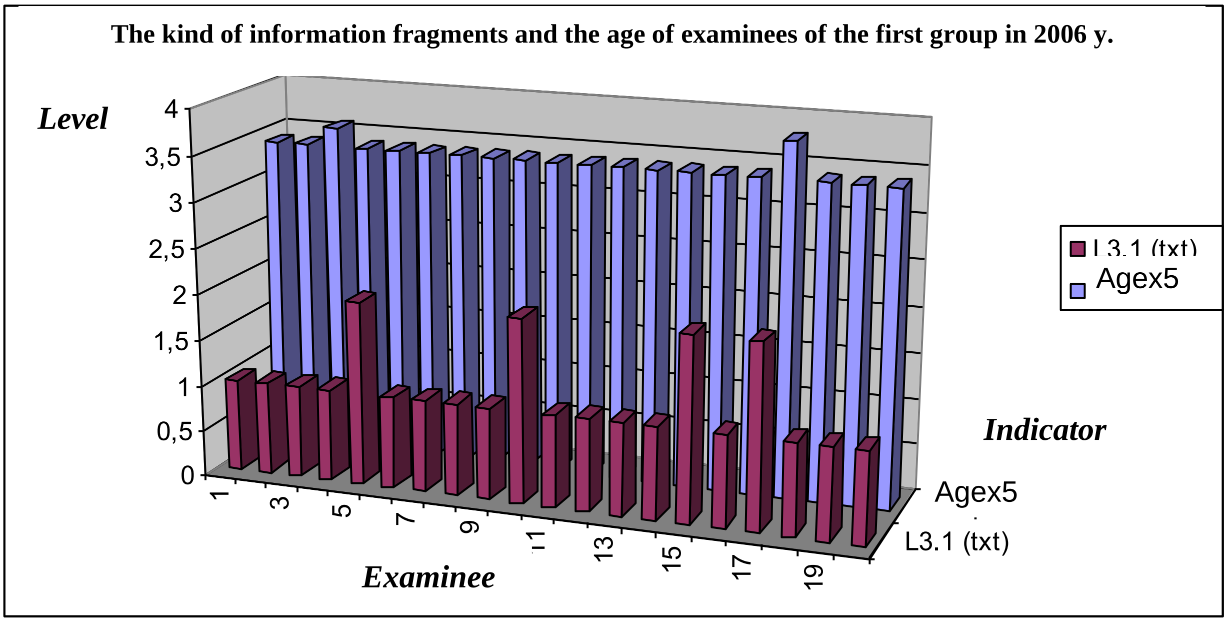
In pic. A15.25-A15.30 the diagrams with the results of research of the psychological parameters of displaying of the information by the means of training are presented directly.

In pic. A15.25 the diagrams are presented directly, which reflect the dynamics of the 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:

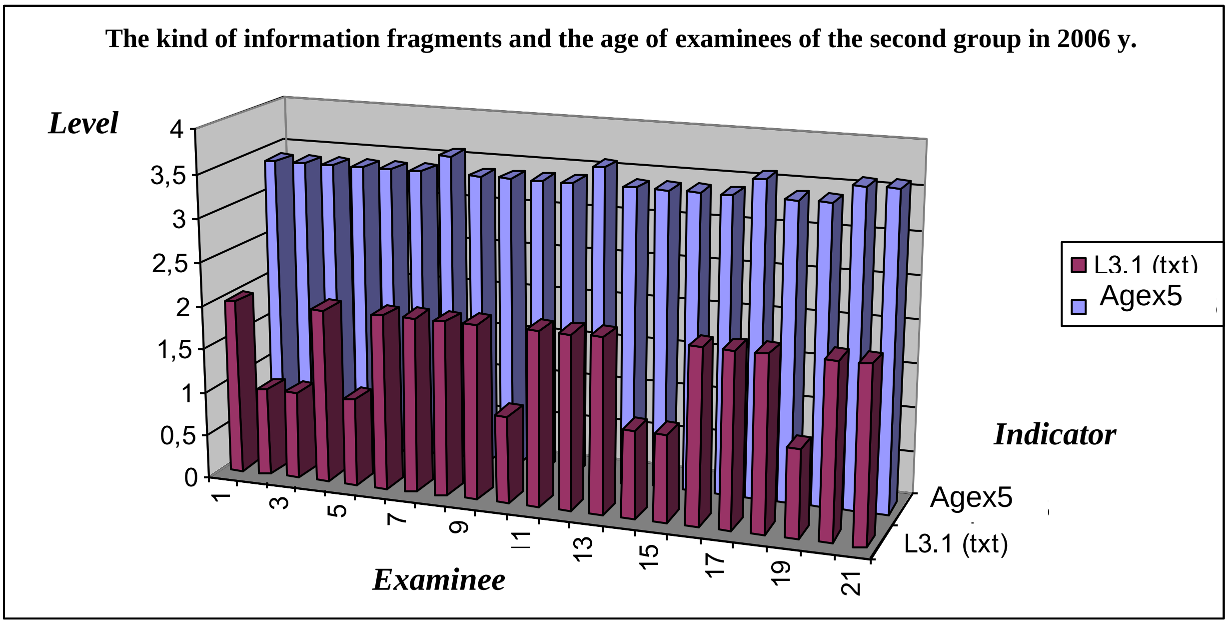
- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- *Age* – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

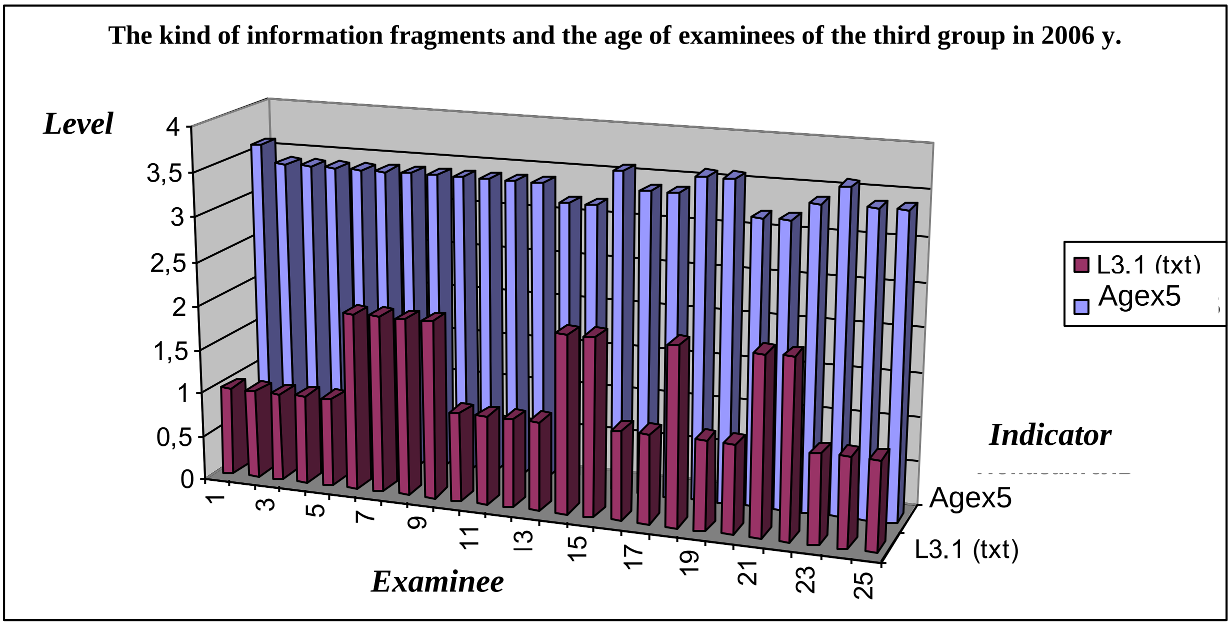
- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



a



b



c

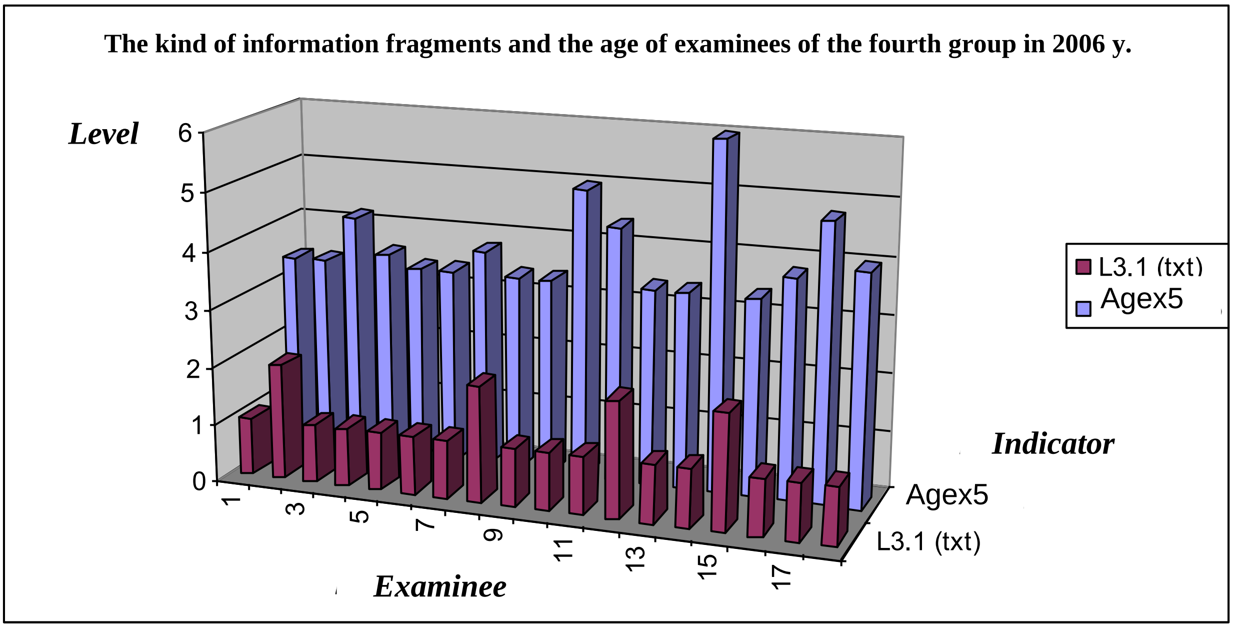
Picture A15.25. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2006 y.

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 (the indexes and identifiers) are used:

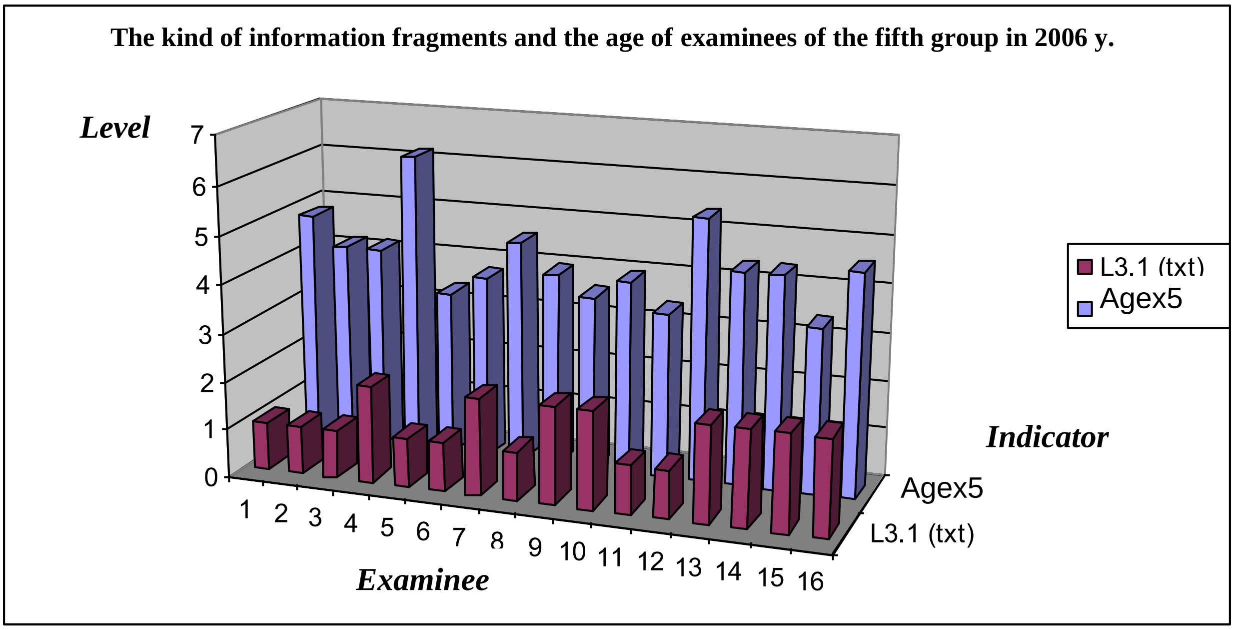
- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- *Age* – the age of examinee (the subject of training).

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).



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 two 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:

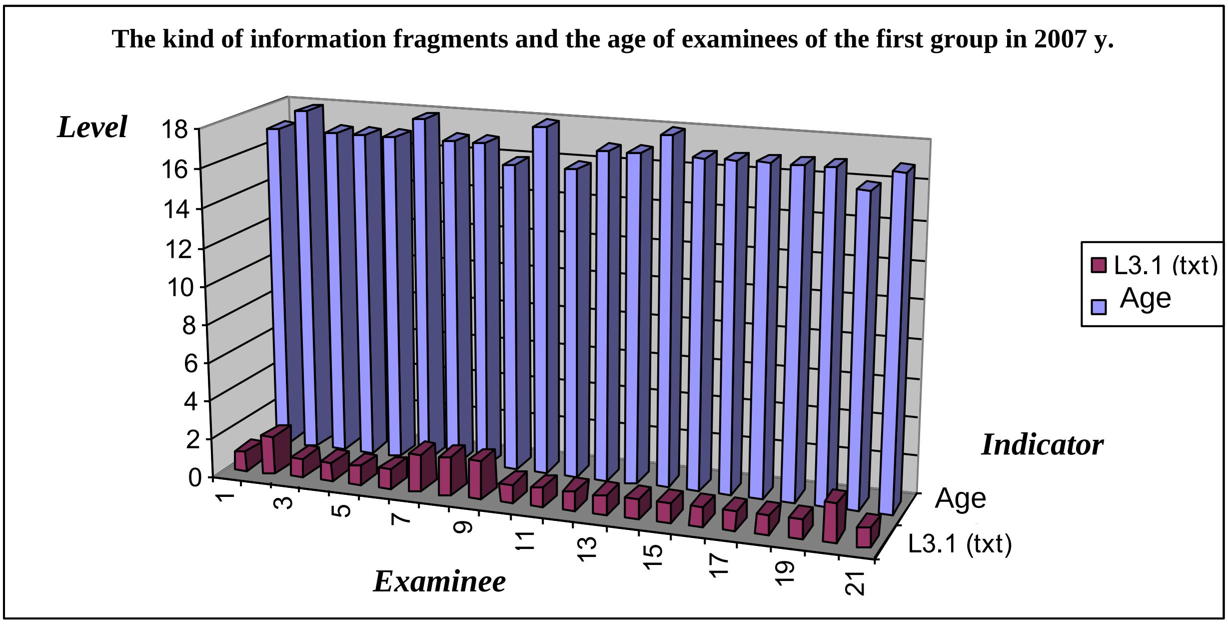
- in the three groups of day department of the chair “ACP” there are no the significant anomalies, that allows to speak about the suitability of data for the statistical processing;
    - the sample $L_{3.1}$ (the kind of information fragment) – there are the heterogeneities of nominal values, that is 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 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 are presented directly, which reflect the dynamics of the 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:

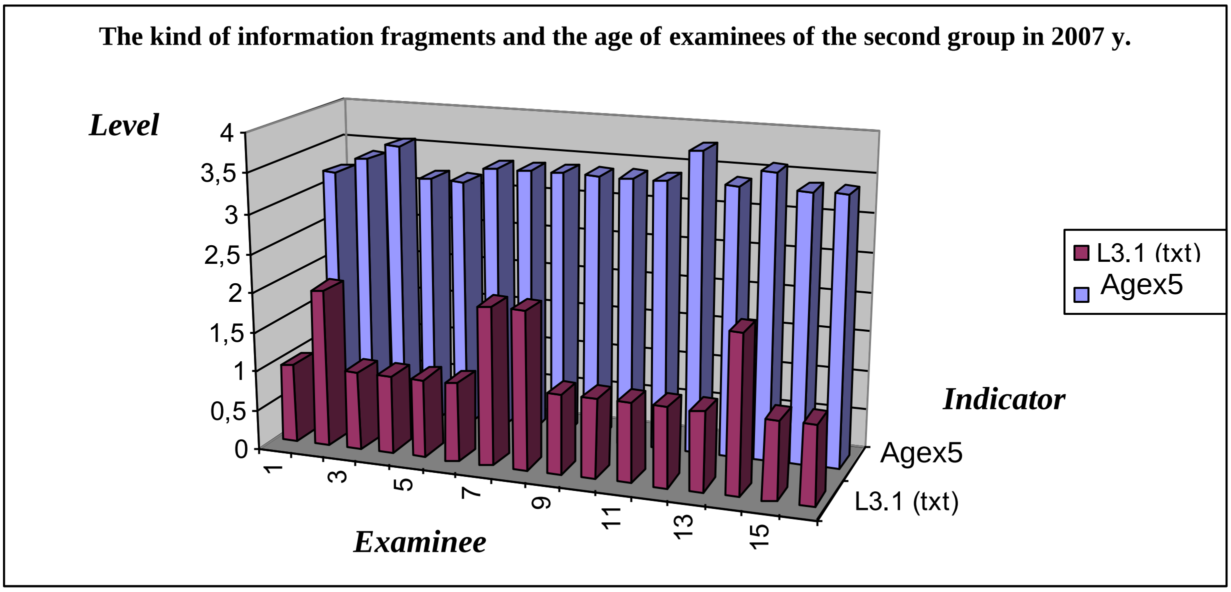
- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- *Age* – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

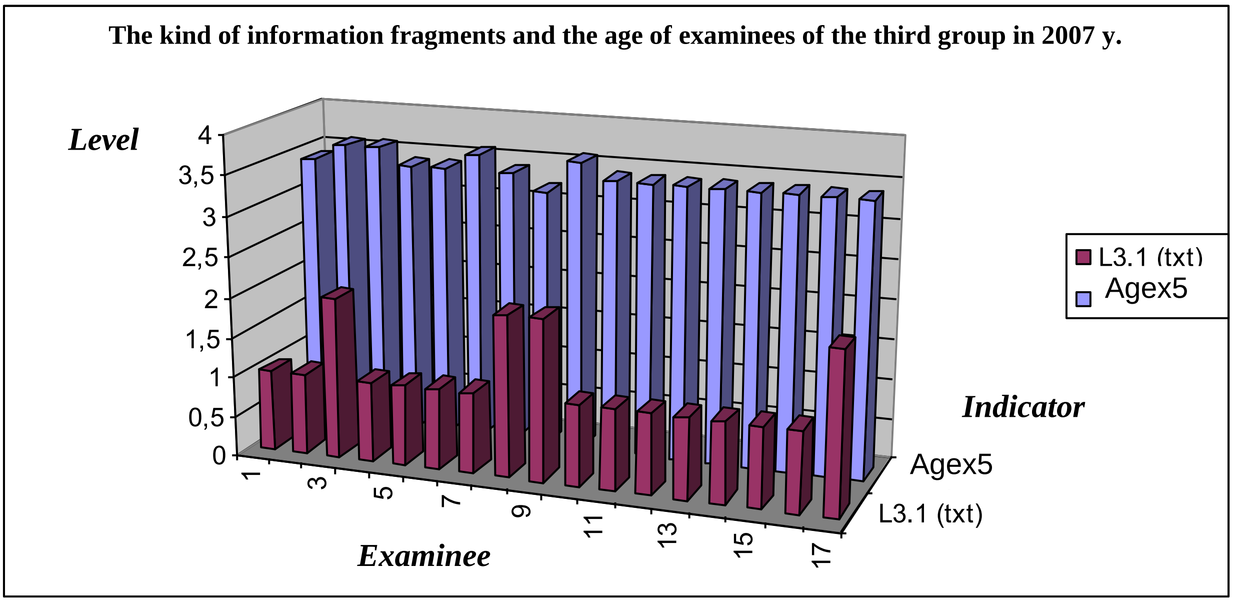
- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



a



b



c

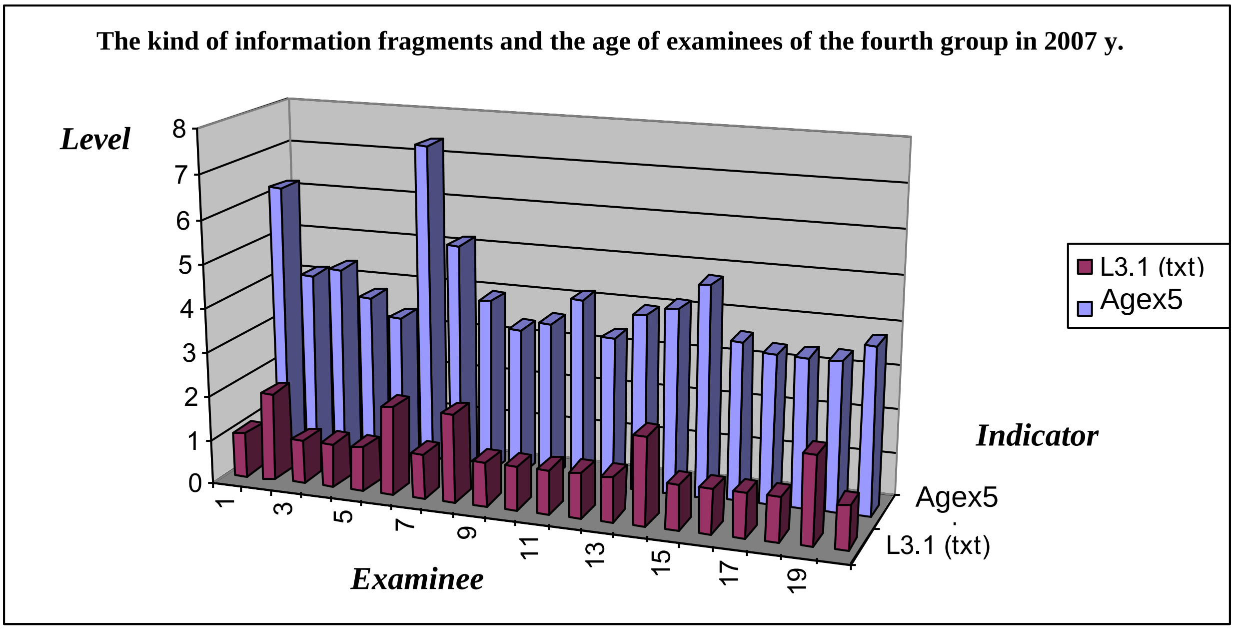
Picture A15.27. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2007 y.

In pic. A15.28 the diagrams are presented directly, which reflect the dynamics of the 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:

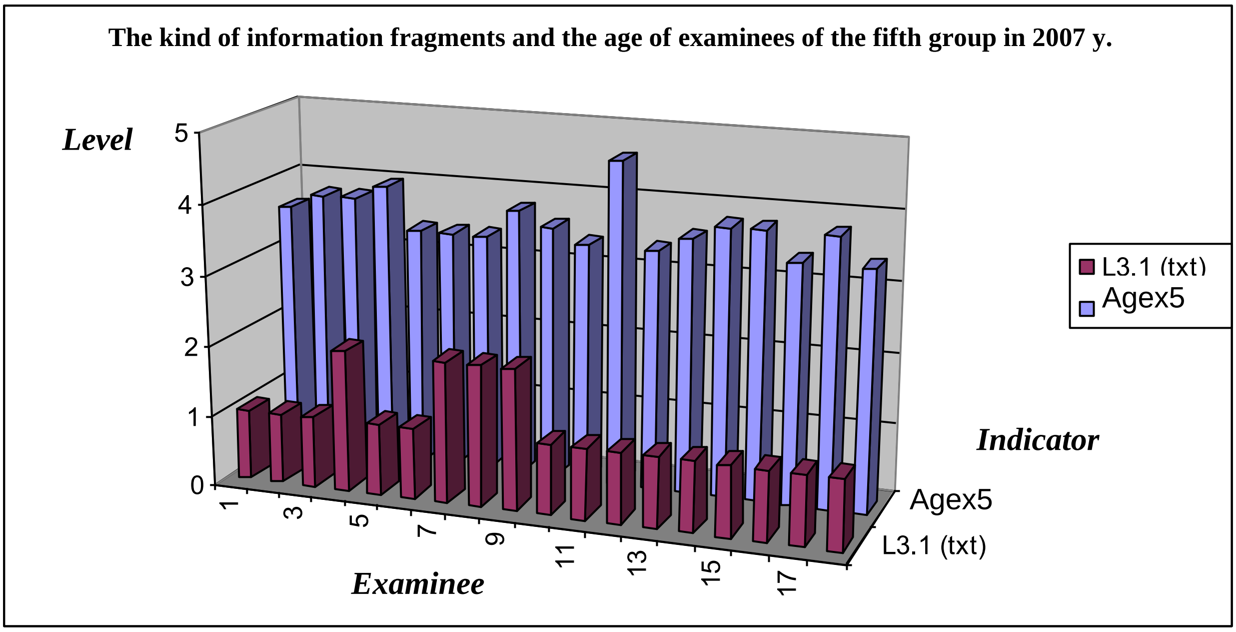
- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- *Age* – the age of examinee (the subject of training).

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).



a



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:

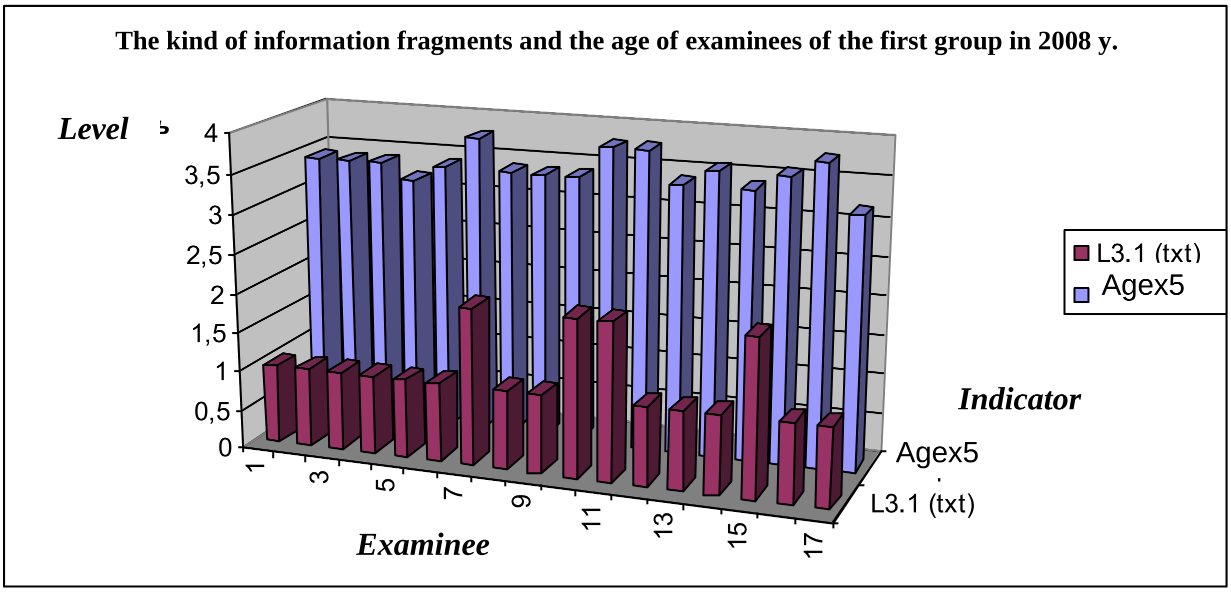
- in the three groups of day department of the chair “ACP” there are no the significant anomalies, that allows to speak about the suitability of data for the statistical processing;
  - the sample $L_{3.1}$ (the kind of information fragment) – there are the heterogeneities of nominal values, that is 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 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.

In pic. A15.29 the diagrams are presented directly, which reflect the dynamics of the 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 (the indexes and identifiers) are used:

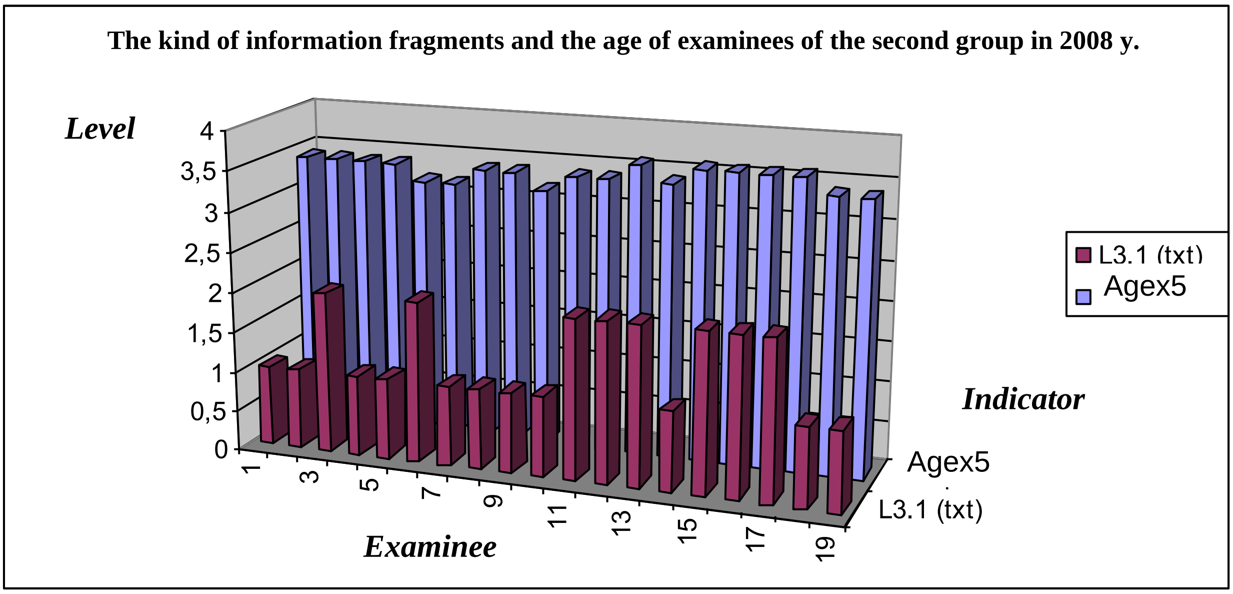
- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- *Age* – the age of examinee (the subject of training).

The codifiers of the kind of information fragment are used:

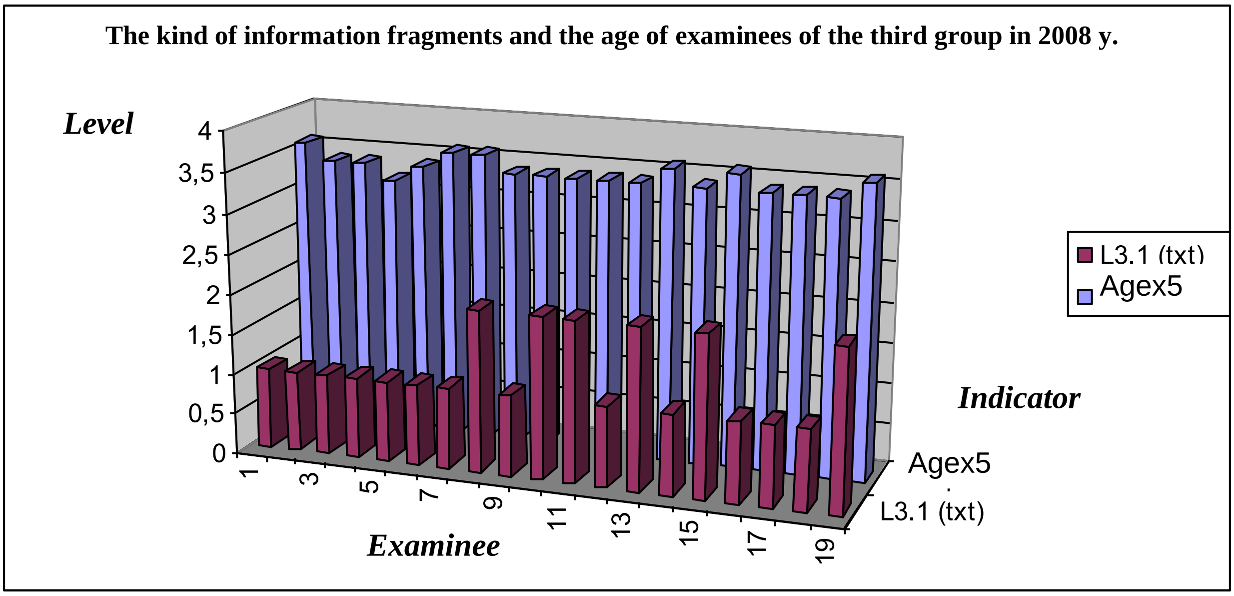
- the textual (text) – 1 (the textual content of information fragment);
- the flat scheme – 2 (the graphical content of information fragment).



a



b



c

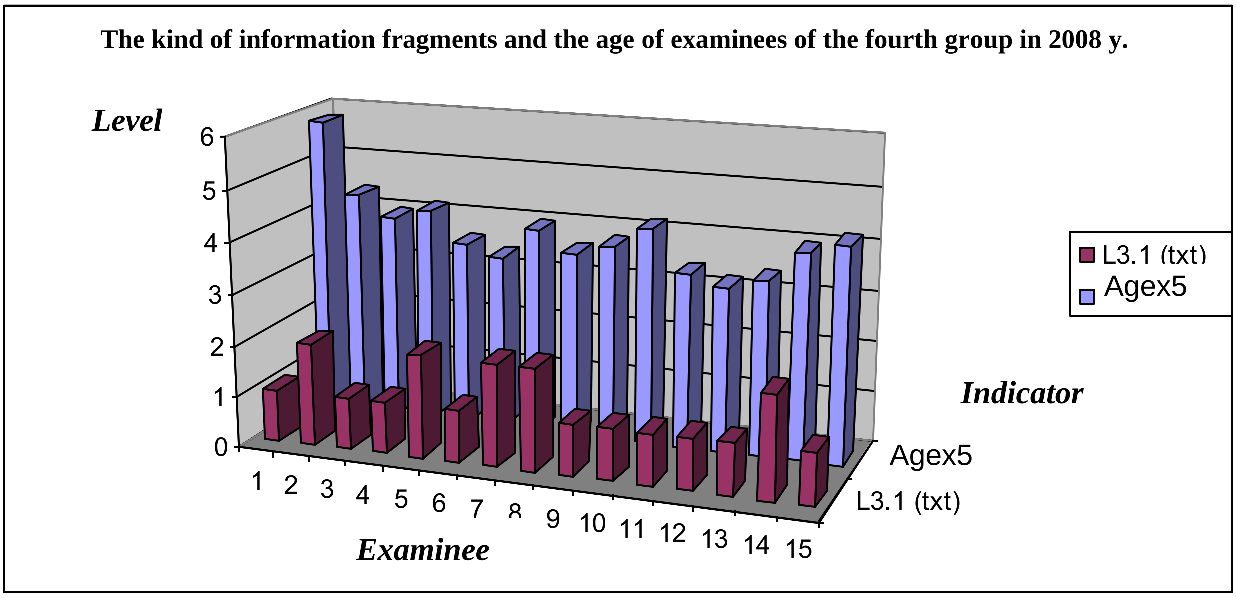
Picture A15.29. The color of symbol, the size of point-size of symbol, the color of background, the level of statement of information fragments and the age of the three groups of examinees of the day department in 2008 y.

In pic. A15.30 the diagrams are presented directly, which reflect the dynamics of the 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 (the indexes and identifiers) are used:

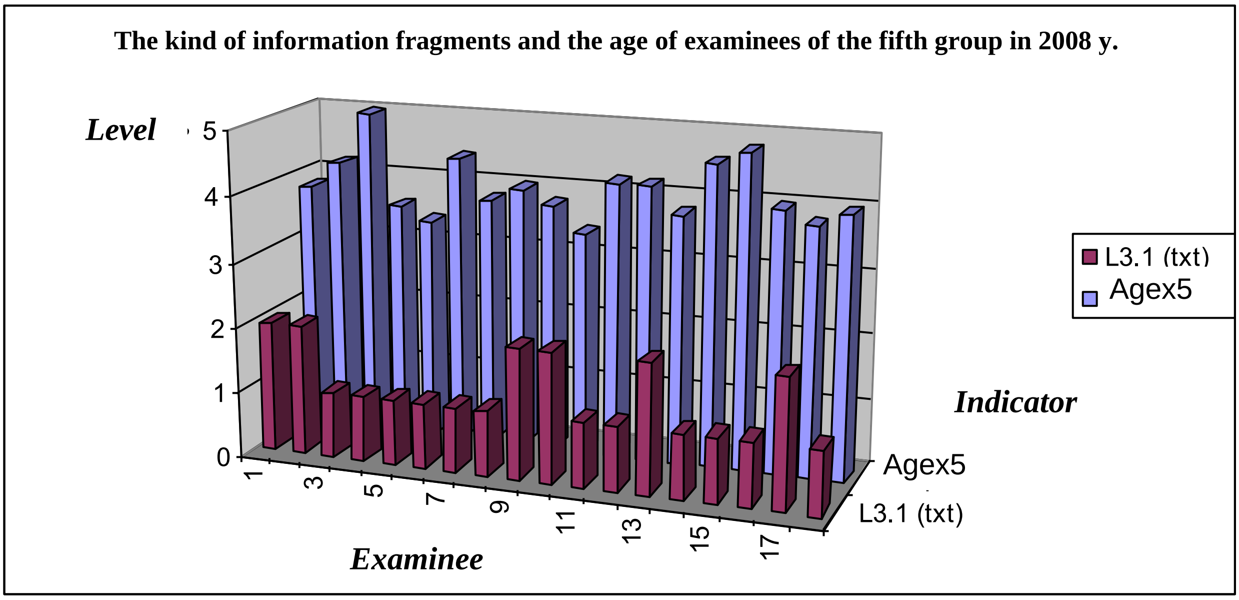
- $L_{3.1}$ – the kind of information fragments (text, table, scheme and others);
- *Age* – the age of examinee (the subject of training).

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).



a



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.

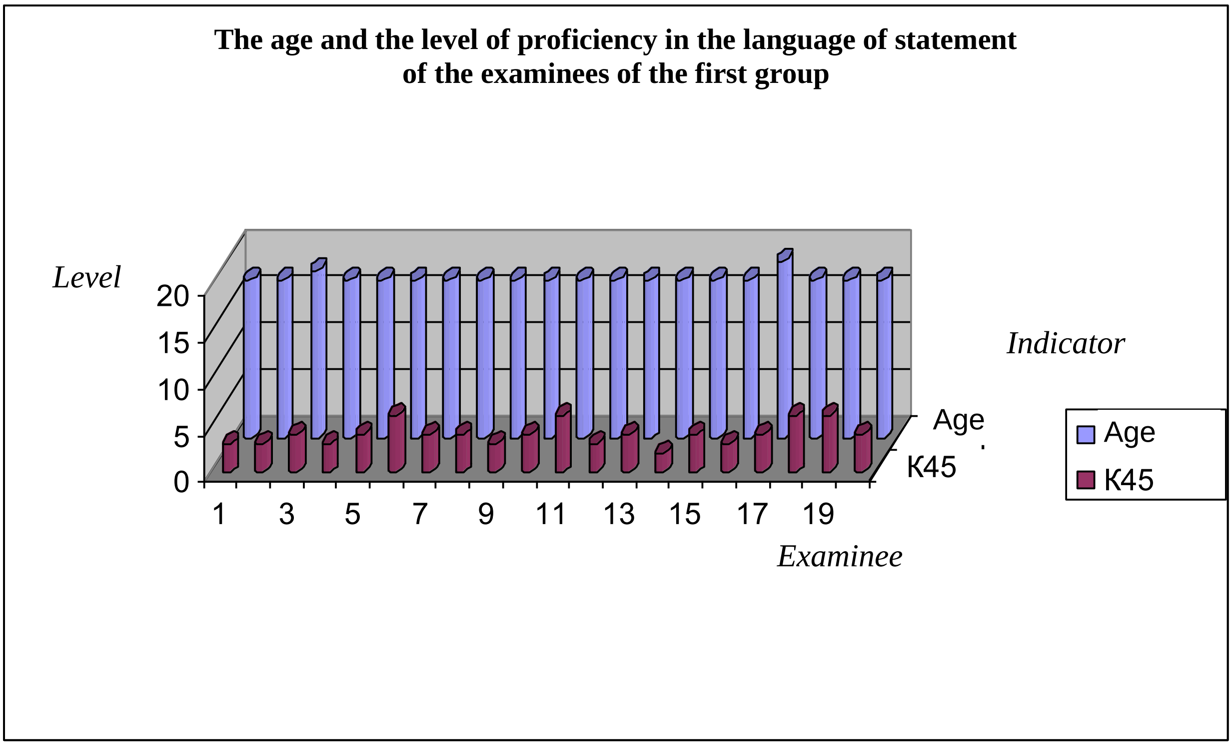
In the presented samples with a posteriori data of research of the parameters of displaying of the information fragments in 2008 y. the heterogeneities were not revealed:

- 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 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.

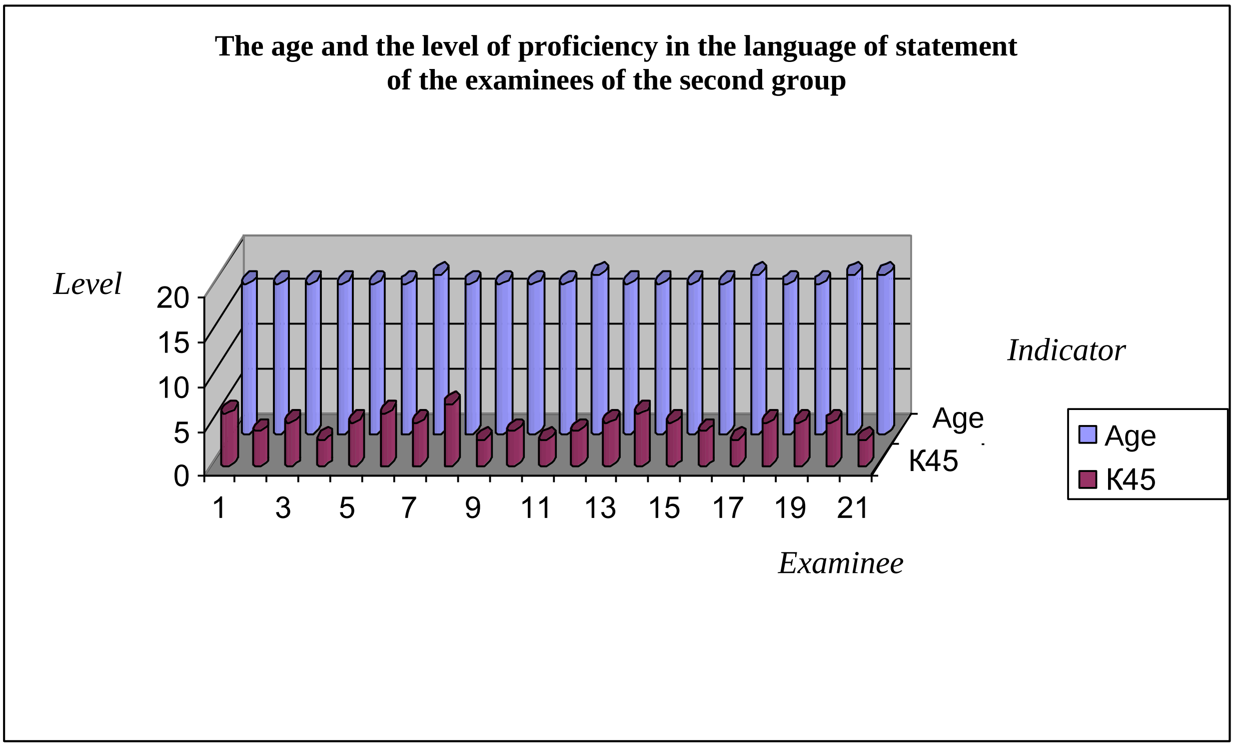
A15.3.5. The parameters of the linguistic portrait of the cognitive model of the subject

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 of understanding of 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 DB of the applied DM.

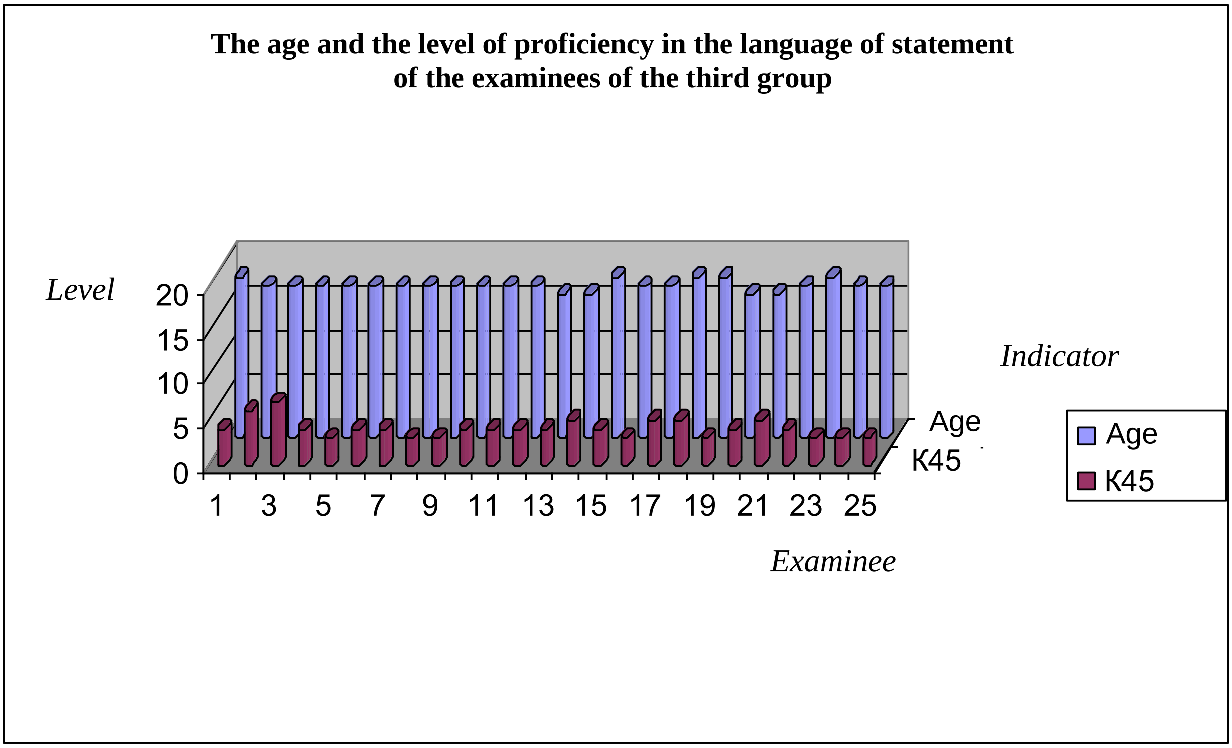
In pic. A15.31 the columnar diagram with a posteriori data of diagnostics of the linguistic abilities of the two groups of evening department for 2006 y. is presented directly.


The age and the level of proficiency in the language of statement of the examinees of the first group

a


The age and the level of proficiency in the language of statement of the examinees of the second group

b

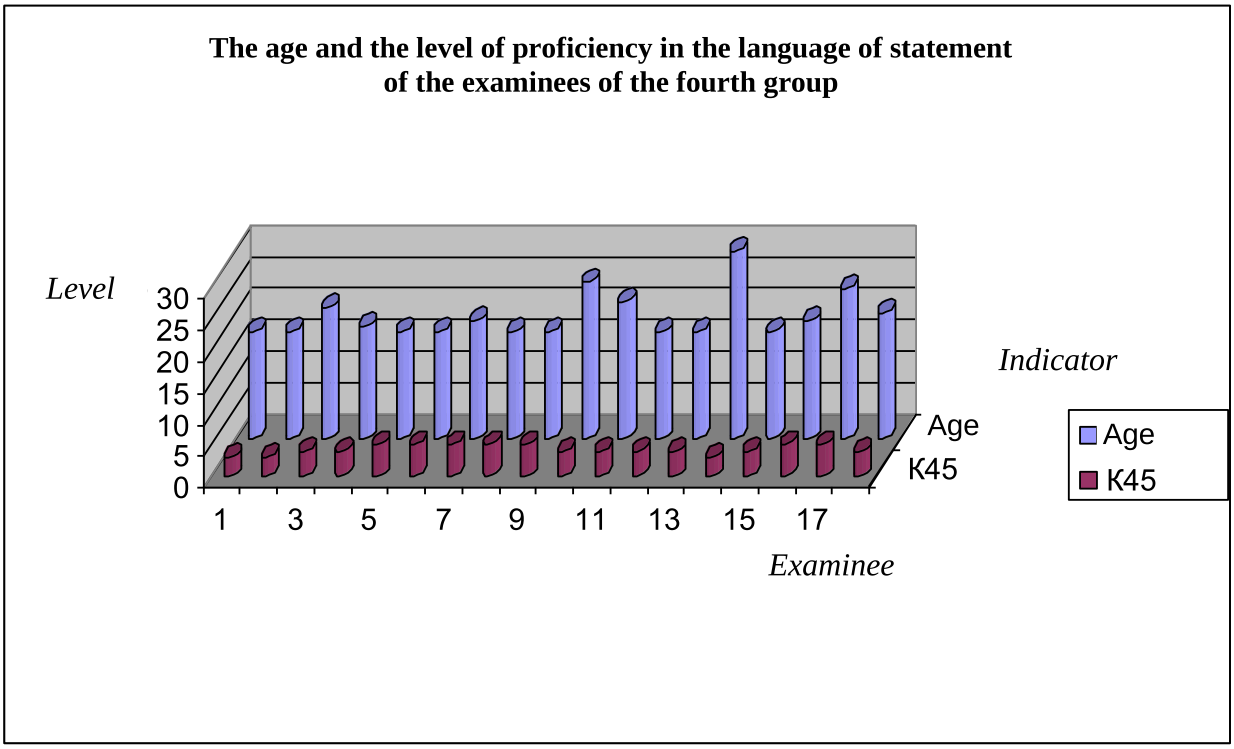


c

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 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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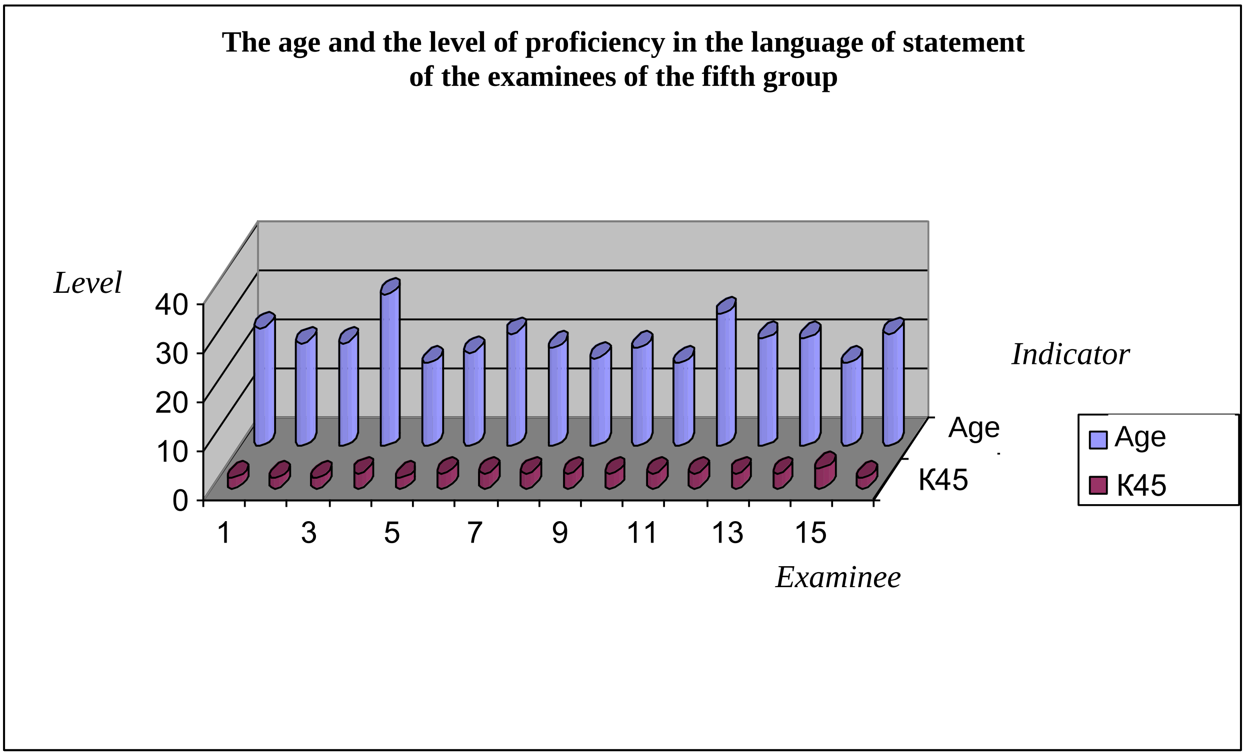
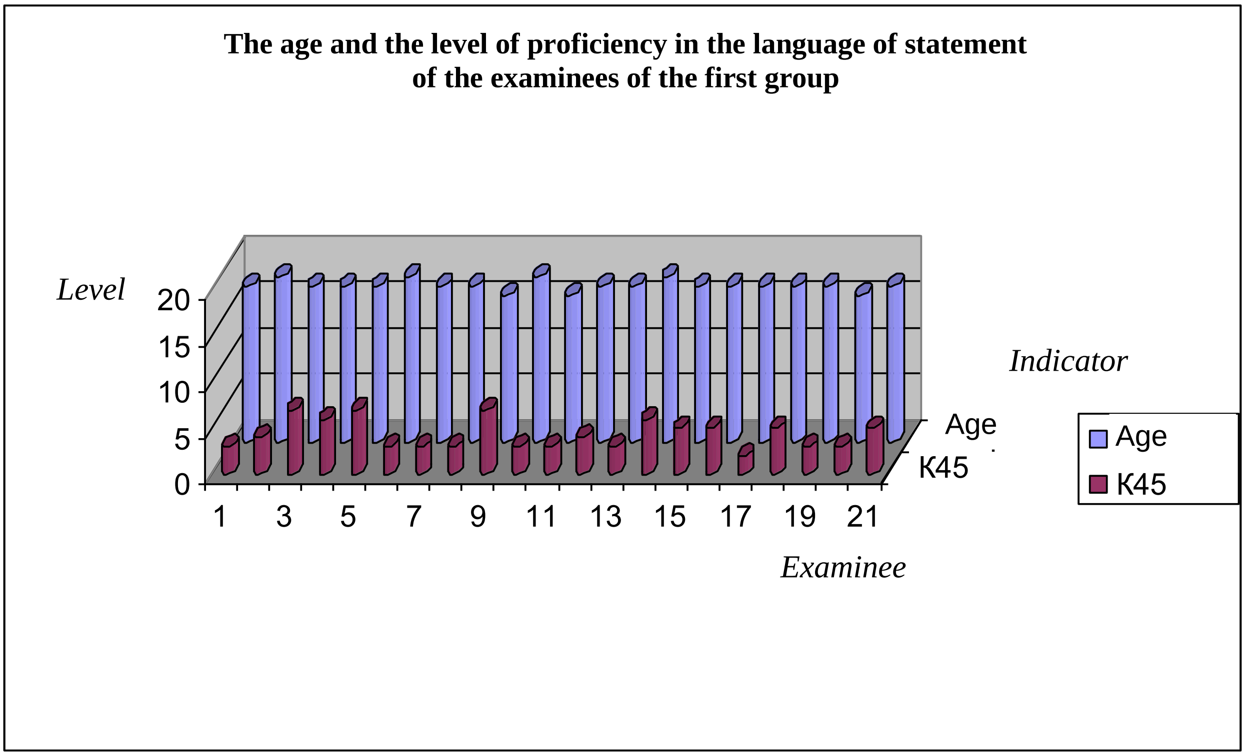


b

Picture A15.32. 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.



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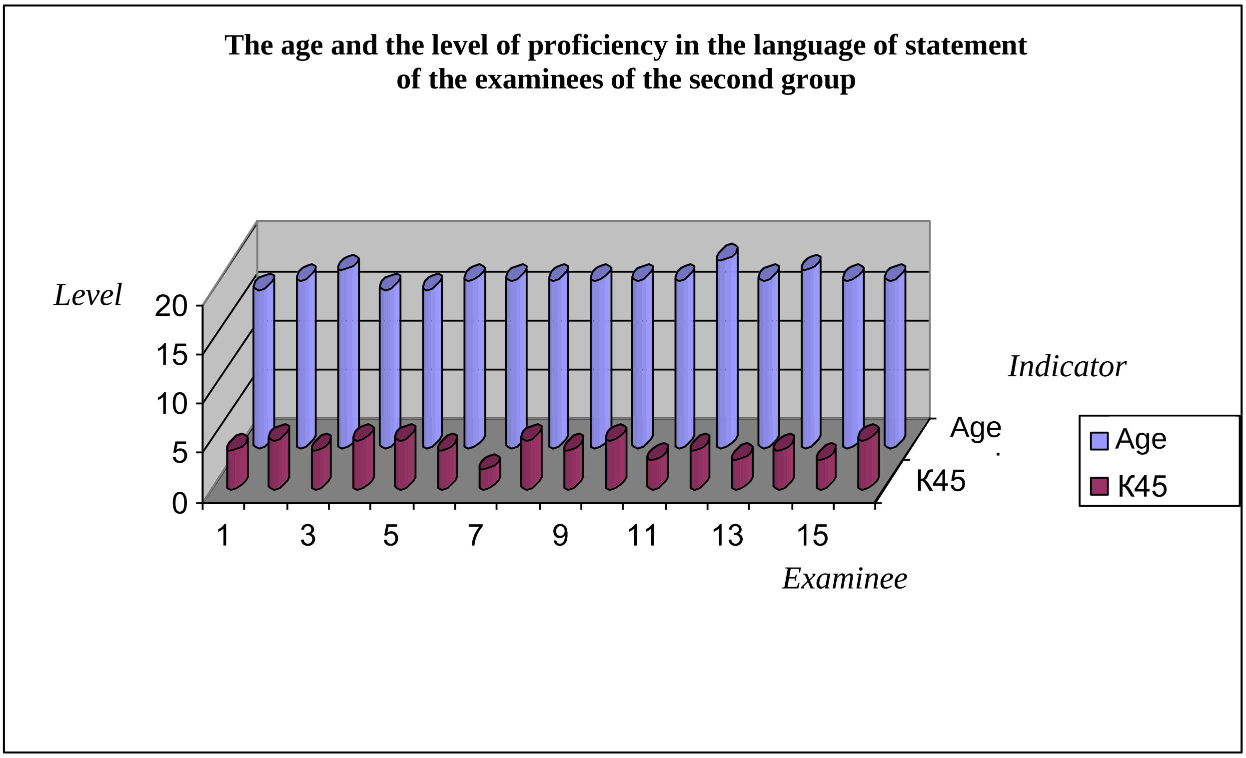
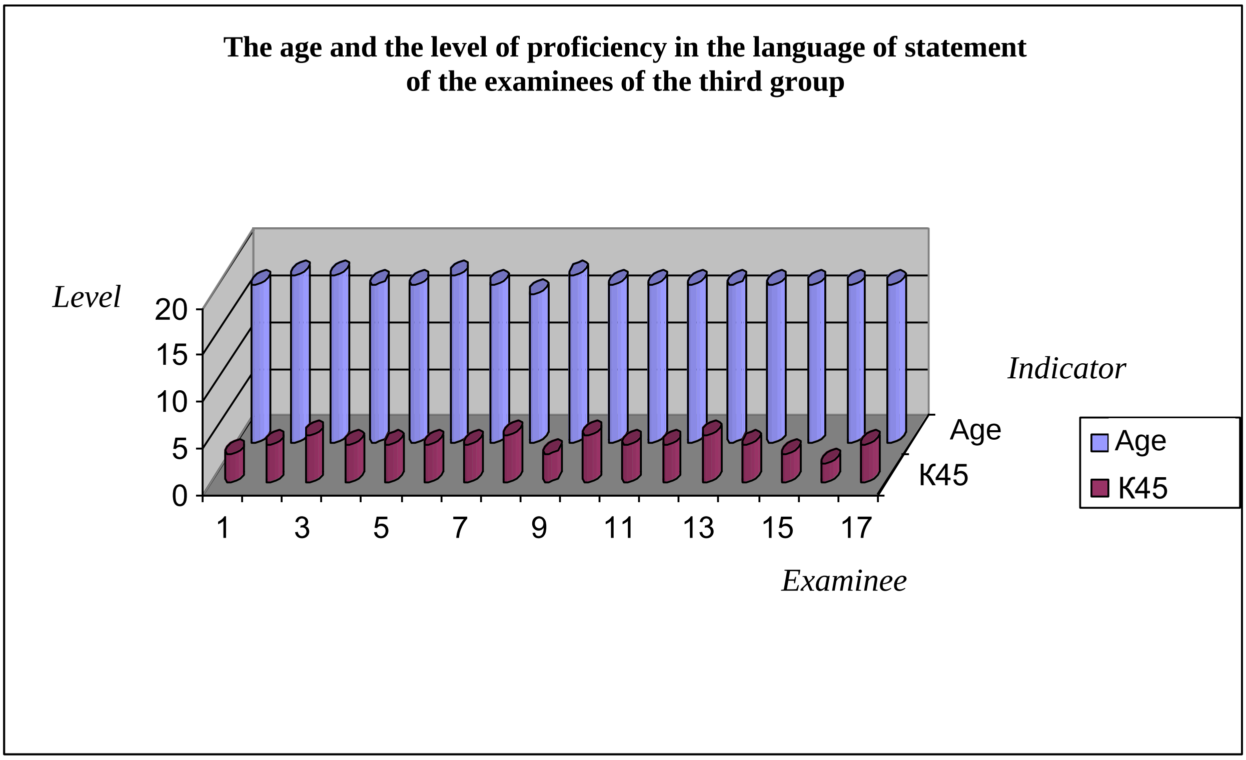


b

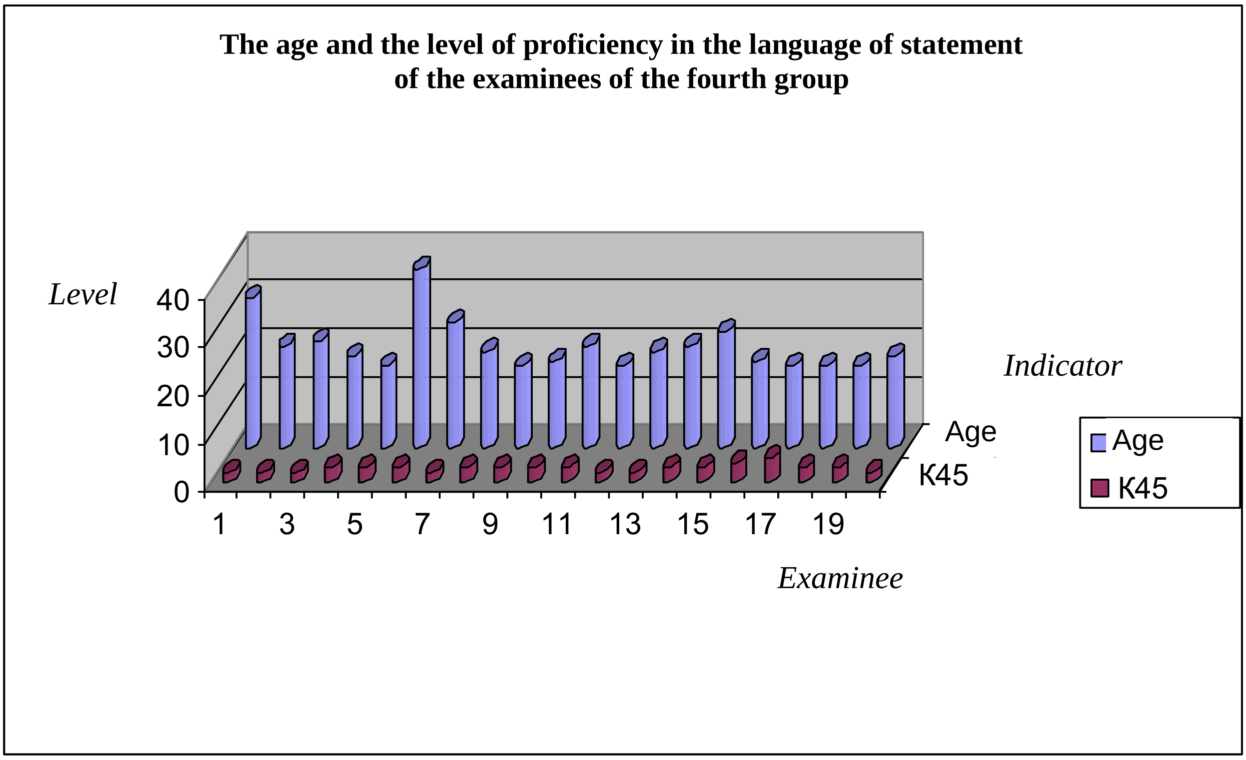


c

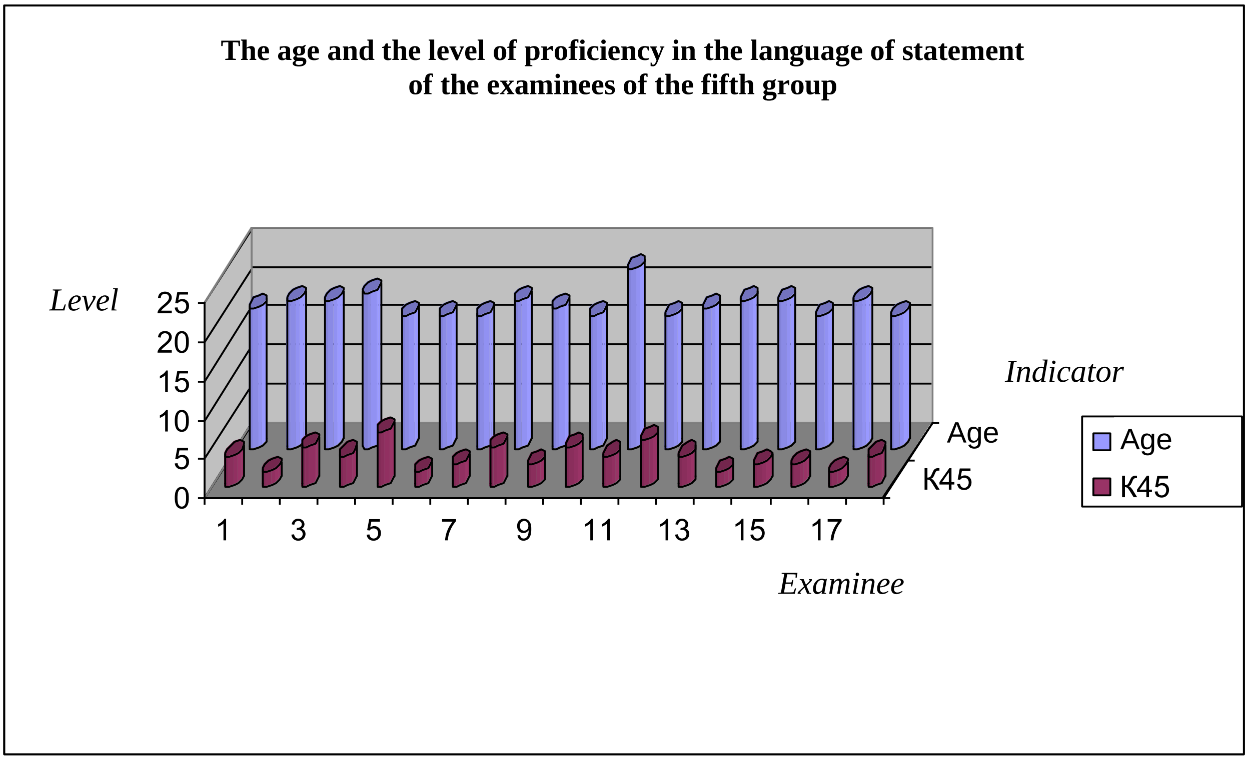
Picture A15.33. The level of proficiency in the language of statement of the trainees of day department in 2007 y.

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.



a



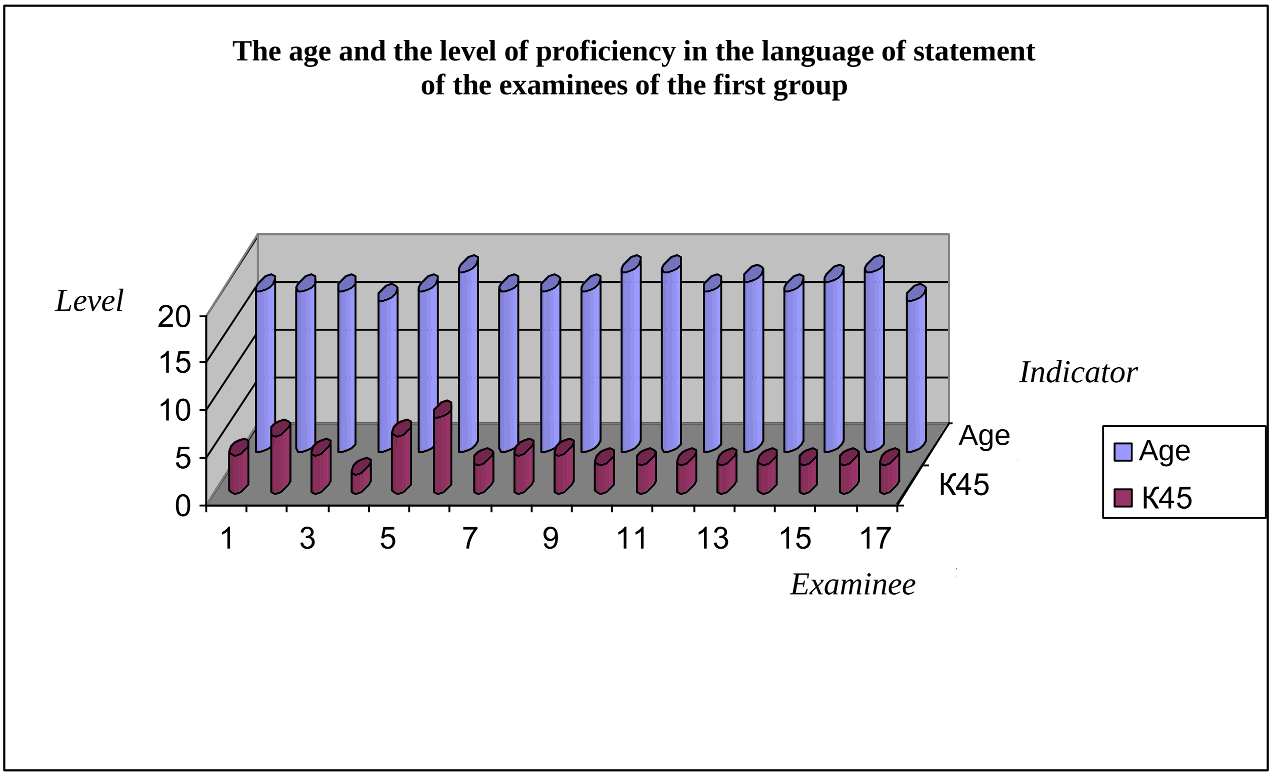
b

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

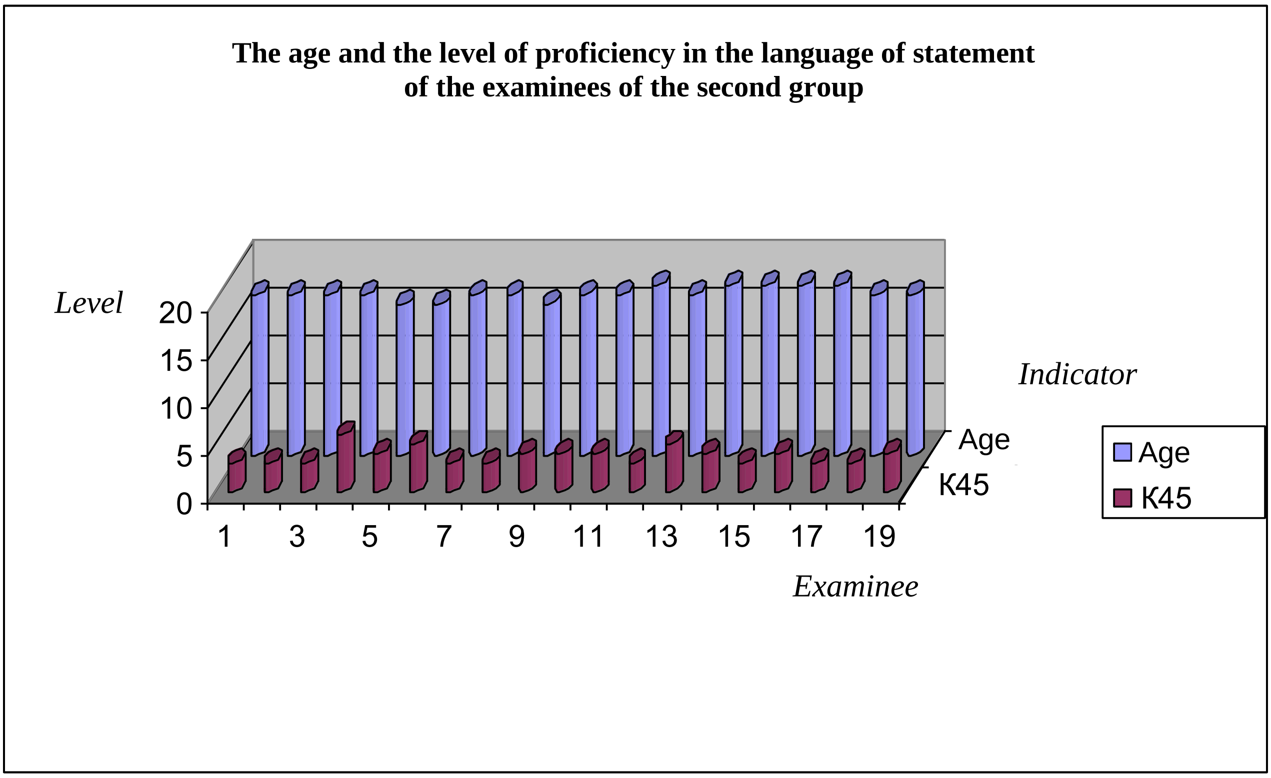
In the result of the analysis of the obtained diagrams with the results of research of the level of proficiency in the language of statement (*Age* and K_{45}) in the two groups of evening department the heterogeneities were not revealed, but the fluctuations are more pronounced in relation to the daytime.

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.



a



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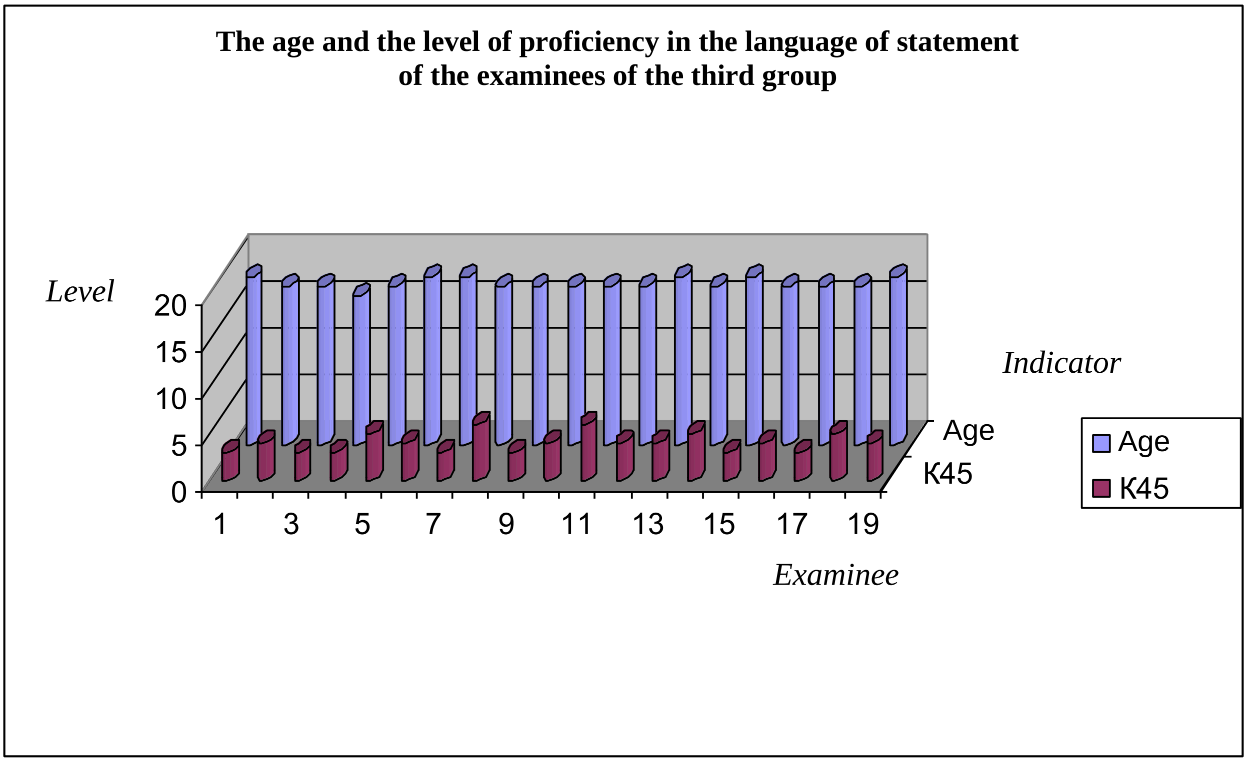
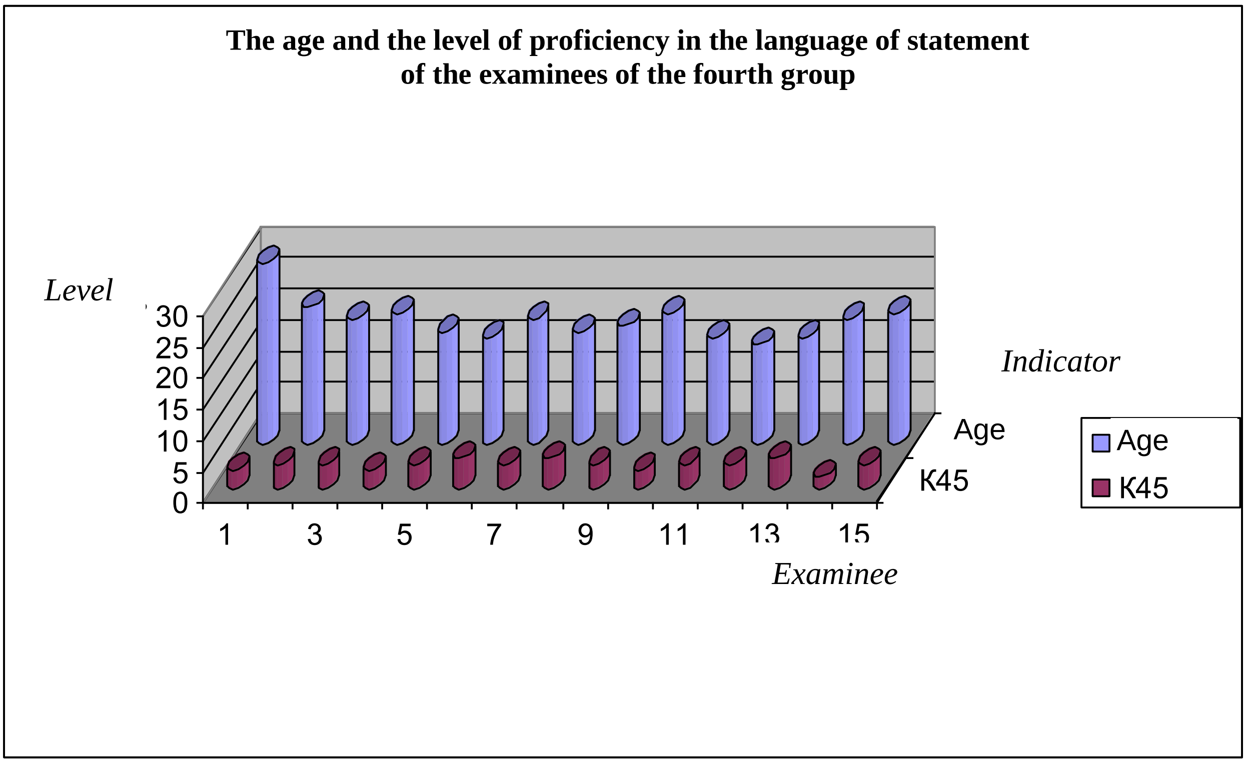


c

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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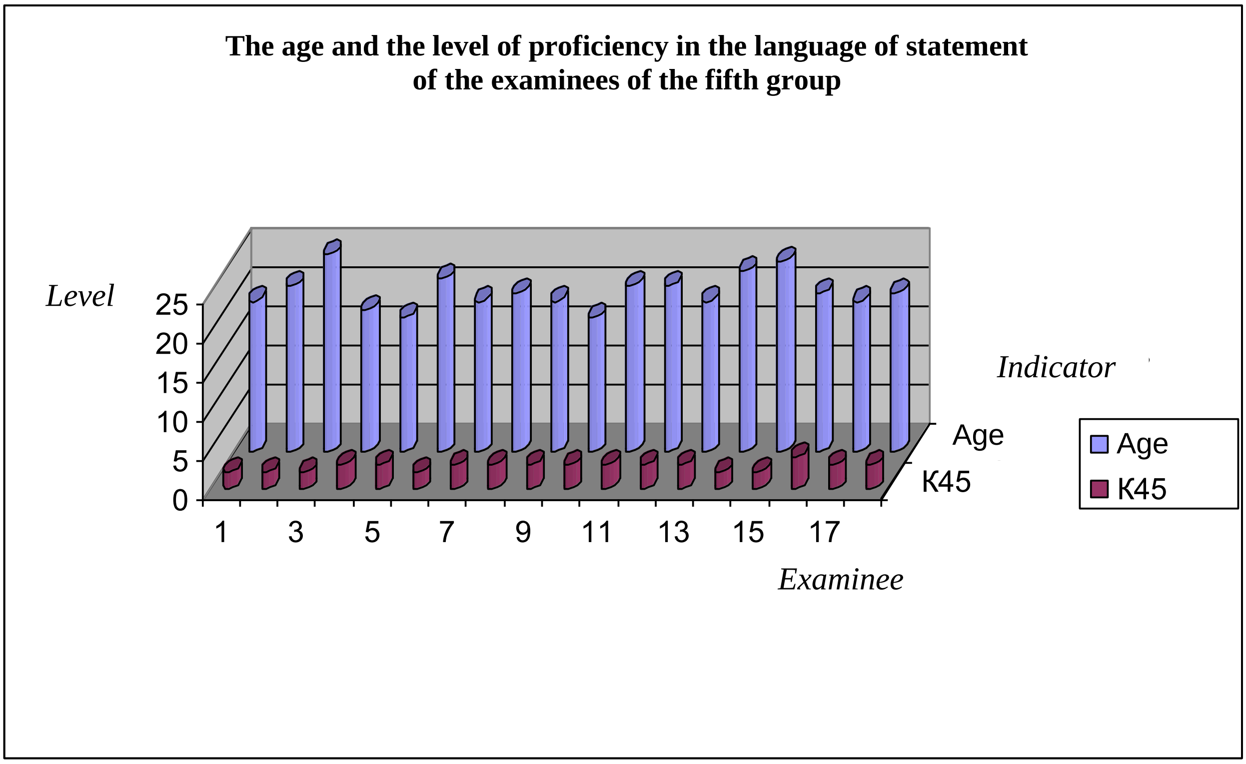

b

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 in the process of the analysis of a posteriori data of day department were revealed directly;
  - the form of distribution in the sample *“*K_{45}*”* is slightly different from the normal, that has no influence 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, as 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 nominal values of obtained descriptive statistics allow to limit a set of reasonable methods of the statistical analysis for the using with taking into account of 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 of time it is not caused the advisability of application of the given method for the mathematical processing of data.

The factor analysis acts as the means of reduction of a set of researched 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 the subsequent regression analysis of the new factorized space the method of the factor analysis complexly was not used).

As the resultativity of training as the dependent value can be measured 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 interrelationship and the prediction of the resultativity of training in dependence from the values of a set of various factors, acting as the analogue of the dispersion analysis. The results of its application with the using of the reverse step-by-step method.

The multidimensional scaling allows to build 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, mediocre-students and poor-students.

The personal cards of a certain format for the registration of a posteriori data of testing of IFPST and LRKT 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. are 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 relationship between deuteranopia (K_8) and 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 relationship 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 relationship 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.

	Age	K_7	K_8	K_9
Age	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 relationship 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 relationship between deuteranopia (K_8) and tritanopia (K_9) is revealed.

In tabl. A15.6-A15.10 the strong correlation relationship 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. are 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 relationship between deuteranopia (K_8) and tritanopia (K_9), and also the negative easy relationships 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 relationship between deuteranopia (K_8) and tritanopia (K_9), the easy relationship between protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9), and also the negative average relationships 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 relationship between deuteranopia (K_8) and tritanopia (K_9), and also the easy relationship 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 relationship 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 easy correlation relationship between the age (*Age*) and protanopia (K_7) are 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 relationship between deuteranopia (K_8) and tritanopia (K_9), the average correlation relationship between protanopia (K_7) and deuteranopia (K_8), protanopia (K_7) and tritanopia (K_9), and also the easy negative relationships 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	0,119203	1	
K_9	0,133679	0,163056	**0,951196**	1

In tabl. A15.16 the strong correlation relationship between deuteranopia (K_8) and tritanopia (K_9), the very easy relationships 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	0,157671	-0,3337	1	
K_9	0,0329	-0,43971	**0,911729**	1

In tabl. A15.17 the strong correlation relationship between deuteranopia (K_8) and tritanopia (K_9), the easy correlation relationship between the age (*Age*) and deuteranopia (K_8), and also the negative easy relationships between protanopia (K_7) and 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	0,249339	1		
K_8	0,275574	**0,774022**	1	
K_9	0,254378	**0,774968**	**0,984207**	1

In tabl. A15.18 the strong correlation relationship 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 easy correlation relationship 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	-0,2315	1		
K_8	0,020816	-0,0089	1	
K_9	0,042105	0,367788	**0,749105**	1

In tabl. A15.19 the strong correlation relationship between deuteranopia (K_8) and tritanopia (K_9), the easy correlation relationship between protanopia (K_7) and tritanopia (K_9), and also the easy negative correlation relationship 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	-0,27751	1		
K_8	0,113561	0,294211	1	
K_9	0,038368	0,179172	**0,941079**	1

In tabl. A15.20 the strong correlation relationship between deuteranopia (K_8) and tritanopia (K_9), the easy correlation relationship 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 easy negative relationship between the age (*Age*) and protanopia (K_7) are revealed, that 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 in the parameters of color-perception of the physiological portrait of CM of the subject of training were revealed:

- in the three groups of day department **the steady correlation dependence is revealed** between the 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 necessary to take into account in the color schemes of displaying);
- in the two groups of evening department **the steady correlation dependence is revealed** between the 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 necessary 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 in the parameters of color-perception of the physiological portrait of CM of the subject of training were revealed:

- in the three groups of day department **the revealed steady corr. dependence is saved** between the 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 necessary to take into account in the color schemes of displaying), and also **the relatively steady negative correlation dependence is revealed** between the age (*Age*) and protanopia (K_7) (the inverse dependence), **the less steady negative correlation dependence is revealed** between the age (*Age*) and deuteranopia (K_8) (the easy inverse dependence), **the relatively very unsteady negative correlation dependence is revealed** between the age (*Age*) and tritanopia (K_9) (the easy inverse dependence), that in the color schemes of displaying of the information fragments is reflected;
- in the two groups of evening department **the steady correlation dependence is revealed** between the deuteranopia (K_8) and tritanopia (K_9), and also **the relatively strong correlation dependences were revealed** between the protanopia (K_7) and deuteranopia (K_8), **the less strong statistical correlation dependence is revealed** between the 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 (it is necessary 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 in the parameters of color-perception of the physiological portrait of CM of the subject of training were revealed:

- in the three groups of day department **the revealed steady corr. dependence is saved** between the 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 neg. corr. dependence is revealed** between the age (*Age*) and protanopia (K_7) (the inverse dependence), **the less steady less obvious positive correlation dependence is revealed** between the age (*Age*) and deuteranopia (K_8) (the easy inverse dependence), **the very unsteady less obvious positive correlation dependence is revealed** between the age (*Age*) and tritanopia (K_9) (the easy inverse dependence), and also **the relatively strong correlation statistical dependences are revealed and saved** between the protanopia (K_7) and deuteranopia (K_8), **the relatively strong correlation statistical dependences are revealed and saved** between the protanopia (K_7) and tritanopia (K_9);
- in the two groups of evening department **the steady correlation dependence was revealed and continues to be saved** between the deuteranopia (K_8) and tritanopia (K_9), and also **the decreasing of relatively easy statistical correlation dependences is revealed** between the protanopia (K_7) and deuteranopia (K_8), **the decreasing of very easy statistical correlation dependences is revealed** between the protanopia (K_7) and tritanopia (K_9), which are linked directly with the relatively equal sensitivity of the three components of the conical apparatus of retina of the visual sensory 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 dependence was revealed and continues to be saved** between the 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 (the increasing of 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. are located, 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} – planar thinking and K_{22} – volumetric thinking.

Table A15.21

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

	Age	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,23094	1								
K15	-0,05701	**0,329913**	1							
K16	**-0,37505**	***0,692987***	***0,508575***	1						
K17	-0,04762	**0,481956**	0,201801	0,097235	1					
K18	**-0,45369**	**0,450071**	0,150512	**0,430608**	0,177155	1				
K19	**-0,38288**	***0,537747***	***0,569605***	***0,637842***	0,215684	**0,435865**	1			
K20	-0,23364	**0,445594**	0,131016	***0,520349***	0,085297	**0,446209**	**0,477924**	1		
K21	0,006368	-0,04655	**0,423184**	-0,03381	0,099763	0,060092	0,126921	0,047279	1	
K22	0,1853	0,027154	**-0,32217**	0,034472	-0,22026	0,065986	0,022874	0,024778	-0,12561	1

The note: the underlined – the easy relationship, the bold italic – the medium relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,19365	1								
K15	0,206999	-0,13857	1							
K16	-0,02504	0,121244	***0,641293***	1						
K17	-0,38098	0,303379	0,052411	0,080699	1					
K18	0,057677	0,362244	0,231374	**0,4839**	0,16207	1				
K19	-0,24618	0,38606	**0,404801**	***0,607456***	**0,403098**	***0,50251***	1			
K20	-0,17676	-0,18146	0,002612	0,06267	0,006673	-0,12934	0,038855	1		
K21	-0,07774	0,103223	0,238388	0,060351	0,23471	0,399403	0,09768	0,196014	1	
K22	**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 relationship, the bold italic – the average relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,3248	1								
K15	-0,30132	0,055114	1							
K16	-0,0599	0,148151	***0,590164***	1						
K17	-0,35728	0,292297	0,336406	0,38468	1					
K18	-0,11476	0,310687	***0,59776***	**0,410745**	***0,52047***	1				
K19	0,075942	0,064385	-0,0838	0,082027	0,159108	0,115151	1			
K20	-0,14554	-0,12476	-0,02224	0,040119	-0,04698	-0,03451	0,362733	1		
K21	0,168048	-0,00888	0,393664	0,309036	**0,447825**	**0,421161**	0,159625	0,173826	1	
K22	-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 relationship, the bold italic – the average relationship. The most significant relationship between the generalization (K_{15}) and mnemonics (K_{18}), generalization (K_{15}) and analyticity (K_{16}), classification (K_{17}) and volumetric thinking (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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,03599	1								
K15	-0,2879	0,097874	1							
K16	0,024094	***0,546752***	0,039016	1						
K17	-0,00388	-0,16189	0,183999	-0,02303	1					
K18	0,002454	0,232381	0,383213	**0,445588**	**0,460434**	1				
K19	***-0,57275***	-0,15853	-0,00207	-0,29214	0,059976	-0,07021	1			
K20	***-0,82075***	-0,02907	0,306937	-0,23532	-0,2805	-0,2363	***0,67009***	1		
K21	-0,15021	0,159999	0,315766	0,340752	0,113415	0,389925	0,263471	0,17613	1	
K22	-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 relationship, the bold italic – the average relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,1668	1								
K15	**-0,48827**	0,332101	1							
K16	-0,06567	***0,575351***	0,282686	1						
K17	-0,19642	***0,549401***	-0,03455	0,294434	1					
K18	0,06021	0,300111	0,05099	***0,577661***	-0,09976	1				
K19	0,0553	0,213757	-0,38957	0,372563	0,237741	***0,718371***	1			
K20	0,270004	-0,14041	**-0,44975**	***-0,57929***	-0,00327	-0,02732	0,166626	1		
K21	-0,08393	0,188628	0,297796	0,209289	0,288656	**0,422847**	0,285006	0,087446	1	
K22	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 relationship, the bold italic – the average relationship. The most significant relationship between the arithmetic abilities (K_{18}) and combinatorics (K_{19}).

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 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 dependence 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 volumetric thinking (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 volumetric thinking (K_{22}), arithmetic abilities (K_{18}) and the combinatorics of thinking (K_{19}), planar thinking (K_{21}) and volumetric thinking (K_{22}), and also **the steady average statistical correlation dependence 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 volumetric thinking (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 the psychodynamic construct of 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 dependence 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}), combinatorial thinking (K_{19}) and volumetric thinking (K_{22}), and also **the steady average statistical correlation dependence is revealed** between the age (Age) and generalization (K_{15}), the age (Age) and volumetric thinking (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 volumetric thinking (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 volumetric thinking (K_{22}), the analyticity of thinking (K_{16}) and planar thinking (K_{21}), the analyticity of thinking (K_{16}) and volumetric thinking (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 volumetric thinking (K_{22}), combinatorial thinking (K_{19}) and planar thinking (K_{21}), which directly is related with the properties of the psychodynamic construct of 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, 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} – planar thinking and K_{22} – volumetric thinking.

Table A15.26

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

	Age	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,22431	1								
K15	0,205299	0,252066	1							
K16	-0,0409	**0,482622**	0,303568	1						
K17	0,073574	0,258807	***0,694818***	0,077245	1					
K18	-0,11135	**0,482575**	**0,411495**	***0,661513***	0,395459	1				
K19	**-0,46354**	0,326851	0,034605	0,200011	**0,424943**	**0,469776**	1			
K20	-0,26929	0,39785	-0,06031	0,299861	0,209303	**0,451068**	**0,469779**	1		
K21	-0,1817	-0,03229	-0,15844	-0,037	-0,10923	0,267993	0,121009	0,16738	1	
K22	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 relationship, the bold italic – the average relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,14954	1								
K15	**-0,42197**	**0,439728**	1							
K16	-0,27057	-0,20387	0,20129	1						
K17	0,255463	0,0098	0,333591	0,263191	1					
K18	-0,37704	0,228845	**0,415703**	***0,621999***	0,341754	1				
K19	-0,37396	0,081007	**0,473147**	***0,629005***	0,123019	***0,819297***	1			
K20	-0,26966	-0,36432	0,378165	**0,409046**	0,244968	0,38301	***0,623483***	1		
K21	0,369825	-0,29151	-0,17171	0,105153	0,148108	-0,07951	-0,15177	0,346542	1	
K22	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 relationship, the bold italic – the average relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,09678	1								
K15	-0,21432	***0,537829***	1							
K16	-0,02734	0,399791	**0,495589**	1						
K17	-0,22253	0,238779	***0,667827***	0,117972	1					
K18	0,236884	0,366374	***0,558855***	***0,688043***	0,395273	1				
K19	0,264351	0,17137	0,318725	0,303424	0,314339	***0,637326***	1			
K20	***-0,50166***	-0,02598	0,239211	**0,411055**	0,206053	-0,05613	-0,09576	1		
K21	0,141598	**0,484609**	0,367486	***0,653674***	0,193958	***0,777188***	**0,443852**	0,036251	1	
K22	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 relationship, the bold italic – the average relationship. The most significant relationship between the analyticity (K_{16}) and volumetric thinking (K_{22}), arithmetic tasks (K_{18}) and planar thinking (K_{21}), arithmetic tasks (K_{18}) and volumetric thinking (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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,01825	1								
K15	0,15764	0,179814	1							
K16	-0,26739	0,156643	0,396034	1						
K17	-0,30316	0,226711	0,078195	-0,30186	1					
K18	-0,02404	***0,539498***	0,368506	0,397521	0,346468	1				
K19	-0,25507	***0,508361***	0,140652	0,329446	**0,426705**	***0,591546***	1			
K20	0,25527	0,013873	**0,42678**	0,1167	-0,37209	0,148892	-0,32125	1		
K21	0,343175	0,147692	0,240487	-0,31344	0,270399	-0,08503	-0,26047	-0,0308	1	
K22	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 relationship, the bold italic – the average relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	0,060455	1								
K15	**0,44**	-0,08557	1							
K16	0,057484	***0,739068***	0,220467	1						
K17	-0,20254	0,379365	-0,12851	***0,595612***	1					
K18	-0,15742	**0,488786**	0,082341	***0,585516***	***0,637679***	1				
K19	0,071447	0,097229	0,242167	0,20853	***0,505309***	0,285954	1			
K20	-0,27929	0,082513	0,049286	**0,401642**	0,32702	0,208883	-0,1112	1		
K21	-0,13043	0,270716	0,052172	0,333796	***0,674118***	**0,430591**	0,265368	0,145487	1	
K22	-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 relationship, the bold italic – the average relationship. The most significant relationship 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 dependence 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 volumetric thinking (K_{22}), the classification of concepts (K_{17}) and volumetric thinking (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 volumetric thinking (K_{22}), combinatorial abilities (K_{19}) and mnemonic abilities (K_{20}), mnemonic abilities (K_{20}) and volumetric thinking (K_{22}), planar thinking (K_{21}) and volumetric thinking (K_{22}), and also **the steady easy statistical correlation dependence 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 volumetric thinking (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 volumetric thinking (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 volumetric thinking (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 volumetric thinking (K_{22}), which are linked directly with the properties of the psychodynamic construct of 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 dependence 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 volumetric thinking (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 volumetric thinking (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 dependence 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 volumetric thinking (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 volumetric thinking (K_{22}), planar thinking (K_{21}) and volumetric thinking (K_{22}), which are linked directly with the properties of the psychodynamic construct of 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. are located, 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} – planar thinking and K_{22} – volumetric thinking.

Table A15.31

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

	Age	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	0,050582	1								
K15	-0,39867	0,381958	1							
K16	-0,13332	0,367524	**0,459152**	1						
K17	-0,04631	***0,619626***	0,351087	***0,549329***	1					
K18	0,283935	**0,479698**	0,205829	***0,637201***	***0,616816***	1				
K19	**0,412036**	**0,403873**	0,21087	0,314737	***0,601817***	***0,622363***	1			
K20	0,344605	0,085162	-0,26183	0,153251	-0,00821	0,206962	0,38674	1		
K21	0,151543	***0,591351***	0,224779	***0,5899***	***0,564307***	***0,725741***	***0,546903***	**0,418431**	1	
K22	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 relationship, the bold italic – the average relationship. The most significant statistical relationship directly between the arithmetic tasks (K_{18}) and volumetric thinking (K_{22}).

Table A15.32

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

	Age	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	0	1								
K15	0,013913	0,355418	1							
K16	**-0,48204**	0,319063	***0,554979***	1						
K17	0,050173	0,175919	0,185683	0,225227	1					
K18	0,036694	0,349217	**0,428192**	**0,452654**	**0,395991**	1				
K19	-0,07054	***0,555515***	**0,467923**	**0,482658**	0,3317	***0,785695***	1			
K20	-0,11944	0,344005	-0,19	0,147536	0,145072	0,207781	***0,523694***	1		
K21	-0,35798	**0,455168**	0,359365	***0,530953***	0,096711	**0,497682**	***0,617909***	0,326156	1	
K22	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 relationship, the bold italic – the average relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	-0,21923	1								
K15	0,366995	-0,08019	1							
K16	0,243456	0,31431	**0,46344**	1						
K17	0,329008	0,239921	**0,496686**	***0,714938***	1					
K18	0,169267	**0,451067**	0,362962	***0,857367***	***0,796285***	1				
K19	0,380109	0,004072	***0,50726***	**0,44204**	***0,763418***	***0,556847***	1			
K20	0,026478	-0,17912	0,085926	-0,11321	-0,17976	-0,27472	-0,00134	1		
K21	0,289133	***0,549897***	0,275771	***0,765428***	***0,742297***	***0,737865***	***0,545672***	-0,25342	1	
K22	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 relationship, the bold italic – the average relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	0,282671	1								
K15	-0,0477	0,058956	1							
K16	-0,08418	0,146392	0,252671	1						
K17	-0,35135	-0,27281	0,027594	**0,340766**	1					
K18	-0,12587	0,359482	0,034527	**0,497504**	0,267916	1				
K19	-0,08818	***0,676832***	0,06754	0,183128	-0,1368	0,342327	1			
K20	-0,04964	0,318286	0,16525	***0,589671***	0,287367	**0,421004**	0,101137	1		
K21	-0,06767	-0,05488	0,360871	-0,1396	-0,06926	-0,22129	-0,1282	-0,36437	1	
K22	-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 relationship, the bold italic – the average relationship. The most significant relationship 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	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*
Age	1									
K14	0,244887	1								
K15	-0,39809	0,098386	1							
K16	***-0,57736***	-0,00386	0,158189	1						
K17	***-0,62957***	0,057703	***0,652176***	0,241643	1					
K18	-0,36861	0,368771	**0,417787**	0,154773	***0,511604***	1				
K19	-0,29428	-0,06473	***0,531195***	-0,20348	**0,437193**	0,103726	1			
K20	0,236476	-0,14771	-0,1284	-0,21556	-0,23807	-0,34953	0,030878	1		
K21	-0,08954	0,130613	0,302189	-0,12191	0,067471	0,233196	***0,603801***	-0,13615	1	
K22	-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 relationship, the bold italic – the average relationship. The most significant relationship 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 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 dependence 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 volumetric thinking (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 volumetric thinking (K_{22}), arithmetic abilities (K_{18}) and planar thinking (K_{21}), the combinatorics of thinking (K_{19}) and volumetric thinking (K_{22}), and also **the steady average statistical correlation dependence is revealed** between the age (*Age*) and analyticity (K_{16}), the age (*Age*) and combinatorics (K_{19}), the age (*Age*) and volumetric thinking (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}), verbalization (K_{14}) and combinatorics (K_{19}), verbalization (K_{14}) and planar thinking (K_{21}), the verbalization of concepts (K_{14}) and volumetric thinking (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 volumetric thinking (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 volumetric thinking (K_{22}), the classification of concepts (K_{17}) and planar thinking (K_{21}), the classification of concepts (K_{17}) and volumetric thinking (K_{22}), combinatorics (K_{19}) and mnemonics (K_{20}), combinatorics (K_{19}) and planar thinking (K_{21}), the combinatorics of thinking (K_{19}) and volumetric thinking (K_{22}), mnemonic abilities (K_{20}) and planar thinking (K_{21}), planar thinking (K_{21}) and volumetric thinking (K_{22}), which are linked with the properties of the psychodynamic construct of 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) are provided;

- in the two groups of evening department **the steady easy statistical correlation dependence is revealed** between the age (*Age*) and classification (K_{17}), the age (*Age*) and arithmetic abilities (K_{18}), the age (*Age*) and volumetric thinking (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 dependence 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 volumetric thinking (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}), the classification of concepts (K_{17}) and arithmetic abilities (K_{18}), arithmetic abilities (K_{18}) and the combinatorics of thinking (K_{19}), the combinatorics of thinking (K_{19}) and volumetric thinking (K_{22}), mnemonic abilities (K_{20}) and planar thinking (K_{21}), which are linked directly with the properties of the psychodynamic construct of 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. are located, and also the following designations are used: verbal originality (K_{23}), verbal associativity (K_{24}), verbal selectivity (K_{25}); figurative originality (K_{27}), figurative associativity (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	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	-0,05432	1					
K24	0,028219	***0,881592***	1				
K25	0,10845	***0,770362***	***0,840829***	1			
K27	-0,04506	0,312264	**0,490135**	***0,592501***	1		
K28	-0,1672	0,151127	0,306089	0,305881	***0,726596***	1	
K29	0,016292	0,290245	0,367287	**0,43142**	***0,80004***	***0,697398***	1

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

Table A15.37

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	0,053365	1					
K24	-0,18401	***0,539144***	1				
K25	-0,17703	**0,43915**	***0,844949***	1			
K27	0,042195	***0,5646***	***0,540636***	0,379123	1		
K28	-0,08337	0,065991	***0,61923***	***0,538593***	***0,562218***	1	
K29	-0,10034	0,195117	***0,677023***	***0,506664***	***0,538514***	***0,865512***	1

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

Table A15.38

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	-0,18533	1					
K24	-0,23314	***0,624112***	1				
K25	-0,22803	***0,557671***	***0,821173***	1			
K27	-0,38345	0,304065	0,38833	**0,444622**	1		
K28	-0,10102	**0,41262**	0,38481	***0,538923***	0,27434	1	
K29	-0,27276	0,14812	0,317965	**0,437981**	***0,606658***	***0,622349***	1

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

In the three groups of day department **the steady statistical correlation dependence is revealed** between the verbal originality (K_{23}) and verbal associativity (K_{24}), verbal originality (K_{23}) and verbal selectivity (K_{25}), verbal selectivity (K_{25}) and figurative originality (K_{27}), verbal associativity (K_{24}) and verbal selectivity (K_{25}), verbal associativity (K_{24}) and figurative originality (K_{27}), verbal selectivity (K_{25}) and figurative originality (K_{27}), verbal selectivity (K_{25}) and figurative associativity (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative originality (K_{27}) and figurative associativity (K_{28}), figurative originality (K_{27}) and figurative selectivity (K_{29}), figurative associativity (K_{28}) and figurative selectivity (K_{29}), that is caused by the properties of the psychodynamic construct of 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	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	-0,23053	1					
K24	-0,05169	***0,829101***	1				
K25	-0,1561	***0,690327***	***0,743989***	1			
K27	-0,3677	***0,861132***	***0,578084***	***0,595511***	1		
K28	-0,26615	0,265181	0,137883	**0,495674**	**0,497405**	1	
K29	**-0,44808**	**0,426196**	0,109172	**0,433879**	***0,699577***	***0,780587***	1

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

Table A15.40

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	0,144663	1					
K24	-0,04843	0,23991	1				
K25	-0,12584	0,018413	***0,896829***	1			
K27	0,031562	0,399749	***0,5499***	***0,589875***	1		
K28	-0,20931	0,006397	***0,598052***	***0,643127***	***0,668469***	1	
K29	-0,18069	-0,30243	***0,503952***	***0,663552***	***0,631441***	***0,782437***	1

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

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 were revealed.

In the two groups of evening department also **the steady statistical correlation dependence is revealed** between the verbal originality (K_{23}) and verbal associativity (K_{24}), verbal originality (K_{23}) and verbal selectivity (K_{25}), verbal originality (K_{23}) and figurative originality (K_{27}), verbal associativity (K_{24}) and verbal selectivity (K_{25}), verbal associativity (K_{24}) and figurative originality (K_{27}), verbal selectivity (K_{25}) and figurative originality (K_{27}), verbal selectivity (K_{25}) and figurative associativity (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative originality (K_{27}) and figurative associativity (K_{28}), figurative originality (K_{27}) and figurative selectivity (K_{29}), figurative associativity (K_{28}) and figurative selectivity (K_{29}), that is caused directly by the properties of the psychodynamic construct of 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 the 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: verbal originality (K_{23}), verbal associativity (K_{24}), verbal selectivity (K_{25}); figurative originality (K_{27}), figurative associativity (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	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	0,05921	1					
K24	-0,17912	***0,568466***	1				
K25	-0,12505	***0,703941***	***0,769551***	1			
K27	0,036809	***0,665917***	0,254796	***0,718739***	1		
K28	0,008989	0,379886	0,336134	***0,516624***	0,39563	1	
K29	-0,04917	0,325824	0,279681	***0,653627***	***0,576081***	***0,863227***	1

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

Table A15.42

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	0,26508	1					
K24	-0,0833	**0,425109**	1				
K25	-0,08165	0,304849	***0,956994***	1			
K27	0,061977	***0,593045***	***0,623201***	***0,582135***	1		
K28	0,020238	0,199729	***0,652058***	***0,691432***	***0,65801***	1	
K29	0,060964	0,131011	***0,541985***	***0,621163***	***0,693747***	***0,89319***	1

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

Table A15.43

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	***0,56032***	1					
K24	-0,30229	**-0,47079**	1				
K25	-0,39748	***-0,55702***	***0,939128***	1			
K27	0,323447	0,201239	**0,46571**	0,325325	1		
K28	-0,28143	-0,2444	***0,647599***	***0,62921***	**0,463066**	1	
K29	-0,3116	-0,33421	***0,733071***	***0,698029***	**0,47852**	***0,963164***	1

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

In the three groups of day department **the steady statistical correlation dependence is revealed** between the verbal originality (K_{23}) and verbal associativity (K_{24}), verbal originality (K_{23}) and verbal selectivity (K_{25}), verbal originality (K_{23}) and figurative originality (K_{27}), verbal associativity (K_{24}) and verbal selectivity (K_{25}), verbal associativity (K_{24}) and figurative originality (K_{27}), verbal associativity (K_{24}) and figurative associativity (K_{28}), verbal associativity (K_{24}) and figurative selectivity (K_{29}), verbal selectivity (K_{25}) and figurative originality (K_{27}), verbal selectivity (K_{25}) and figurative associativity (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative originality (K_{27}) and figurative associativity (K_{28}), figurative originality (K_{27}) and figurative selectivity (K_{29}), figurative associativity (K_{28}) and figurative selectivity (K_{29}), that is caused by the properties of the psychodynamic construct of 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 department 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	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	0,145335	1					
K24	***0,508316***	***0,538367***	1				
K25	***0,637351***	0,397879	***0,8849***	1			
K27	0,252565	***0,60565***	0,312539	0,351762	1		
K28	**0,413173**	0,30048	***0,516549***	***0,715201***	0,154611	1	
K29	0,354071	***0,512874***	***0,780299***	***0,870303***	***0,503756***	***0,739577364***	1

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

Table A15.45

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	-0,39673	1					
K24	-0,26463	0,333762	1				
K25	-0,16203	0,099327	***0,858525***	1			
K27	**-0,42438**	**0,435524**	0,249458	0,114666	1		
K28	-0,11798	0,059182	0,062901	0,387816	0,16775	1	
K29	-0,11547	0,255951	**0,413454**	***0,502836***	0,31218	***0,661724***	1

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

In the two groups of evening department **the steady statistical correlation dependence is revealed** between the verbal originality (K_{23}) and verbal associativity (K_{24}), verbal originality (K_{23}) and verbal selectivity (K_{25}), verbal originality (K_{23}) and figurative originality (K_{27}), verbal associativity (K_{24}) and verbal selectivity (K_{25}), verbal associativity (K_{24}) and figurative originality (K_{27}), verbal associativity (K_{24}) and figurative selectivity (K_{29}), verbal selectivity (K_{25}) and figurative originality (K_{27}), verbal selectivity (K_{25}) and figurative associativity (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative originality (K_{27}) and figurative selectivity (K_{29}), figurative associativity (K_{28}) and figurative selectivity (K_{29}), that is caused directly by the properties of the psychodynamic construct of 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 originality (K_{23}), verbal associativity (K_{24}), verbal selectivity (K_{25}); figurative originality (K_{27}), figurative associativity (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	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	-0,15951	1					
K24	**0,439543**	***0,634068***	1				
K25	0,281296	***0,709112***	***0,781051***	1			
K27	-0,02233	***0,596772***	0,288441	0,396655	1		
K28	0,144722	0,222096	0,26955	0,306919	***0,686076***	1	
K29	-0,12472	***0,651895***	0,287377	***0,57362***	***0,793305***	***0,664217***	1

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

Table A15.47

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	0,141104	1					
K24	0,12691	***0,710766***	1				
K25	-0,04128	0,191723	**0,485676**	1			
K27	-0,0008	***0,788748***	***0,601013***	0,106135	1		
K28	0,064009	0,314694	0,378807	0,284459	0,344959	1	
K29	-0,04074	0,053435	0,232356	**0,485871**	0,085301	***0,814604***	1

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

Table A15.48

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	-0,3182	1					
K24	***-0,58004***	**0,499928**	1				
K25	***-0,57725***	0,101326	***0,688894***	1			
K27	-0,31911	**0,485454**	0,217078	0,261787	1		
K28	-0,18787	0,189418	0,272066	0,116609	**0,418821**	1	
K29	-0,1711	0,003146	-0,09902	0,116327	***0,565364***	***0,526532***	1

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

In the three groups of day department **the steady statistical correlation dependence is revealed** between the verbal originality (K_{23}) and verbal associativity (K_{24}), verbal originality (K_{23}) and verbal selectivity (K_{25}), verbal originality (K_{23}) and figurative originality (K_{27}), verbal associativity (K_{24}) and verbal selectivity (K_{25}), verbal associativity (K_{24}) and figurative originality (K_{27}), verbal associativity (K_{24}) and figurative associativity (K_{28}), verbal selectivity (K_{25}) and figurative originality (K_{27}), verbal selectivity (K_{25}) and figurative associativity (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative originality (K_{27}) and figurative associativity (K_{28}), figurative associativity (K_{28}) and figurative selectivity (K_{29}), that is caused directly with the properties of the psychodynamic construct of 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	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	-0,3638	1					
K24	-0,3663	***0,705397***	1				
K25	-0,03019	0,373728	***0,853766***	1			
K27	-0,28939	***0,623387***	***0,660431***	**0,407615**	1		
K28	-0,23382	***0,717002***	***0,661649***	***0,547944***	***0,51357***	1	
K29	-0,01509	0,112184	***0,541188***	***0,776713***	**0,426905**	**0,454222**	1

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

Table A15.50

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

	Age	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*
Age	1						
K23	-0,19851	1					
K24	0,060655	0,252924	1				
K25	0,193377	0,042044	***0,908037***	1			
K27	-0,12672	**0,452143**	**0,373366**	0,286356	1		
K28	-0,23033	0,312821	0,223005	0,18983	0,224378	1	
K29	-0,12509	0,355764	***0,524266***	**0,401133**	***0,560631***	***0,752373***	1

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

In the two groups of evening department also **the steady statistical corr. dependence is revealed** between the verbal originality (K_{23}) and verbal associativity (K_{24}), verbal originality (K_{23}) and verbal selectivity (K_{25}), verbal originality (K_{23}) and figurative originality (K_{27}), verbal originality (K_{23}) and figurative associativity (K_{28}), verbal associativity (K_{24}) and verbal selectivity (K_{25}), verbal associativity (K_{24}) and figurative originality (K_{27}), verbal associativity (K_{24}) and figurative associativity (K_{28}), verbal associativity (K_{24}) and figurative selectivity (K_{29}), verbal selectivity (K_{25}) and figurative originality (K_{27}), verbal selectivity (K_{25}) and figurative associativity (K_{28}), verbal selectivity (K_{25}) and figurative selectivity (K_{29}), figurative originality (K_{27}) and figurative associativity (K_{28}), figurative originality (K_{27}) and figurative selectivity (K_{29}), figurative associativity (K_{28}) and figurative selectivity (K_{29}), that is caused directly by the properties of the psychodynamic construct of 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. are located, and also a row of 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. A15.51-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 relationship, the bold italic – the average relationship.

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 relationship, the bold italic – the average relationship.

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 relationship, the bold italic – the average relationship.

In the three groups of day department **the steady statistical correlation dependence 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 relationship, the bold italic – the average relationship.

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 relationship, the bold italic – the average relationship.

In the two groups of evening department **the steady statistical correlation dependence 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 of the 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 protanopes – excludes the presence of red color;
  - the color scheme for deuteranopes – excludes the presence of green color;
  - the color scheme for tritanopes – excludes the presence of blue color.

By the type of contrast schemes at 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. are located, 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				
$L_{3.1N}$	-0,24058	-0,10322	1			
$L_{3.6N}$	-0,30904	-0,37418	-0,01678	1		
$L_{3.7}$	0,144999	0,081859	0,176773	-0,29007	1	
$L_{3.8N}$	0,370117	-0,04129	***0,4***	-0,3063	***0,642593***	1

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

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	***-0,56019***	1		
$L_{3.7}$	0,354066	-0,3111	-0,06984	0,039125	1	
$L_{3.8N}$	0,094821	0,078811	-0,21822	-0,36673	-0,04572	1

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

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	0,213531	1			
$L_{3.6N}$	-0,14784	0,050625	0,159576	1		
$L_{3.7}$	-0,32139	***0,569514***	0,081152	0,007346	1	
$L_{3.8N}$	0,075986	-0,23873	-0,05473	-0,16738	-0,34141	1

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

In the three groups of day department **the steady statistical correlation dependence is revealed** 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 ($L_{3.8N}$), that 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 language of 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}	-0,26599	1				
$L_{3.1N}$	0,256008	0	1			
$L_{3.6N}$	0,035917	-0,07332	0,24891	1		
$L_{3.7}$	-0,14344	0,157064	0,260998	0,235055	1	
$L_{3.8N}$	0,278713	-0,13001	0,109599	-0,14508	-0,00286	1

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

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	0,206692	0	1		
$L_{3.7}$	-0,08414	-0,05239	0,100567	0,271563	1	
$L_{3.8N}$	-0,38423	0,071555	-0,04664	0,127884	0,039148	1

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

In the two groups of evening department **the steady statistical correlation dependence is revealed** 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. are located, 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 relationship, the bold italic – the average relationship.

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}	$L_{3.1N}$	$L_{3.6N}$	$L_{3.7}$	$L_{3.8N}$
Age	1					
K_{45}	-0,336455	1				
$L_{3.1N}$	0,359262	0,013222	1			
$L_{3.6N}$	-0,050107	0,195070	0,283317	1		
$L_{3.7}$	-0,037999	0,017202	0,286639	0,036633	1	
$L_{3.8N}$	-0,140200	0,013222	0,136364	-0,309309	0,083774	1

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

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 relationship, the bold italic – the average relationship.

In the three groups of day department **the relatively steady statistical correlation dependence 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 relationship, the bold italic – the average relationship.

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 relationship, the bold italic – the average relationship.

In the two groups of evening department **the statistical correlation dependence 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 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.

The adaptive representation of information fragments processor in the basis of the adaptive means of training (ET) provides the direct calculation of 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;
- to estimate directly 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 asymmetricity 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 experimental 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 presents the reduced and complete set of independent variables.

In the course of carrying out of the regression analysis of a posteriori data the reduced sample of initial data for the realization of research is formed (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}	analyticity	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 size of font	15,83	18,836	0,734	1,666
24.	L_{38N}	the color 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 the significant heterogeneities were not revealed, and all abnormal values were eliminated:

- *Age* – the artifacts, which does not appear possible to eliminate are revealed;
- 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*	the age	18,2357	6,919	3,326	14,765
2.	*RU*	the mark in the Russian language	4,0929	0,400	-0,076	-0,510
3.	*LIT*	the mark in literature	4,2214	0,445	-0,286	-0,787
4.	*LG*	the mark in the foreign language	4,3286	0,422	-0,448	-0,707
5.	*HIS*	the mark in history	4,3321	0,323	-0,139	-0,669
6.	*GEO*	the mark in geography	4,4250	0,374	-0,562	-0,594
7.	*BIO*	the mark in biology	4,3750	0,343	-0,312	-0,701
8.	*ALG*	the mark in algebra	4,2714	0,471	-0,409	-0,850
9.	*GEOM*	the mark in geometry	4,2929	0,495	-0,480	-0,890
10.	*FIZ*	the mark in physics	4,2321	0,437	-0,293	-0,760
11.	*CHE*	the mark in chemistry	4,1929	0,479	-0,276	-0,903
12.	*SCH*	the mark in drawing	4,5643	0,290	-0,675	-0,721
13.	*AST*	the mark 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}	analyticity	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
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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_{31N}	the kind of information	1,3214	0,219	0,769	-1,419
34.	L_{36N}	the color of background	5,4536	3,209	-0,397	-1,092
35.	L_{37}	the size of font	15,83	18,836	0,734	1,666
36.	L_{38N}	the color 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 the significant heterogeneities was not revealed, 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 insignificant emissions were 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 complete compliance to the analytical criterion;
- Y_4 – the partial compliance, 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 the statistical methods of 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 (un)standardized coefficients and the equations of regression

The unstandardized 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 the 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.

The reduced and complete set of independent variables is presented, 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 valid answers to the questions;
- Y_4 – the vector of estimations of LRKT, measured by the means of use of the developed reconfigurable exact scale based on the sum of scored points for each valid 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 the means of directly substituting of a set of the standardized coefficients of multiple regression of the different nominal.

The unstandardized equation of multiple regression (the linear regression model) is formed by the means of directly substituting of a set of the unstandardized 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), it is estimated by means of 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. Let's 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 unstandardized and standardized coefficients, presented in tabl. A15.69.

Table A15.69

The unstandardized and standardized coefficients (Coefficients) of model Y_2

The model	The variable	The unstandardized coefficients		The stand. coeff.	t	The significance	95% confidence interval for B		The correlations			The statistics of collinearity	
		B	The std. error	Beta			The lower bound	The upper bound	The zero order	Partial (Private)	Part (Partial)	Tole-ran-ce	VIF
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 unstandardized 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 significant, but relatively high degree of contribution into the dispersion of dependent variable (factor Y_2) is acted 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) and 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. Let's 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 allow to obtain the basis of the linear regression model with the nominal values of unstandardized and standardized coefficients, presented in tabl. A15.70.

Table A15.70

The unstandardized and standardized coefficients (Coefficients) of model Y_4

The model	The variable	The unstandardized coefficients		The stand. coeff.	t	The significance	95% confidence interval for B		The correlations			The statistics of collinearity	
		B	The std. error	Beta			The lower bound	The upper bound	The zero order	Partial (Private)	Part (Partial)	Tole-ran-ce	VIF
1	*Constant*	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
	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 unstandardized 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. Let's consider the complete set of independent variables K_i and factor Y_2.

The formation and processing of the 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 unstandardized and standardized coefficients, presented directly in tabl. A15.71.

Table A15.71

The unstandardized and standardized coefficients (Coefficients) of model Y_2

The model	The variable	The unstandardized coefficients		The stand. coeff.	t	The significance	95% confidence interval for B		The correlations			The statistics of collinearity	
		B	The std. error	Beta			The lower bound	The upper bound	The zero order	Partial (Private)	Part (Partial)	Tole-ran-ce	VIF
1	*Constant*	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 unstandardized 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 practical interest presents the analysis of residues at the substituting of nominal values of independent variables for the estimation of quality of the regression equation.

The nominal values of unstandardized 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 unstandardized 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 dependences between a set of independent variables (predictors) K_i;
- the nominal value of the unstandardized and standardized coefficient – reflects the potential increasing of dispersion of the dependent variable (factor) Y under the influence of variation of a set of the independent variables (predictors) K_i.

2.B. Let's consider the complete set of independent variables K_i and factor Y_4.

The formation and processing of the 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 unstandardized and standardized coefficients, presented in tabl. A15.72.

Table A15.72

The unstandardized and standardized coefficients (Coefficients) of model Y_4

The model	The variable	The unstandardized coefficients		The stand. coeff.	t	The significance	95% confidence interval for B		The correlations			The statistics of collinearity	
		B	The std. error	Beta			The lower bound	The upper bound	The zero order	Partial (Private)	Part (Partial)	Tolerance	VIF
1	*Conssnt*	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 unstandardized coefficients K_i:

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

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

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 estimations of 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 the previously formed set of techniques and algorithms.

The experimental researches allow to estimate the level of quality of IEE of the 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 arises 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 coordinated change and the interrelation of variables

The significant value has the coordinated change and the system of relationships 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 applied for the realization of research of the coordinated change of values of a set of considered variables.

The covariance table acts 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 coordinated change of the other variable.

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

The correlation table acts 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 consistency and the strength of dependences (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 dependence (relationship) – to the increasing (decreasing) of nominal values in one sample of data corresponds the coordinated increasing (decreasing) of nominal values in the other sample of data;
- the inverse correlation dependence (relationship) – to the increasing (decreasing) of nominal values in one sample of data corresponds the coordinated increasing (decreasing) of nominal values in the other sample of data.

In dependence from the nominal value of the coefficient of correlation are 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).

Appears 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 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 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 – 6;
  - the positively defined relationships – 61;
- 03 relationships of strong strength – directly accepted to 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** are revealed between the 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** are revealed between the verbal intellect (K_{14}) and the generalization of concepts (K_{15}) [0,219839], generalization (K_{15}) and analyticity (K_{16}) [0,38222], verbal intellect (K_{14}) and analyticity (K_{16}) [0,387334], the age (*Age*) and the analyticity of thinking (K_{16}) [-0,21575], the analyticity 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 analyticity 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}) [0,567756], the classification of concepts (K_{17}) and the combinatorics of thinking (K_{19}) [0,403094], the analyticity 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 the combinatorics of thinking (K_{19}) [-0,29261], the combinatorics of thinking (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 the combinatorics of thinking (K_{19}) [0,256585], planar thinking (K_{21}) and mathematical counting (K_{18}) [0,392775], planar thinking (K_{21}) and the classification of concepts (K_{17}) [0,378737], planar thinking (K_{21}) and the analyticity of thinking (K_{16}) [0,242556], planar thinking (K_{21}) and the generalization of concepts (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], volumetric thinking (K_{22}) and the classification of concepts (K_{17}) [0,361477], volumetric thinking (K_{22}) and the analyticity 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}) [0,396916], 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 abilities (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 analyticity 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 diagnostics of collinearity:
the eigenvalues of the linear model of multiple regression with the reduced set of parameters Y_2

The dimension	The eigenvalue	The condition index (the commonality)	The variance proportions (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: *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 are revealed:

- 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 the verbal intellect (K_{14}) and generalization (K_{15}) [0,219839], the age (Age) and the analyticity of thinking (K_{16}) [-0,215748], verbal intellect (K_{14}) and the analyticity of thinking (K_{16}) [0,387334], the generalization of concepts (K_{15}) and the analyticity 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], the generalization of concepts (K_{15}) and the classification of concepts (K_{17}) [0,311599], the analyticity of thinking (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 analyticity 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 analyticity 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 analyticity 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 analyticity of thinking (K_{16}) and the 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 analyticity 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) [-0,384923], 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 diagnostics of collinearity: 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 dimension	The eigenvalue	The condition index (the commonality)	The variance proportions (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_2 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*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*	*K45*	*L31N*	*L36N*	*L37*	*L38N*	*Y2*
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	0,549	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	-0,159	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																			

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																			

The completion of tabl. A15.80

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 relationships, 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** are 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 associativity (K_{28}) and figurative selectivity (K_{29}) (0,741), the value of the mark in algebra (*ALG*) and the value of the mark in geometry (*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 volumetric thinking (K_{22}) (0,267), the generalization of concepts (K_{15}) and volumetric thinking (K_{22}) (0,262), the analyticity of thinking (K_{16}) and volumetric thinking (K_{22}) (0,359), the classification of concepts (K_{17}) and volumetric thinking (K_{22}) (0,362), arithmetic abilities (K_{18}) and volumetric thinking (K_{22}) (0,386), combinatorial abilities (K_{19}) and volumetric thinking (K_{22}) (0,295), planar thinking (K_{21}) and volumetric thinking (K_{22}) (0,312), combinatorial abilities (K_{19}) and verbal associativity (K_{24}) (0,297), verbal originality (K_{23}) and verbal associativity (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 abilities (K_{19}) and verbal selectivity (K_{25}) (0,364), verbal originality (K_{23}) and verbal selectivity (K_{25}) (0,420), arithmetic abilities (K_{18}) and figurative originality (K_{27}) (0,300), combinatorial abilities (K_{19}) and figurative originality (K_{27}) (0,259), mnemonic abilities (K_{20}) and figurative originality (K_{27}) (0,202), volumetric thinking (K_{22}) and figurative originality (K_{27}) (0,202), verbal originality (K_{23}) and figurative originality (K_{27}) (0,408), verbal associativity (K_{24}) and figurative originality (K_{27}) (0,415), verbal selectivity (K_{25}) and figurative originality (K_{27}) (0,409), verbal associativity (K_{24}) and figurative associativity (K_{28}) (0,397), verbal selectivity (K_{25}) and figurative associativity (K_{28}) (0,448), figurative originality (K_{27}) and figurative associativity (K_{28}) (0,461), verbal associativity (K_{24}) and figurative selectivity (K_{29}) (0,397), verbal selectivity (K_{25}) and figurative selectivity (K_{29}) (0,512), figurative originality (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 abilities (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 originality (K_{23}) and the level of proficiency in the language of statement (K_{45}) (0,210), verbal associativity (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 originality (K_{27}) and the level of proficiency in the language of statement (K_{45}) (0,249), volumetric thinking (K_{22}) and the kind of information (L_{31N}) (0,595).

The eigenvalues of the linear model of multiple regression with the complete set of independent variables K_i and dependent variable Y_2 in tabl. A15.81.

Table A15.81

The diagnostics of collinearity: the eigenvalues of the linear model of multiple regression with the complete set of independent variables K_i and dependent variable Y_2

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	The dimension	
0,045	0,050	0,056	0,062	0,063	0,071	0,101	0,109	0,127	0,145	0,158	0,178	0,325	0,367	0,474	0,708	33,682	The eigenvalue	
27,248	26,060	24,562	23,371	23,201	21,815	18,302	17,596	16,287	15,216	14,595	13,750	10,173	9,582	8,428	6,895	1,000	The condition index (the commonality)	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*(Constant)*	The proportions of variance (the shares of dispersion)
0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*Age*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*RU*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*LIT*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*LG*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*HIS*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*GEO*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*BIO*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*ALG*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*GEOM*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*FIZ*	
0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*CHE*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*SCH*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*AST*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*K7*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00	*K8*	
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00	*K9*	
0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*K14*	
0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*K15*	
0,03	0,07	0,17	0,08	0,15	0,01	0,04	0,02	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*K16*	
0,00	0,01	0,09	0,01	0,01	0,02	0,05	0,09	0,30	0,01	0,03	0,06	0,15	0,04	0,00	0,00	0,00	*K17*	
0,00	0,21	0,32	0,02	0,00	0,01	0,06	0,03	0,01	0,00	0,02	0,01	0,03	0,01	0,00	0,00	0,00	*K18*	
0,08	0,30	0,00	0,17	0,08	0,13	0,00	0,02	0,00	0,00	0,02	0,00	0,01	0,00	0,00	0,00	0,00	*K19*	
0,16	0,03	0,01	0,01	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*K20*	
0,19	0,00	0,02	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	*K21*	
0,04	0,03	0,00	0,00	0,01	0,02	0,00	0,00	0,02	0,02	0,02	0,00	0,00	0,00	0,00	0,00	0,00	*K22*	
0,02	0,06	0,09	0,00	0,01	0,06	0,01	0,09	0,07	0,07	0,11	0,02	0,09	0,17	0,00	0,03	0,00	*K23*	
0,02	0,03	0,00	0,00	0,01	0,01	0,00	0,01	0,01	0,03	0,01	0,03	0,01	0,00	0,00	0,01	0,00	*K24*	
0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,01	0,02	0,03	0,00	0,00	0,00	0,01	0,00	*K25*	
0,00	0,04	0,05	0,00	0,00	0,21	0,05	0,19	0,08	0,07	0,01	0,12	0,00	0,00	0,00	0,02	0,00	*K27*	
0,04	0,09	0,19	0,01	0,01	0,03	0,00	0,32	0,08	0,00	0,01	0,01	0,01	0,05	0,00	0,03	0,00	*K28*	
0,04	0,18	0,16	0,01	0,02	0,19	0,01	0,04	0,00	0,00	0,00	0,00	0,01	0,04	0,00	0,02	0,00	*K29*	
0,00	0,10	0,12	0,05	0,22	0,20	0,01	0,00	0,02	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	*K45*	
0,15	0,06	0,00	0,00	0,00	0,00	0,02	0,00	0,02	0,14	0,08	0,00	0,00	0,00	0,00	0,00	0,00	*L31N*	
0,02	0,00	0,02	0,01	0,04	0,08	0,45	0,09	0,03	0,01	0,02	0,00	0,00	0,00	0,00	0,00	0,00	*L36N*	
0,02	0,00	0,02	0,51	0,27	0,03	0,03	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	*L37*	
0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,00	0,01	0,00	0,06	0,00	0,02	0,01	0,73	0,02	0,00	*L38N*	

The completion of tabl. A15.81

18	0,038	29,813	0,00	0,10	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,01	0,02	0,00	0,00	0,01	0,03	0,01	0,01	0,01	0,01	0,05	0,00	0,24	0,00	0,00	0,00	0,01	0,00	0,01	0,01	0,03	0,12	0,00	0,02
19	0,032	32,200	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,03	0,01	0,16	0,05	0,24	0,52	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,00	0,00	0,01	0,00
20	0,031	32,825	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,04	0,00	0,10	0,00	0,00	0,01	0,30	0,04	0,34	0,01	0,01	0,01	0,03	0,02	0,08	0,02	0,17	0,00	0,01	0,00
21	0,025	36,616	0,00	0,04	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,00	0,00	0,01	0,01	0,00	0,01	0,00	0,01	0,02	0,03	0,01	0,03	0,58	0,63	0,01	0,00	0,04	0,00	0,04	0,00	0,01	0,00
22	0,019	42,372	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,00	0,02	0,00	0,00	0,00	0,80	0,05	0,03	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,02	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00
23	0,017	44,495	0,00	0,02	0,01	0,02	0,00	0,02	0,11	0,02	0,06	0,01	0,00	0,01	0,01	0,00	0,03	0,00	0,00	0,28	0,00	0,00	0,00	0,01	0,03	0,00	0,00	0,05	0,01	0,00	0,02	0,02	0,00	0,01	0,00	0,08	0,00	0,01	0,00
24	0,015	46,688	0,00	0,00	0,04	0,03	0,07	0,00	0,00	0,00	0,02	0,05	0,02	0,00	0,05	0,02	0,12	0,00	0,00	0,19	0,00	0,00	0,00	0,02	0,03	0,01	0,02	0,03	0,00	0,01	0,04	0,01	0,00	0,03	0,00	0,07	0,00	0,00	0,00
25	0,015	47,831	0,00	0,36	0,00	0,00	0,00	0,00	0,03	0,03	0,03	0,03	0,01	0,01	0,01	0,00	0,22	0,00	0,00	0,02	0,00	0,02	0,02	0,00	0,01	0,00	0,04	0,00	0,01	0,13	0,10	0,00	0,00	0,01	0,01	0,00	0,03	0,00	0,00
26	0,012	52,040	0,00	0,01	0,17	0,09	0,02	0,01	0,10	0,00	0,00	0,01	0,03	0,03	0,00	0,02	0,18	0,00	0,00	0,12	0,00	0,00	0,00	0,00	0,01	0,03	0,00	0,03	0,00	0,02	0,02	0,02	0,00	0,00	0,02	0,05	0,00	0,00	0,00
27	0,012	54,052	0,00	0,01	0,04	0,00	0,31	0,01	0,00	0,03	0,00	0,00	0,01	0,12	0,06	0,16	0,00	0,00	0,00	0,01	0,00	0,05	0,03	0,01	0,00	0,06	0,01	0,05	0,00	0,02	0,02	0,01	0,01	0,03	0,01	0,00	0,00	0,00	0,01
28	0,010	57,481	0,00	0,01	0,08	0,01	0,06	0,04	0,16	0,00	0,01	0,00	0,03	0,50	0,01	0,00	0,00	0,00	0,00	0,10	0,01	0,00	0,00	0,00	0,01	0,02	0,04	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00
29	0,009	61,590	0,00	0,05	0,00	0,02	0,06	0,02	0,08	0,01	0,00	0,01	0,16	0,05	0,48	0,00	0,11	0,00	0,00	0,01	0,02	0,01	0,00	0,01	0,00	0,00	0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,00	0,00	0,00	0,00
30	0,008	63,443	0,00	0,00	0,11	0,01	0,00	0,15	0,04	0,04	0,00	0,01	0,07	0,20	0,01	0,35	0,03	0,01	0,01	0,03	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,01	0,00	0,01
31	0,008	66,981	0,00	0,00	0,04	0,09	0,01	0,00	0,11	0,67	0,00	0,01	0,01	0,03	0,07	0,09	0,01	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,02	0,00	0,00	0,01	0,00	0,00	0,01	0,00	0,00	0,00	0,00
32	0,007	71,797	0,00	0,04	0,01	0,11	0,08	0,03	0,30	0,05	0,14	0,03	0,28	0,00	0,07	0,11	0,05	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,02	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,00	0,00	0,00	0,03
33	0,006	74,468	0,00	0,00	0,09	0,38	0,22	0,02	0,01	0,01	0,01	0,10	0,31	0,01	0,08	0,10	0,00	0,00	0,00	0,02	0,01	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,01	0,01	0,02	0,00	0,05	0,03	0,05	0,00	0,00	0,00	0,00
34	0,005	79,421	0,00	0,01	0,21	0,17	0,11	0,67	0,01	0,11	0,02	0,02	0,03	0,00	0,03	0,00	0,01	0,02	0,02	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,01	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,04	0,00
35	0,004	86,531	0,01	0,00	0,16	0,05	0,01	0,00	0,00	0,00	0,61	0,63	0,01	0,01	0,03	0,00	0,03	0,03	0,03	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,02	0,00	0,02	0,00	0,00	0,01	0,00	0,00
36	0,004	93,931	0,00	0,00	0,01	0,00	0,03	0,01	0,01	0,00	0,05	0,05	0,03	0,00	0,00	0,03	0,01	0,90	0,88	0,00	0,00	0,06	0,01	0,02	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00
37	0,002	135,542	0,99	0,25	0,01	0,00	0,00	0,01	0,02	0,00	0,03	0,02	0,00	0,01	0,05	0,10	0,12	0,00	0,00	0,09	0,07	0,04	0,00	0,02	0,01	0,01	0,00	0,00	0,00	0,02	0,00	0,00	0,01	0,01	0,03	0,01	0,03	0,02	0,01

a. The dependent variable: *Y2*

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 A15.82

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*
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	-0,160
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	0,550	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																	
Y4																	

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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 A15.83

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

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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 **the strong relationships** were revealed relatively between the deuteranopia of color-perception (K_8) and the tritanopia of color-vision (K_9) (0,944), verbal selectivity (K_{25}) and verbal associativity (K_{24}) (0,849), figurative selectivity (K_{29}) and figurative associativity (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 analyticity of thinking (K_{16}) and the age (*Age*) (-0,216), the analyticity of thinking (K_{16}) and the value of the mark in foreign language (*LG*) (0,299), the analyticity of thinking (K_{16}) and the value of the mark in history (*HIS*) (0,225), the analyticity of thinking (K_{16}) and the value of the mark in geometry (*GEOM*) (0,227), the analyticity of thinking (K_{16}) and verbal intellect (K_{14}) (0,387), the analyticity 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 analyticity 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 analyticity of thinking (K_{16}) (0,348), combinatorial abilities (K_{19}) and the classification of concepts *(*K_{17}) (0,403), combinatorial abilities (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 analyticity 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 analyticity 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 thinking (K_{22}) and verbal intellect (K_{14}) (0,267), volumetric thinking (K_{22}) and the generalization of concepts (K_{15}) (0,263), volumetric thinking (K_{22}) and the analyticity of thinking (K_{16}) (0,359), volumetric thinking (K_{22}) and the classification of concepts (K_{17}) (0,362), volumetric thinking (K_{22}) and mathematical abilities (K_{18}) (0,386), volumetric thinking (K_{22}) and combinatorial abilities (K_{19}) (0,295), volumetric thinking (K_{22}) and planar thinking (K_{21}) (0,312), volumetric thinking (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 abilities (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 thinking (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 originality (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).

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.

The eigenvalues of the linear model of multiple regression with the complete set of independent variables K_i and dependent variable Y_4 in tabl. A15.84.

Table A15.84

The diagnostics of collinearity: the eigenvalues of the linear model of multiple regression with the complete set of independent variables K_i and dependent variable Y_4

The dimension	The eigenvalue	The condition index (the commonality)	The proportions of variance (the shares of dispersion)																																				
			(Constant)	*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*
1	33,682	1,000	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2	0,708	6,895	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,01	0,01	0,02	0,03	0,02	0,00	0,00	0,00	0,00	0,02
3	0,474	8,428	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,73
4	0,367	9,582	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,01	0,00	0,00	0,00	0,00	0,17	0,00	0,00	0,00	0,05	0,04	0,00	0,00	0,00	0,00	0,01
5	0,325	10,173	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,15	0,03	0,01	0,00	0,00	0,00	0,09	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,02
6	0,178	13,750	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,06	0,01	0,00	0,00	0,00	0,00	0,02	0,03	0,03	0,12	0,01	0,00	0,00	0,00	0,00	0,01	0,00
7	0,158	14,595	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,02	0,02	0,00	0,00	0,02	0,11	0,01	0,02	0,01	0,01	0,00	0,01	0,08	0,02	0,00	0,06
8	0,145	15,216	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,02	0,07	0,03	0,01	0,07	0,00	0,00	0,00	0,14	0,01	0,00	0,00
9	0,127	16,287	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,30	0,01	0,00	0,00	0,00	0,02	0,07	0,01	0,00	0,08	0,08	0,00	0,02	0,02	0,03	0,00	0,01
10	0,109	17,596	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,09	0,03	0,02	0,00	0,00	0,00	0,09	0,01	0,01	0,19	0,32	0,04	0,00	0,00	0,09	0,00	0,00
11	0,101	18,302	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,05	0,06	0,00	0,01	0,00	0,00	0,01	0,00	0,00	0,05	0,00	0,01	0,01	0,02	0,45	0,03	0,02
12	0,071	21,815	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,01	0,13	0,00	0,01	0,02	0,06	0,01	0,00	0,21	0,03	0,19	0,20	0,00	0,08	0,03	0,01
13	0,063	23,201	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,15	0,01	0,00	0,08	0,01	0,00	0,01	0,01	0,01	0,00	0,00	0,01	0,02	0,22	0,00	0,04	0,27	0,00
14	0,062	23,371	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,08	0,01	0,02	0,17	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,05	0,00	0,01	0,51	0,00
15	0,056	24,562	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,17	0,09	0,32	0,00	0,01	0,02	0,00	0,09	0,00	0,00	0,05	0,19	0,16	0,12	0,00	0,02	0,02	0,00
16	0,050	26,060	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,07	0,01	0,21	0,30	0,03	0,00	0,03	0,06	0,03	0,00	0,04	0,09	0,18	0,10	0,06	0,00	0,00	0,00
17	0,045	27,248	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,02	0,01	0,03	0,00	0,00	0,08	0,16	0,19	0,04	0,02	0,02	0,01	0,00	0,04	0,04	0,00	0,15	0,02	0,02	0,00

The completion of tabl. A15.84

18	0,038	29,813	0,00	0,10	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,01	0,02	0,00	0,00	0,01	0,03	0,01	0,01	0,01	0,01	0,05	0,00	0,24	0,00	0,00	0,00	0,01	0,00	0,01	0,01	0,03	0,12	0,00	0,02
19	0,032	32,200	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,03	0,01	0,16	0,05	0,24	0,52	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,00	0,00	0,01	0,00
20	0,031	32,825	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,04	0,00	0,10	0,00	0,00	0,01	0,30	0,04	0,34	0,01	0,01	0,01	0,03	0,02	0,08	0,02	0,17	0,00	0,01	0,00
21	0,025	36,616	0,00	0,04	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,00	0,00	0,01	0,01	0,00	0,01	0,00	0,01	0,02	0,03	0,01	0,03	0,58	0,63	0,01	0,00	0,04	0,00	0,04	0,00	0,01	0,00
22	0,019	42,372	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,00	0,02	0,00	0,00	0,00	0,80	0,05	0,03	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,02	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00
23	0,017	44,495	0,00	0,02	0,01	0,02	0,00	0,02	0,11	0,02	0,06	0,01	0,00	0,01	0,01	0,00	0,03	0,00	0,00	0,28	0,00	0,00	0,00	0,01	0,03	0,00	0,00	0,05	0,01	0,00	0,02	0,02	0,00	0,01	0,00	0,08	0,00	0,01	0,00
24	0,015	46,688	0,00	0,00	0,04	0,03	0,07	0,00	0,00	0,00	0,02	0,05	0,02	0,00	0,05	0,02	0,12	0,00	0,00	0,19	0,00	0,00	0,00	0,02	0,03	0,01	0,02	0,03	0,00	0,01	0,04	0,01	0,00	0,03	0,00	0,07	0,00	0,00	0,00
25	0,015	47,831	0,00	0,36	0,00	0,00	0,00	0,00	0,03	0,03	0,03	0,03	0,01	0,01	0,01	0,00	0,22	0,00	0,00	0,02	0,00	0,02	0,02	0,00	0,01	0,00	0,04	0,00	0,01	0,13	0,10	0,00	0,00	0,01	0,01	0,00	0,03	0,00	0,00
26	0,012	52,040	0,00	0,01	0,17	0,09	0,02	0,01	0,10	0,00	0,00	0,01	0,03	0,03	0,00	0,02	0,18	0,00	0,00	0,12	0,00	0,00	0,00	0,00	0,01	0,03	0,00	0,03	0,00	0,02	0,02	0,02	0,00	0,00	0,02	0,05	0,00	0,00	0,00
27	0,012	54,052	0,00	0,01	0,04	0,00	0,31	0,01	0,00	0,03	0,00	0,00	0,01	0,12	0,06	0,16	0,00	0,00	0,00	0,01	0,00	0,05	0,03	0,01	0,00	0,06	0,01	0,05	0,00	0,02	0,02	0,01	0,01	0,03	0,01	0,00	0,00	0,00	0,01
28	0,010	57,481	0,00	0,01	0,08	0,01	0,06	0,04	0,16	0,00	0,01	0,00	0,03	0,50	0,01	0,00	0,00	0,00	0,00	0,10	0,01	0,00	0,00	0,00	0,01	0,02	0,04	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00
29	0,009	61,590	0,00	0,05	0,00	0,02	0,06	0,02	0,08	0,01	0,00	0,01	0,16	0,05	0,48	0,00	0,11	0,00	0,00	0,01	0,02	0,01	0,00	0,01	0,00	0,00	0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,00	0,00	0,00	0,00
30	0,008	63,443	0,00	0,00	0,11	0,01	0,00	0,15	0,04	0,04	0,00	0,01	0,07	0,20	0,01	0,35	0,03	0,01	0,01	0,03	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,01	0,00	0,01
31	0,008	66,981	0,00	0,00	0,04	0,09	0,01	0,00	0,11	0,67	0,00	0,01	0,01	0,03	0,07	0,09	0,01	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,02	0,00	0,00	0,01	0,00	0,00	0,01	0,00	0,00	0,00	0,00
32	0,007	71,797	0,00	0,04	0,01	0,11	0,08	0,03	0,30	0,05	0,14	0,03	0,28	0,00	0,07	0,11	0,05	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,02	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,00	0,00	0,00	0,03
33	0,006	74,468	0,00	0,00	0,09	0,38	0,22	0,02	0,01	0,01	0,01	0,10	0,31	0,01	0,08	0,10	0,00	0,00	0,00	0,02	0,01	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,01	0,01	0,02	0,00	0,05	0,03	0,05	0,00	0,00	0,00	0,00
34	0,005	79,421	0,00	0,01	0,21	0,17	0,11	0,67	0,01	0,11	0,02	0,02	0,03	0,00	0,03	0,00	0,01	0,02	0,02	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,01	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,04	0,00
35	0,004	86,531	0,01	0,00	0,16	0,05	0,01	0,00	0,00	0,00	0,61	0,63	0,01	0,01	0,03	0,00	0,03	0,03	0,03	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,02	0,00	0,02	0,00	0,00	0,01	0,00	0,00
36	0,004	93,931	0,00	0,00	0,01	0,00	0,03	0,01	0,01	0,00	0,05	0,05	0,03	0,00	0,00	0,03	0,01	0,90	0,88	0,00	0,00	0,06	0,01	0,02	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00
37	0,002	135,542	0,99	0,25	0,01	0,00	0,00	0,01	0,02	0,00	0,03	0,02	0,00	0,01	0,05	0,10	0,12	0,00	0,00	0,09	0,07	0,04	0,00	0,02	0,01	0,01	0,00	0,00	0,00	0,02	0,00	0,00	0,01	0,01	0,03	0,01	0,03	0,02	0,01

a. The dependent variable: *Y4*

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

The reduced 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 training, 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 exhaustive (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 the automated training system with the properties of adaptation 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. A15.85.

Table A15.85

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*
The correlation of Pearson	*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. A15.85

The significance (1-tailed)																				
Y2	*Age*	*K7*	*K8*	*K9*	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*	*K45*
.	,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 necessity 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. A15.86.

Table A15.86

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. A15.86

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

- the analytical – the 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 dependence – the direct or inverse correlation dependence 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 increasing (decreasing) 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 coordinated 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 coordinated 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 coordinated 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).

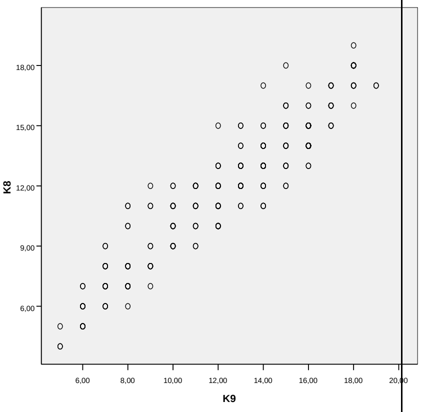
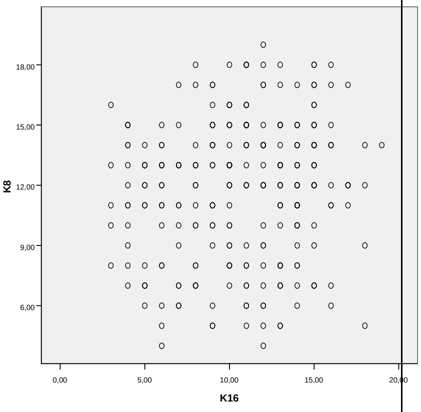
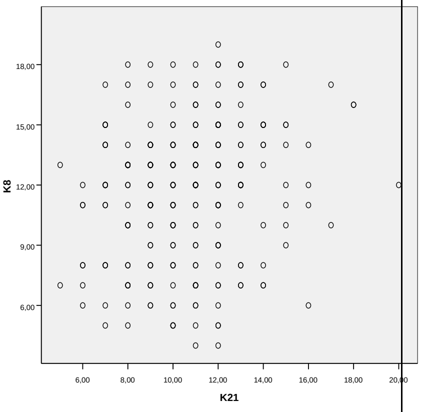
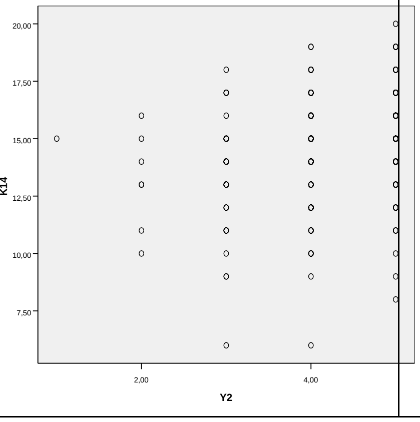
The further it is directly proposed to estimate the form of the normal distribution of nominal values based on the construction of the graphs of two-dimensional scattering.

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 A15.87

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 is observed (the strong relationship)
2.	K_8-K_{16}	0,123		The very easy direct correlation dependence is observed (the false relationship)
3.	K_8-K_{21}	0,200		The very easy direct correlation dependence is observed (the false relationship)
4.	K_{14}-Y_2	0,252		The very easy direct correlation dependence is observed (the false relationship, it is possible the nonlinear relationship)

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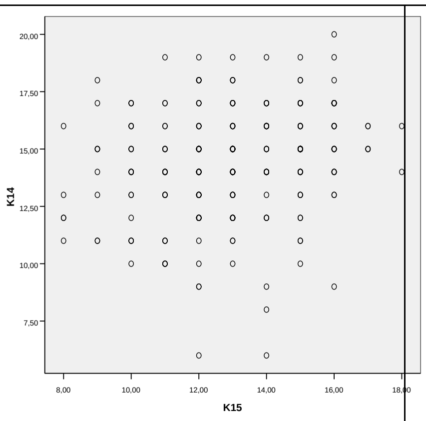
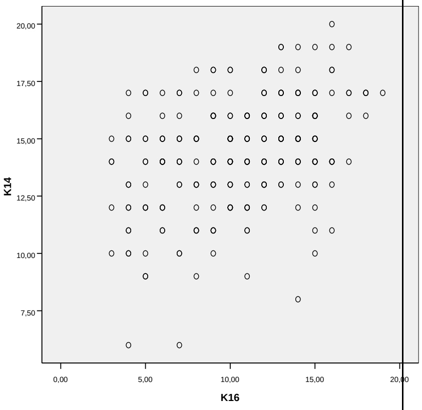
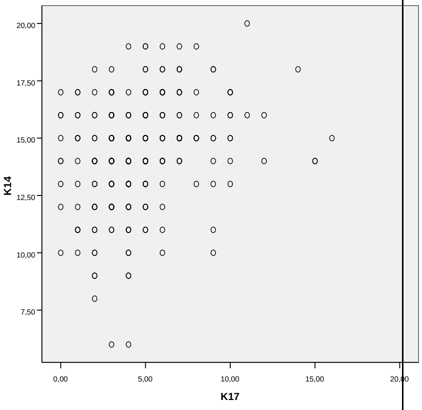
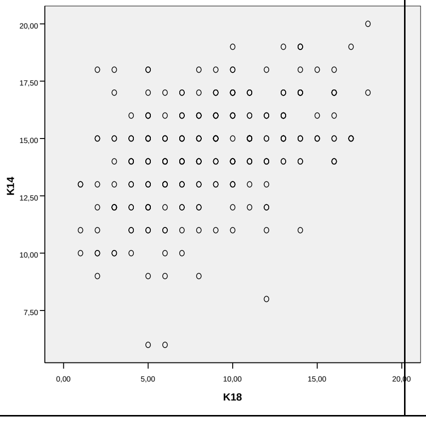
5.	K_{14}-K_{15}	0,220		The very easy direct correlation dependence is observed (the false relationship)
6.	K_{14}-K_{16}	0,387		The very easy direct correlation dependence is observed (the false relationship)
7.	K_{14}-K_{17}	0,292		The very easy direct correlation dependence is observed (the false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

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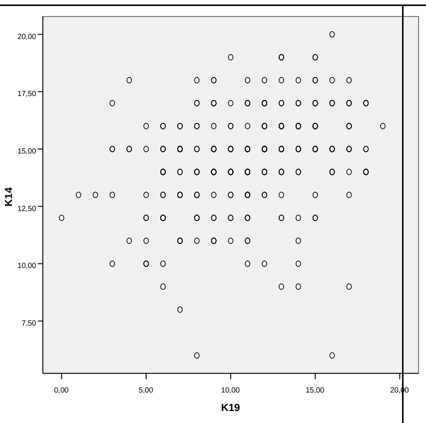
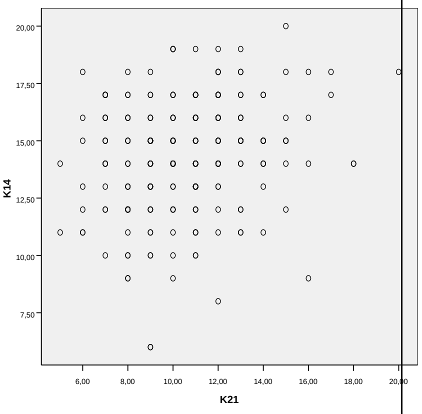
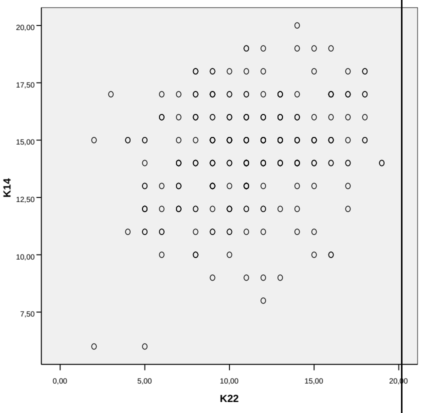
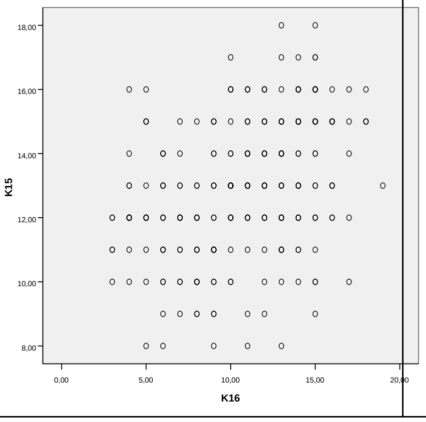
9.	K_{14}-K_{19}	0,309		The very easy direct correlation dependence is observed (the false relationship)
10.	K_{14}-K_{21}	0,218		The very easy direct correlation dependence is observed (the false relationship)
11.	K_{14}-K_{22}	0,267		The very easy direct correlation dependence is observed (the false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

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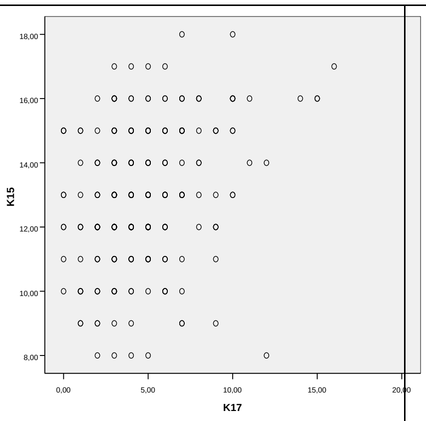
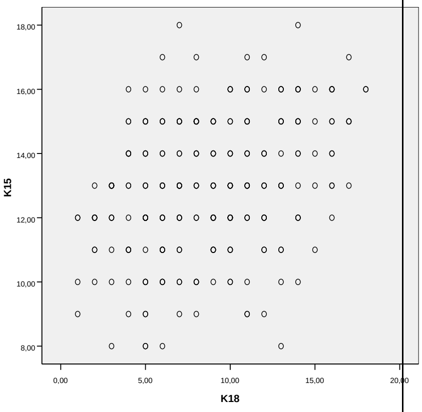
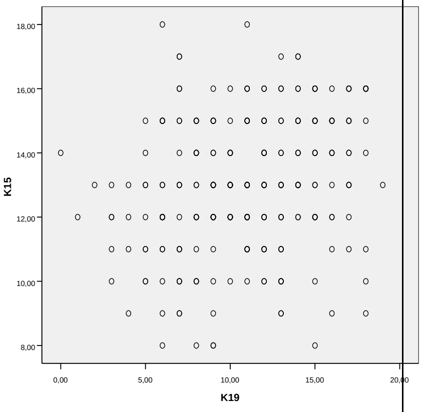
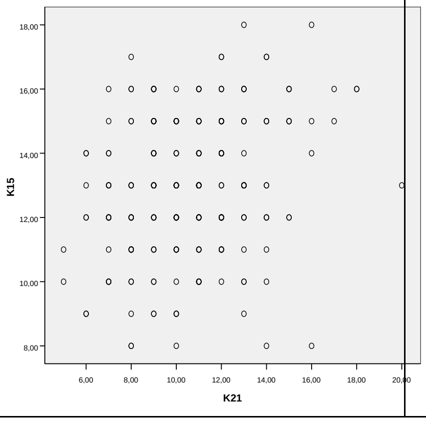
13.	K_{15}-K_{17}	0,312		The very easy direct correlation dependence is observed (the false relationship)
14.	K_{15}-K_{18}	0,349		The very easy direct correlation dependence is observed (the false relationship)
15.	K_{15}-K_{19}	0,242		The very easy direct correlation dependence is observed (the false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

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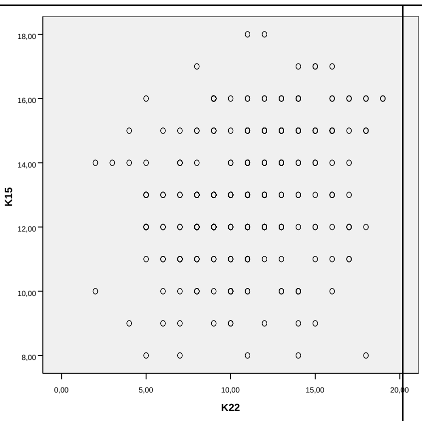
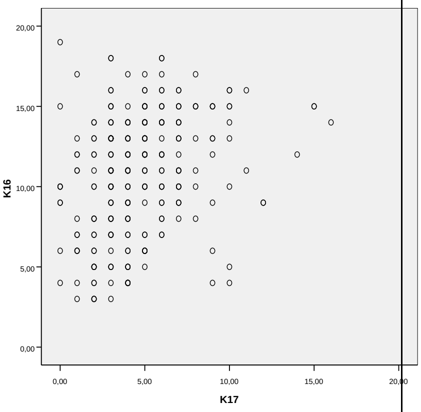
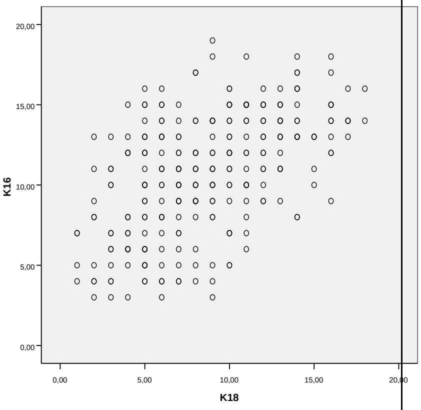
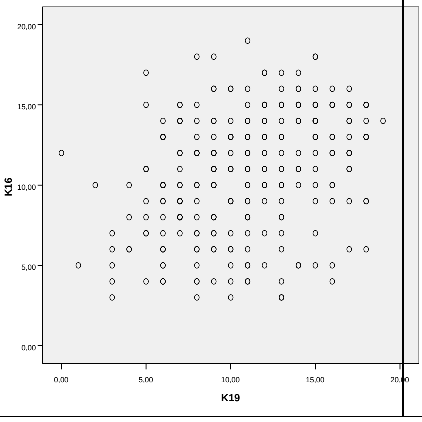
17.	K_{15}-K_{22}	0,262		The very easy direct correlation dependence is observed (the false relationship)
18.	K_{16}-K_{17}	0,287		The very easy direct correlation dependence is observed (the false relationship)
19.	K_{16}-K_{18}	0,535		The average direct correlation dependence is observed (the average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

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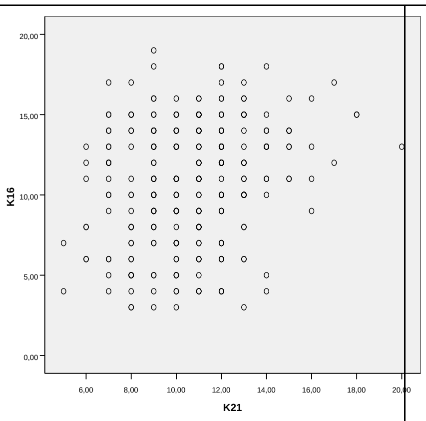
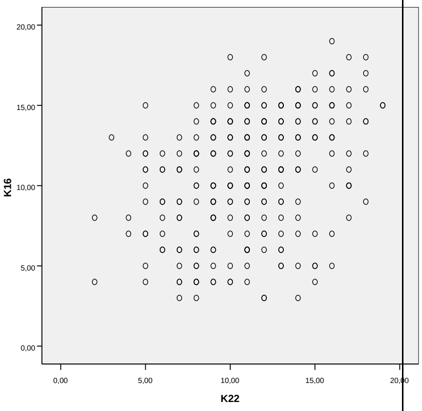
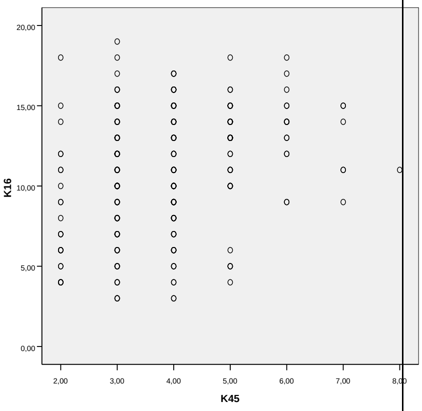
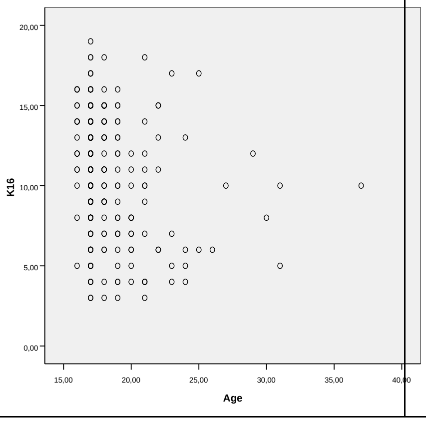
21.	K_{16}-K_{21}	0,243		The very easy direct correlation dependence is observed (the false relationship)
22.	K_{16}-K_{22}	0,359		The easy direct correlation dependence is observed (the false relationship)
23.	K_{16}-K_{45}	0,325		The very easy direct correlation dependence is observed (the false relationship,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

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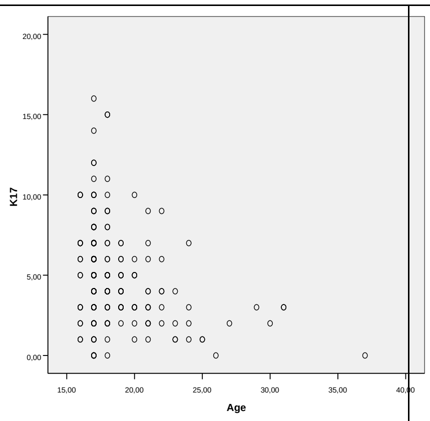
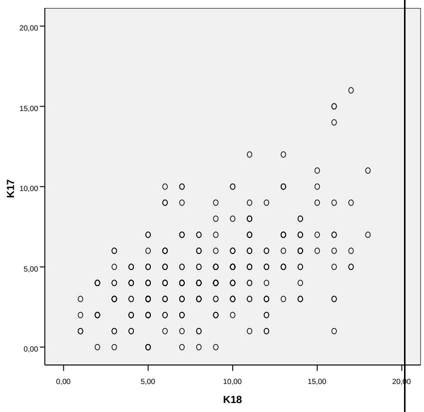
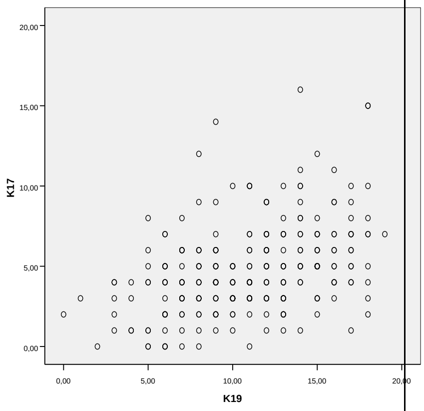
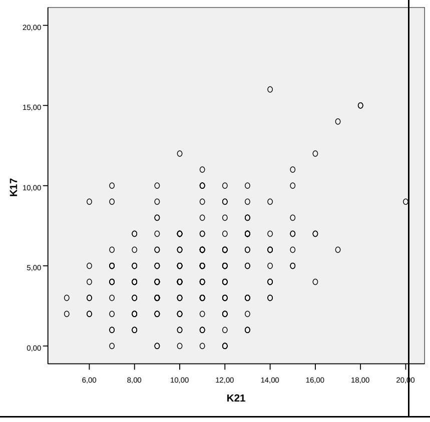
25.	K_{17}-Age	-0,260		The very easy inverse correlation dependence is observed (the false relationship)
26.	K_{17}-K_{18}	0,495		The average direct correlation dependence is observed (the false relationship)
27.	K_{17}-K_{19}	0,403		The easy direct correlation dependence is observed (the false relationship)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

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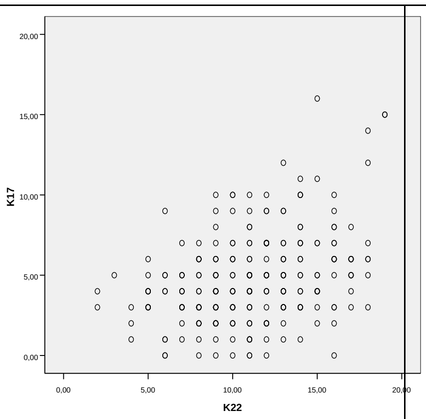
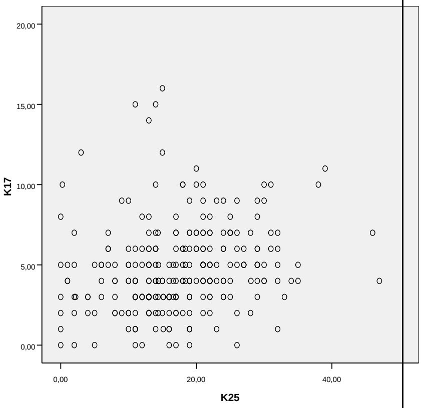
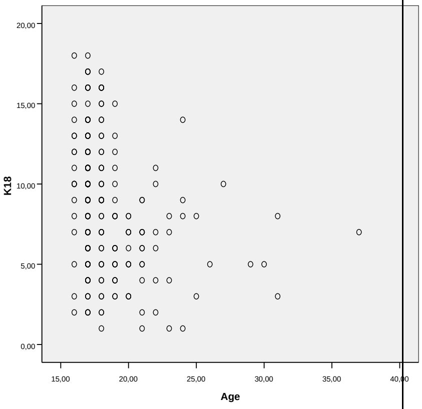
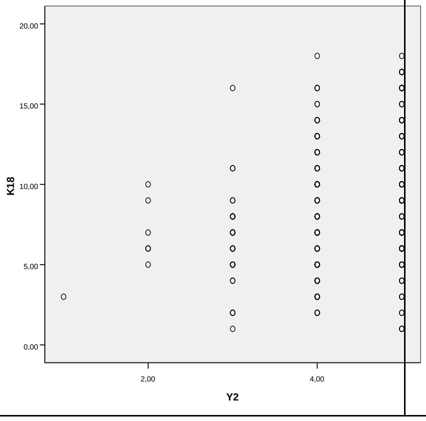
29.	K_{17}-K_{22}	0,362		The very easy direct correlation dependence is observed (the false relationship)
30.	K_{17}-K_{25}	0,203		The very easy direct correlation dependence is observed (the false relationship)
31.	K_{18}-*Age*	-0,265		The very easy inverse correlation dependence is observed (the false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

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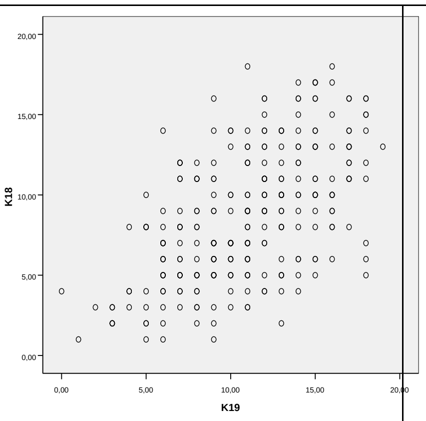
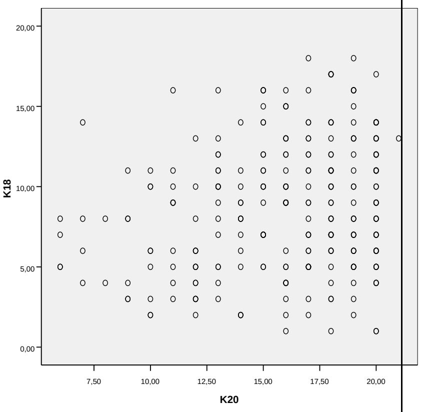
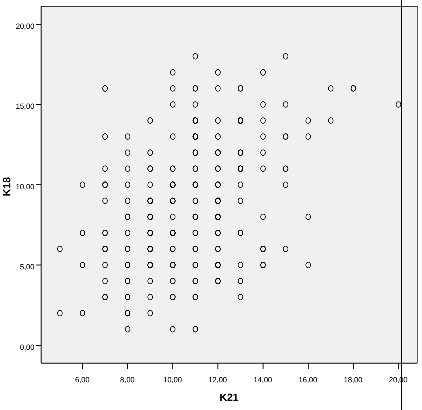
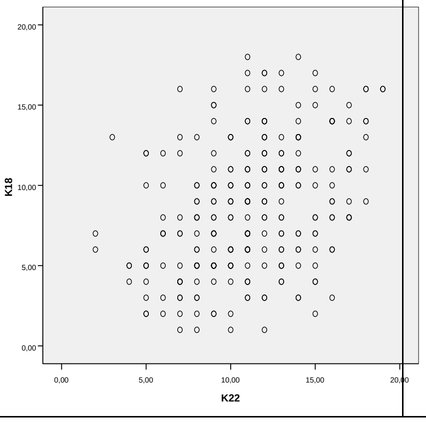
33.	*K_{18}-K_{19}*	0,568		The average direct correlation dependence is observed (the average relationship)
34.	*K_{18}-K_{20}*	0,204		The very easy direct correlation dependence is observed (the false relationship)
35.	*K_{18}-K_{21}*	0,393		The very easy direct correlation dependence is observed (the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

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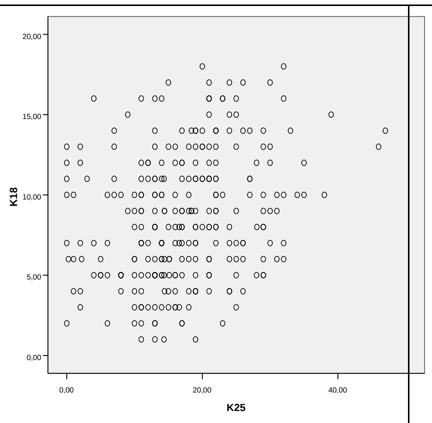
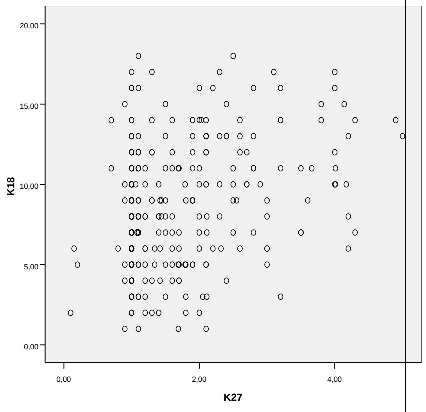
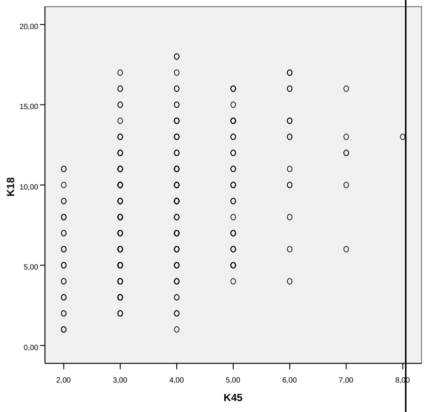
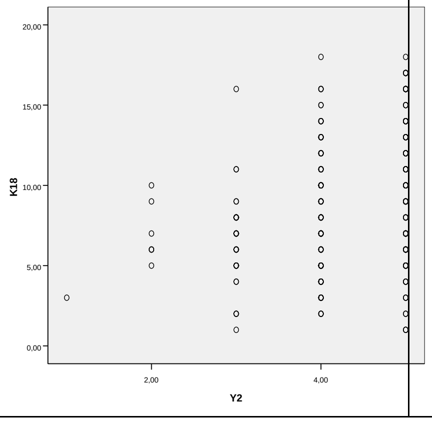
37.	K_{18}-K_{25}	0,272		The very easy direct correlation dependence is observed (the false relationship)
38.	K_{18}-K_{27}	0,300		The very easy direct correlation dependence is observed (the false relationship)
39.	K_{18}-K_{45}	0,394		The very easy direct correlation dependence is observed (the false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

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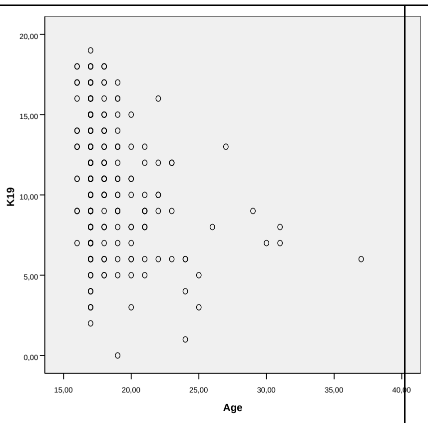
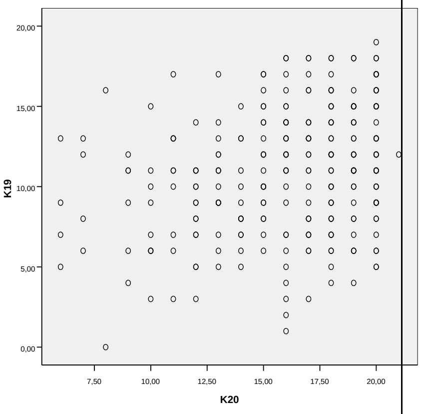
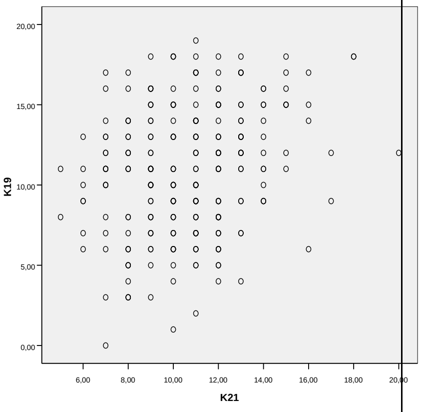
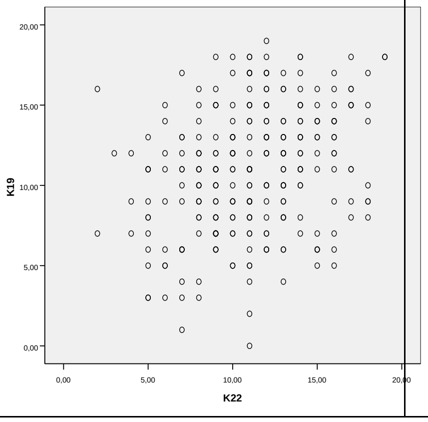
41.	K_{19}-*Age*	-0,293		The very easy inverse correlation dependence is observed (the false relationship)
42.	K_{19}-K_{20}	0,284		The very easy direct correlation dependence is observed (the false relationship)
43.	K_{19}-K_{21}	0,257		The very easy direct correlation dependence is observed (the false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

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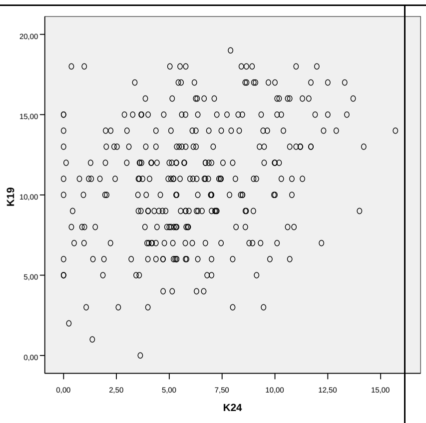
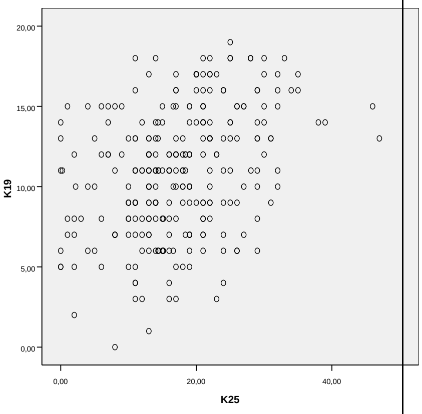
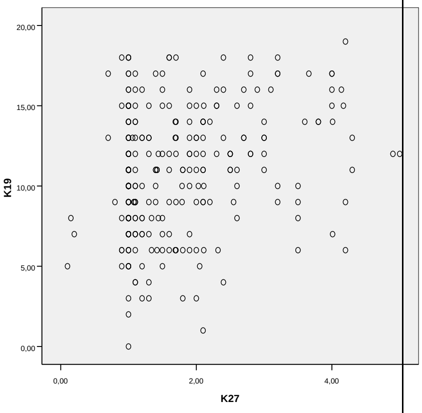
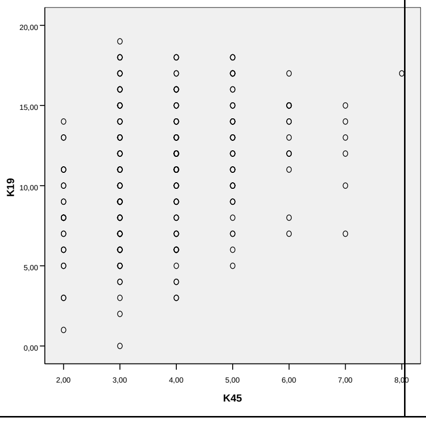
45.	K_{19}-K_{24}	0,297		The very easy direct correlation dependence is observed (the false relationship)
46.	K_{19}-K_{25}	0,364		The very easy direct correlation dependence is observed (the false relationship)
47.	K_{19}-K_{27}	0,259		The very easy direct correlation dependence is observed (the false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

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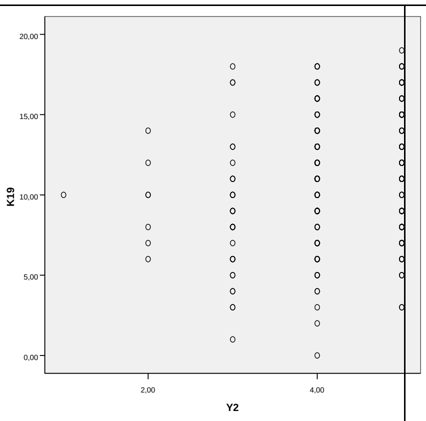
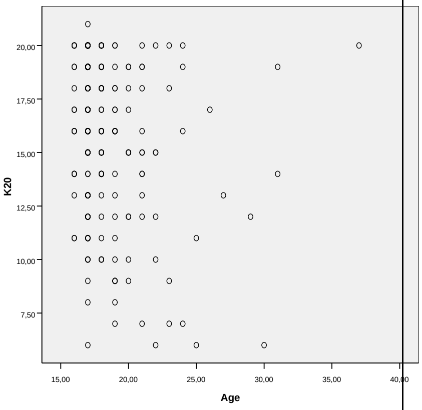
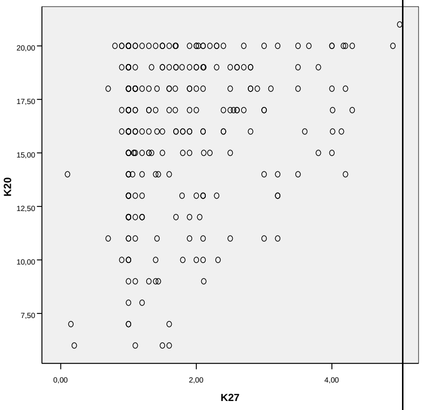
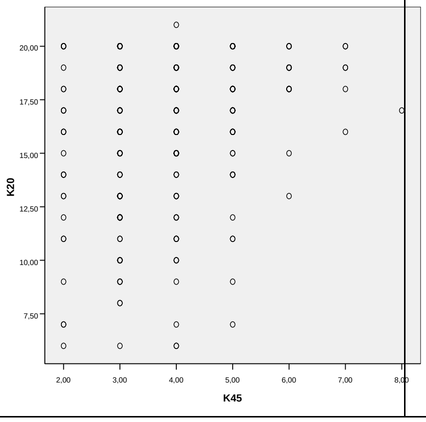
49.	*K_{19}-Y_2*	0,216		The very easy direct correlation dependence is observed (the false relationship, it is possible the nonlinear relationship)
50.	*K_{20}-Age*	-0,214		The very easy inverse correlation dependence is observed (the false relationship)
51.	*K_{20}-K_{27}*	0,202		The very easy direct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

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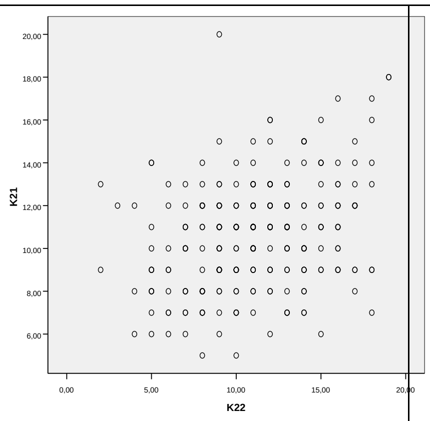
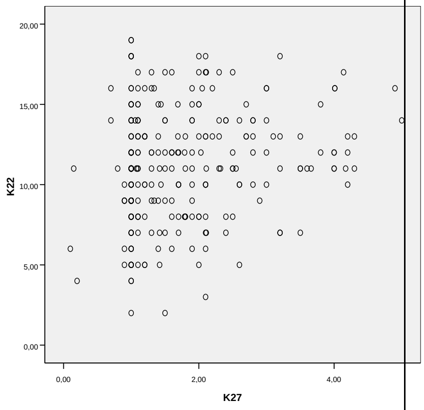
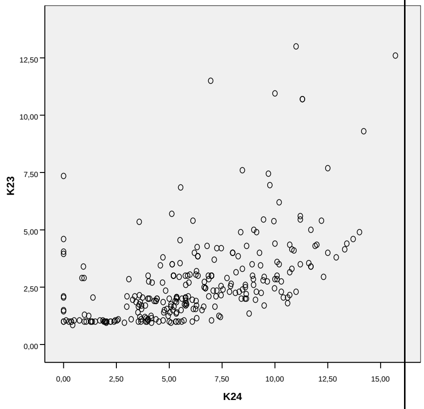
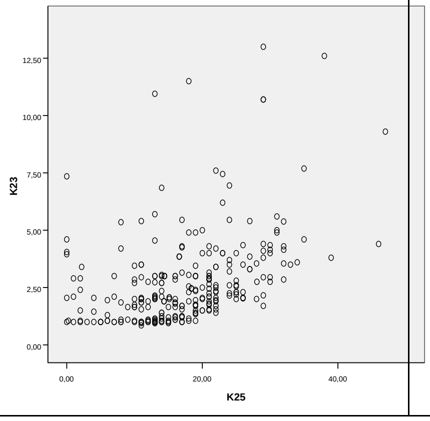
53.	K_{21}-K_{22}	0,312		The very easy direct correlation dependence is observed (the false relationship)
54.	K_{22}-K_{27}	0,202		The very easy direct correlation dependence is observed (the false relationship)
55.	K_{23}-K_{24}	0,541		The easy direct correlation dependence is observed (the false relationship,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

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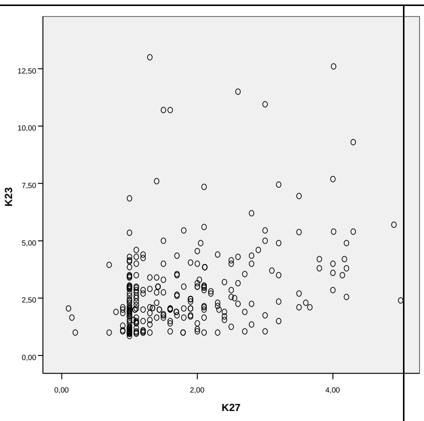
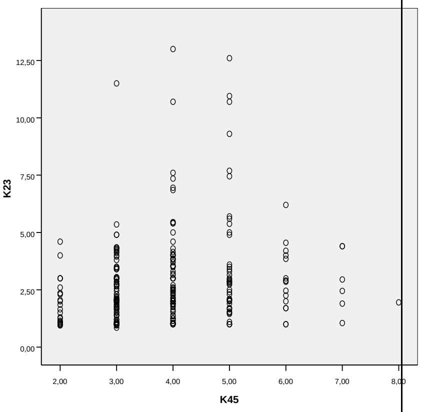
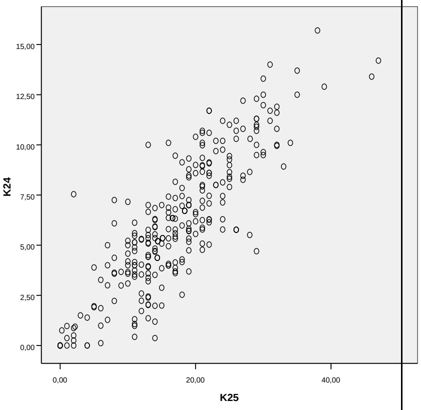
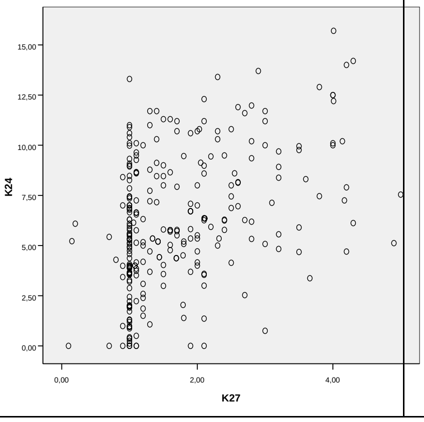
57.	K_{23}-K_{27}	0,408		The very easy direct correlation dependence is observed (the false relationship)
58.	K_{23}-K_{45}	0,210		The very easy direct correlation dependence is observed (the false relationship, it is possible the nonlinear relationship)
59.	K_{24}-K_{25}	0,849		The strong direct correlation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

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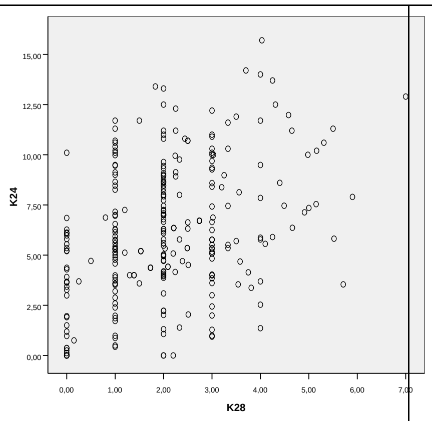
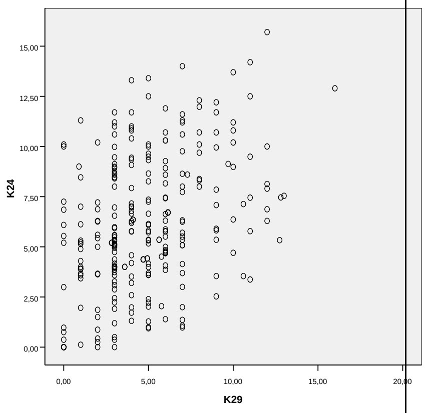
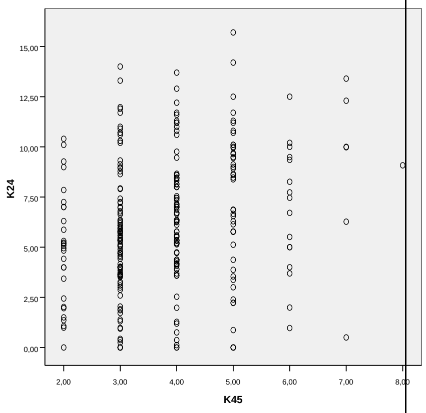
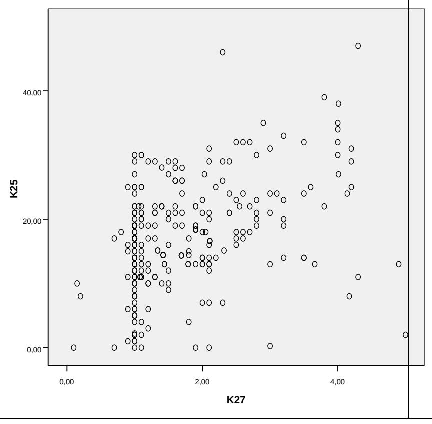
61.	*K_{24}-K_{28}*	0,397		The very easy direct correlation dependence is observed (the false relationship, it is possible the nonlinear relationship)
62.	*K_{24}-K_{29}*	0,397		The very easy direct correlation dependence is observed (the false relationship)
63.	*K_{24}-K_{45}*	0,239		The very easy direct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

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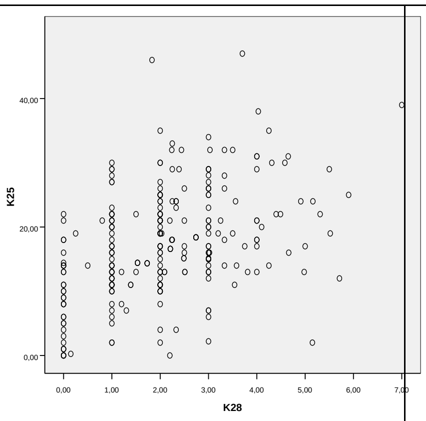
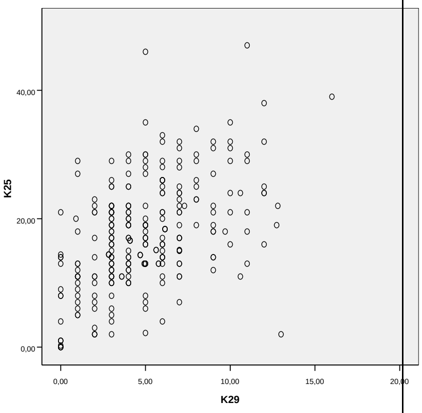
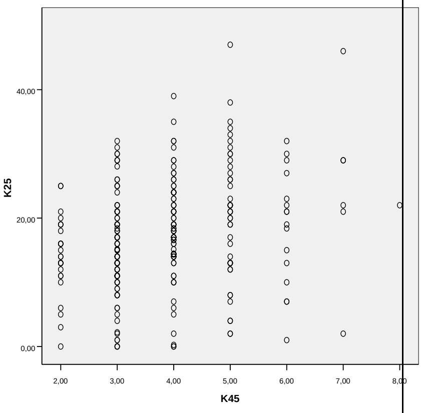
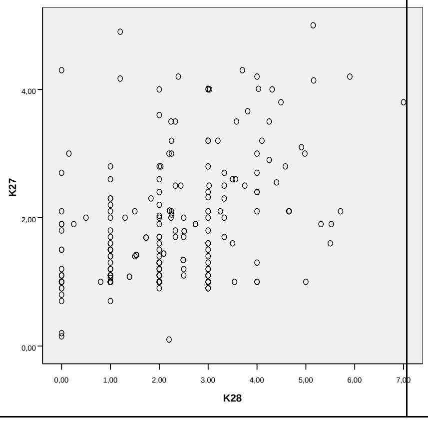
65.	K_{25}-K_{28}	0,448		The very easy direct correlation dependence is observed (the false relationship, it is possible the nonlinear relationship)
66.	K_{25}-K_{29}	0,512		The average direct correlation dependence is observed (the false relationship, it is possible the nonlinear relationship)
67.	K_{25}-K_{45}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

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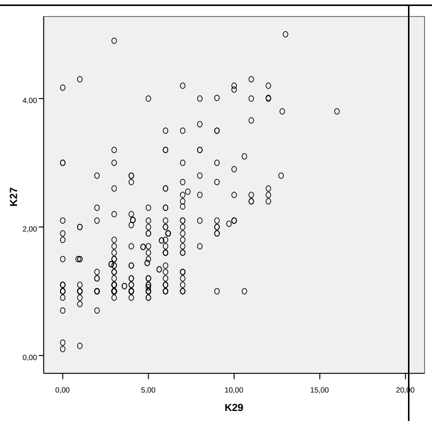
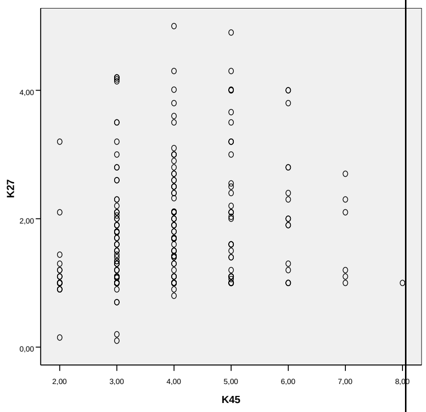
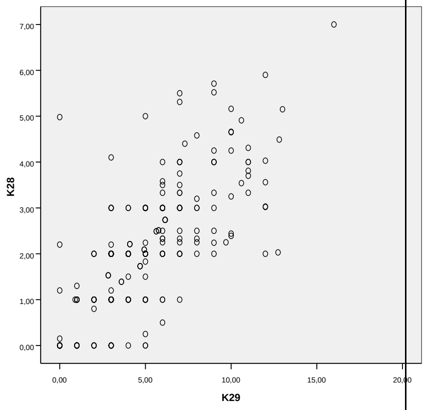
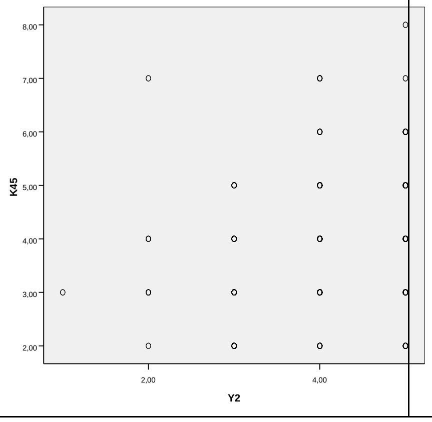
69.	K_{27}-K_{29}	0,556		The very easy direct correlation dependence is observed (the false relationship)
70.	K_{27}-K_{45}	0,249		The very easy direct correlation dependence is observed (the false relationship, it is possible the nonlinear relationship)
71.	K_{28}-K_{29}	0,741		The average direct correlation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

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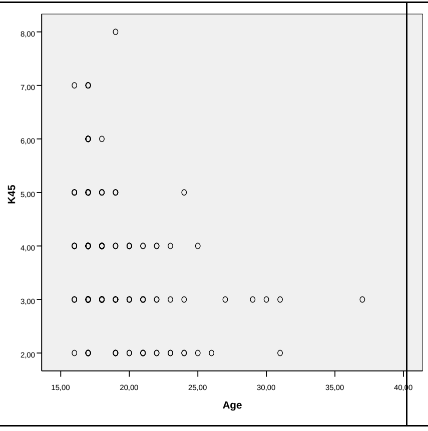
73.	K_{45}-*Age*	-0,315		The very easy inverse correlation dependence is observed (the false relationship)

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 dependence between the verbal intellect (K_{14}) and combinatorial abilities (K_{16});
- the easy expressed dependence between 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 dependence 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 selectivity (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 correlation dependence between 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 selectivity (K_{25}) is easy expressed;
- the small correlation dependence between the verbal associativity (K_{24}) and verbal selectivity (K_{25}) is easy expressed;
- the average correlation dependence between the verbal selectivity (K_{25}) and figurative selectivity (K_{29}) is easy expressed;
- the small correlation dependence between the figurative originality (K_{27}) and figurative selectivity (K_{29}) is easy expressed;
- the average correlation dependence between the figurative associativity (K_{28}) and figurative selectivity (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 A15.88.

Table A15.88

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

		Y2	*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	*Y2*	1,000	-,146	,126	,155	,227	,242	,067	,158	,221	,238	,166	,169	,165	,087	,099	-,030	-,038	,252	,065	,135	,124	,292	,216	,167	,170	,126	,009	,059	,065	,149	,033	,070	,171	,030	-,085	,163	-,034
	Age	-,146	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	,126	-,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	,155	-,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	,227	-,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	,242	-,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	,067	-,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	,158	-,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	,221	-,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	,238	-,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	,166	-,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	,169	-,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	,165	-,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	,087	-,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	,099	-,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	-,030	-,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

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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. A15.88

The significance (1-tailed)																							
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. A15.88

K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
,002	,018	,441	,161	,139	,006	,289	,121	,002	,306	,077	,003	,284
,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	.

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

All presented relationships do not act the 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 A15.89.

Table A15.89

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

The continuation of tabl. A15.89

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

The continuation of tabl. A15.89

The significance (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 arrows: the researching of the form of relationship, the determination of the directionality of relationship, the determining of the truly and falsely of relationship.

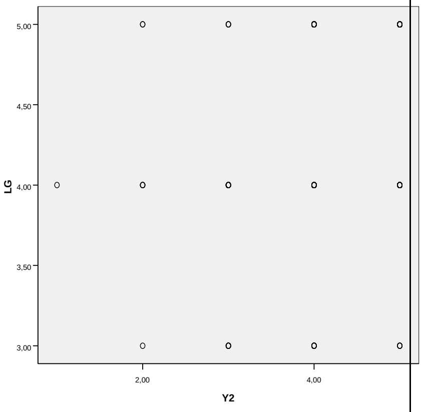
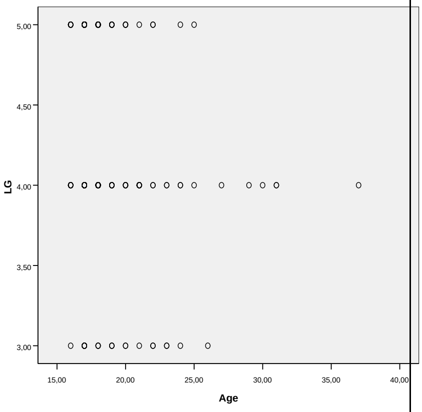
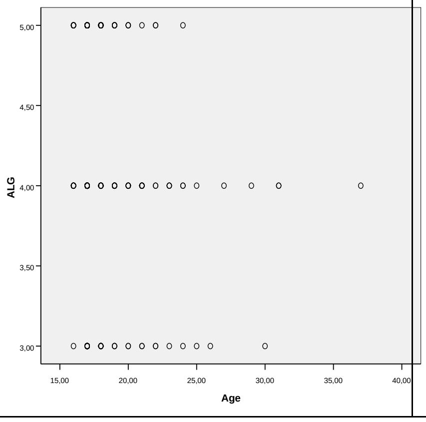
The analysis of residues allows to estimate the degree of inconsistency between the theoretical predicted and practical experimental nominal values, and also directly to estimate the quality of the obtained equation of multiple regression.

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 and Y_4), that allows to reveal practically the features of correlation dependences based on the building of their graphical interpretation.

In tabl. A15.90 the correlation dependences of some independent variables from the complete set are presented, and also their directionality and strength are characterized.

Table A15.90

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 is absent (the false relationship)
2.	*Age*-*LG*	-0,207		The expressed correlation dependence is absent (the false relationship)
3.	*Age*-*ALG*	-0,226		The expressed correlation dependence is absent (the false relationship)

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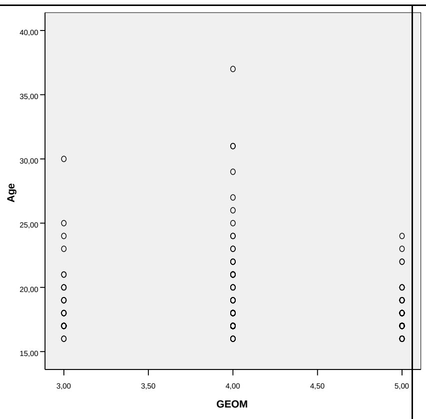
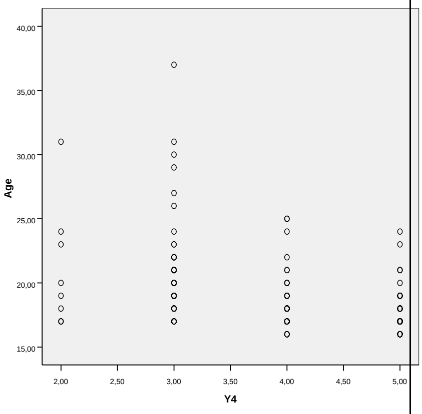
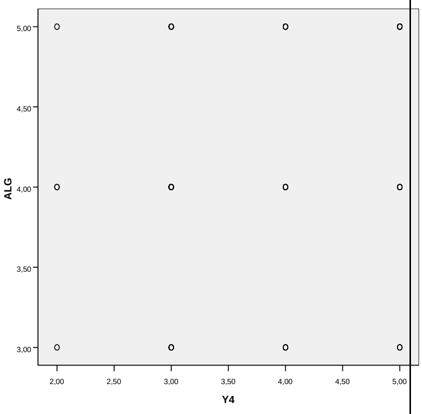
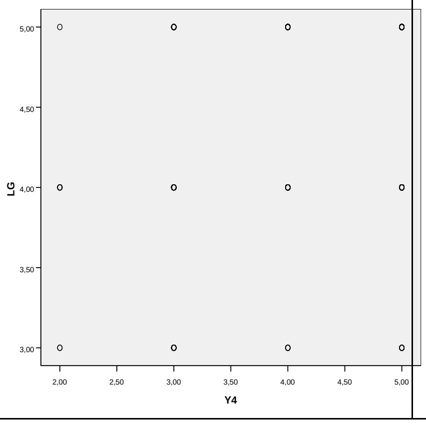
4.	*Age-GEOM*	-0,196		The expressed correlation dependence is absent (the false relationship)
5.	*Age*-Y_4	-0,385		The expressed correlation dependence is absent (the false relationship)
6.	*ALG*-Y_4	0,337		The expressed correlation dependence is absent (the false relationship)
7.	*LG*-Y_4	0,215		The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

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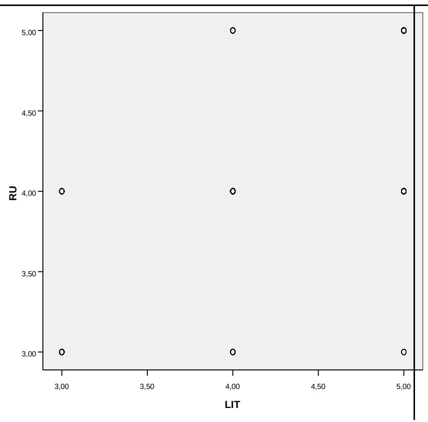
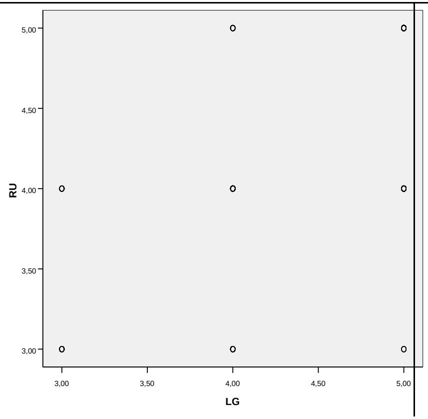
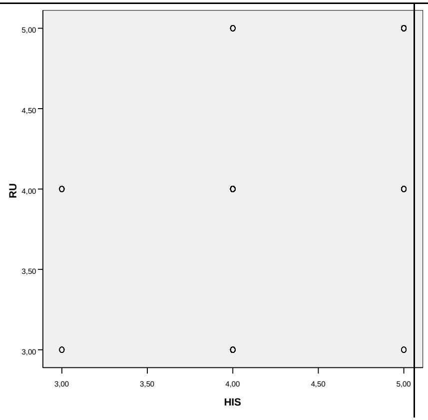
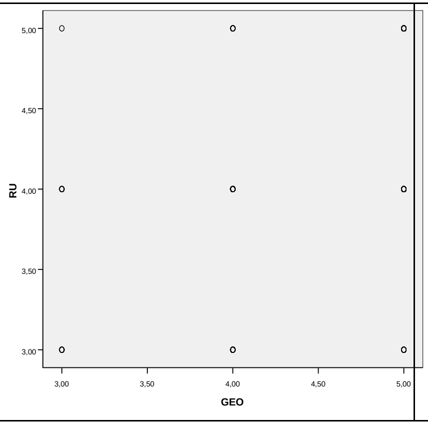
8.	*RU-LIT*	0,664		The expressed correlation dependence is absent (the false relationship)
9.	*RU-LG*	0,527		The expressed correlation dependence is absent (the false relationship)
10.	*RU-HIS*	0,472		The expressed correlation dependence is absent (the false relationship)
11.	*RU-GEO*	0,398		The expressed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

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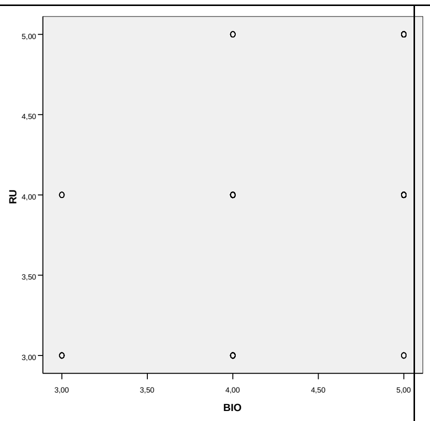
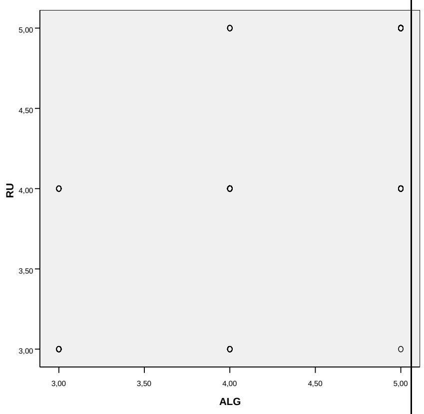
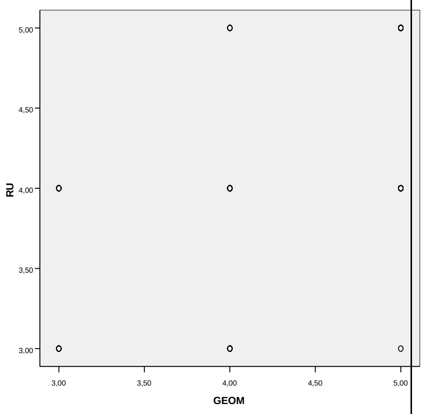
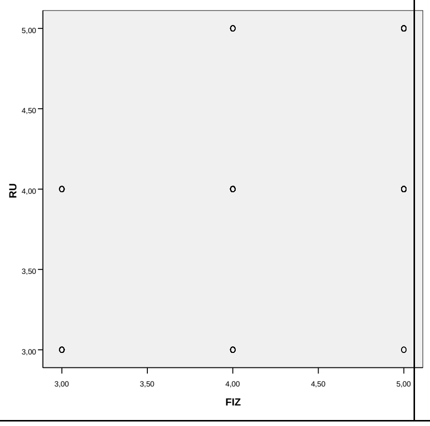
12.	*RU-BIO*	0,516		The expressed correlation dependence is absent (the false relationship)
13.	*RU-ALG*	0,611		The expressed correlation dependence is absent (the false relationship)
14.	*RU-GEOM*	0,559		The expressed correlation dependence is absent (the false relationship)
15.	*RU-FIZ*	0,557		The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

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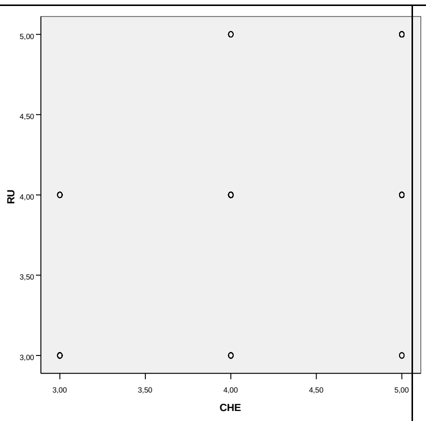
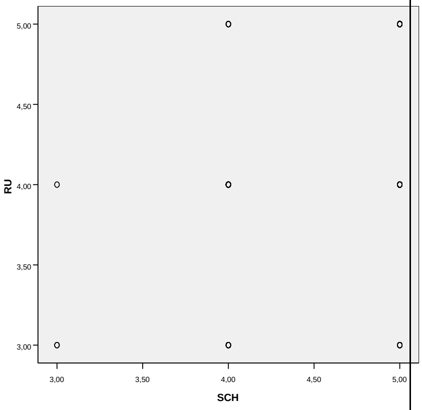
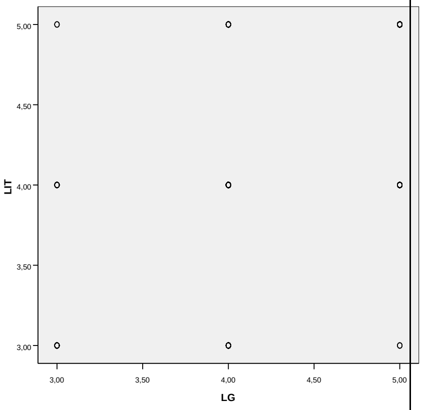
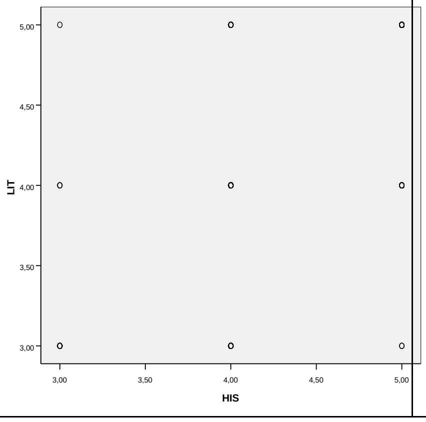
16.	*RU-CHE*	0,557		The expressed correlation dependence is absent (the false relationship)
17.	*RU-SCH*	0,309		The expressed correlation dependence is absent (the false relationship)
18.	*LIT-LG*	0,567		The expressed correlation dependence is absent (the false relationship)
19.	*LIT-HIS*	0,618		The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

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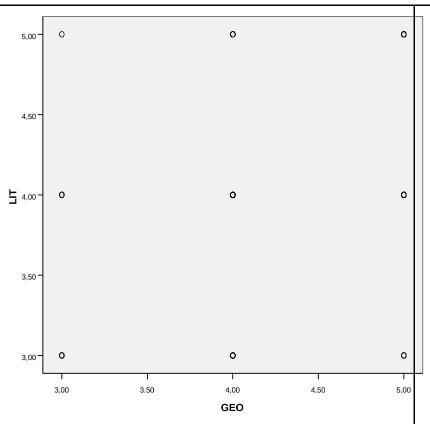
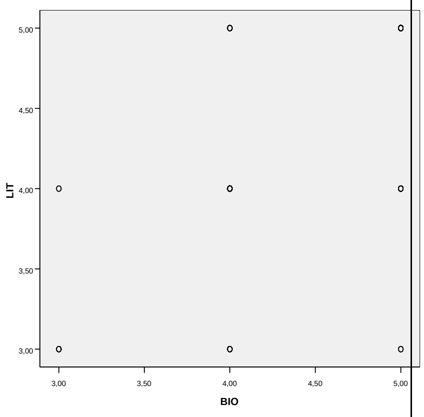
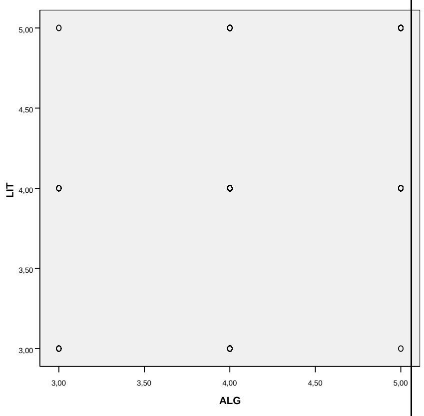
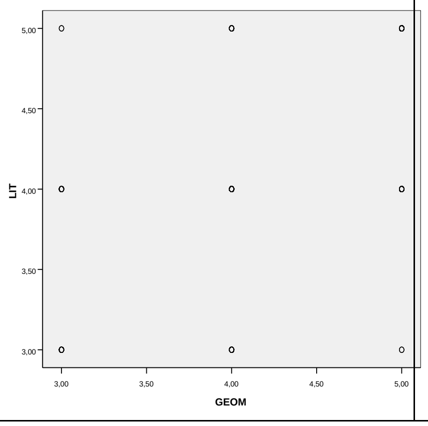
20.	*LIT-GEO*	0,506		The expressed correlation dependence is absent (the false relationship)
21.	*LIT-BIO*	0,567		The expressed correlation dependence is absent (the false relationship)
22.	*LIT-ALG*	0,550		The expressed correlation dependence is absent (the false relationship)
23.	*LIT-GEOM*	0,579	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

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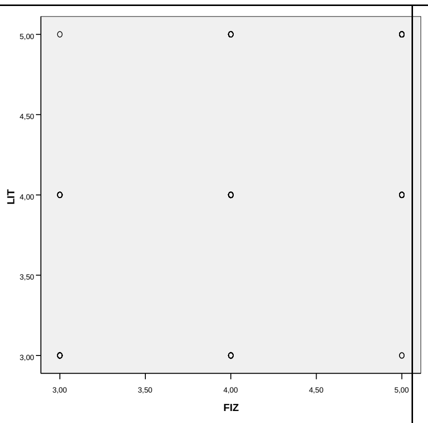
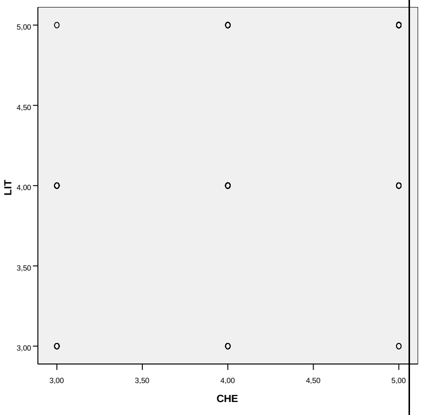
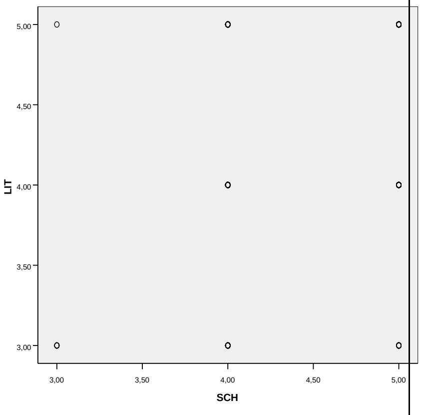
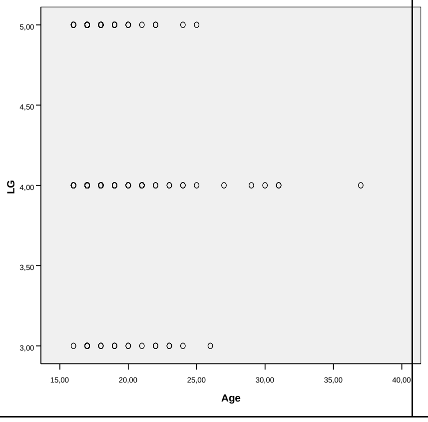
24.	*LIT-FIZ*	0,606		The expressed correlation dependence is absent (the false relationship)
25.	*LIT-CHE*	0,582		The expressed correlation dependence is absent (the false relationship)
26.	*LIT-SCH*	0,329		The expressed correlation dependence is absent (the false relationship)
27.	*LG-Age*	0,567		The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

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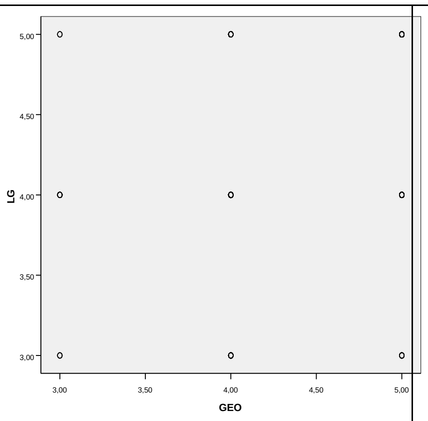
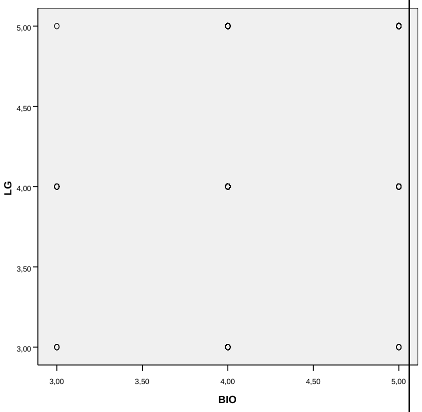
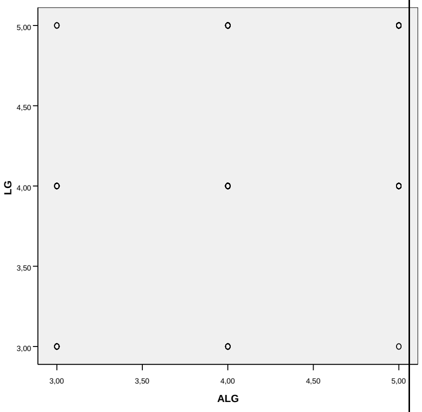
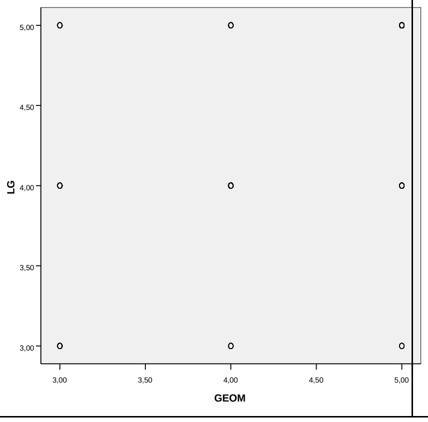
28.	*LG-GEO*	0,369		The expressed correlation dependence is absent (the false relationship)
29.	*LG-BIO*	0,429		The expressed correlation dependence is absent (the false relationship)
30.	*LG-ALG*	0,507		The expressed correlation dependence is absent (the false relationship)
31.	*LG-GEOM*	0,503		The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

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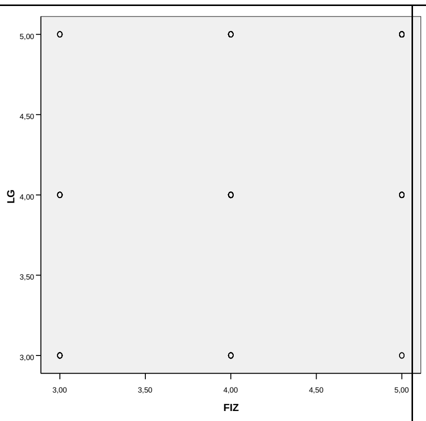
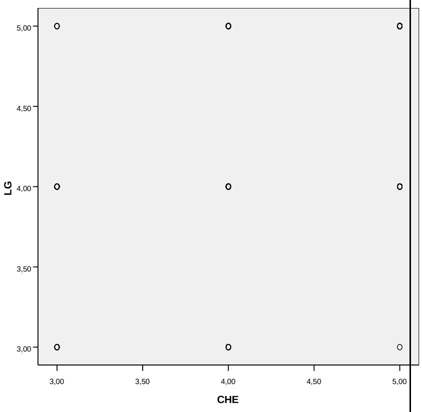
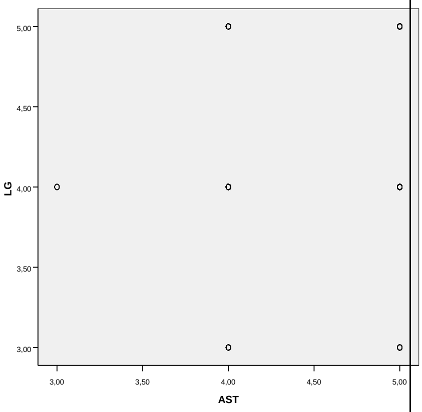
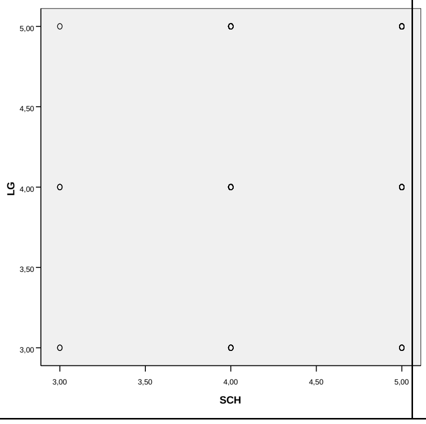
32.	*LG-FIZ*	0,481		The expressed correlation dependence is absent (the false relationship)
33.	*LG-CHE*	0,496		The expressed correlation dependence is absent (the false relationship)
34.	*LG-AST*	0,231		The expressed correlation dependence is absent (the false relationship)
35.	*LG-SCH*	0,196		The expressed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

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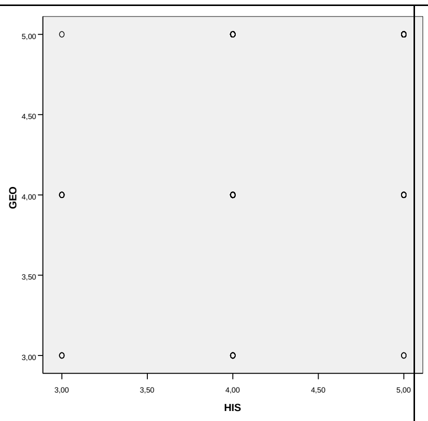
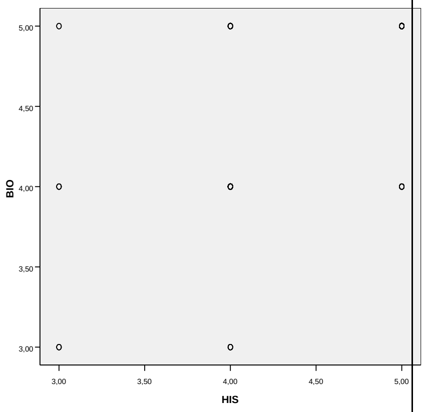
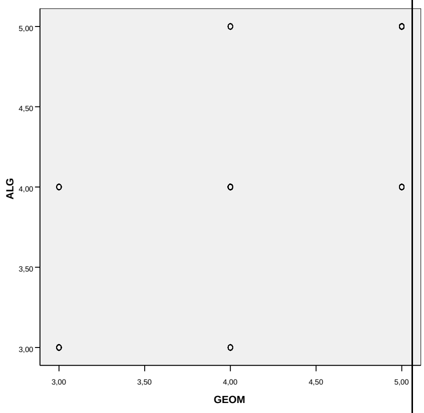
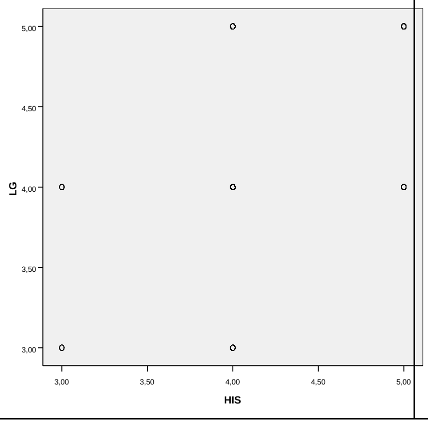
36.	*GEO-HIS*	0,500		The expressed correlation dependence is absent (the false relationship)
37.	*BIO-HIS*	0,572		The expressed correlation dependence is absent (the false relationship)
38.	*ALG-GEOM*	0,785		The expressed correlation dependence is absent (the false relationship)
39.	*LG-HIS*	0,467		The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

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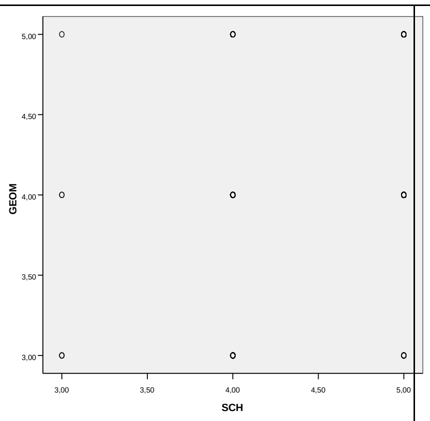
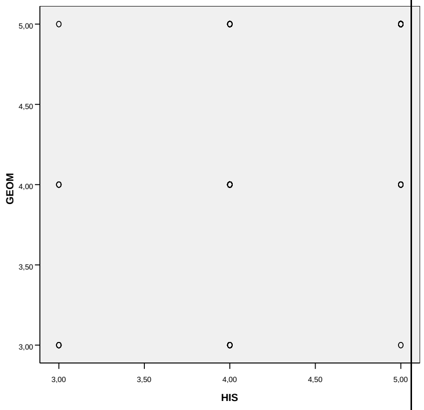
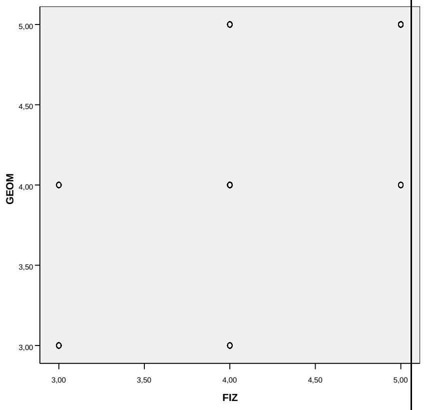
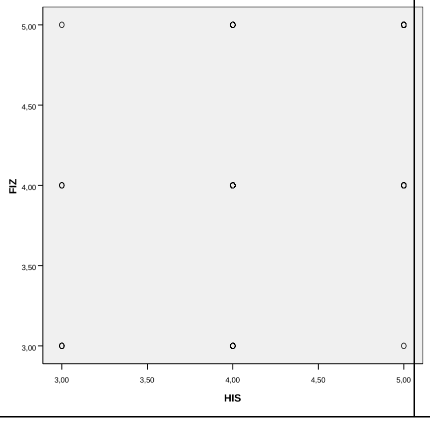
40.	*GEOM-SCH*	0,414		The expressed correlation dependence is absent (the false relationship)
41.	*GEOM-HIS*	0,563		The expressed correlation dependence is absent (the false relationship)
42.	*GEOM-FIZ*	0,717		The expressed correlation dependence is absent (the false relationship)
43.	*FIZ-HIS*	0,576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

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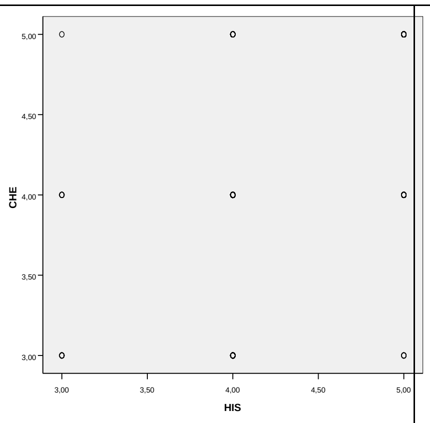
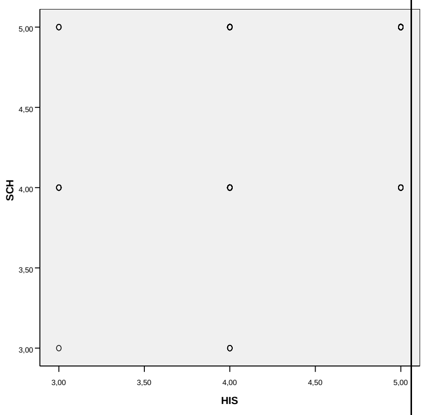
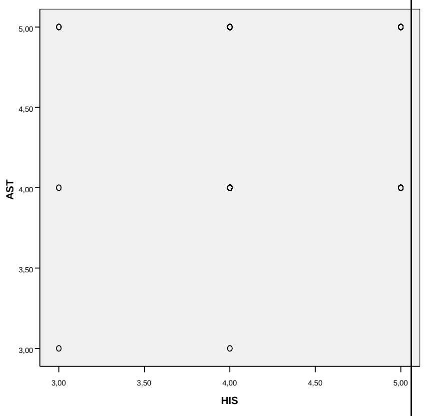
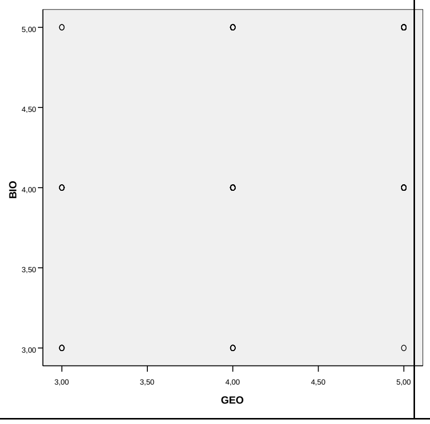
44.	*CHE-HIS*	0,557		The expressed correlation dependence is absent (the false relationship)
45.	*SCH-HIS*	0,323		The expressed correlation dependence is absent (the false relationship)
46.	*AST-HIS*	0,218		The expressed correlation dependence is absent (the false relationship)
47.	*BIO-GEO*	0,524		The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

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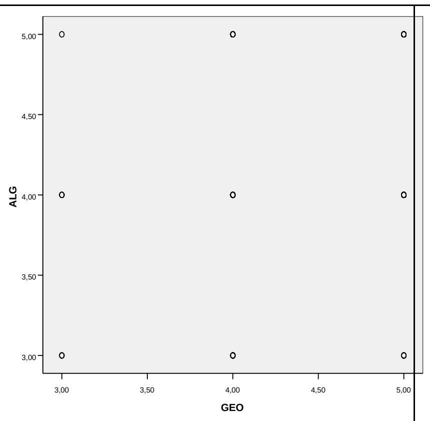
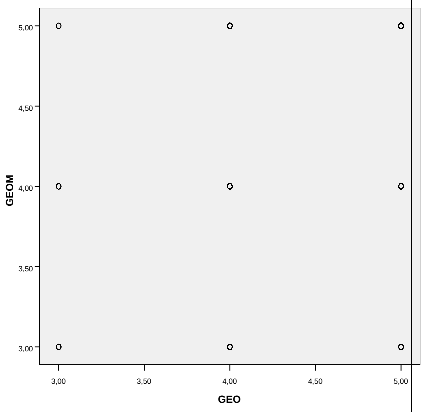
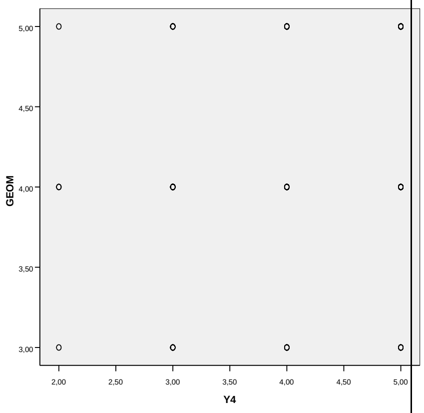
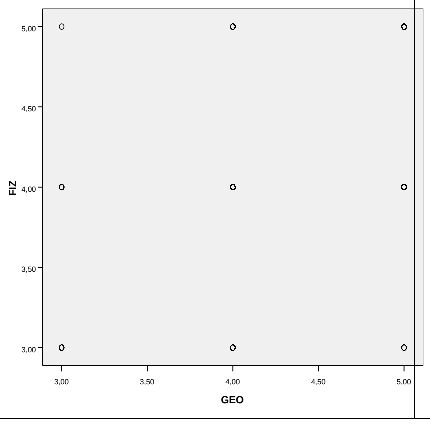
48.	*ALG-GEO*	0,330		The expressed correlation dependence is absent (the false relationship)
49.	*GEOM-GEO*	0,435		The expressed correlation dependence is absent (the false relationship)
50.	*GEOM-Y*$_4$	0,268		The expressed correlation dependence is absent (the false relationship)
51.	*FIZ-GEO*	0,491		The expressed correlation dependence is absent (the false relationship)

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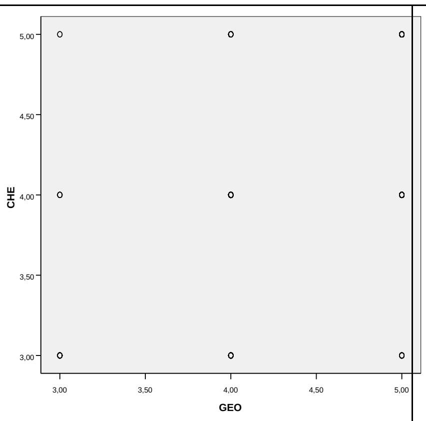
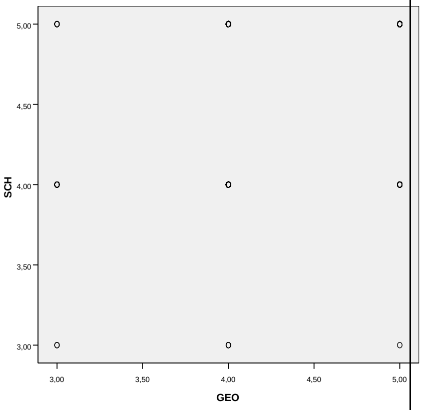
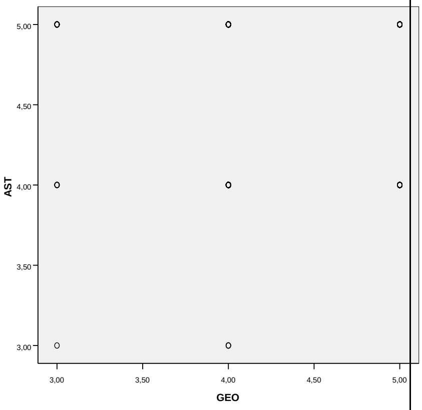
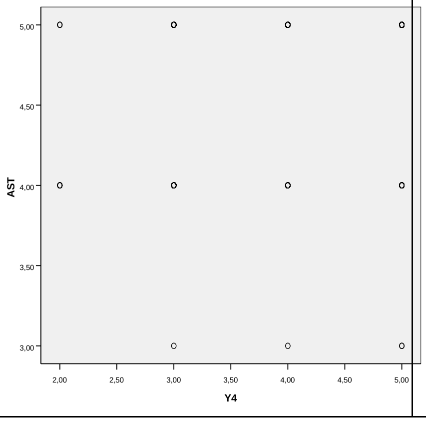
52.	*CHE-GEO*	0,458		The expressed correlation dependence is absent (the false relationship)
53.	*SCH-GEO*	0,358		The expressed correlation dependence is absent (the false relationship)
54.	*AST-GEO*	0,216		The expressed correlation dependence is absent (the false relationship)
55.	*AST-*Y_4	0,220		The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

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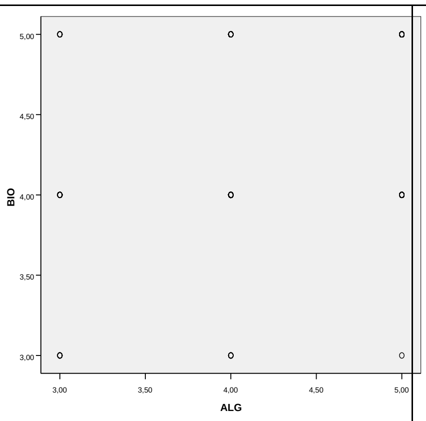
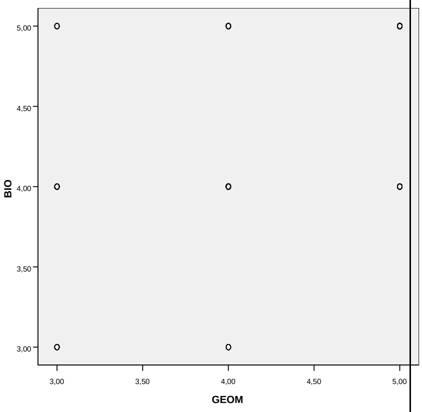
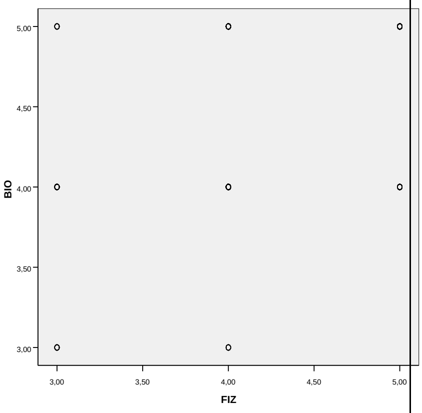
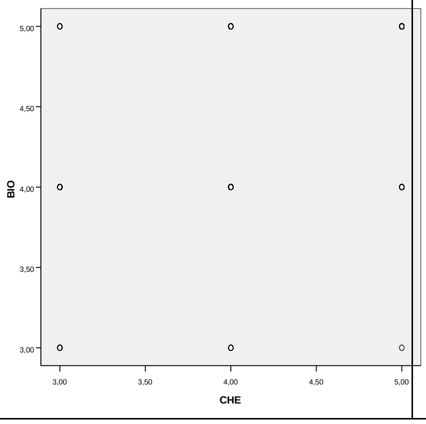
56.	*BIO-ALG*	0,460		The expressed correlation dependence is absent (the false relationship)
57.	*BIO-GEOM*	0,516		The expressed correlation dependence is absent (the false relationship)
58.	*BIO-FIZ*	0,543		The expressed correlation dependence is absent (the false relationship)
59.	*BIO-CHE*	0,555	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

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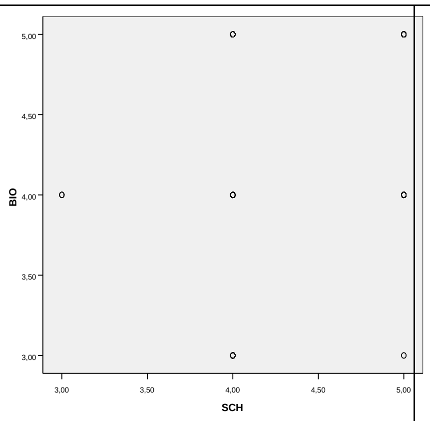
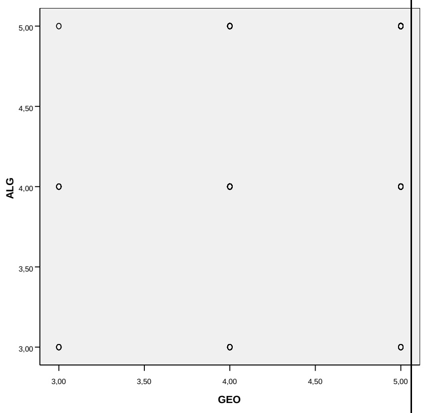
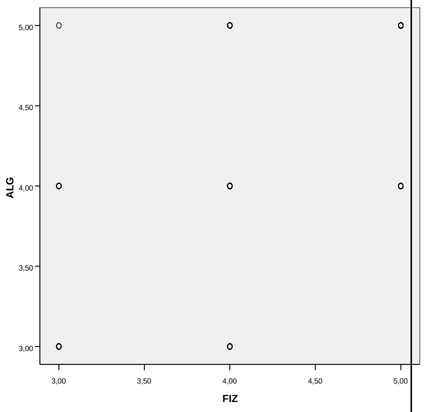
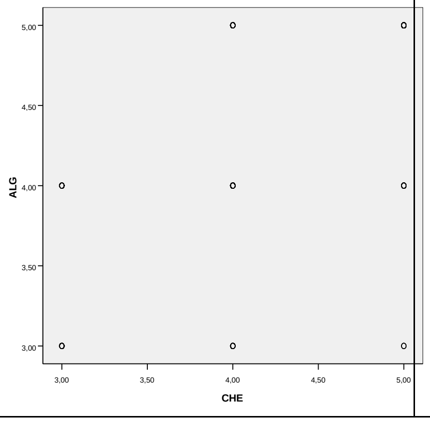
60.	*BIO-SCH*	0,384		The expressed correlation dependence is absent (the false relationship)
61.	*ALG-GEO*	0,330		The expressed correlation dependence is absent (the false relationship)
62.	*ALG-FIZ*	0,682		The expressed correlation dependence is absent (the false relationship)
63.	*ALG-CHE*	0,584		The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

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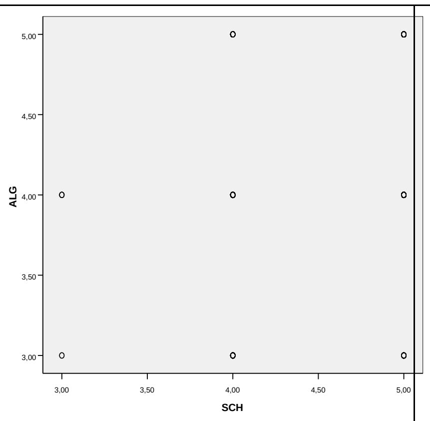
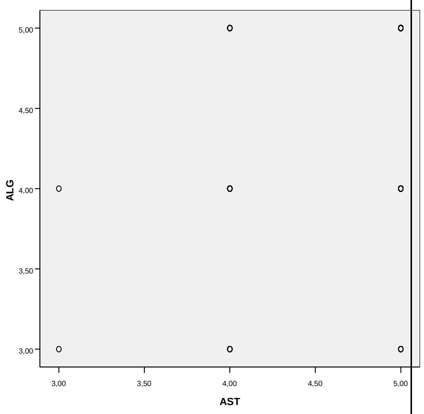
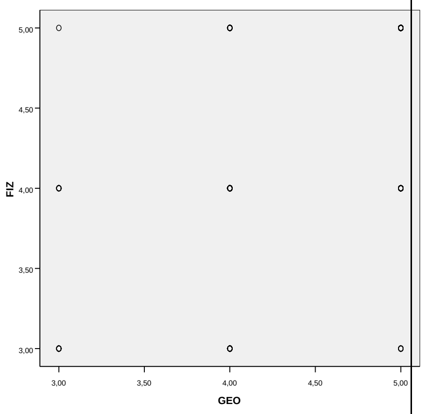
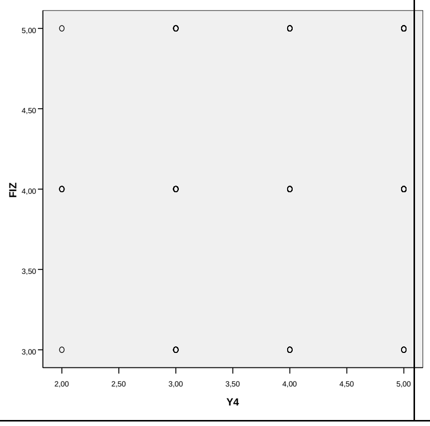
64.	*ALG-SCH*	0,321		The expressed correlation dependence is absent (the false relationship)
65.	*ALG-AST*	0,192		The expressed correlation dependence is absent (the false relationship)
66.	*FIZ-GEO*	0,491		The expressed correlation dependence is absent (the false relationship)
67.	*FIZ-*Y_4	0,281		The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

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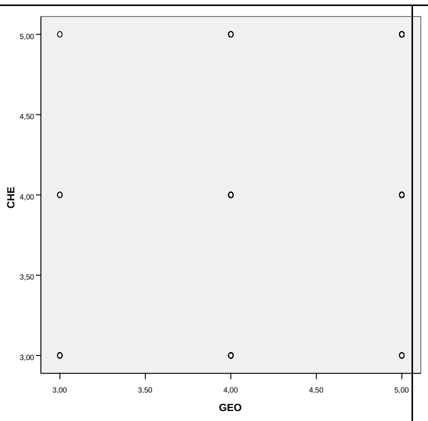
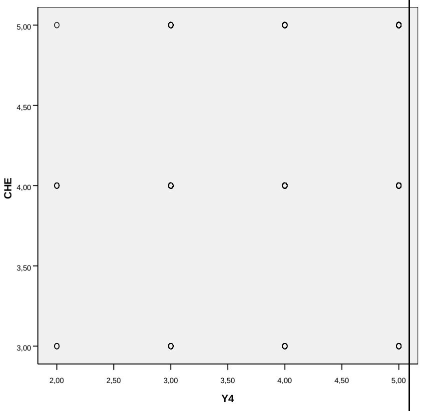
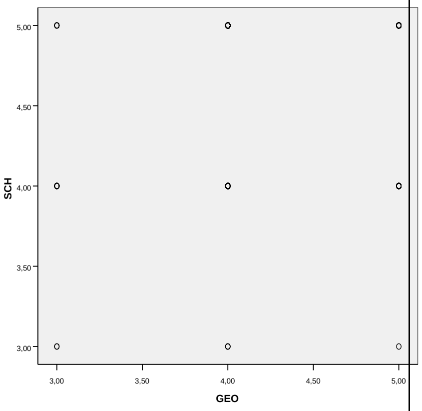
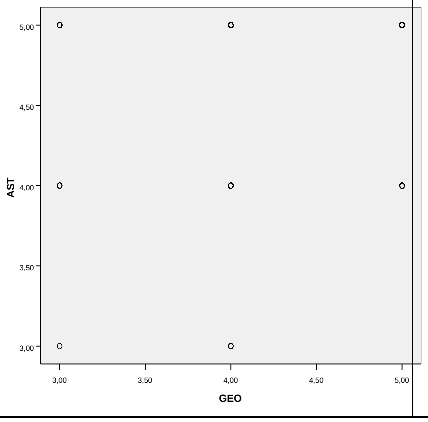
68.	*CHE-GEO*	0,458		The expressed correlation dependence is absent (the false relationship)
69.	*CHE-Y_4*	0,243		The expressed correlation dependence is absent (the false relationship)
70.	*SCH-GEO*	0,358		The expressed correlation dependence is absent (the false relationship)
71.	*AST-GEO*	0,216		The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

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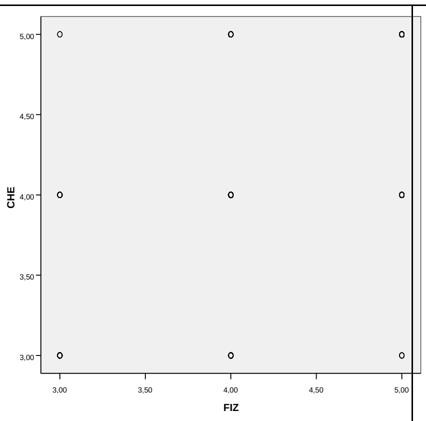
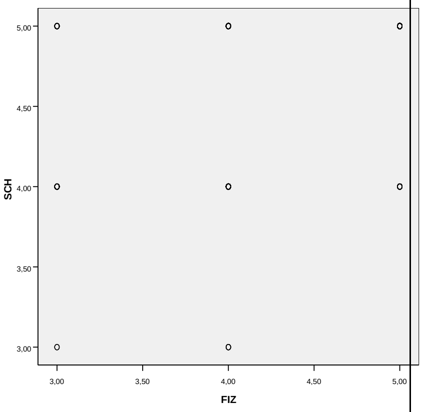
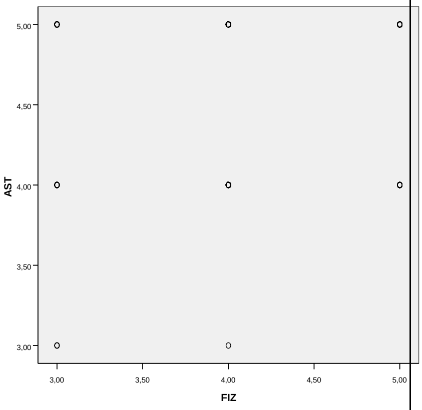
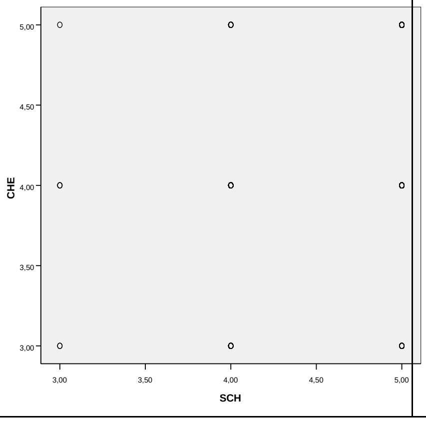
72.	*CHE-FIZ*	0,599		The expressed correlation dependence is absent (the false relationship)
73.	*SCH-FIZ*	0,346		The expressed correlation dependence is absent (the false relationship)
74.	*AST-FIZ*	0,265		The expressed correlation dependence is absent (the false relationship)
75.	*SCH-CHE*	0,352		The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

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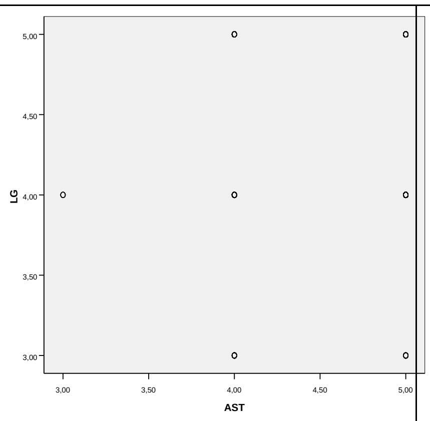
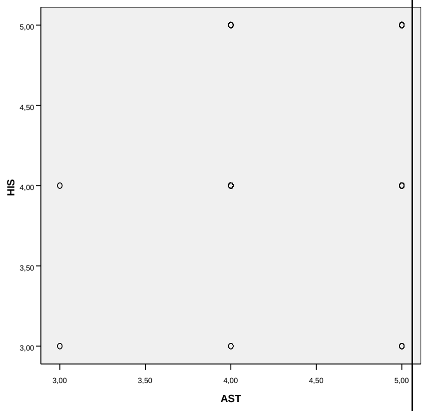
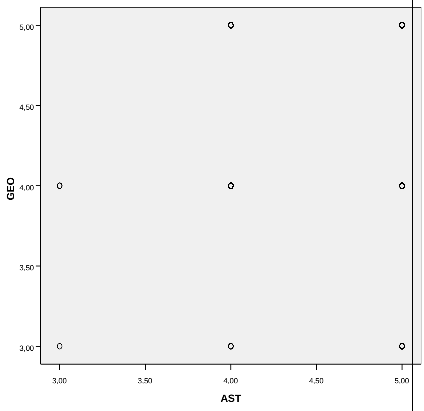
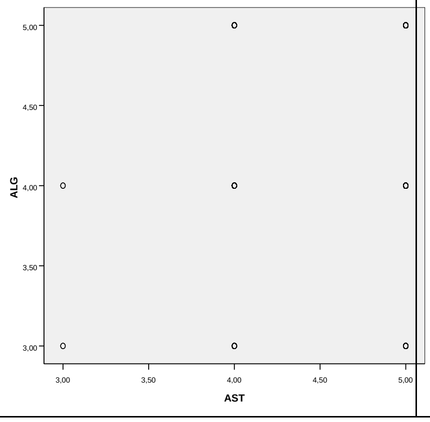
76.	*LG-AST*	0,231		The expressed correlation dependence is absent (the false relationship)
77.	*HIS-AST*	0,218		The expressed correlation dependence is absent (the false relationship)
78.	*GEO-AST*	0,216		The expressed correlation dependence is absent (the false relationship)
79.	*ALG-AST*	0,192		The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

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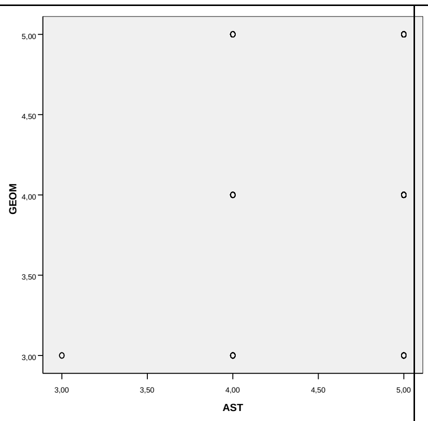
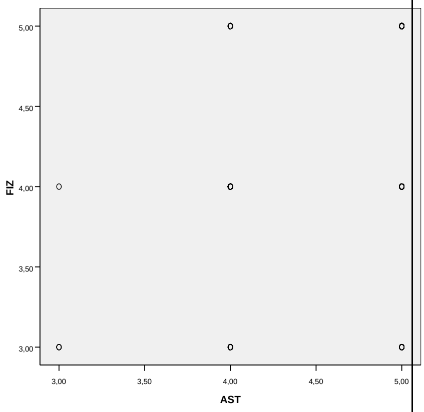
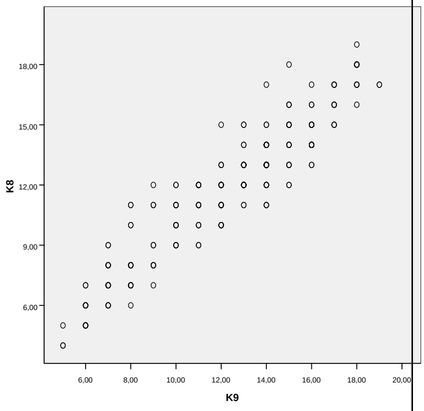
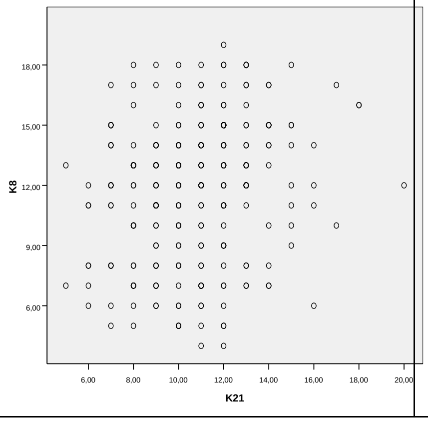
80.	*GEOM-AST*	0,238	 	The expressed correlation dependence is absent (the false relationship)
81.	*FIZ-AST*	0,265	 	The expressed correlation dependence is absent (the false relationship)
82.	K_8-K_9	0,944	 	There is the strong correlation dependence (the strong relationship)
83.	K_8-K_{21}	0,200	 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

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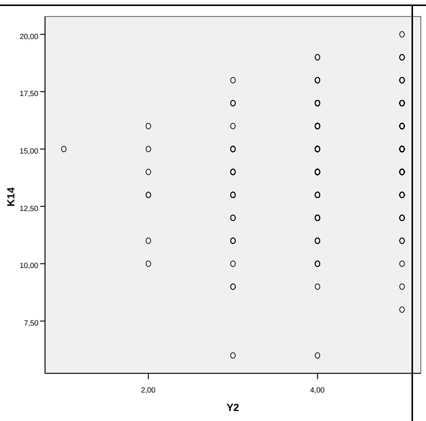
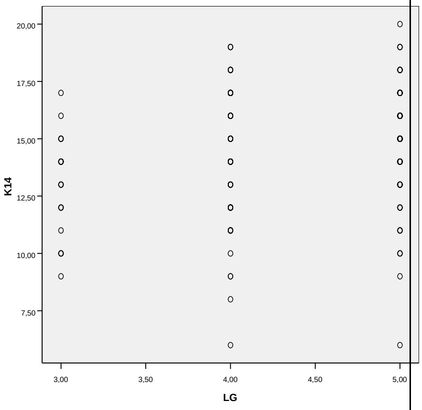
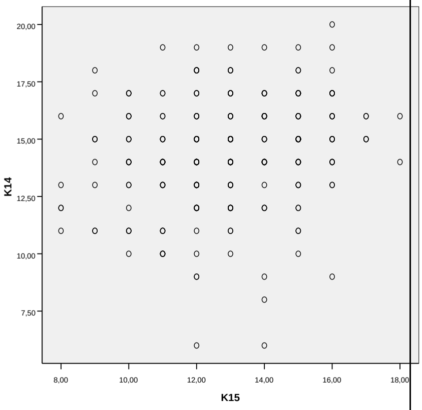
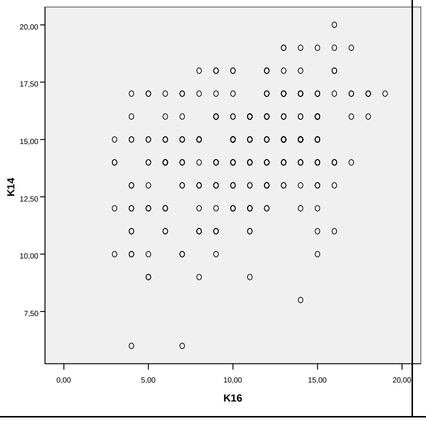
84.	K_{14}-Y_2	0,252	 	The expressed correlation dependence is absent (the false relationship)
85.	K_{14}-LG	0,207	 	The expressed correlation dependence is absent (the false relationship)
86.	K_{14}-K_{15}	0,220	 	The expressed correlation dependence is absent (the false relationship)
87.	K_{14}-K_{16}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

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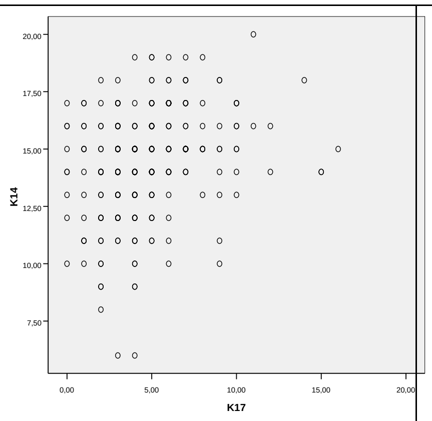
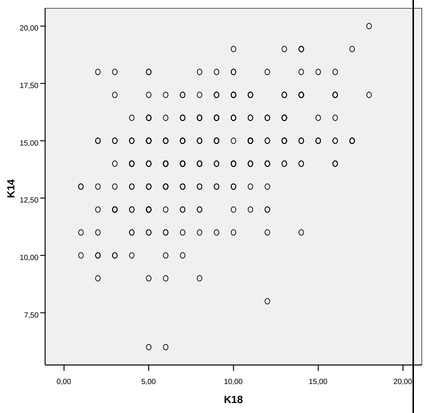
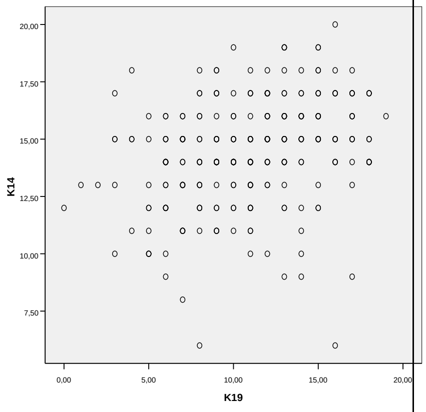
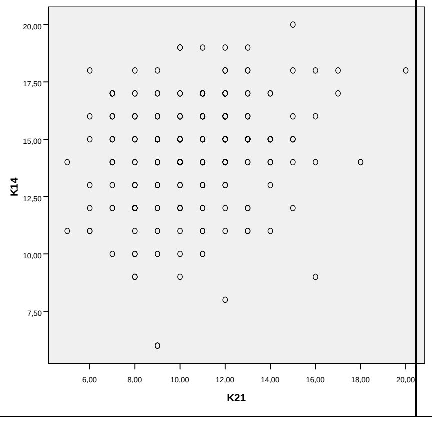
88.	K_{14}-K_{17}	0,292		The expressed correlation dependence is absent (the false relationship)
89.	K_{14}-K_{18}	0,443		There is the easy correlation dependence (the easy relationship)
90.	K_{14}-K_{19}	0,309		There is the easy correlation dependence (the easy relationship)
91.	K_{14}-K_{21}	0,218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

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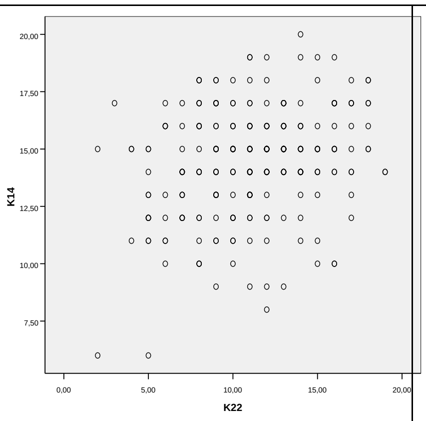
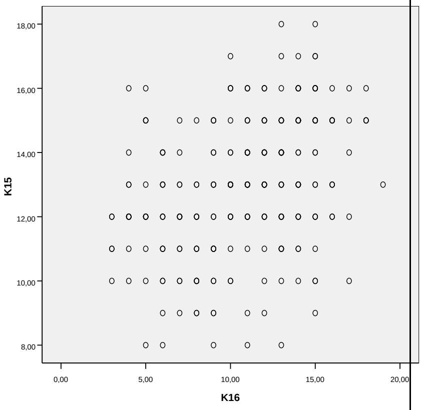
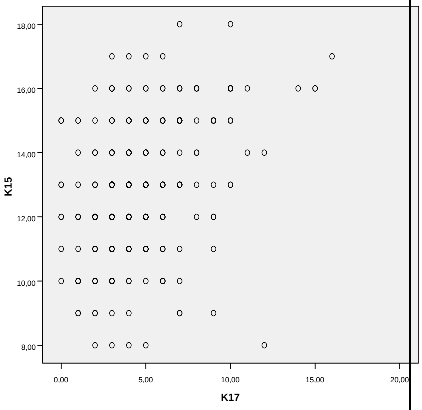
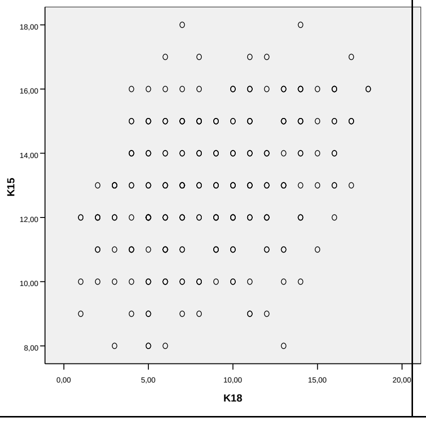
92.	*K_{14}-K_{22}*	0,267		There is the very easy correlation dependence (the easy relationship)
93.	*K_{15}-K_{16}*	0,382		There is the very easy correlation dependence (the easy relationship)
94.	*K_{15}-K_{17}*	0,312		The expressed correlation dependence is absent (the false linear relationship, it possible the nonlinear relationship)
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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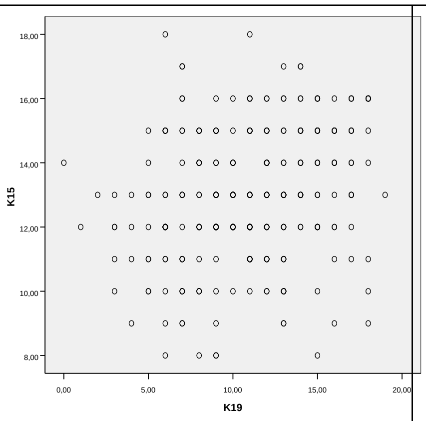
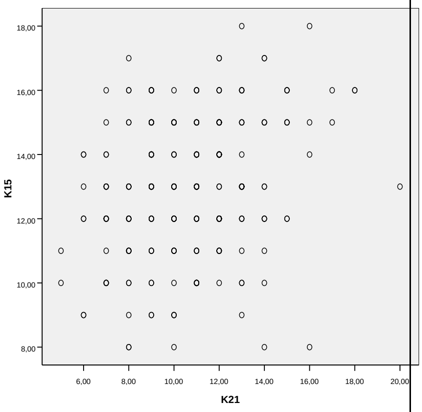
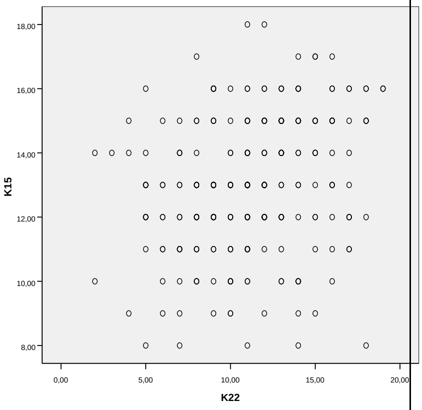
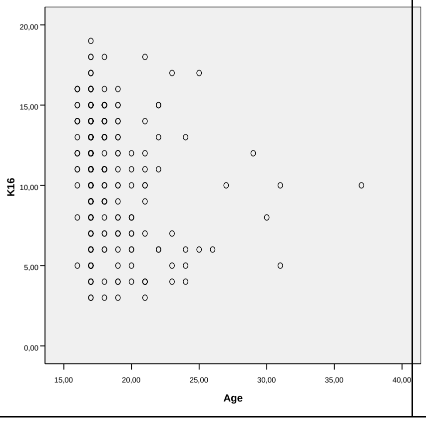
96.	K_{15}-K_{19}	0,242		The expressed correlation dependence is absent (the false relationship)
97.	K_{15}-K_{21}	0,261		The expressed correlation dependence is absent (the false linear relationship, it is possible the nonlinear relationship)
98.	K_{15}-K_{22}	0,263		The expressed correlation dependence is absent (the false relationship)
99.	K_{16}-*Age*	-0,216		The expressed correlation dependence is absent (the false relationship)

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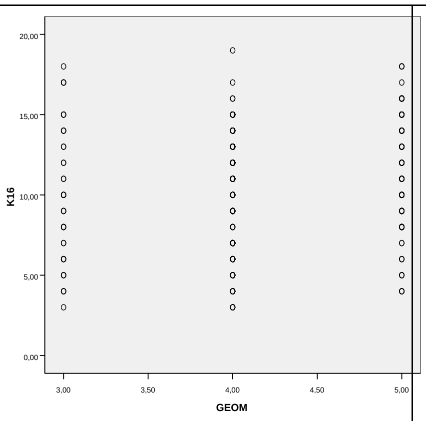
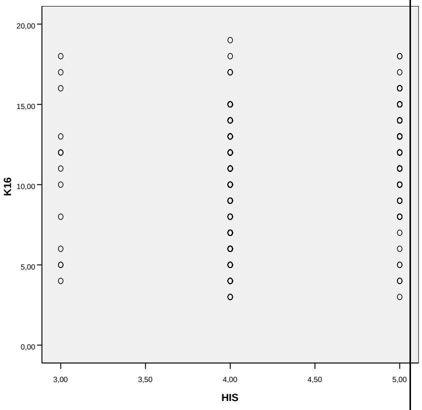
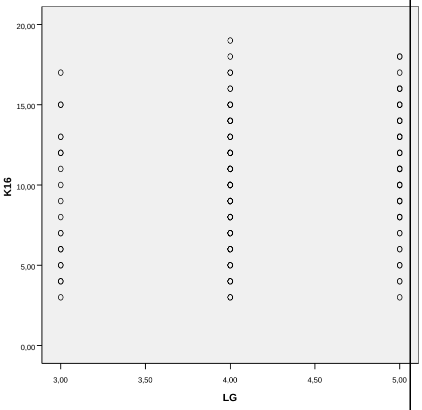
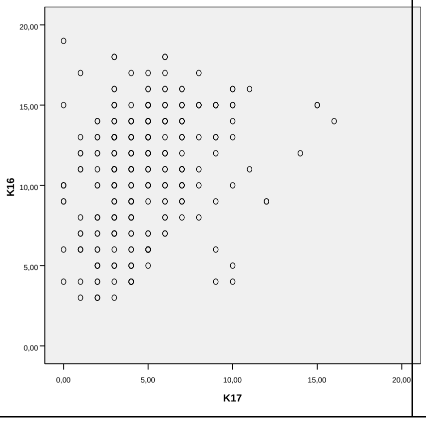
100.	*K*$_{16}$-*GEOM*	0,227		The expressed correlation dependence is absent (the false relationship)
101.	*K*$_{16}$-*HIS*	0,225		The expressed correlation dependence is absent (the false relationship)
102.	*K*$_{16}$-*LG*	0,299		The expressed correlation dependence is absent (the false relationship)
103.	*K*$_{16}$-*K*$_{17}$	0,287		The expressed correlation dependence is absent (the false relationship)

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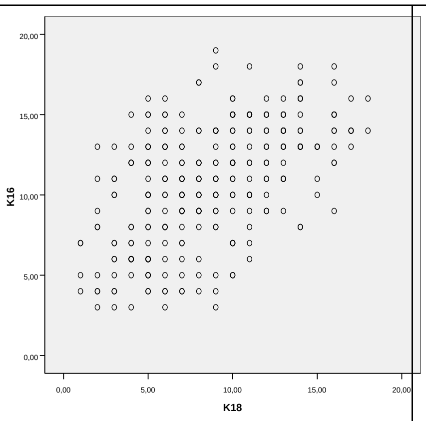
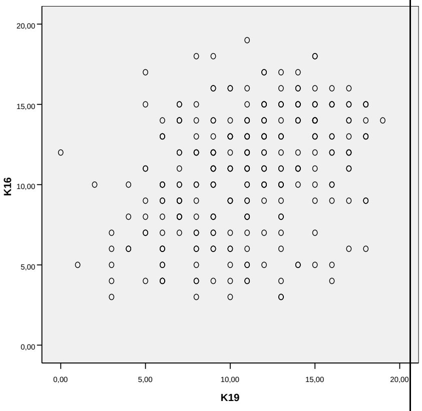
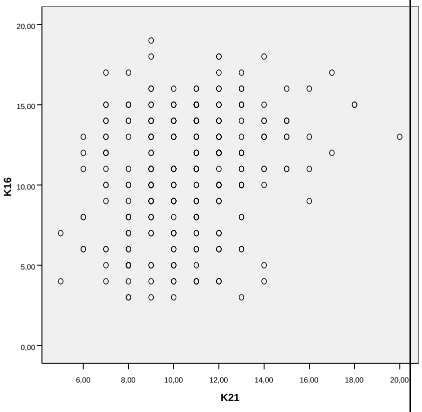
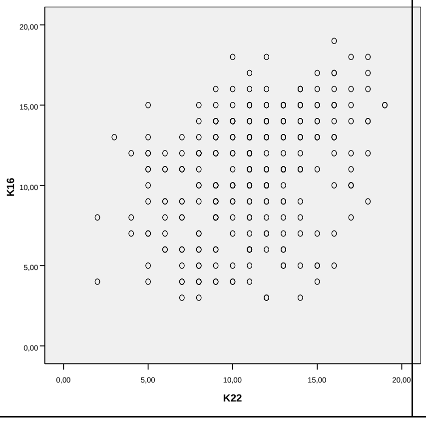
104.	*K_{16}-K_{18}*	0,535		There is the easy expressed correlation dependence (the easy relationship)
105.	*K_{16}-K_{19}*	0,348		The expressed correlation dependence is absent (the false relationship)
106.	*K_{16}-K_{21}*	0,243		The expressed correlation dependence is absent (the false relationship)
107.	*K_{16}-K_{22}*	0,359		The expressed correlation dependence is absent (the false relationship)

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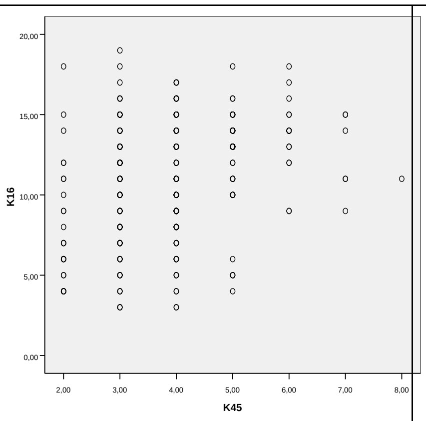
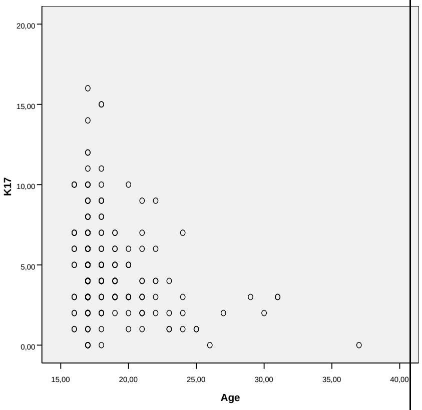
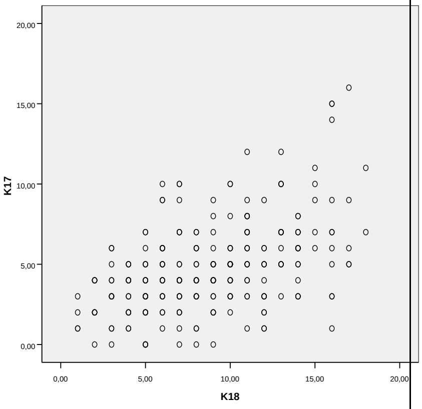
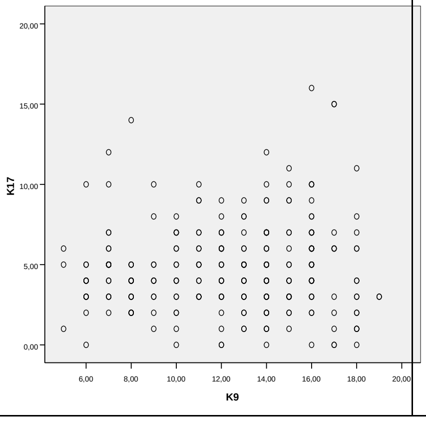
108.	K_{16}-K_{45}	0,325		The expressed correlation dependence is absent (the false relationship)
109.	K_{17}-*Age*	-0,260		The expressed correlation dependence is absent (the false relationship)
110.	K_{17}-K_{18}	0,495		There is the easy correlation dependence (the easy relationship)
111.	K_{17}-K_{9}	0,403		The expressed correlation dependence is absent (the false relationship)

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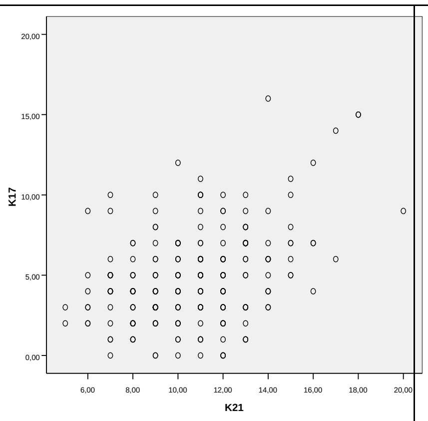
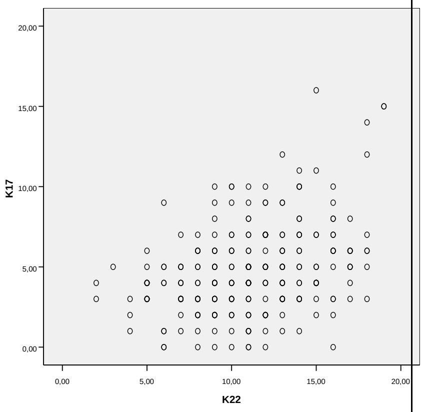
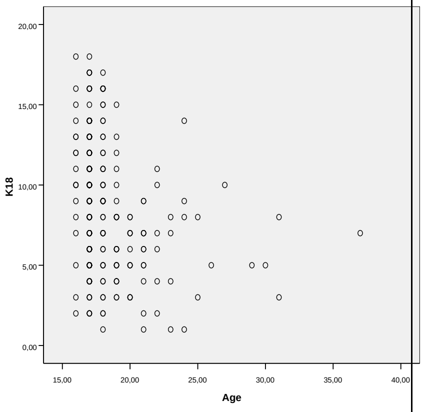
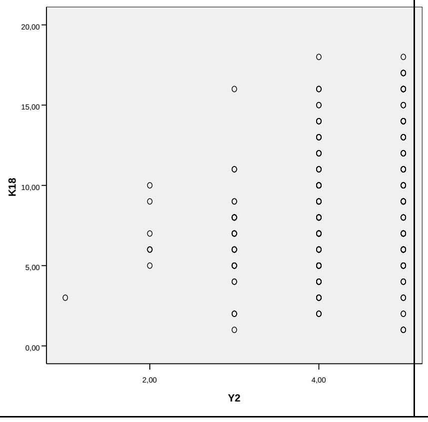
112.	K_{17}-K_{21}	0,379		The expressed correlation dependence is absent (the false relationship)
113.	K_{17}-K_{22}	0,362		The expressed correlation dependence is absent (the false relationship)
114.	K_{18}-*Age*	-0,265		The expressed correlation dependence is absent (the false relationship)
115.	K_{18}-Y_2	0,292		The expressed correlation dependence is absent (the false relationship)

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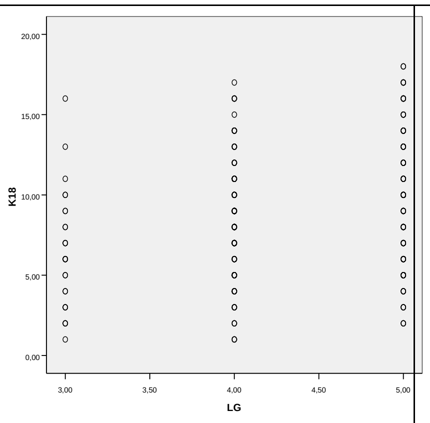
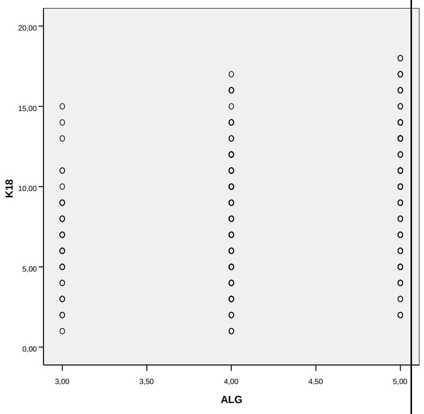
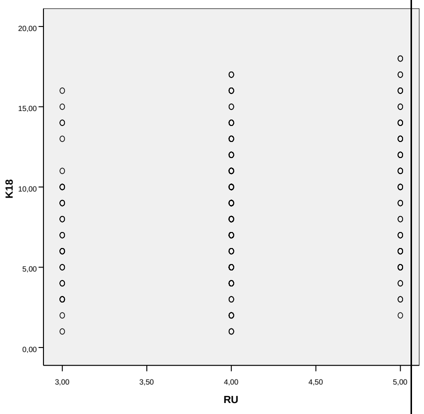
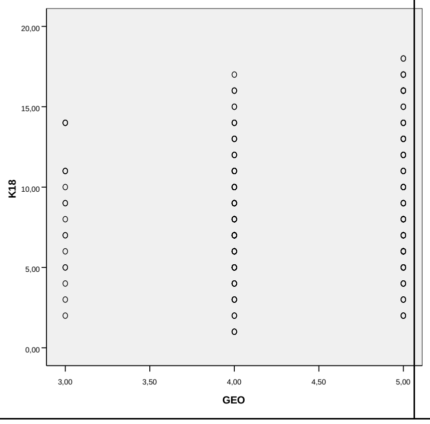
116.	K_{18}-*LG*	0,239		The expressed correlation dependence is absent (the false relationship)
117.	K_{18}-*ALG*	0,249		The expressed correlation dependence is absent (the false relationship)
118.	K_{18}-*RU*	0,217		The expressed correlation dependence is absent (the false relationship)
119.	K_{18}-*GEO*	0,234		The expressed correlation dependence is absent (the false relationship)

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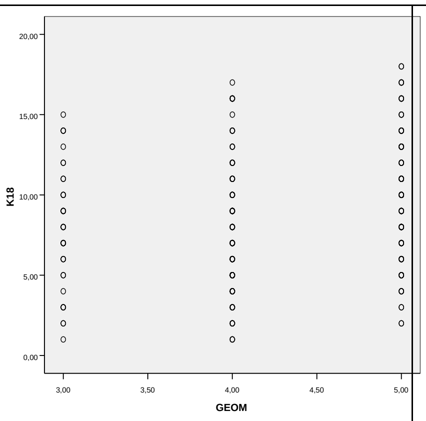
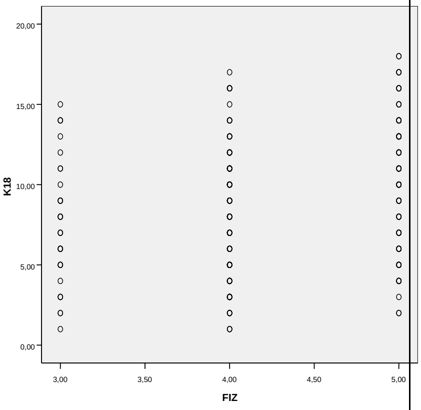
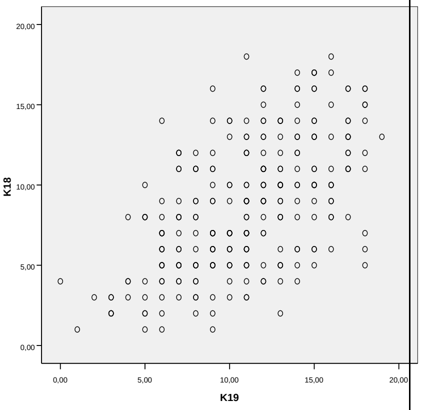
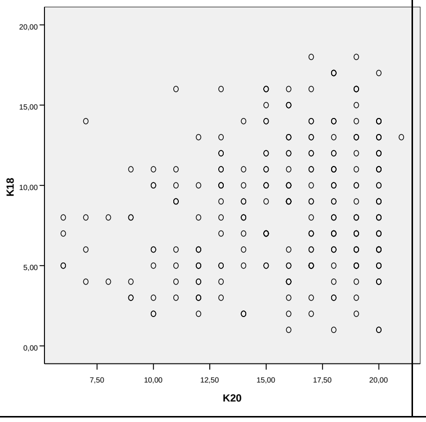
120.	*K_{18}-GEOM*	0,234		The expressed correlation dependence is absent (the false relationship)
121.	*K_{18}-FIZ*	0,220		The expressed correlation dependence is absent (the false relationship)
122.	*K_{18}-K_{19}*	0,568		There is the average correlation dependence (the average relationship)
123.	*K_{18}-K_{20}*	0,204		The expressed correlation dependence is absent (the false relationship)

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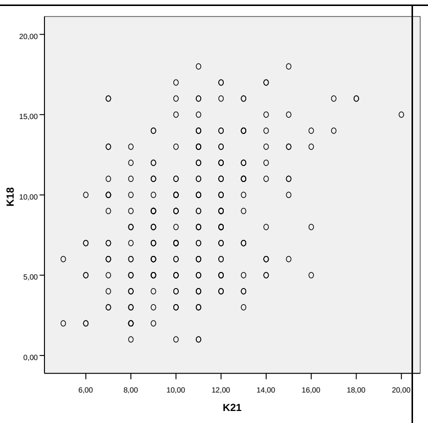
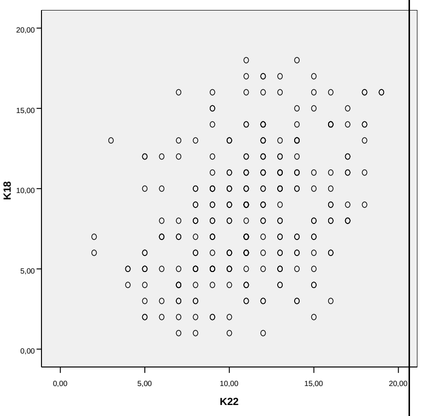
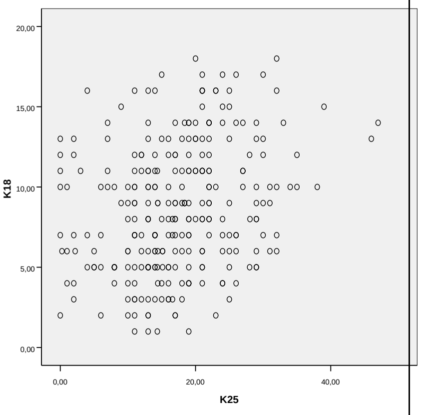
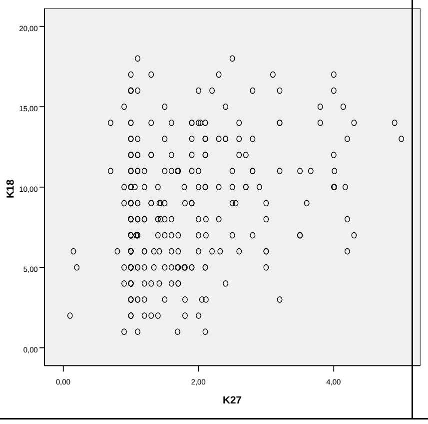
124.	K_{18}-K_{21}	0,393		There is the easy correlation dependence (the easy relationship)
125.	K_{18}-K_{22}	0,386		There is the easy correlation dependence (the easy relationship)
126.	K_{18}-K_{25}	0,272		The expressed correlation dependence is absent (the false relationship)
127.	K_{18}-K_{27}	0,300		The expressed correlation dependence is absent (the false relationship)

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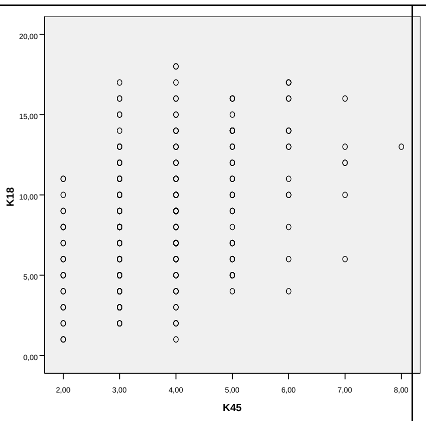
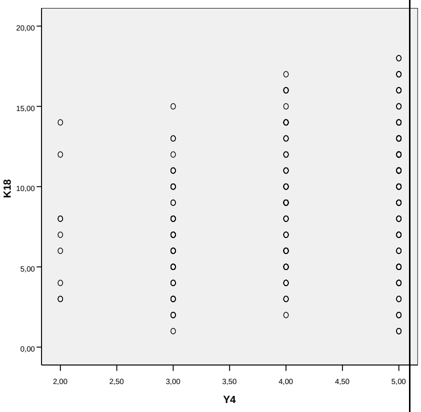
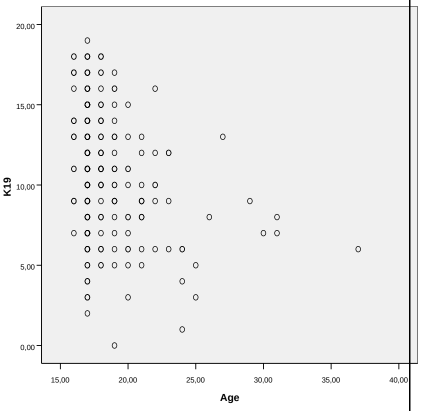
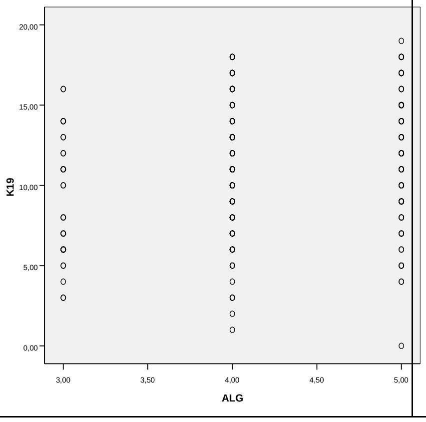
128.	K_{18}-K_{45}	0,394		The expressed correlation dependence is absent (the false relationship)
129.	K_{18}-Y_4	0,278		The expressed correlation dependence is absent (the false relationship)
130.	K_{19}-Age	0,293		The expressed correlation dependence is absent (the false relationship)
131.	K_{19}-ALG	0,220		The expressed correlation dependence is absent (the false relationship)

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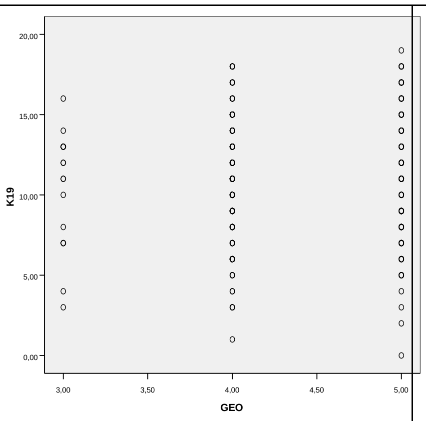
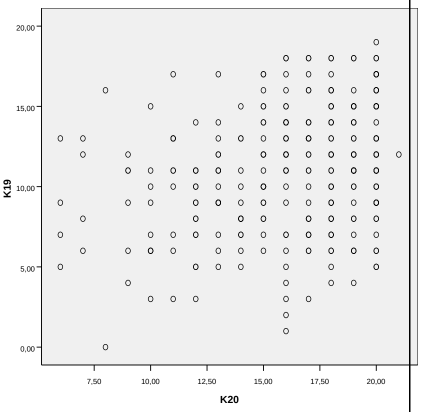
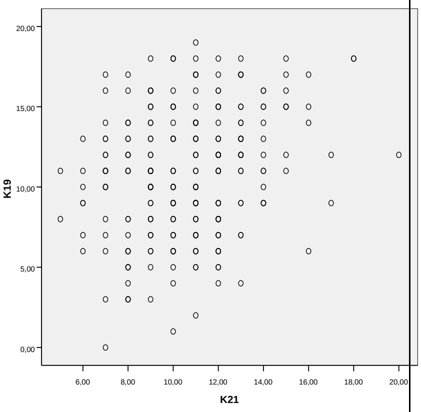
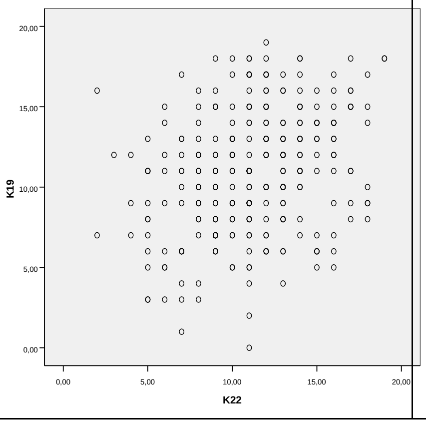
132.	*K_{19}-GEO*	0,064		The expressed correlation dependence is absent (the false relationship)
133.	*K_{19}-K_{20}*	0,284		The expressed correlation dependence is absent (the false relationship)
134.	*K_{19}-K_{21}*	0,257		The expressed correlation dependence is absent (the false relationship)
135.	*K_{19}-K_{22}*	0,295		The expressed correlation dependence is absent (the false relationship)

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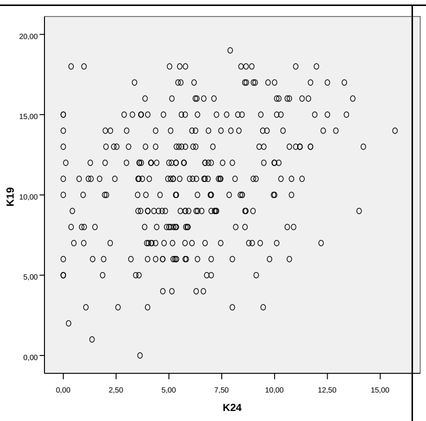
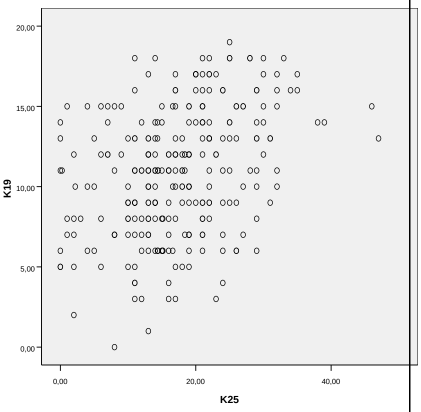
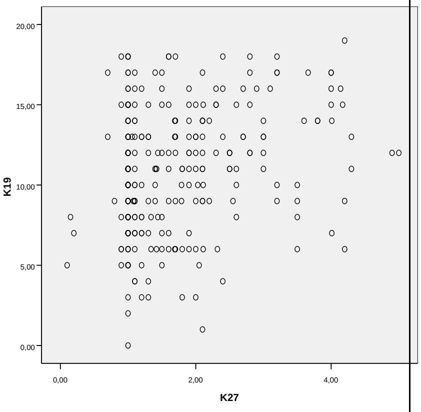
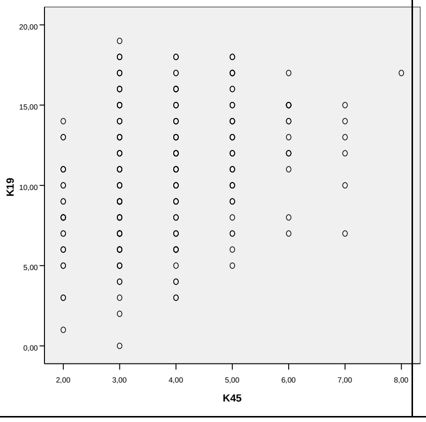
136.	K_{19}-K_{24}	0,297		The expressed correlation dependence is absent (the false relationship)
137.	K_{19}-K_{25}	0,364		The expressed correlation dependence is absent (the false relationship)
138.	K_{19}-K_{27}	0,259		The expressed correlation dependence is absent (the false relationship)
139.	K_{19}-K_{45}	0,313		The expressed correlation dependence is absent (the false relationship)

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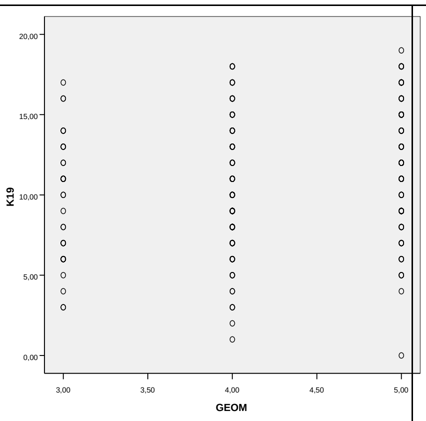
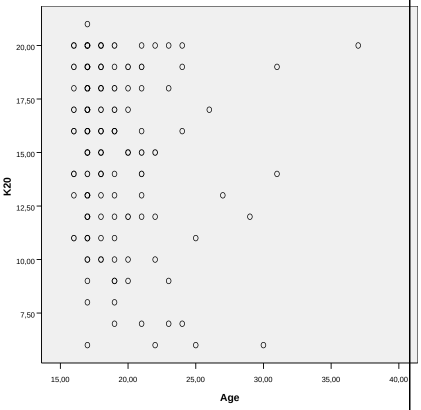
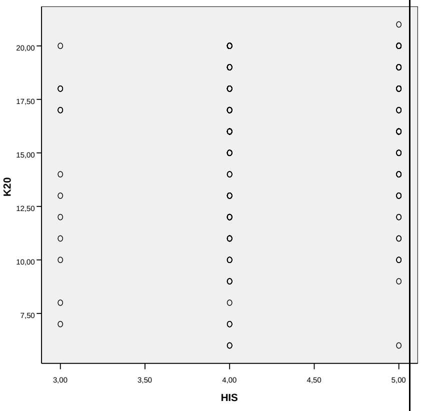
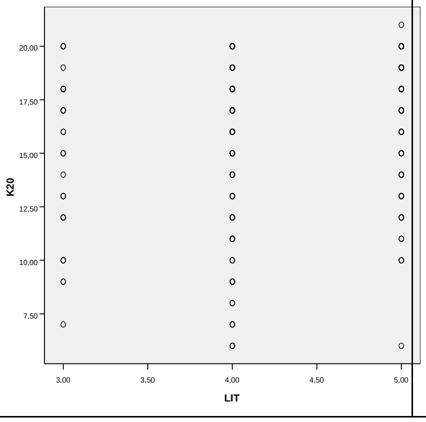
140.	*K_{19}-GEOM*	0,242		The expressed correlation dependence is absent (the false relationship)
141.	*K_{20}-Age*	-0,214		The expressed correlation dependence is absent (the false relationship)
142.	*K_{20}-HIS*	0,193		The expressed correlation dependence is absent (the false relationship)
143.	*K_{20}-LIT*	0,217		The expressed correlation dependence is absent (the false relationship)

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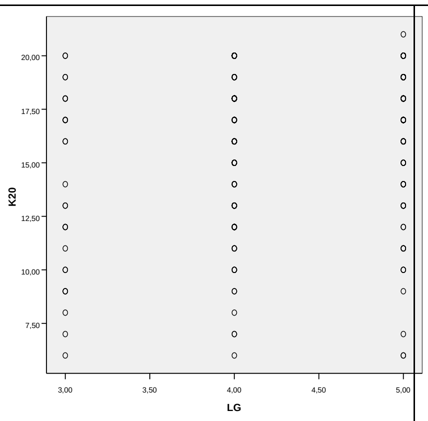
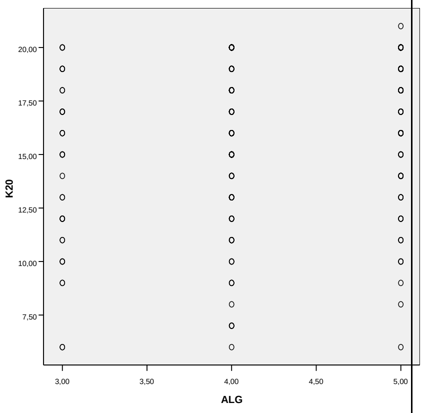
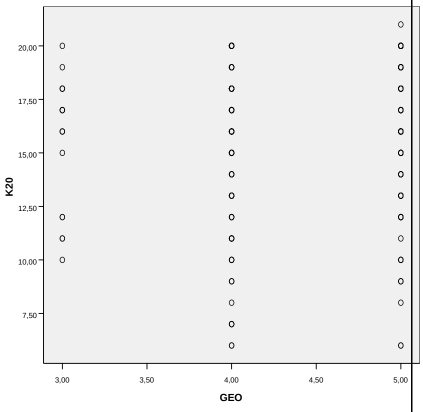
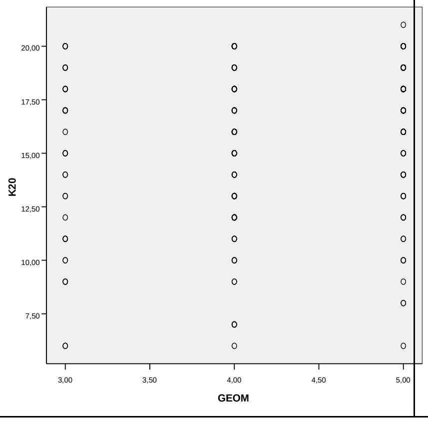
144.	K_{20}-LG	0,222		The expressed correlation dependence is absent (the false relationship)
145.	K_{20}-ALG	0,231		The expressed correlation dependence is absent (the false relationship)
146.	K_{20}-GEO	0,112		The expressed correlation dependence is absent (the false relationship)
147.	K_{20}-GEOM	0,217		The expressed correlation dependence is absent (the false relationship)

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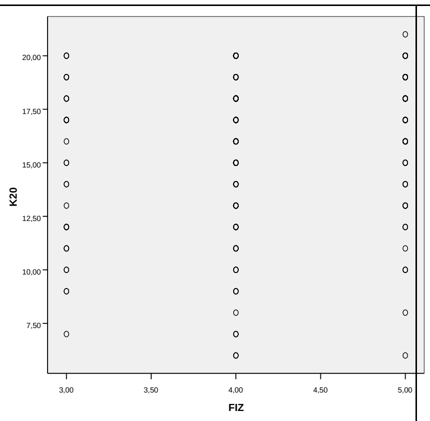
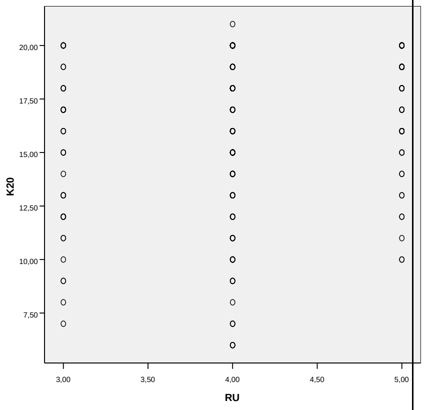
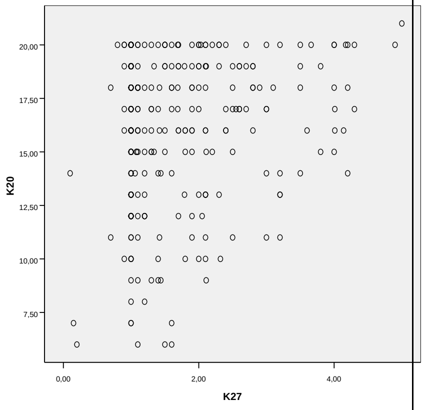
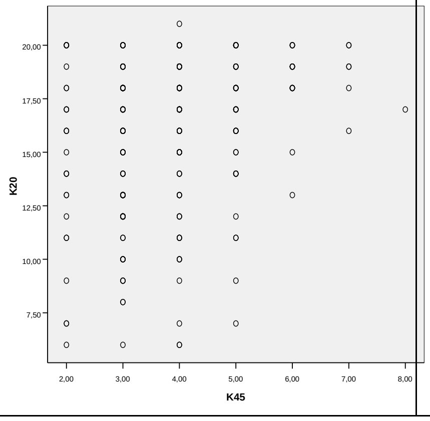
148.	K_{20}-*FIZ*	0,217		The expressed correlation dependence is absent (the false relationship)
149.	K_{20}-*RU*	0,232		The expressed correlation dependence is absent (the false relationship)
150.	K_{20}-K_{27}	0,202		The expressed correlation dependence is absent (the false relationship)
151.	K_{20}-K_{45}	0,243		The expressed correlation dependence is absent (the false relationship)

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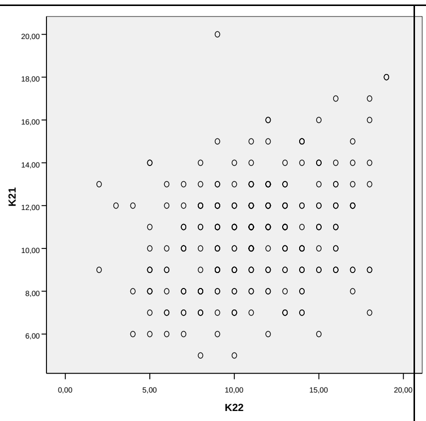
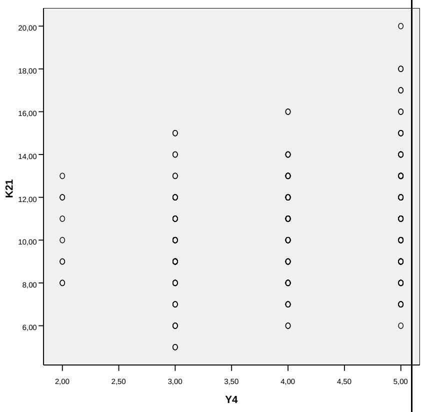
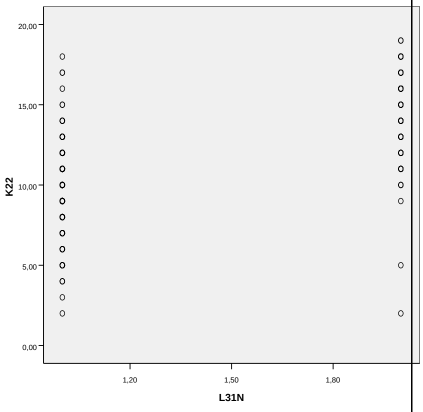
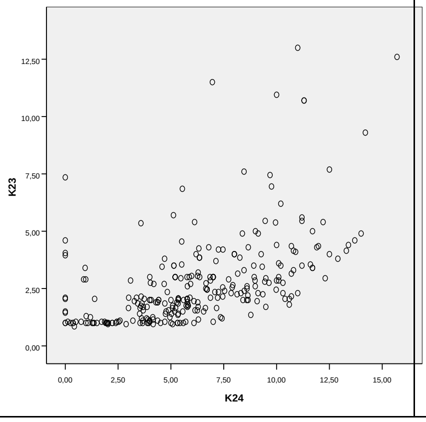
152.	K_{21}-K_{22}	0,312		There is the very easy correlation dependence (the very easy relationship)
153.	K_{21}-Y_4	0,222		The expressed correlation dependence is absent (the false relationship)
154.	K_{22}-L_{31N}	0,595		The expressed correlation dependence is absent (the false relationship)
155.	K_{23}-K_{24}	0,541		The expressed correlation dependence is absent (the false relationship)

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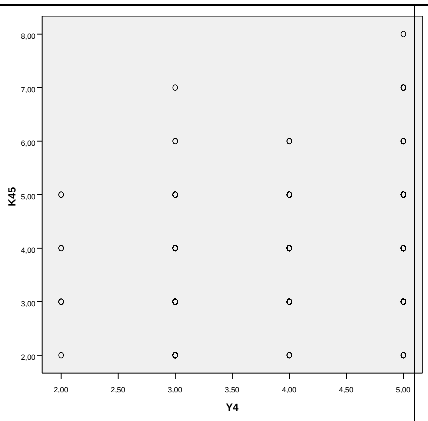
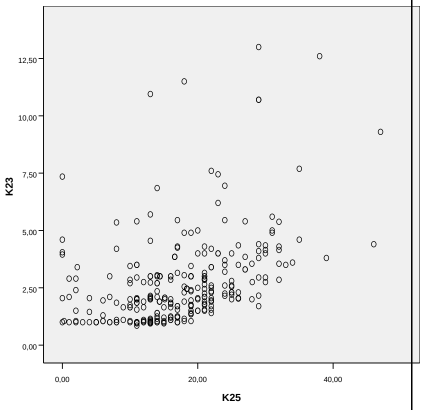
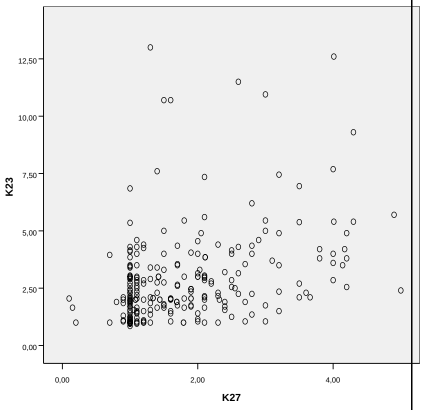
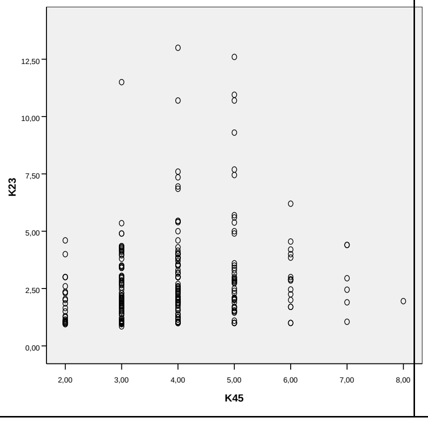
156.	K_{45}-Y_4	0,249		The expressed correlation dependence is absent (the false relationship)
157.	K_{23}-K_{25}	0,420		The expressed correlation dependence is absent (the false relationship)
158.	K_{23}-K_{27}	0,408		The expressed correlation dependence is absent (the false relationship)
159.	K_{23}-K_{45}	0,209		The expressed correlation dependence is absent (the false relationship)

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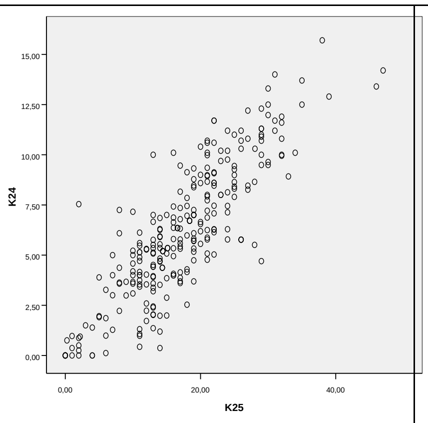
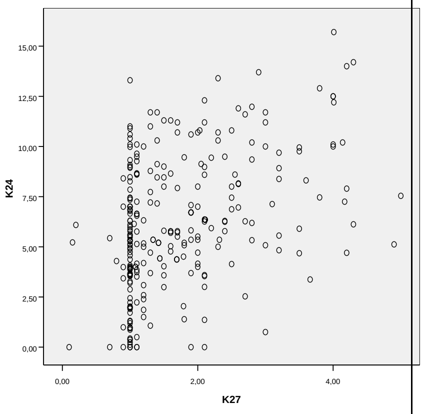
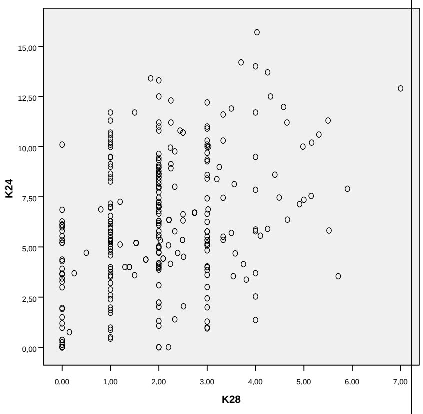
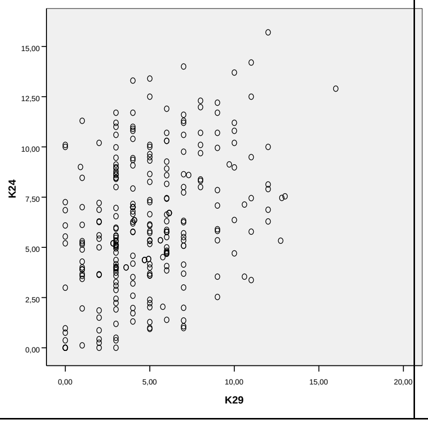
160.	K_{24}-K_{25}	0,849		There is the strong correlation dependence (the strong relationship)
161.	K_{24}-K_{27}	0,415		The expressed correlation dependence is absent (the false relationship)
162.	K_{24}-K_{28}	0,397		The expressed correlation dependence is absent (the false relationship)
163.	K_{24}-K_{29}	0,397		The expressed correlation dependence is absent (the false relationship)

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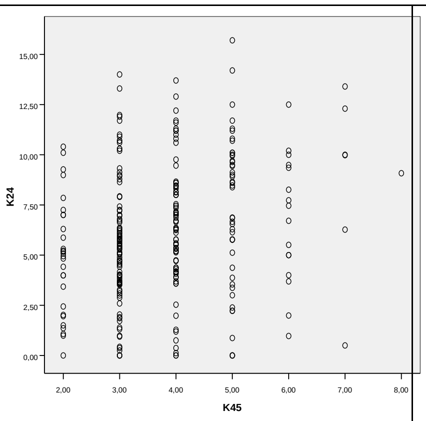
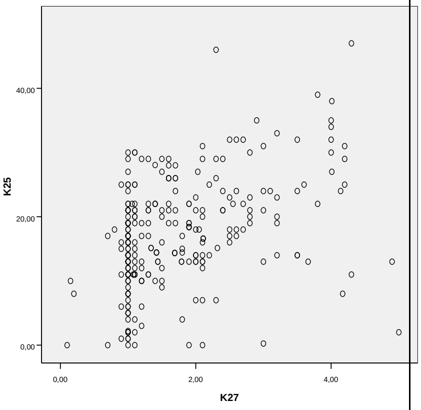
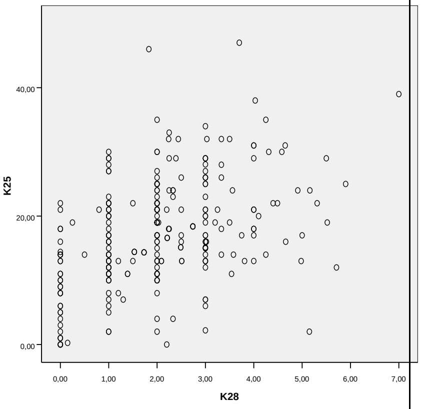
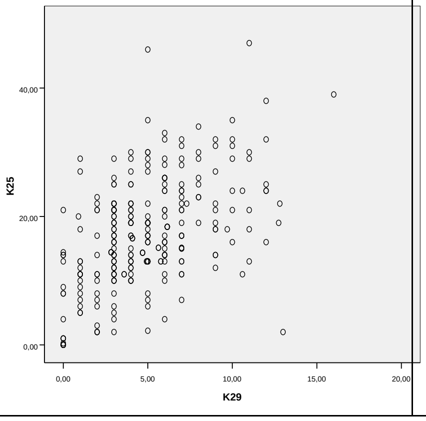
164.	K_{24}-K_{45}	0,239		The expressed correlation dependence is absent (the false relationship)
165.	K_{25}-K_{27}	0,409		The expressed correlation dependence is absent (the false relationship)
166.	K_{25}-K_{28}	0,448		The expressed correlation dependence is absent (the false relationship)
167.	K_{25}-K_{29}	0,512		There is the average correlation dependence (the average relationship)

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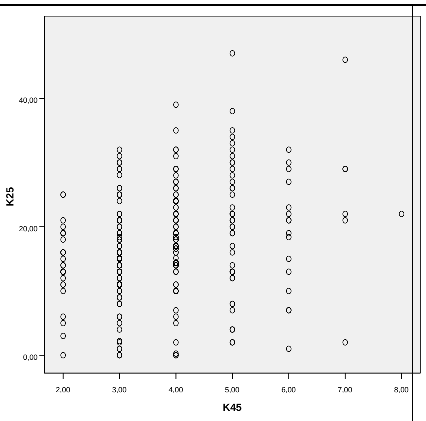
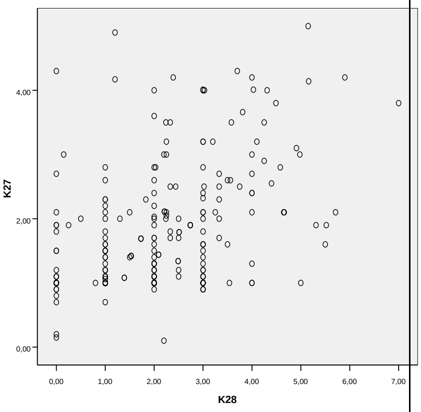
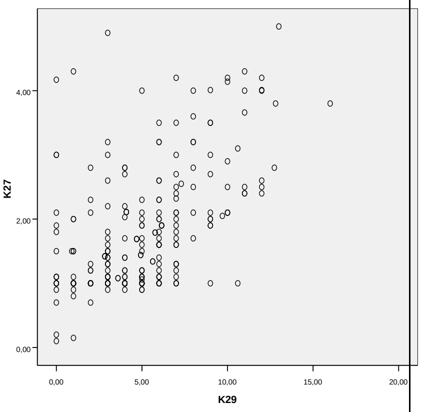
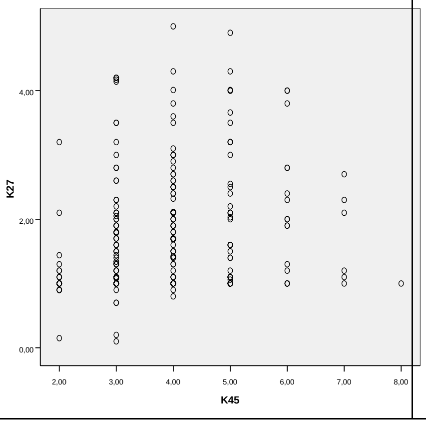
168.	K_{25}-K_{45}	0,267		The expressed correlation dependence is absent (the false relationship)
169.	K_{27}-K_{28}	0,461		The expressed correlation dependence is absent (the false relationship)
170.	K_{27}-K_{29}	0,556		The expressed correlation dependence is absent (the false relationship)
171.	K_{27}-K_{45}	0,249		The expressed correlation dependence is absent (the false relationship)

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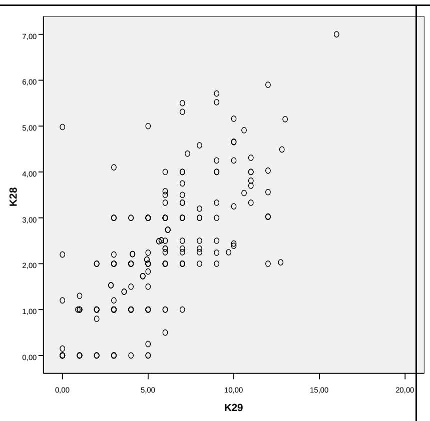
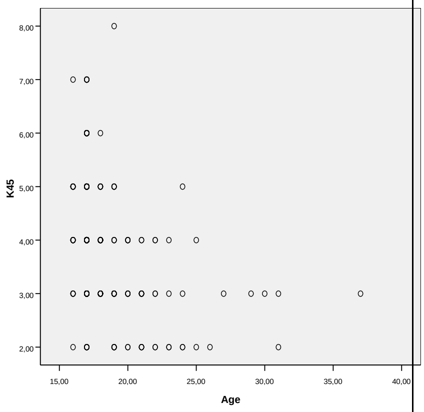
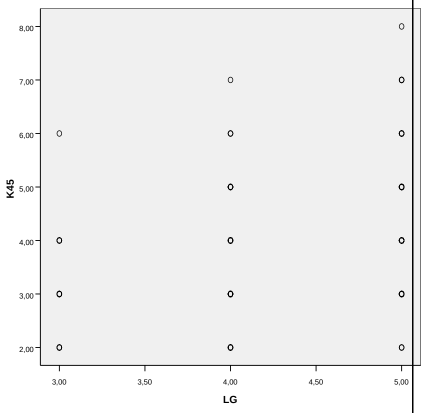
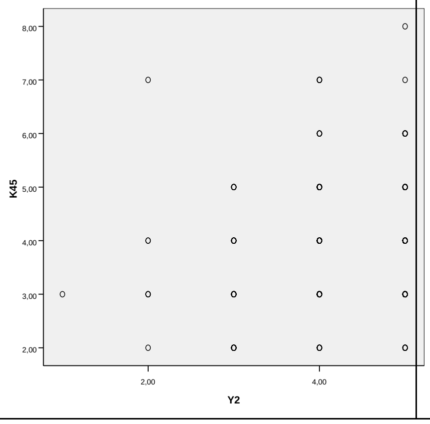
172.	*K_{28}-K_{29}*	0,741		There is the average correlation dependence (the average relationship)
173.	*K_{45}-Age*	-0,315		The expressed correlation dependence is absent (the false relationship)
174.	*K_{45}-LG*	0,350		The expressed correlation dependence is absent (the false relationship)
175.	*K_{45}-Y_2*	0,171		The expressed correlation dependence is absent (the false relationship)

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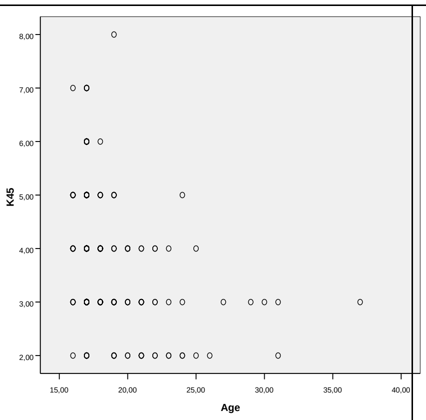
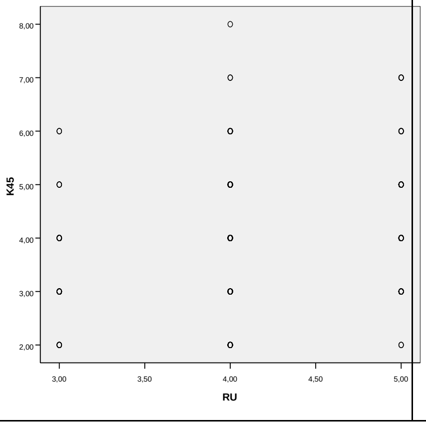
176.	*K_{45}-Age*	-0,315		The expressed correlation dependence is absent (the false relationship)
177.	*K_{45}-RU*	0,216		The expressed correlation dependence is absent (the false relationship)

The significant correlation dependences on the graphs of bivariate scattering were not revealed, that reflect the very high quality of the linear model of multiple regression:

- the very steady correlation dependence between the deuteranopia (K_8) and tritanopia (K_9) was confirmed;
- the very steady correlation dependence between the divergent figurative associativity (K_{28}) and divergent figurative selectively (K_{29}) was confirmed;
- the easy expressed small correlation dependence between the divergent figurative originality (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 originality (K_{27});
- the very steady correlation dependence between the divergent verbal associativity (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 relationships 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 and 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 the nominal values of one row of data corresponds the interconnected coordinated 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 the nominal values of one row of data corresponds the interconnected coordinated decreasing of the 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 a large quantity of significant relationships between a set of independent variables is not revealed, therefore in the linear equation of multiple regression the dispersion of dependent variable is caused by the variation of a set of independent variables only.

The several linear equations of multiple regression are built, 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) K_i.

The practical interest represents 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 represents 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 represent the operator of converting of the initial set of values of the independent variables K_i into the final 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 the means of using of the rough scale based on the sum of valid answers to the question;
- the factor Y_4 – the estimation of the level of residual knowledge, which is measured by the means of the exact scale based on the sum of points for each valid 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 different tests in DB.

The applied DM provides the automation of the complex estimation of the individual features of the contingent of 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. A15.91.

Table A15.91

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 significance 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 dependent 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 valid answers to the questions has a very low accuracy of measurement of the nominal value, which characterizes the estimation of LRKT.

Table A15.92

The dispersion analysis (ANOVA)

The model	The indicator	The sum of squares	The degrees of freedom	The average square	The indicator *F*	The significance
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 dependent 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 parameters 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.

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. A15.93.

Table A15.93

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 changing of *F*	The degrees of freedom 1	The degrees of freedom 2	The significance of changing 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 scored points for each valid variant of answer to the question has the significantly greater accuracy of measurement 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 significance
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 parameters 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. A15.95.

Table A15.95

The generalized indicators of the complete model of multiple regression Y_2

The model	The indicator *R*	*R* square	The corrected *R* square	The standard error of estimation	The changes of statistics					Durbin-Watson
					The changing of *R* square	The changing of *F*	The degree of freedom 1	The degree of freedom 2	The significance of changing 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 valid answers to the questions has the very low accuracy of measurement of the nominal value, which characterizes the estimation of LRKT.

Table A15.96

The dispersion analysis (ANOVA)

The model	The indicator	The sum of squares	The degrees of freedom	The average square	The indicator *F*	The significance
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 parameters 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. A15.97.

Table A15.97

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 changing of *R* square	The changing of *F*	The degree of freedom 1	The degree of freedom 2	The significance of changing 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 Y_4.

The exact scale based on the sum of scored points for each valid variant of answer to the question has the significantly higher accuracy of measurement of LRKT.

Table A15.98

The dispersion analysis (ANOVA)

The model	The indicator	The sum of squares	The degree of freedom	The average square	The indicator *F*	The significance
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 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 parameters 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 of 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. A15.99.

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 A15.99

The analysis of residues of the linear model of multiple regression Y_2 with the reduced set of independent variables K_i

№	Y_{2E}	Y_{2T}	*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. A15.99

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. A15.100.

Table A15.100

The analysis of residues of the linear model of multiple regression Y_4 with the reduced set of independent variables K_i

№	Y_{4E}	Y_{4T}	*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} and 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. A15.101.

Table A15.101

The analysis of residues of the linear model of multiple regression Y_2 with the complete set of independent variables K_i

№	Y_{2E}	Y_{2T}	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

The completion of tabl. A15.101

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}, that 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, so 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 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 of 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. A15.102.

Table A15.102

The analysis of residues of the linear model of multiple regression Y_4 with the complete set of independent variables K_i

№	Y_{4E}	Y_{4T}	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

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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

The continuation of tabl. A15.102

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

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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 exact 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 lies.

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 the consideration (the level of influences of stochastic genesis is estimated) and the experimental group (the level of influences and the efficiency of functioning of the innovative components of the automated training system is estimated, including the training systems at distance).

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.

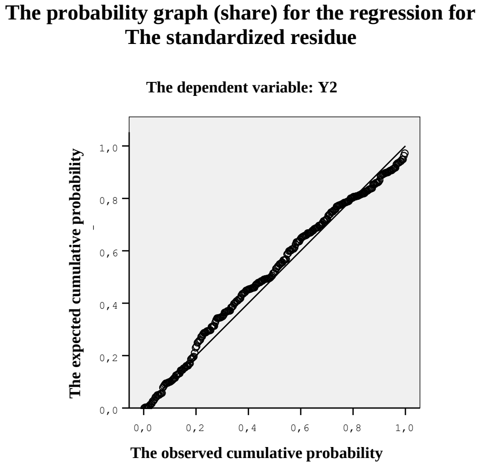
The probability graph of the share of regression for the standardized residue reflects the relative inconsistency of the expected and factual cumulative probability of appearance of the nominal value of the given dependent variable (Y_2), that allows to estimate the degree of compliance of a sequence 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.

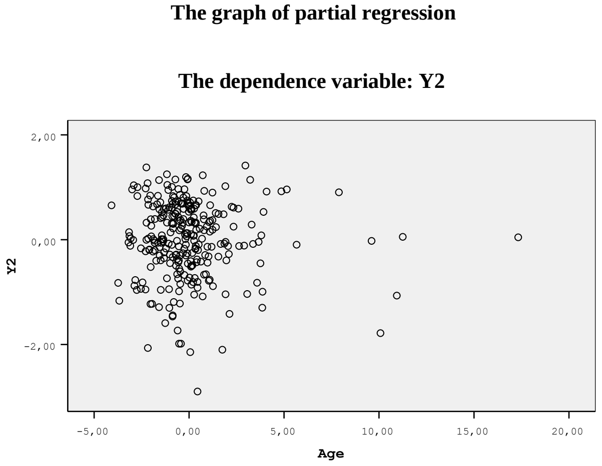
In pic. A15.37 presents directly the probabilistic graph with the factual nominal values and the expected nominal values of dependent variable Y_2 at the reduced set of various independent variables K_i.


The probability graph (share) for the regression for
The standardized residue

The dependent variable: Y2

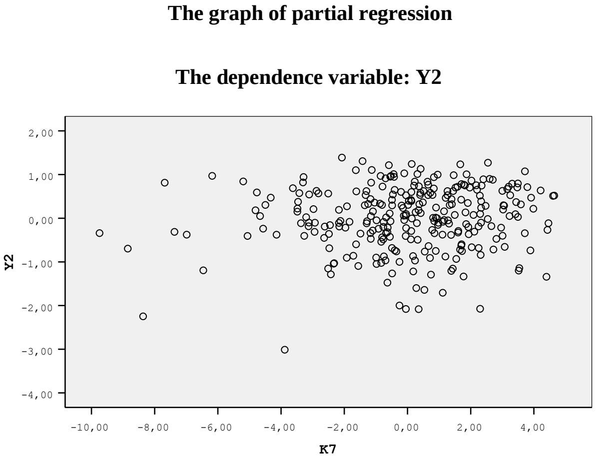
Picture A15.37. The probability graph of the regression of dependent variable Y_2 at the reduced set of independent variables K_i

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.


The graph of partial regression

The dependence variable: Y2

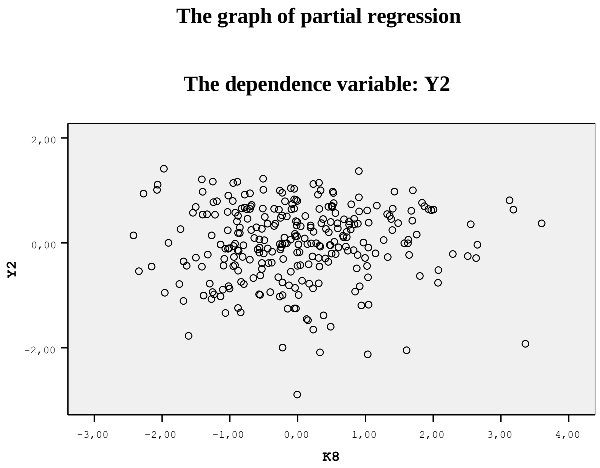
Picture A15.38. The partial regression of the age (*Age*) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

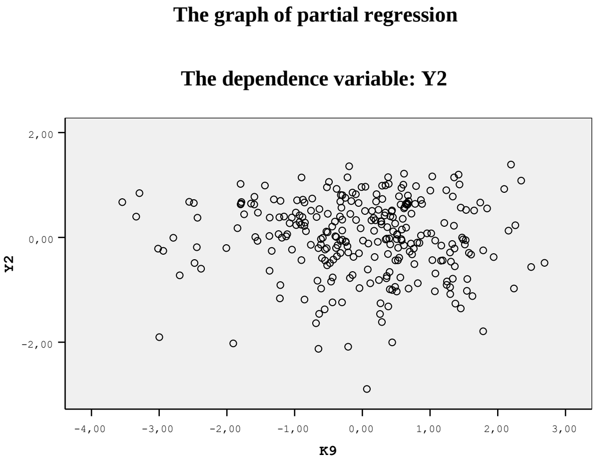
The dependence variable: Y2

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 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.

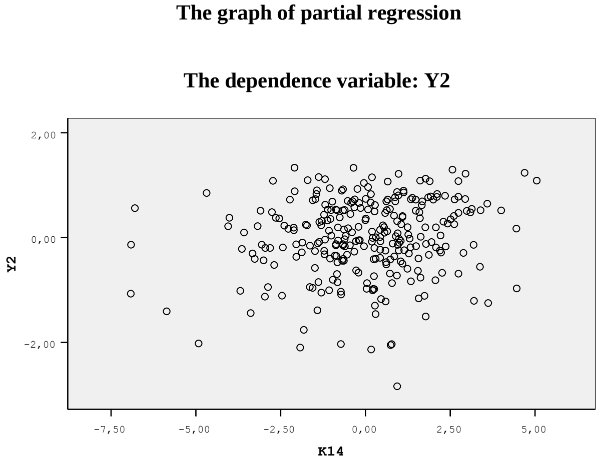


Picture A15.40. The partial regression
of deuteranopia (K_8)
and the level of residual knowledge
by the exact scale (Y_2)

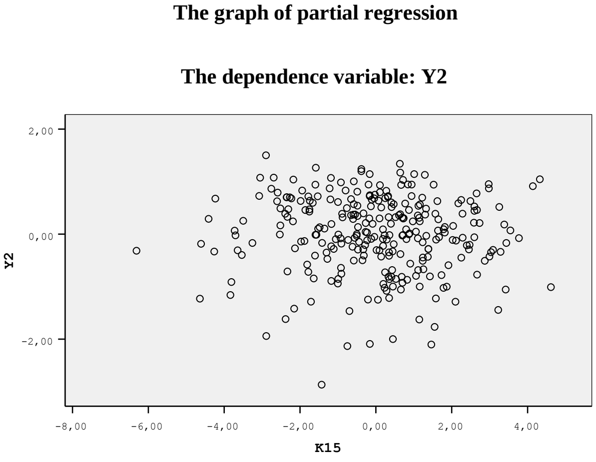


Picture A15.41. The partial regression
of tritanopia (K_9)
and the level of residual knowledge
by the exact scale (Y_2)

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.

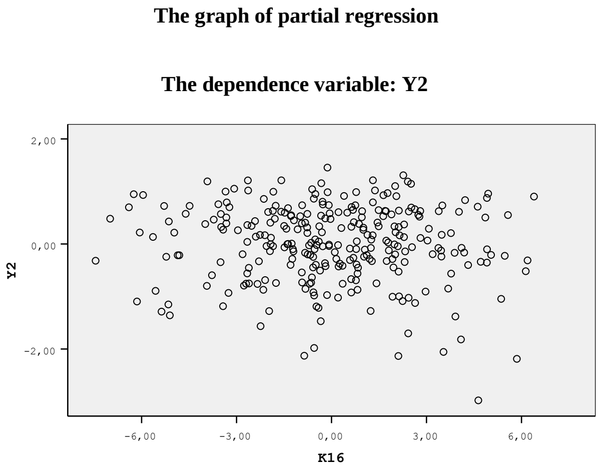


Picture A15.42. The partial regression
of verbalization (K_{14})
and the level of residual knowledge
by the exact scale (Y_2)

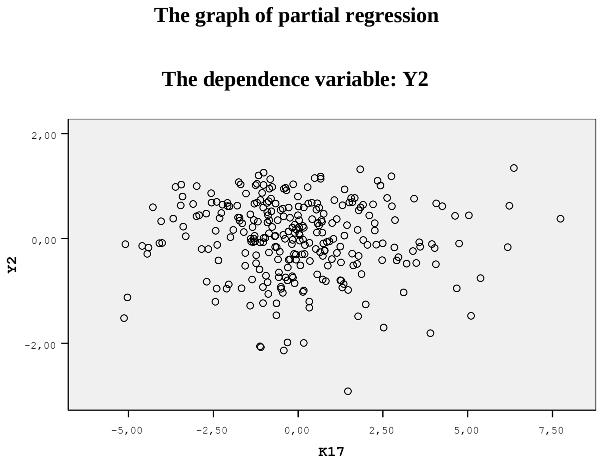


Picture A15.43. The partial regression
of generalization (K_{15})
and the level of residual knowledge
by the exact scale (Y_2)

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.

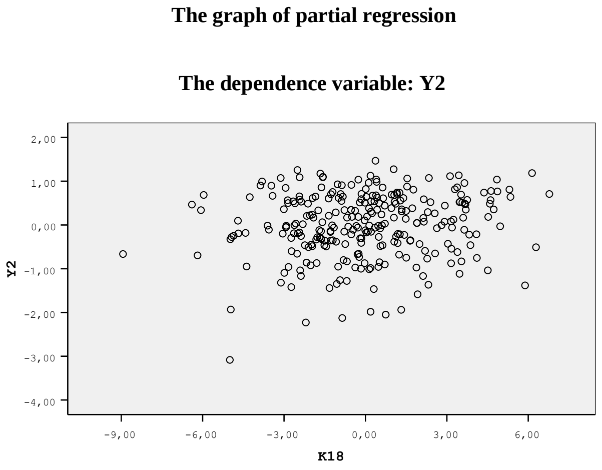


Picture A15.44. The partial regression of analyticity (K_{16}) and the level of residual knowledge by the exact scale (Y_2)

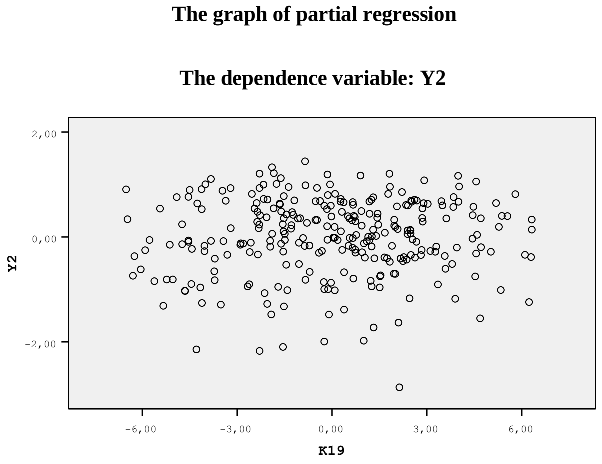


Picture A15.45. The partial regression of classification (K_{17}) and the level of residual knowledge by the exact scale (Y_2)

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.

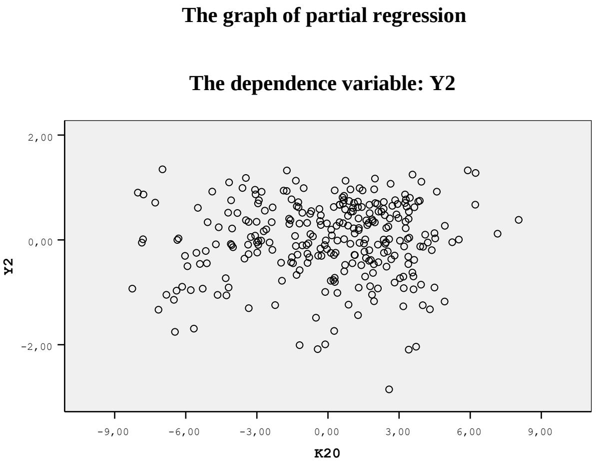


Picture A15.46. The partial regression of arithmetic abilities (K_{18}) and the level of residual knowledge by the exact scale (Y_2)

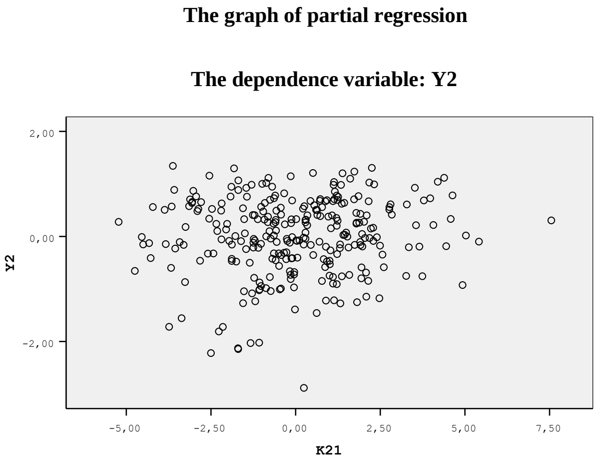


Picture A15.47. The partial regression of combinatorics (K_{19}) and the level of residual knowledge by the exact scale (Y_2)

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.

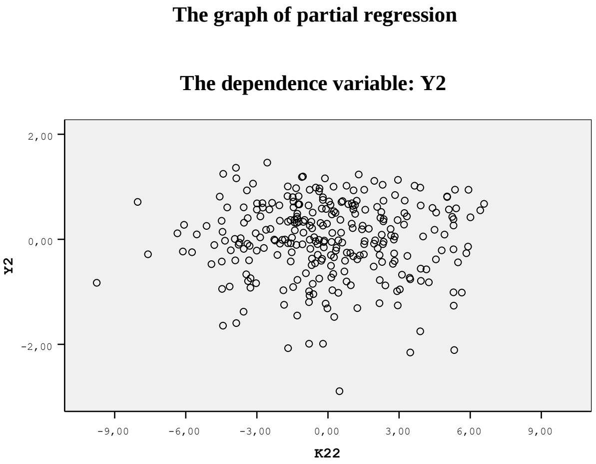


Picture A15.48. The partial regression of mnemonic abilities (K_{20}) and the level of residual knowledge by the exact scale (Y_2)

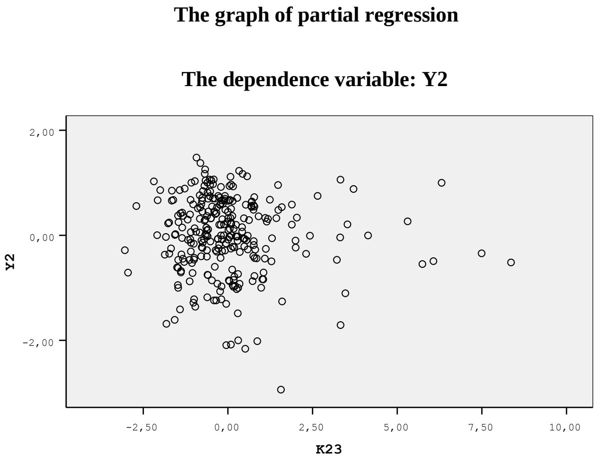


Picture A15.49. The partial regression of planar thinking (K_{21}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_2) and volumetric thinking (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.

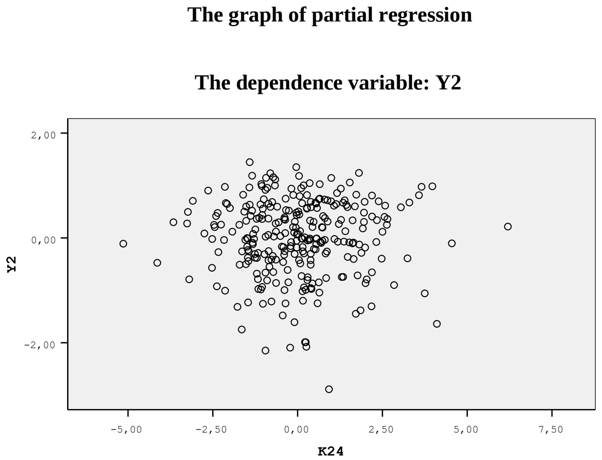


Picture A15.50. The partial regression of volumetric thinking (K_{22}) and the level of residual knowledge by the exact scale (Y_2)

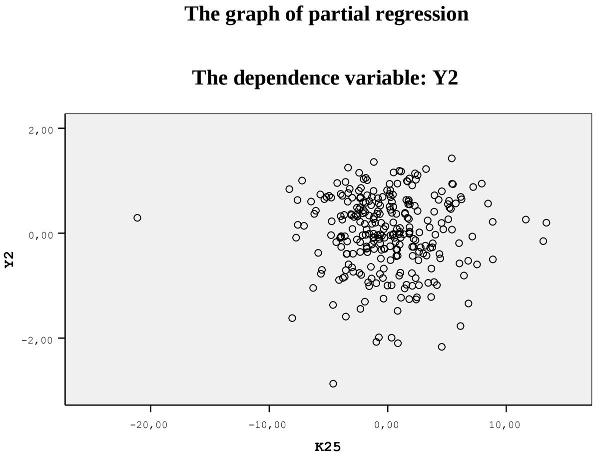


Picture A15.51. The partial regression of verbal originality (K_{23}) and the level of residual knowledge by the exact scale (Y_2)

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.

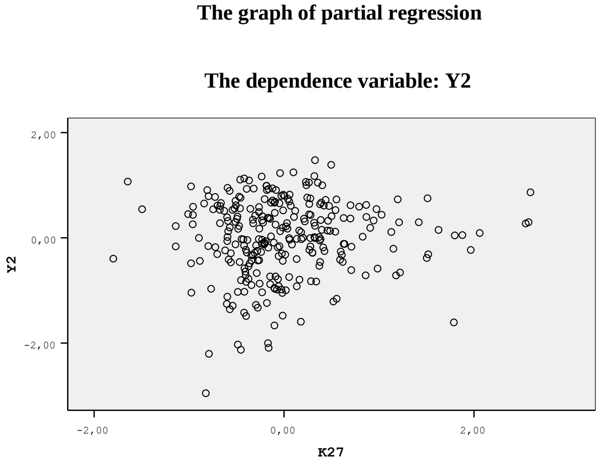


Picture A15.52. The partial regression of verbal associativity (K_{24}) and the level of residual knowledge by the exact scale (Y_2)

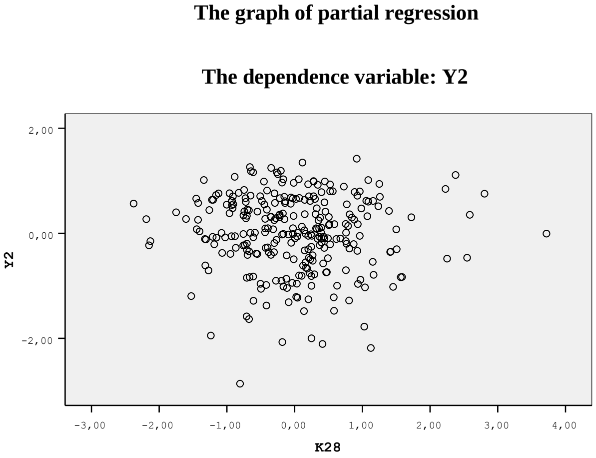


Picture A15.53. The partial regression of verbal selectivity (K_{25}) and the level of residual knowledge by the exact scale (Y_2)

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.

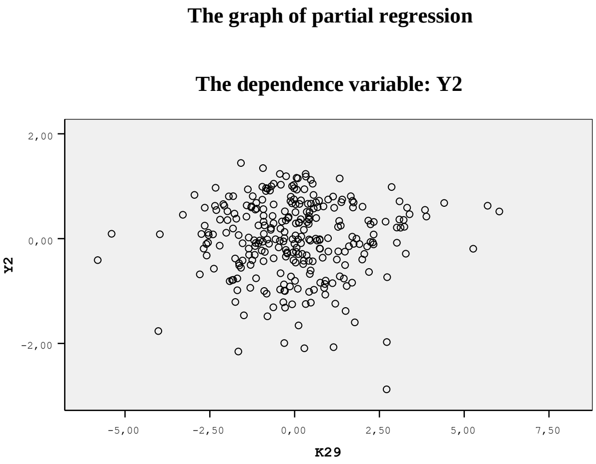


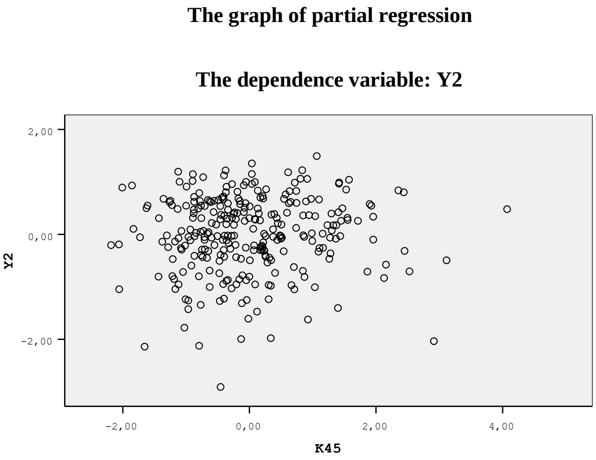
Picture A15.54. The partial regression of figurative originality (K_{27}) and the level of residual knowledge by the exact scale (Y_2)



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.





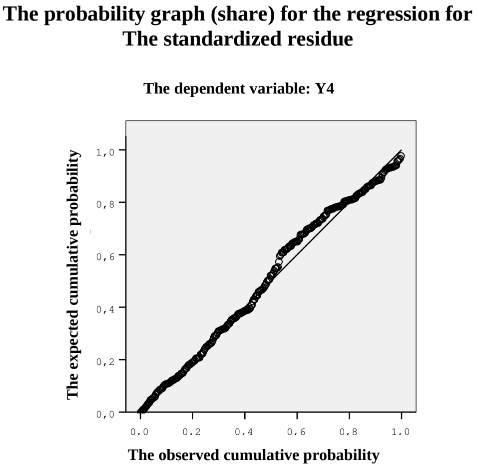
Picture A15.56. The partial regression of figurative selectivity (K_{29}) and the level of residual knowledge by the exact scale (Y_2)

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. The indicators of quality of the model of multiple regression with the reduced set of predictors K_i and factor Y_4.

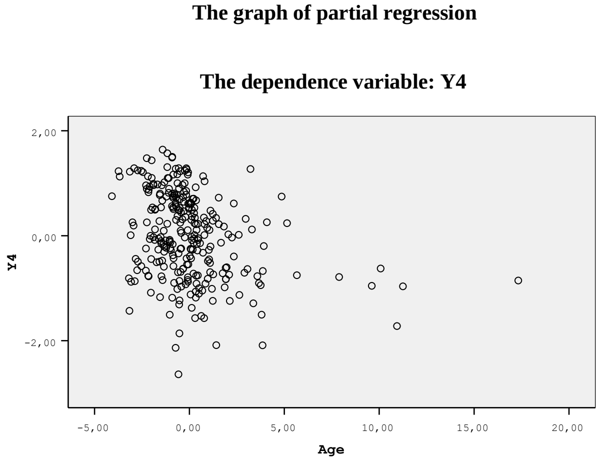
To the indicators of quality of the linear equation of multiple regression directly refer the probability graph of regression of the factual and predicted nominal value of the level of residual knowledge of the contingent of trainees.

In pic. A15.58 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 is presented directly.

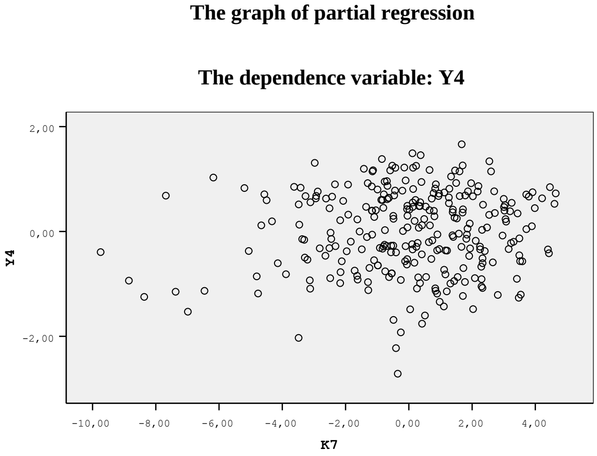


Picture A15.58. The probability graph of regression of the dependent variable Y_4 at the reduced set of independent variables K_i

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_4) 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_4) and protanopia (K_7) is presented in pic. A15.60.

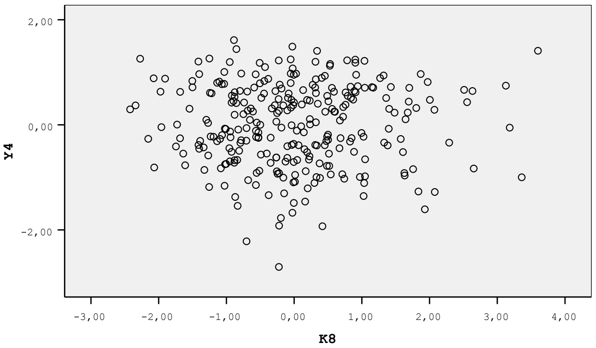


Picture A15.59. The partial regression of the age (*Age*) and the level of residual knowledge by the exact scale (Y_4)



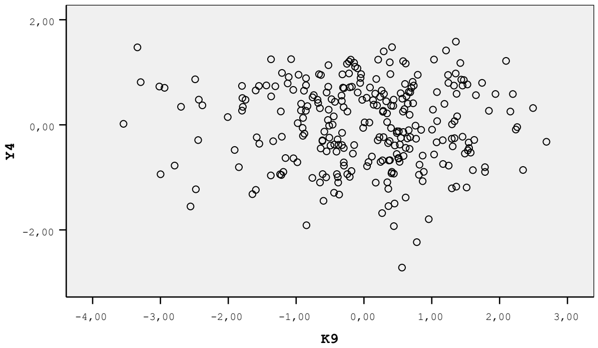
Picture A15.60. The partial regression of protanopia (K_7) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_4) and deuteranopia (K_8) is presented directly in pic. A15.61, and the graph of partial regression of LRKT (Y_4) and tritanopia (K_9) is presented directly in pic. A15.62.


The graph of partial regression

The dependence variable: Y4

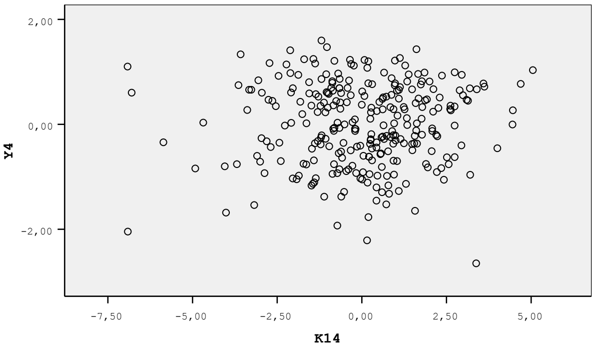
Picture A15.61. The partial regression of deuteranopia (K_8) and the level of residual knowledge by the exact scale (Y_4)


The graph of partial regression

The dependence variable: Y4

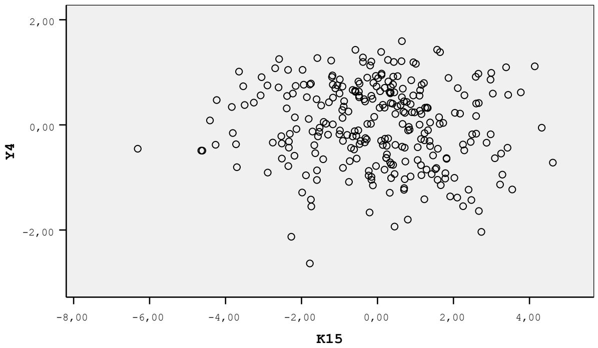
Picture A15.62. The partial regression of tritanopia (K_9) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of the level of residual knowledge of the contingent of trainees (Y_4) and verbalization (K_{14}) is presented directly in pic. A15.63, and the graph of partial regression of LRKT (Y_4) and generalization (K_{15}) is presented directly in pic. A15.64.


The graph of partial regression

The dependence variable: Y4

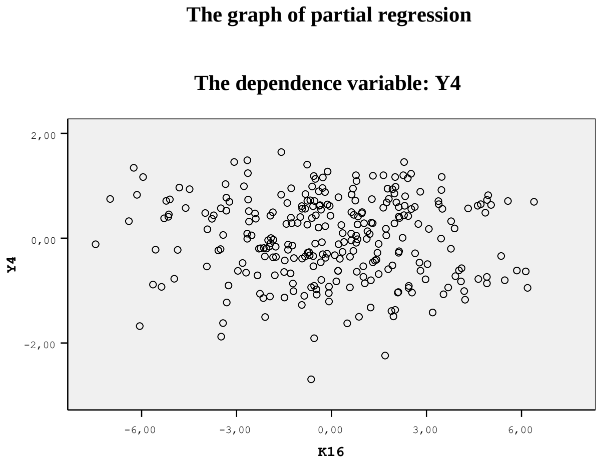
Picture A15.63. The partial regression of verbalization (K_{14}) and the level of residual knowledge by the exact scale (Y_4)


The graph of partial regression

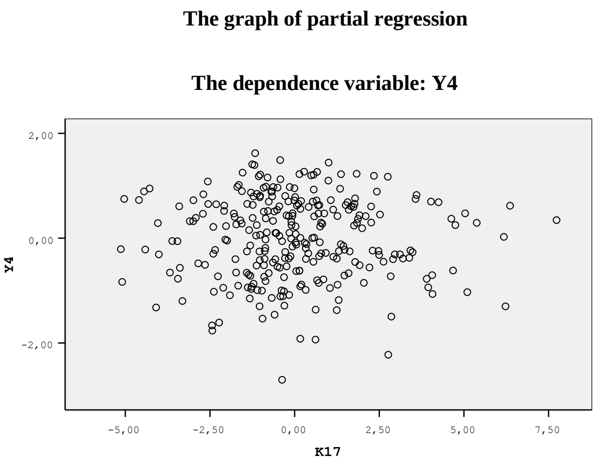
The dependence variable: Y4

Picture A15.64. The partial regression of generalization (K_{15}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and analyticity (K_{16}) is presented in pic. A15.65, and the graph of partial regression of LRKT (Y_4) and classification (K_{17}) is presented in pic. A15.66.

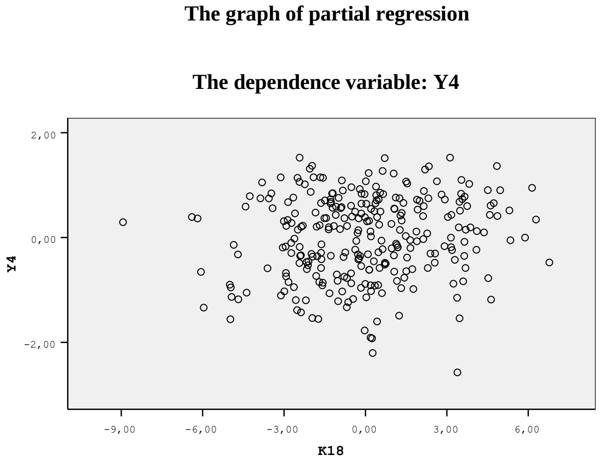


Picture A15.65. The partial regression of analyticity (K_{16}) and the level of residual knowledge by the exact scale (Y_4)

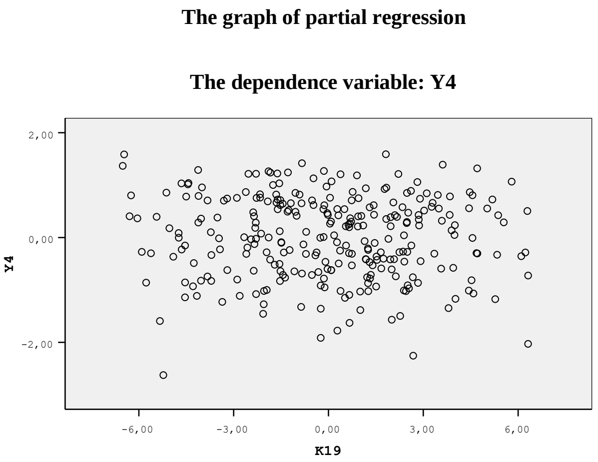


Picture A15.66. The partial regression of classification (K_{17}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and arithmetic abilities (K_{18}) is presented directly in pic. A15.67, and the graph of partial regression of LRKT (Y_4) and combinatorics (K_{19}) is presented directly in pic. A15.68.

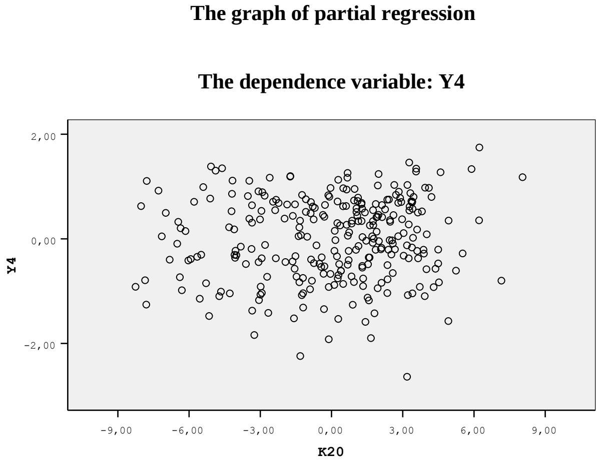


Picture A15.67. The partial regression of arithmetic abilities (K_{18}) and the level of residual knowledge by the exact scale (Y_4)

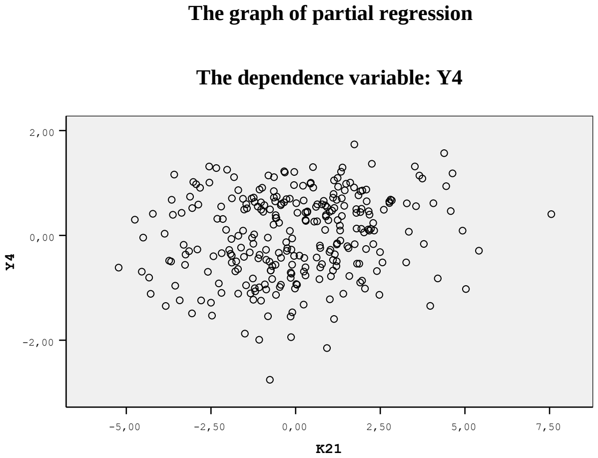


Picture A15.68. The partial regression of combinatorics (K_{19}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and mnemonic abilities (K_{20}) is presented directly in pic. A15.69, and the graph of partial regression of LRKT (Y_4) and planar thinking (K_{21}) is presented directly in pic. A15.70.

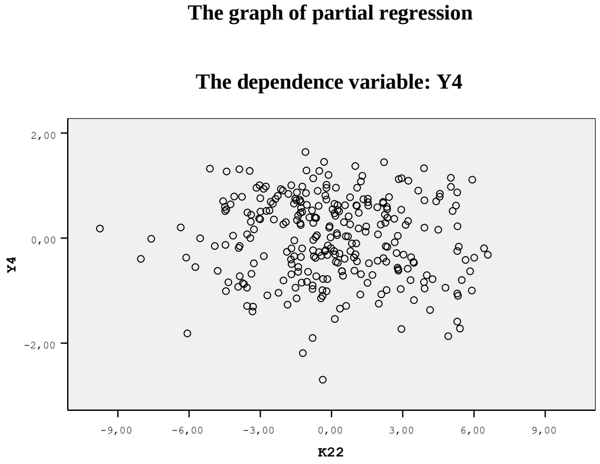


Picture A15.69. The partial regression of mnemonic abilities (K_{20}) and the level of residual knowledge by the exact scale (Y_4)

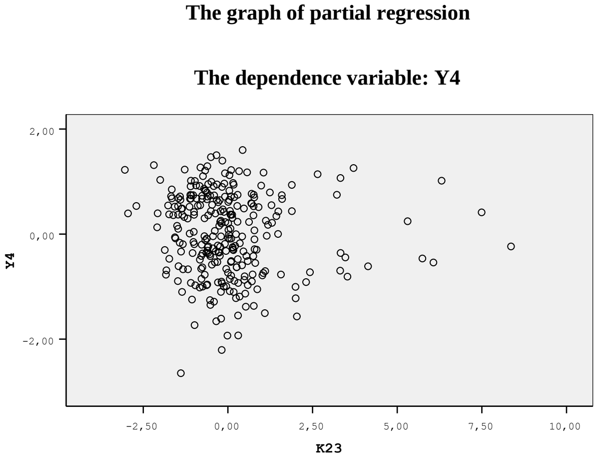


Picture A15.70. The partial regression of planar thinking (K_{21}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and volumetric thinking (K_{22}) is presented directly in pic. A15.71, and the graph of partial regression of LRKT (Y_4) and verbal originality (K_{23}) is presented directly in pic. A15.72.

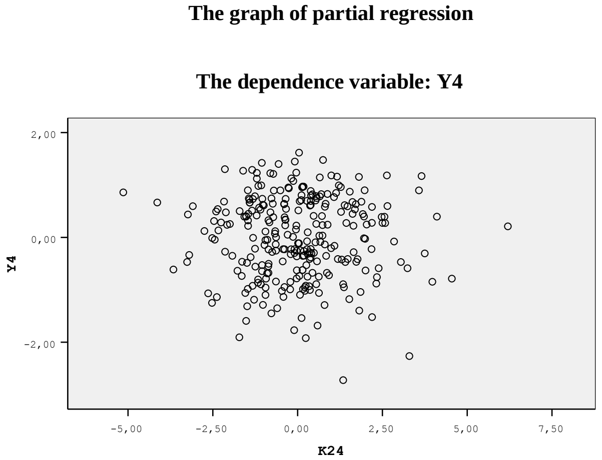


Picture A15.71. The partial regression of volumetric thinking (K_{22}) and the level of residual knowledge by the exact scale (Y_4)



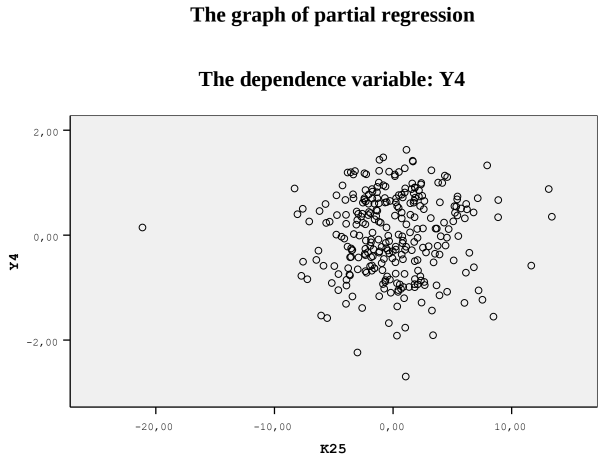
Picture A15.72. The partial regression of verbal originality (K_{23}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and verbal associativity (K_{24}) is presented directly in pic. A15.73, and the graph of partial regression of LRKT (Y_4) and verbal selectivity (K_{25}) is presented directly in pic. A15.74.


The graph of partial regression

The dependence variable: Y4

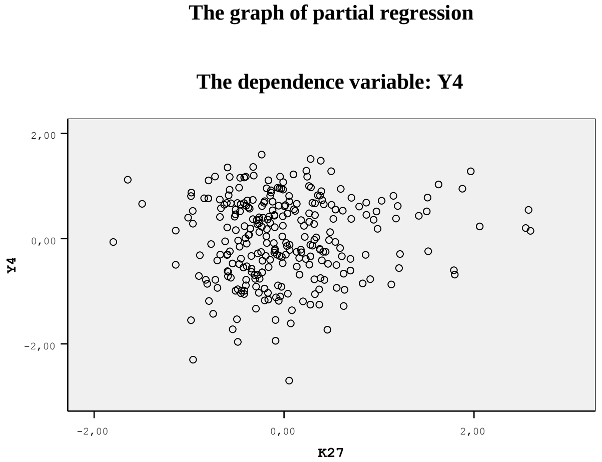
Picture A15.73. The partial regression of verbal associativity (K_{24}) and the level of residual knowledge by the exact scale (Y_4)


The graph of partial regression

The dependence variable: Y4

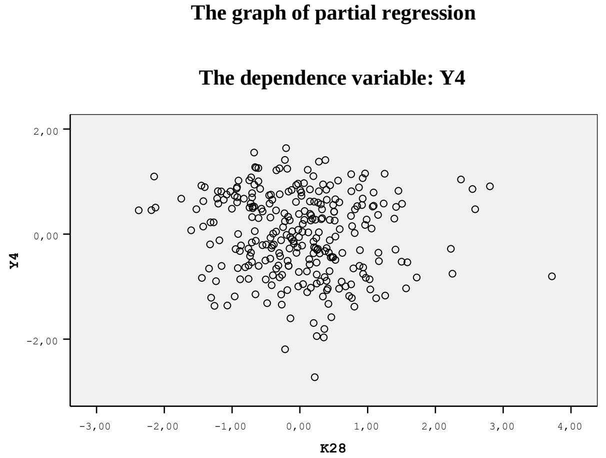
Picture A15.74. The partial regression of verbal selectivity (K_{25}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and figurative originality (K_{27}) is presented directly in pic. A15.75, and the graph of partial regression of LRKT (Y_4) and figurative associativity (K_{28}) is presented directly in pic. A15.76.


The graph of partial regression

The dependence variable: Y4

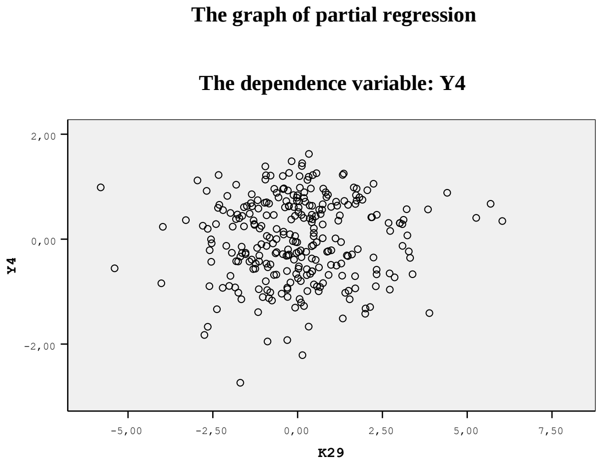
Picture A15.75. The partial regression of figurative originality (K_{27}) and the level of residual knowledge by the exact scale (Y_4)


The graph of partial regression

The dependence variable: Y4

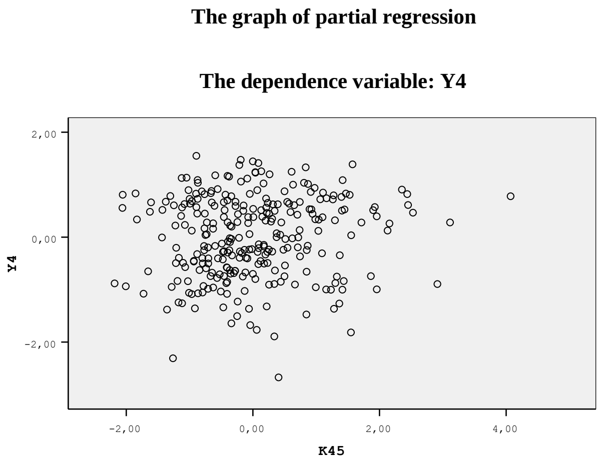
Picture A15.76. The partial regression of figurative associativity (K_{28}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and figurative selectivity (K_{29}) is presented directly in pic. A15.77, and the graph of partial regression of LRKT (Y_4) 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

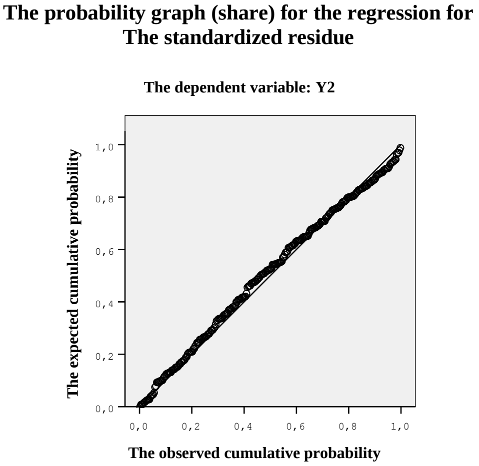
The dependence variable: Y4

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.

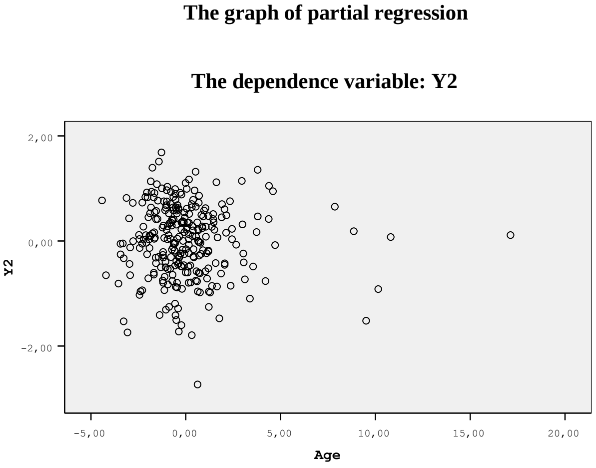
The indicators of quality of the linear equation of multiple regression directly refer the probability graph of regression of the factual and predicted nominal value of the level of residual knowledge of the contingent of trainees.

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.

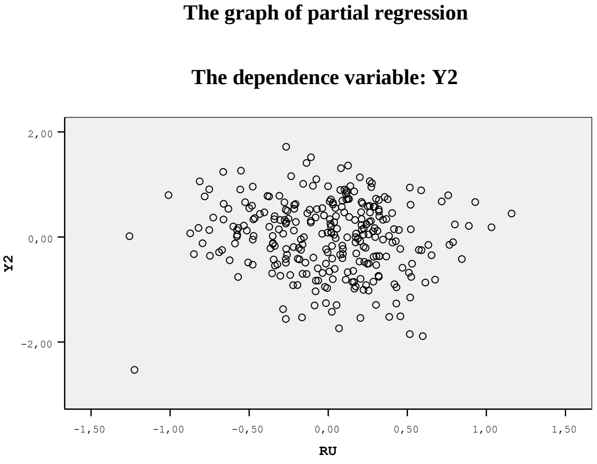


Picture A15.79. The probability graph of regression of the dependent variable Y_2 at the complete set of independent variables K_i

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 mark in the Russian language (*RU*) is presented directly in pic. A15.81.

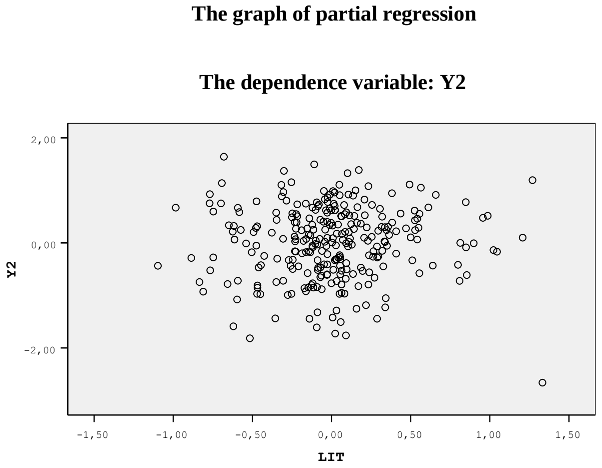


Picture A15.80. The partial regression of the age (*Age*) and the level of residual knowledge by the exact scale (Y_2)

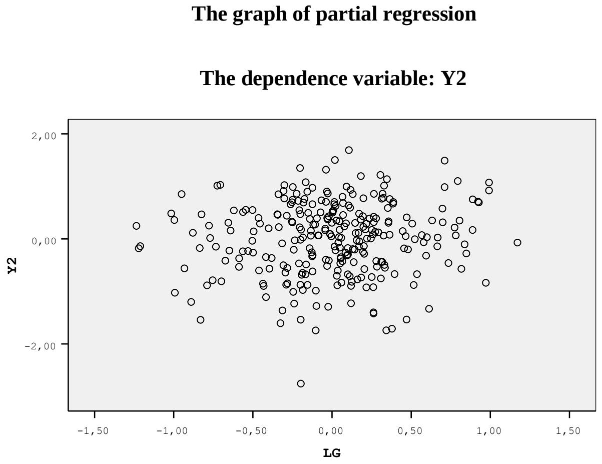


Picture A15.81. The partial regression of the mark in the Russian language (*RU*) and the level of residual knowledge by the exact scale (Y_2)

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.

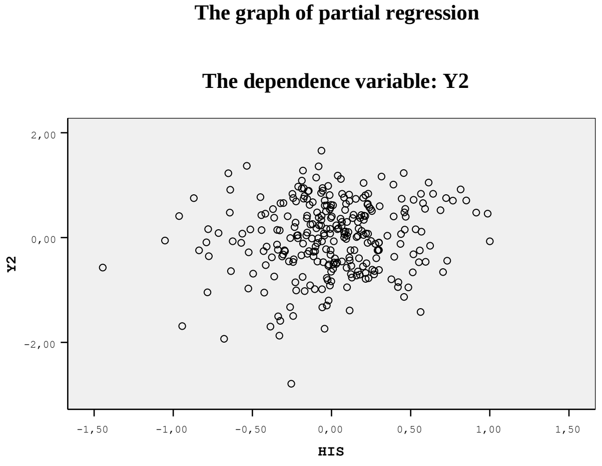


Picture A15.82. The partial regression of the mark in literature (*LIT*) and the level of residual knowledge by the exact scale (Y_2)

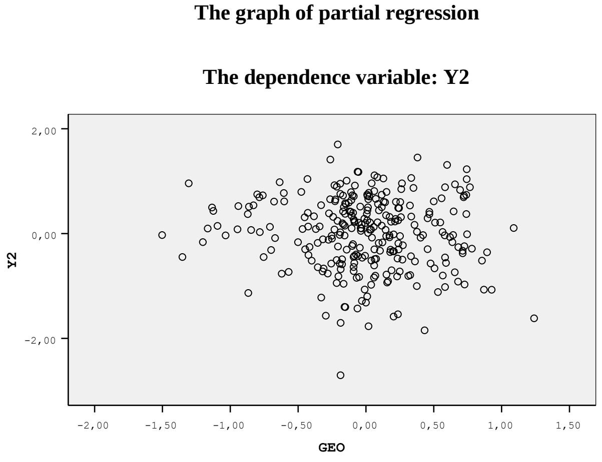


Picture A15.83. The partial regression of the mark in foreign language (*LG*) and the level of residual knowledge by the exact scale (Y_2)

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.

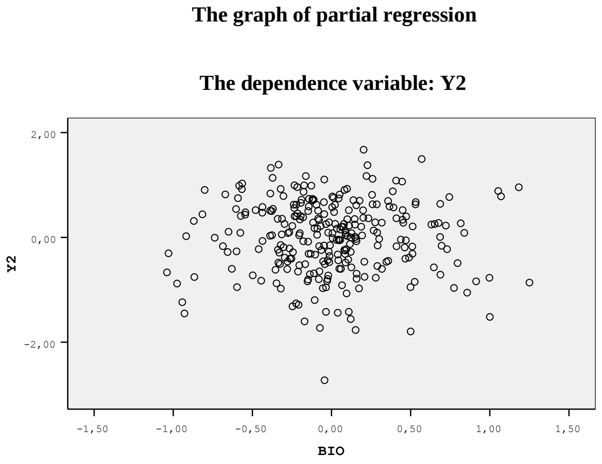


Picture A15.84. The partial regression of the mark in history (*HIS*) and the level of residual knowledge by the exact scale (Y_2)

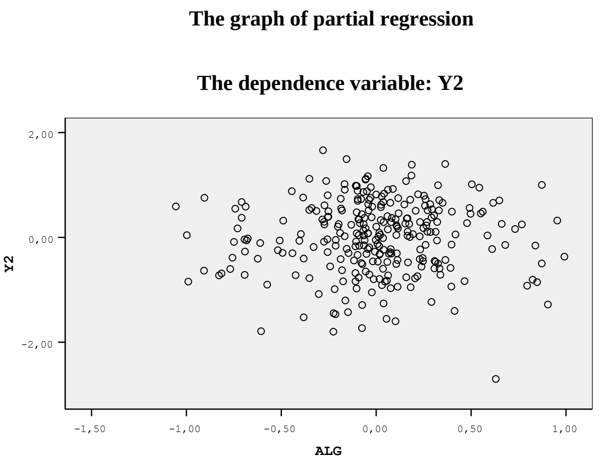


Picture A15.85. The partial regression of the mark in geography (*GEO*) and the level of residual knowledge by the exact scale (Y_2)

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.

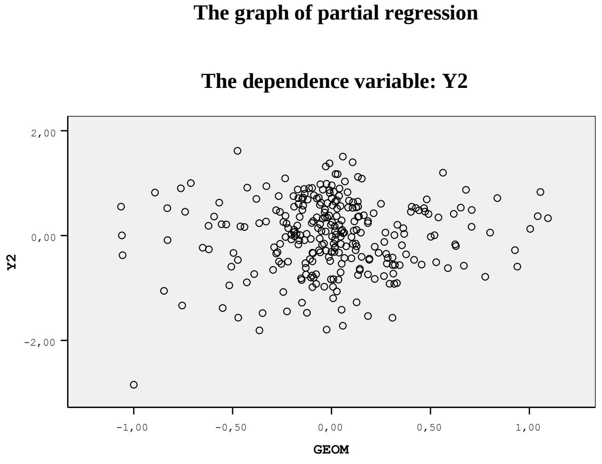


Picture A15.86. The partial regression of the mark in biology (*BIO*) and the level of residual knowledge by the exact scale (Y_2)

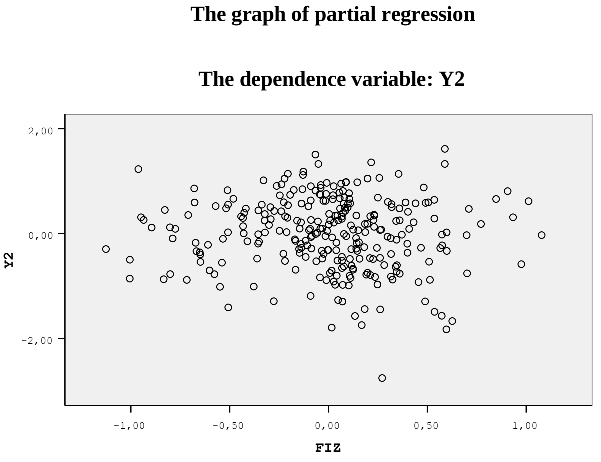


Picture A15.87. The partial regression of the mark in geography (*GEO*) and the level of residual knowledge by the exact scale (Y_2)

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 (*FIZ*) is presented directly in pic. A15.89.

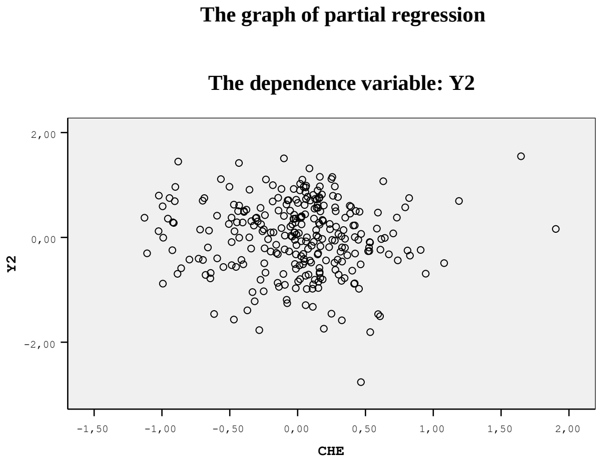


Picture A15.88. The partial regression of the mark in geometry (*GEOM*) and the level of residual knowledge by the exact scale (Y_2)



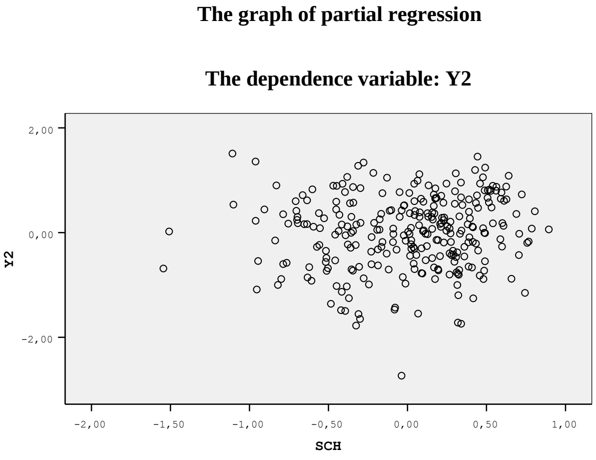
Picture A15.89. The partial regression of the mark in physics (*FIZ*) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and the mark in chemistry (*CHE*) 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.


The graph of partial regression

The dependence variable: Y2

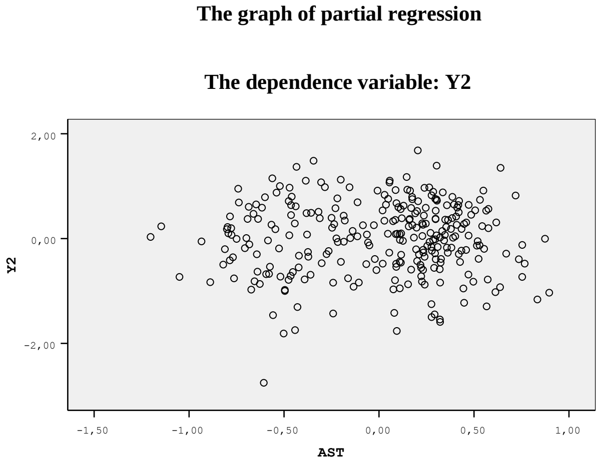
Picture A15.90. The partial regression of the mark in chemistry (*CHE*) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

The dependence variable: Y2

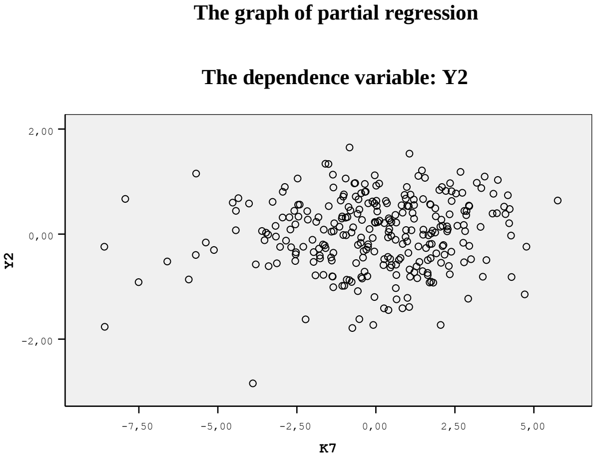
Picture A15.91. The partial regression of the mark in drawing (*SCH*) and the level of residual knowledge by the exact scale (Y_2)

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.


The graph of partial regression

The dependence variable: Y2

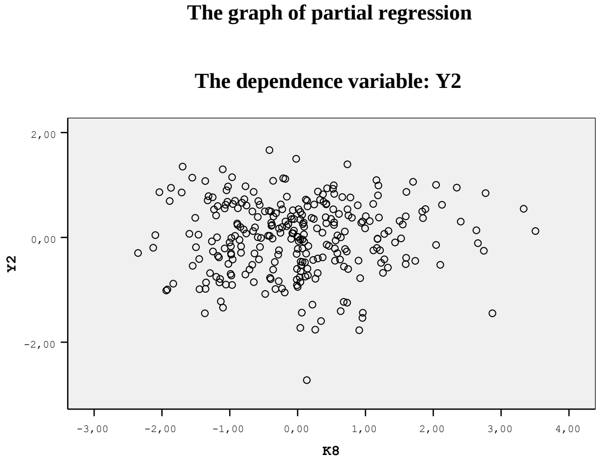
Picture A15.92. The partial regression of the mark in astronomy (*AST*) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

The dependence variable: Y2

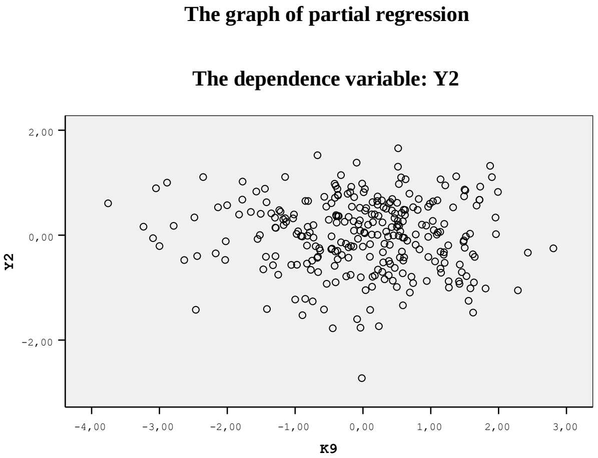
Picture A15.93. The partial regression of protanopia (K_7) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of 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.


The graph of partial regression

The dependence variable: Y2

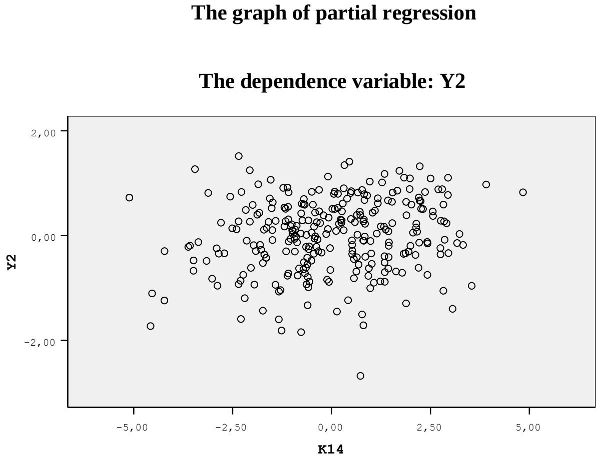
Picture A15.94. The partial regression of deuteranopia (K_8) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

The dependence variable: Y2

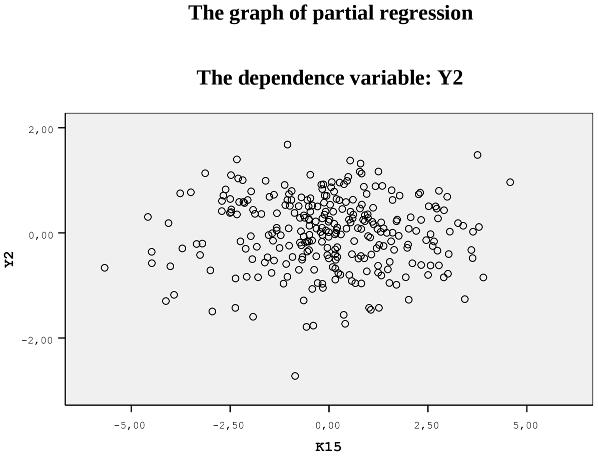
Picture A15.95. The partial regression of tritanopia (K_9) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of 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.


The graph of partial regression

The dependence variable: Y2

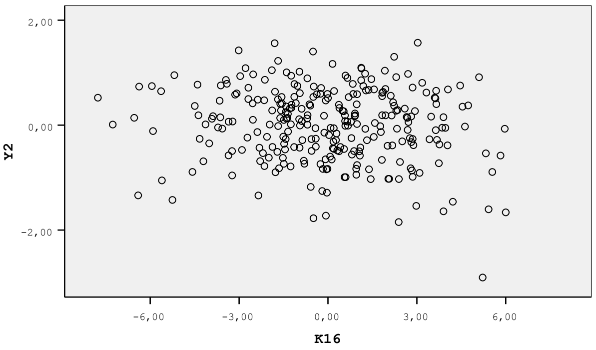
Picture A15.96. The partial regression of verbalization (K_{14}) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

The dependence variable: Y2

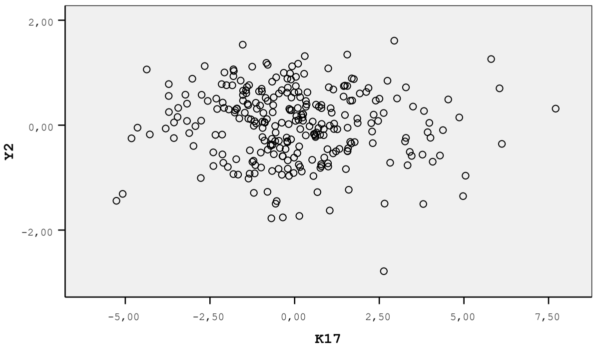
Picture A15.97. The partial regression of generalization (K_{15}) and the level of residual knowledge by the exact scale (Y_2)

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.


The graph of partial regression

The dependence variable: Y2

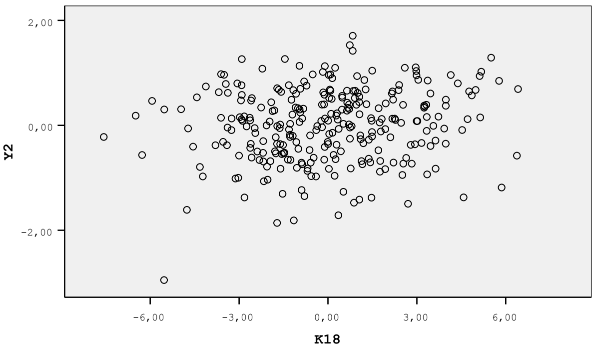
Picture A15.98. The partial regression of analyticity (K_{16}) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

The dependence variable: Y2

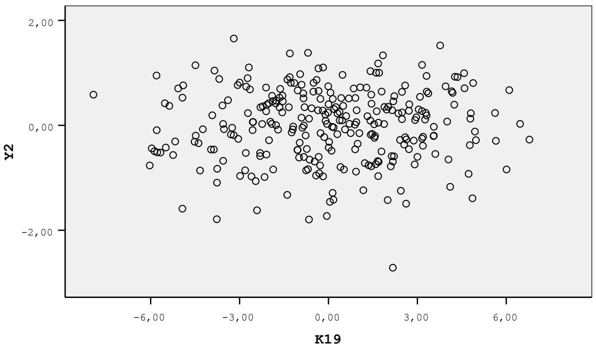
Picture A15.99. The partial regression of classification (K_{17}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of 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.


The graph of partial regression

The dependence variable: Y2

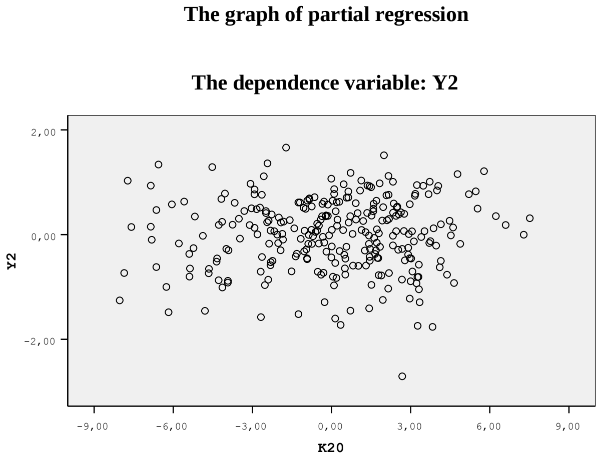
Picture A15.100. The partial regression of arithmetic abilities (K_{18}) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

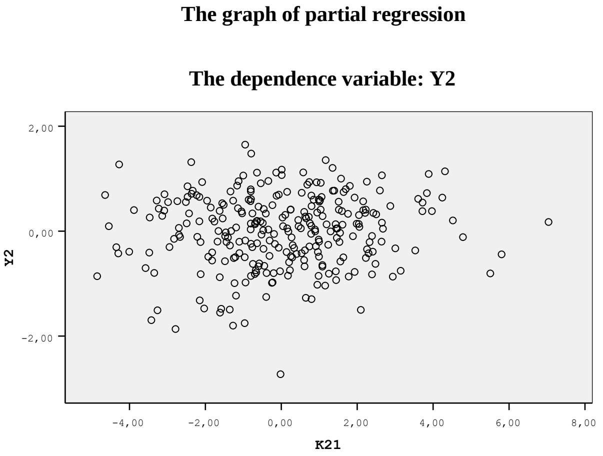
The dependence variable: Y2

Picture A15.101. The partial regression of 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.

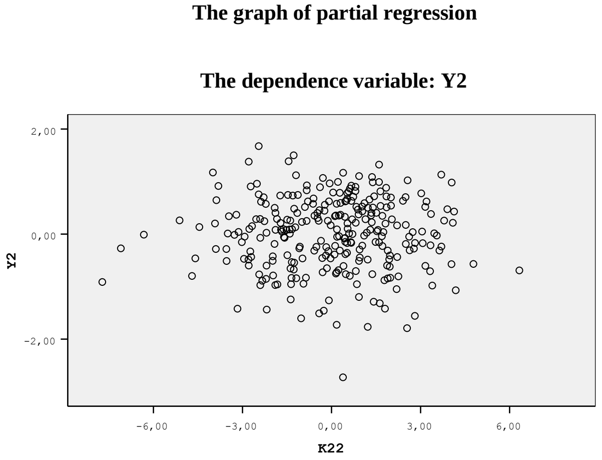


Picture A15.102. The partial regression of mnemonic abilities (K_{20}) and the level of residual knowledge by the exact scale (Y_2)

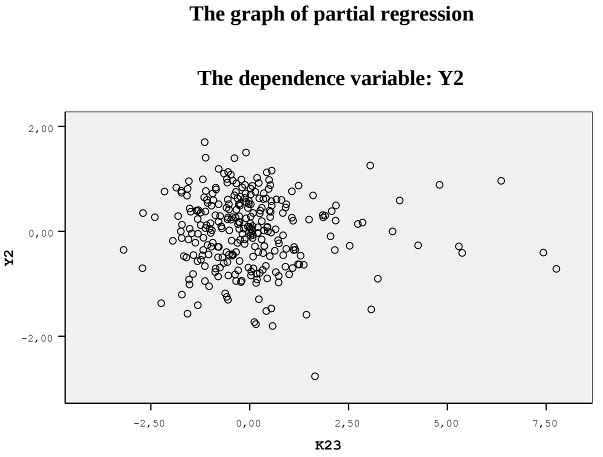


Picture A15.103. The partial regression of planar thinking (K_{21}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of LRKT (Y_2) and volumetric thinking (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.

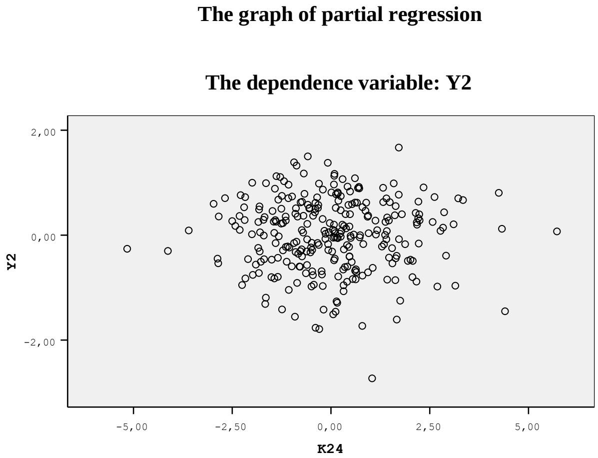


Picture A15.104. The partial regression of volumetric thinking (K_{22}) and the level of residual knowledge by the exact scale (Y_2)



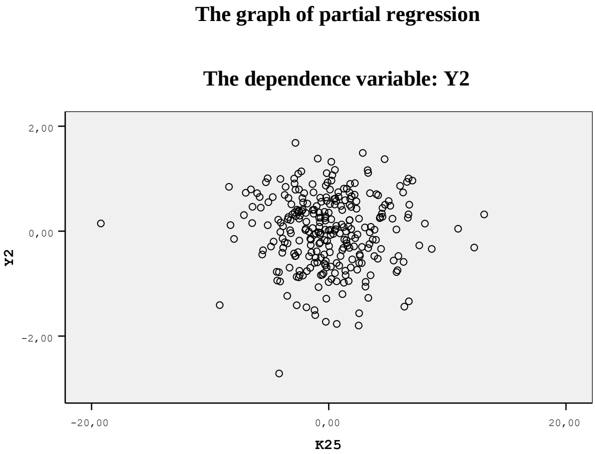
Picture A15.105. The partial regression of verbal originality (K_{23}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of 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.


The graph of partial regression

The dependence variable: Y2

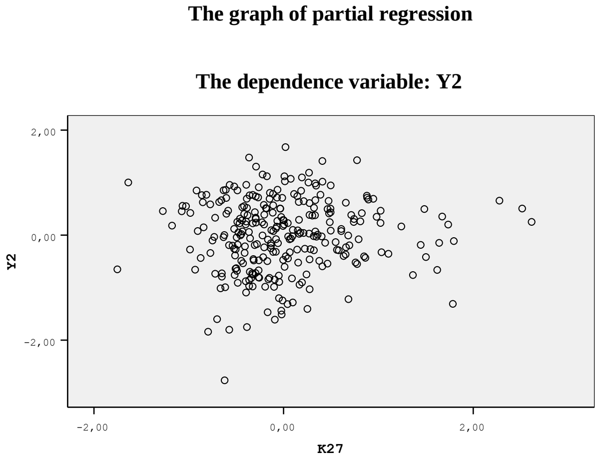
Picture A15.106. The partial regression of verbal associativity (K_{24}) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

The dependence variable: Y2

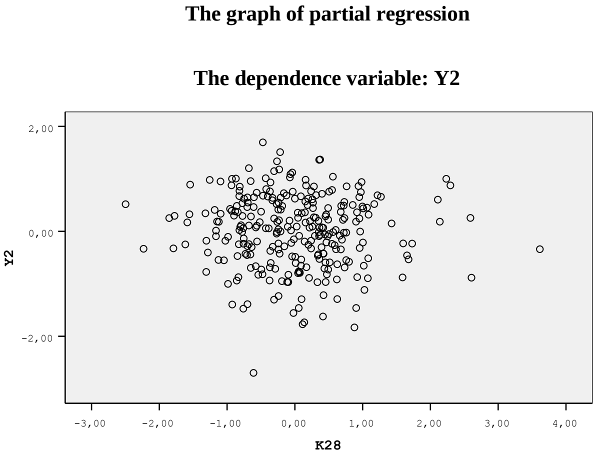
Picture A15.107. The partial regression of verbal selectivity (K_{25}) and the level of residual knowledge by the exact scale (Y_2)

The graph of partial regression of 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.


The graph of partial regression

The dependence variable: Y2

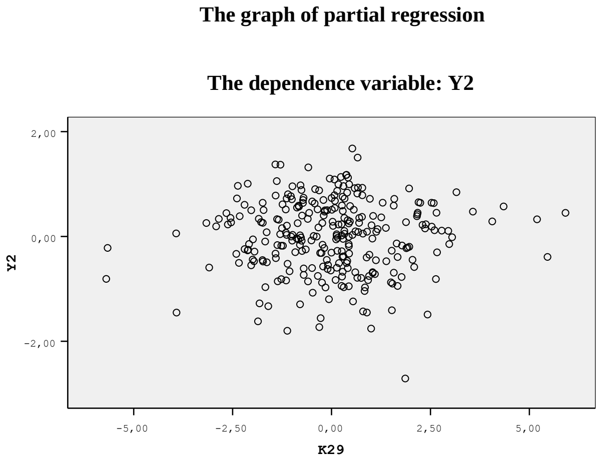
Picture A15.108. The partial regression of figurative originality (K_{27}) and the level of residual knowledge by the exact scale (Y_2)


The graph of partial regression

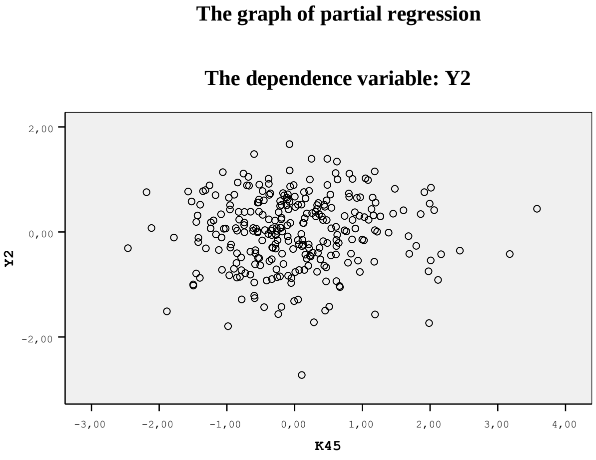
The dependence variable: Y2

Picture A15.109. 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 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 in pic. A15.111.

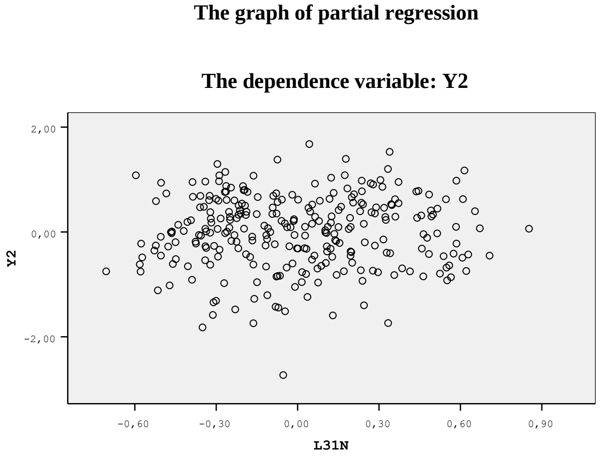


Picture A15.110. The partial regression of figurative selectivity (K_{29}) and the level of residual knowledge by the exact scale (Y_2)

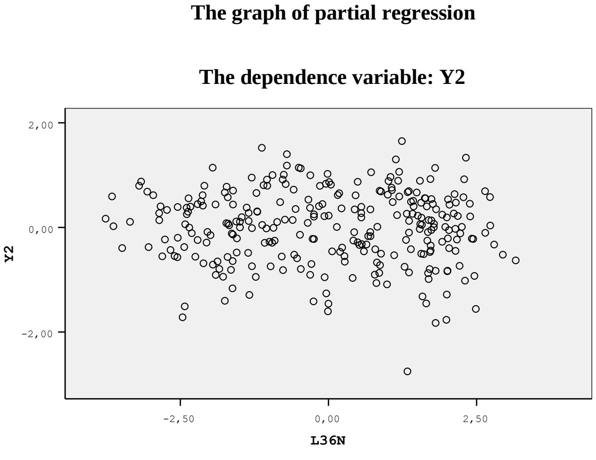


Picture A15.111. The partial regression of the level of proficiency in the language of statement of the information (K_{45}) and the level of residual knowledge by the exact scale (Y_2)

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.

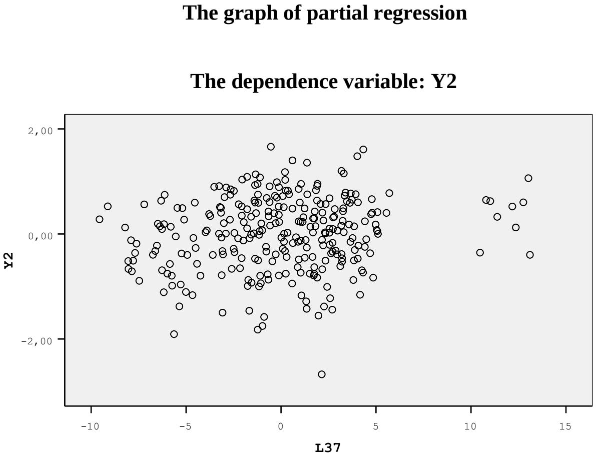


Picture A15.112. The partial regression of the kind of information (L_{31N}) and the level of residual knowledge by the exact scale (Y_2)

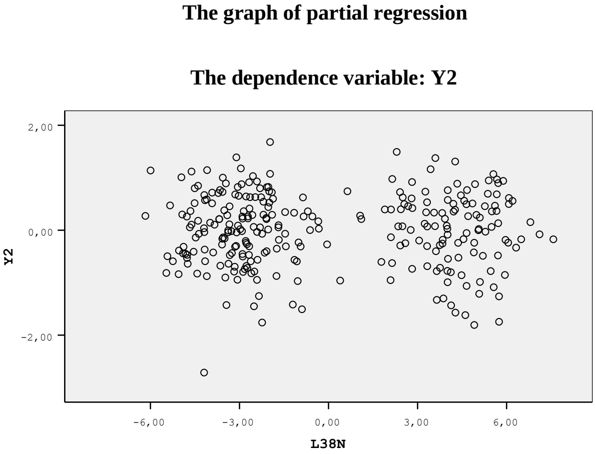


Picture A15.113. The partial regression of the color of background (L_{36N}) and the level of residual knowledge by the exact scale (Y_2)

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)

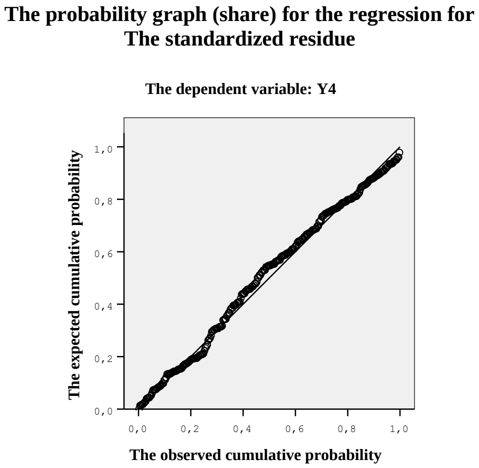


Picture A15.115. The partial regression of the color of symbol (K_{38N}) and the level of residual knowledge by the exact scale (Y_2)

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.

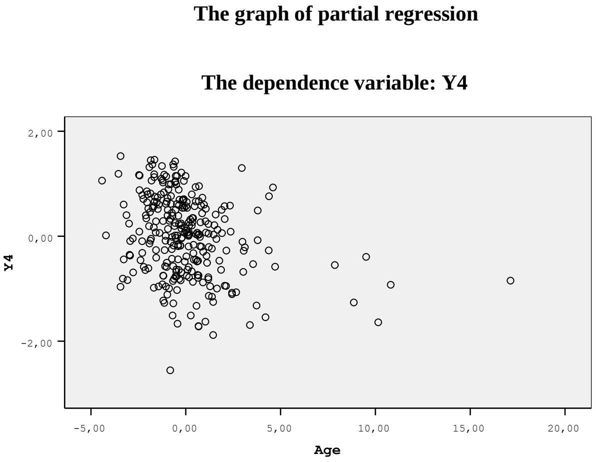
In pic. A15.116 presents directly the probability graph with the factual nominal values and the expected nominal values of dependent variable Y_4 at the complete set of various independent variables K_i.


The probability graph (share) for the regression for
The standardized residue

The dependent variable: Y4

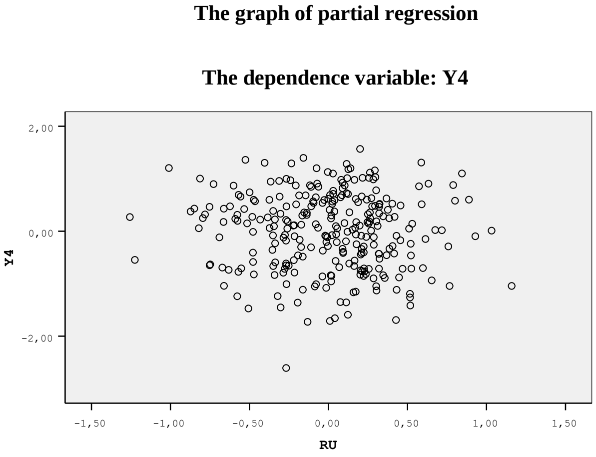
Picture A15.116. The probability graph of regression of the dependent variable Y_4 at the complete set of independent variables K_i

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.


The graph of partial regression

The dependence variable: Y4

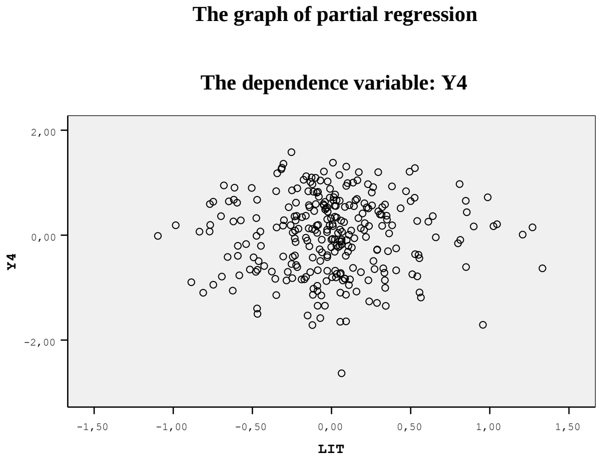
Picture A15.117. The partial regression of the age (*Age*) and the level of residual knowledge by the exact scale (Y_4)


The graph of partial regression

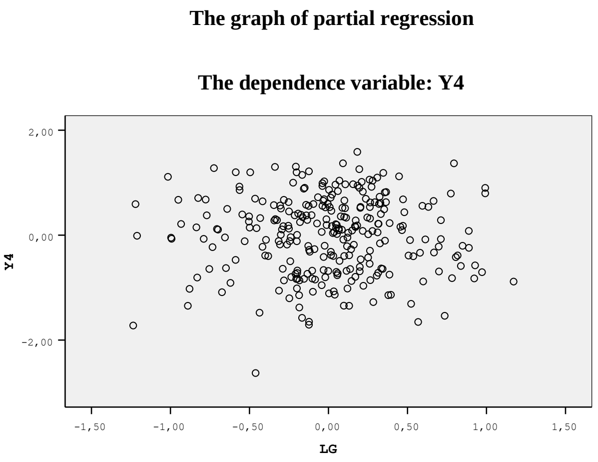
The dependence variable: Y4

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.

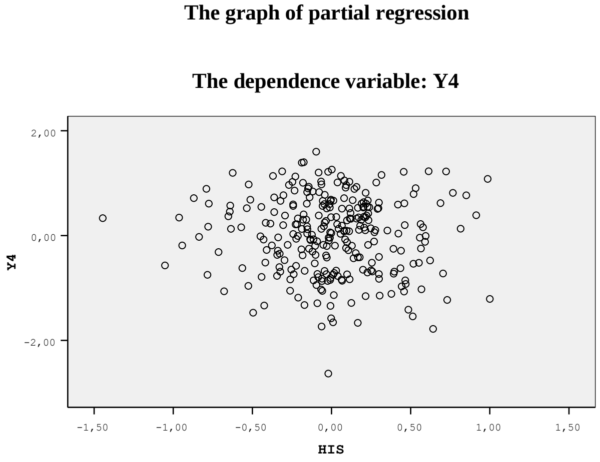


Picture A15.119. The partial regression of the mark in literature (*LIT*) and the level of residual knowledge by the exact scale (Y_4)

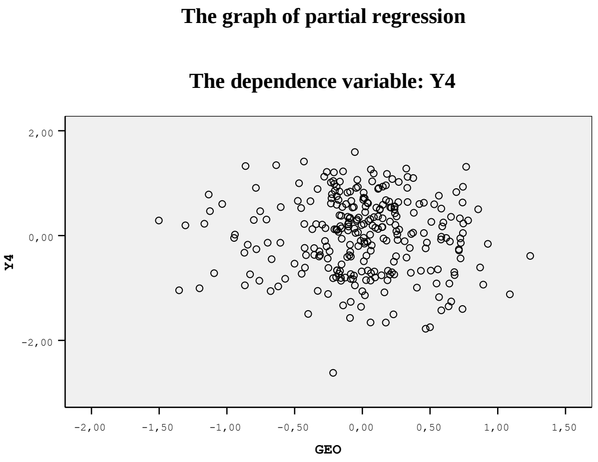


Picture A15.120. The partial regression of the mark in foreign language (*LG*) and the level of residual knowledge by the exact scale (Y_4)

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.

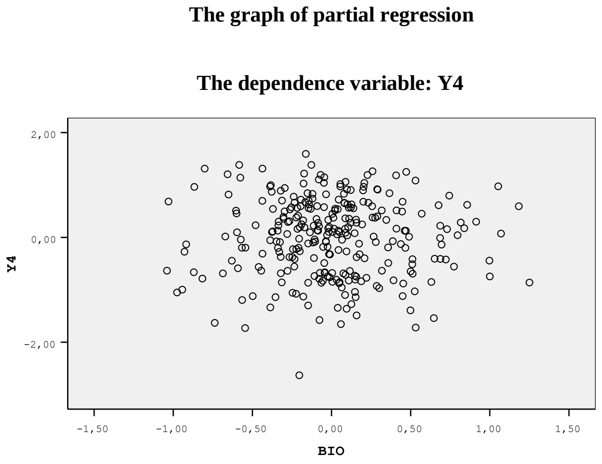


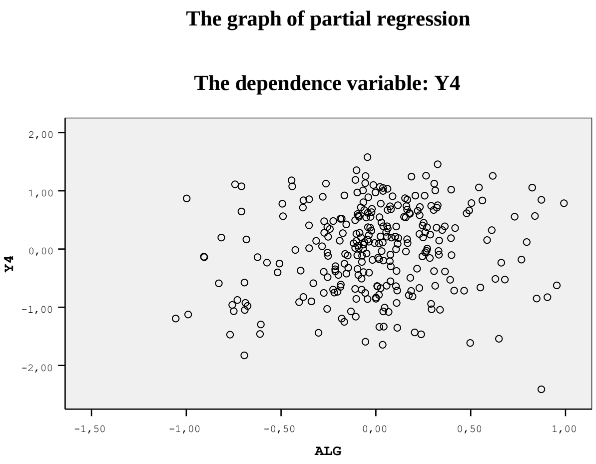
Picture A15.121. The partial regression of the mark in history (*HIS*) and the level of residual knowledge by the exact scale (Y_4)



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.

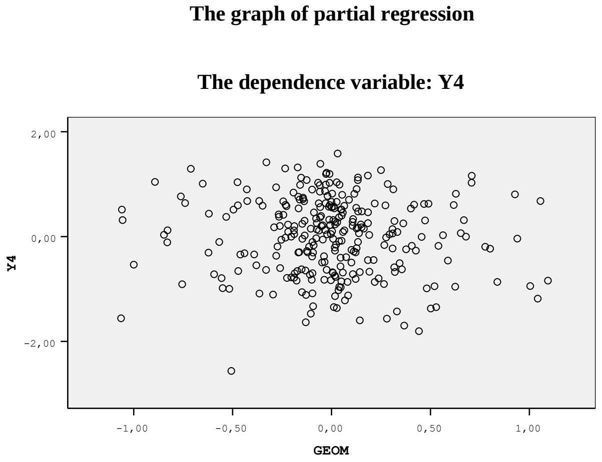


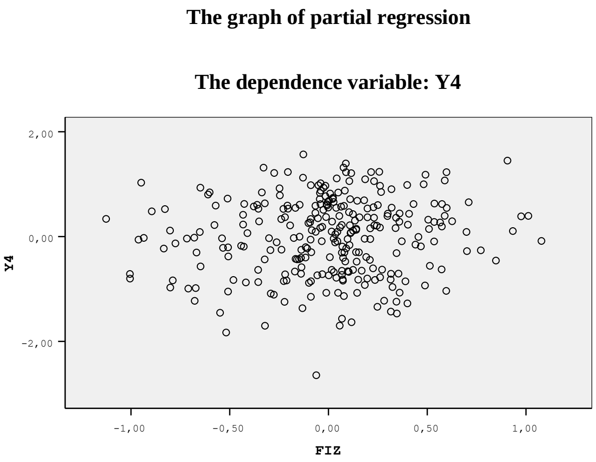


Picture A15.123. The partial regression of the mark in biology (*BIO*) and the level of residual knowledge by the exact scale (Y_4)

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.

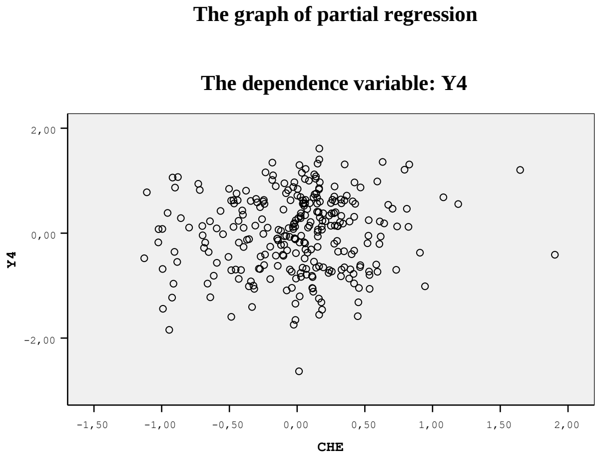




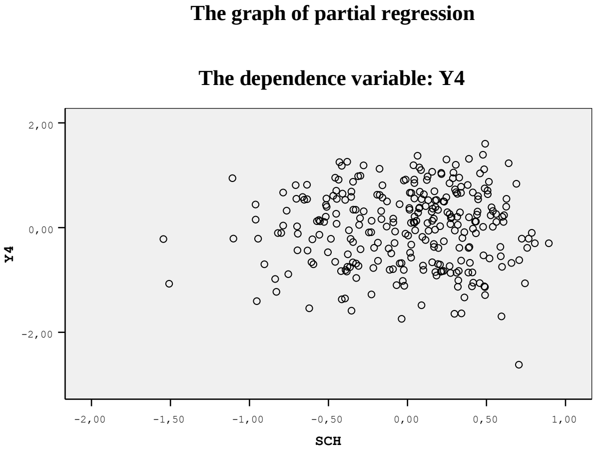
Picture A15.125. The partial regression of the mark in geometry (*GEOM*) and the level of residual knowledge by the exact scale (Y_4)

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.

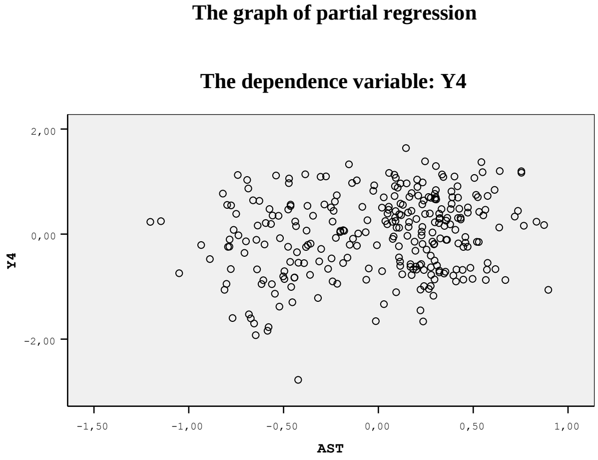


Picture A15.127. The partial regression of the mark in chemistry (*CHE*) and the level of residual knowledge by the exact scale (Y_4)

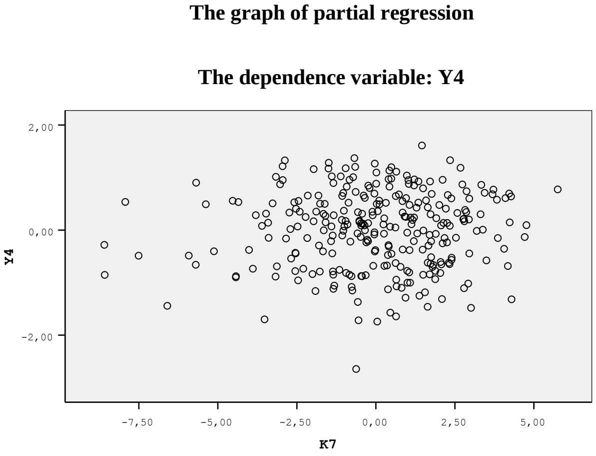


Picture A15.128. The partial regression of the mark in drawing (*SCH*) and the level of residual knowledge by the exact scale (Y_4)

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.

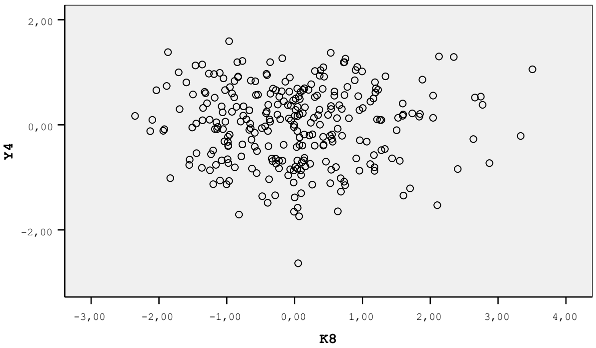


Picture A15.129. The partial regression of the mark in astronomy (*AST*) and the level of residual knowledge by the exact scale (Y_4)



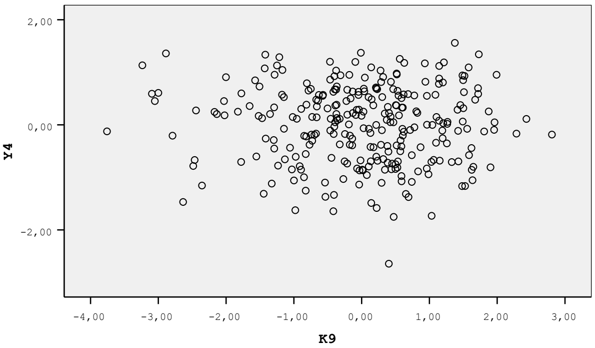
Picture A15.130. The partial regression of protanopia (K_7) and the level of residual knowledge by the exact scale (Y_4)

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.


The graph of partial regression

The dependence variable: Y4

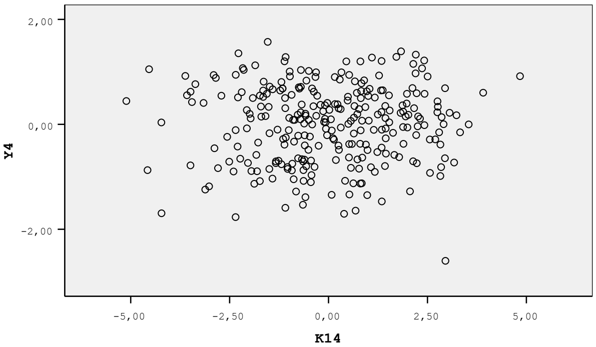
Picture A15.131. The partial regression of deuteranopia (K_8) and the level of residual knowledge by the exact scale (Y_4)


The graph of partial regression

The dependence variable: Y4

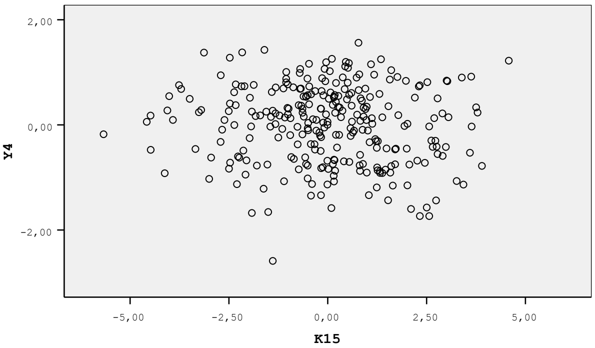
Picture A15.132. The partial regression of tritanopia (K_9) and the level of residual knowledge by the exact scale (Y_4)

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.


The graph of partial regression

The dependence variable: Y4

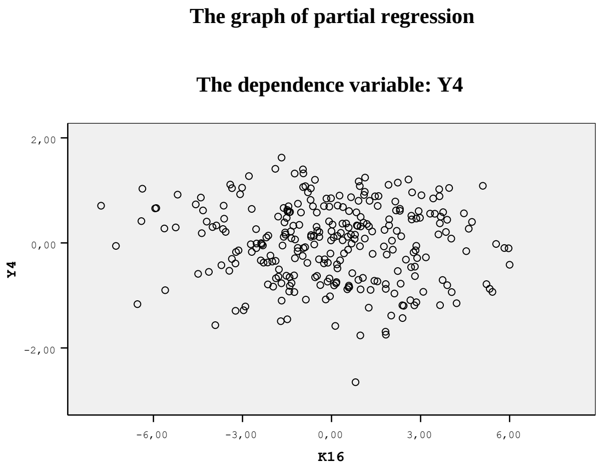
Picture A15.133. The partial regression of verbalization (K_{14}) and the level of residual knowledge by the exact scale (Y_4)

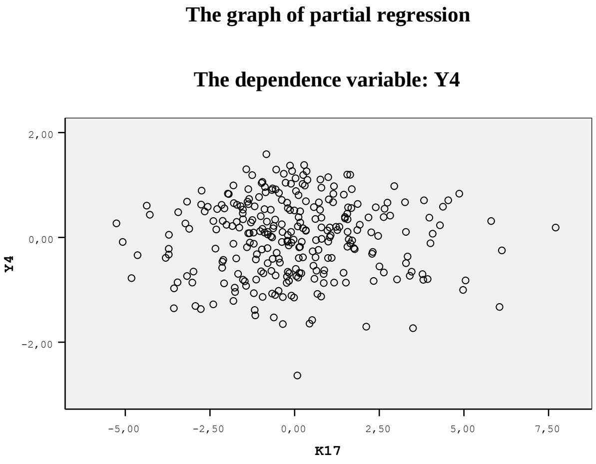

The graph of partial regression

The dependence variable: Y4

Picture A15.134. The partial regression of generalization (K_{15}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and analyticity (K_{16}) is presented directly in pic. A15.135, and the graph of partial regression of LRKT (Y_4) and classification (K_{17}) is presented directly in pic. A15.136.

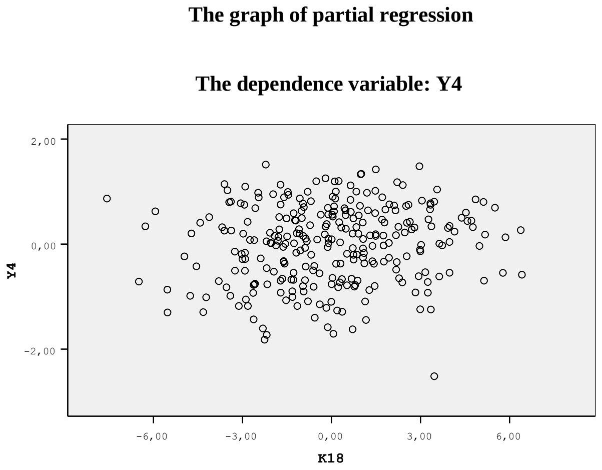


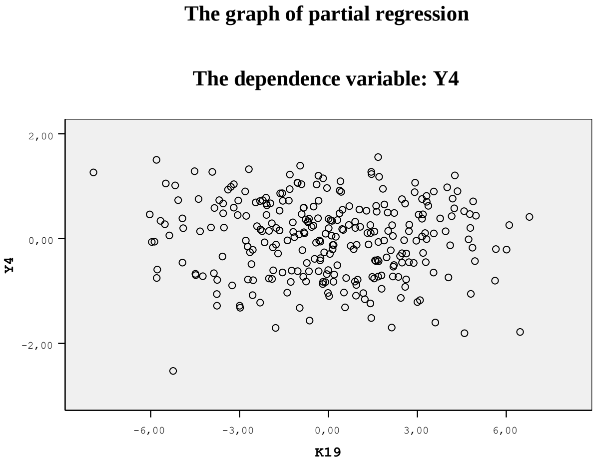


Picture A15.135. The partial regression of analyticity (K_{16}) and the level of residual knowledge by the exact scale (Y_4)

Picture A15.136. 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_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.

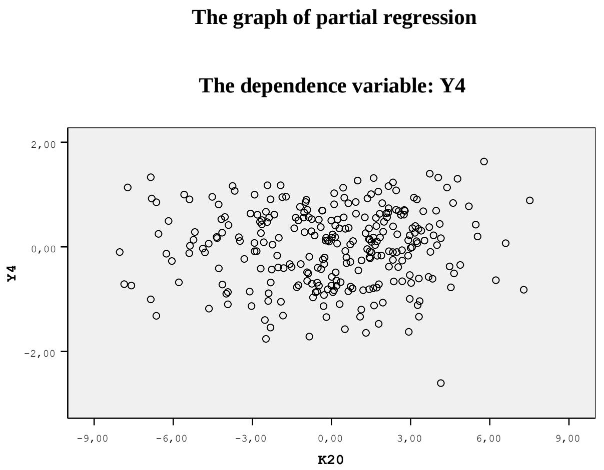




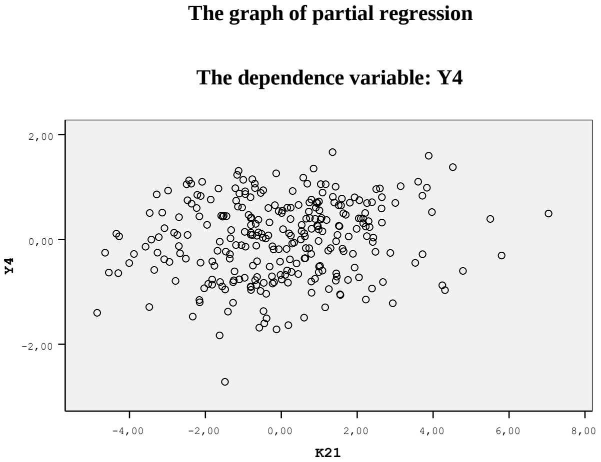
Picture A15.137. The partial regression of arithmetic abilities (K_{18}) and the level of residual knowledge by the exact scale (Y_4)

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.

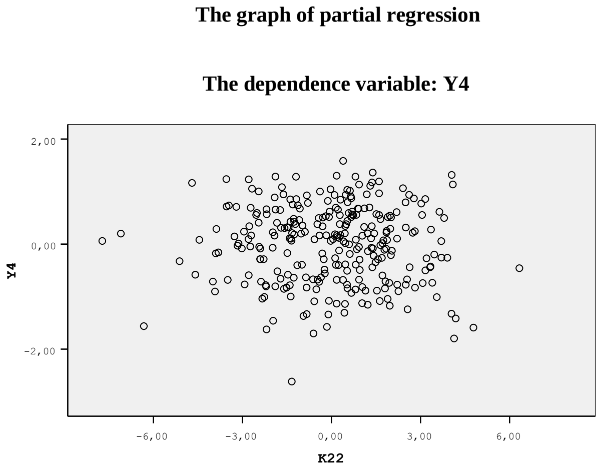


Picture A15.139. The partial regression of mnemonic abilities (K_{20}) and the level of residual knowledge by the exact scale (Y_4)

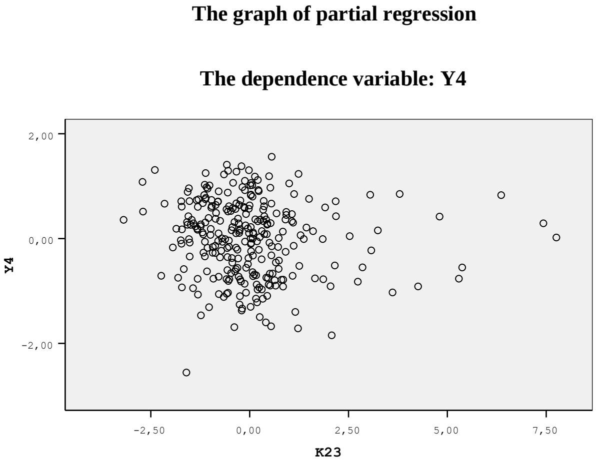


Picture A15.140. The partial regression of planar thinking (K_{21}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and volumetric thinking (K_{22}) is presented directly in pic. A15.141, and the graph of partial regression of LRKT (Y_4) and verbal originality (K_{23}) is presented directly in pic. A15.142.

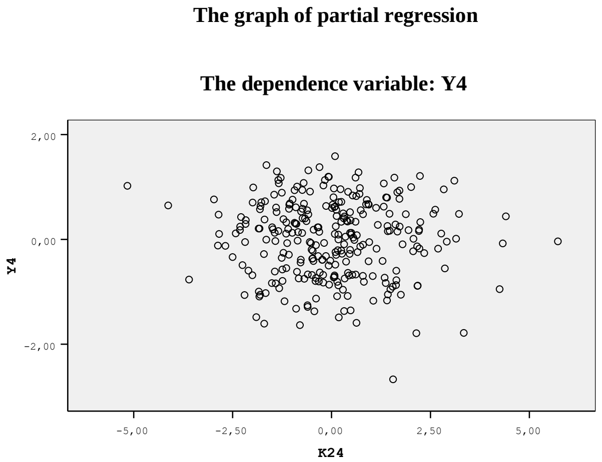


Picture A15.141. The partial regression of volumetric thinking (K_{22}) and the level of residual knowledge by the exact scale (Y_4)

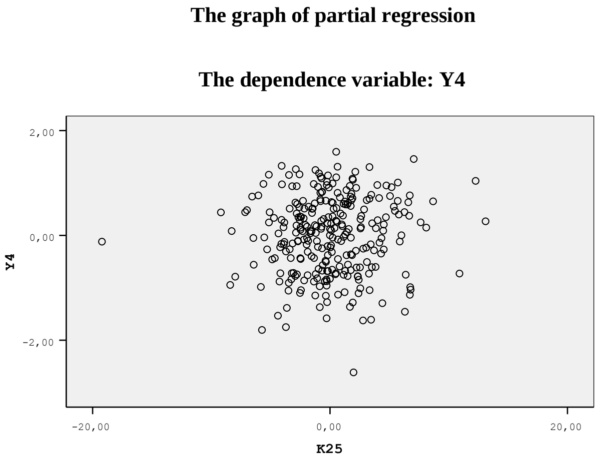


Picture A15.142. The partial regression of verbal originality (K_{23}) and the level of residual knowledge by the exact scale (Y_4)

The graph of the partial regression of LRKT (Y_4) and verbal associativity (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.

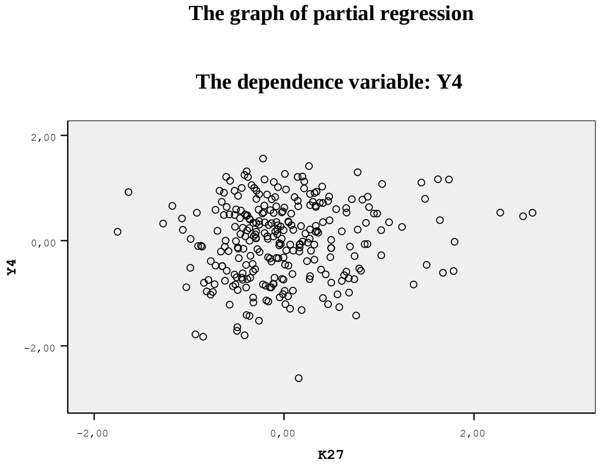


Picture A15.143. The partial regression of verbal associativity (K_{24}) and the level of residual knowledge by the exact scale (Y_4)

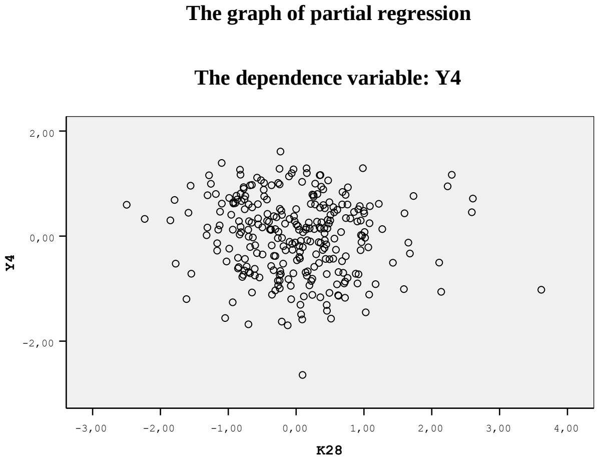


Picture A15.144. The partial regression of verbal selectivity (K_{25}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_4) and figurative originality (K_{27}) is presented directly in pic. A15.145, and the graph of partial regression of LRKT (Y_4) and figurative associativity (K_{28}) is presented directly in pic. A15.146.

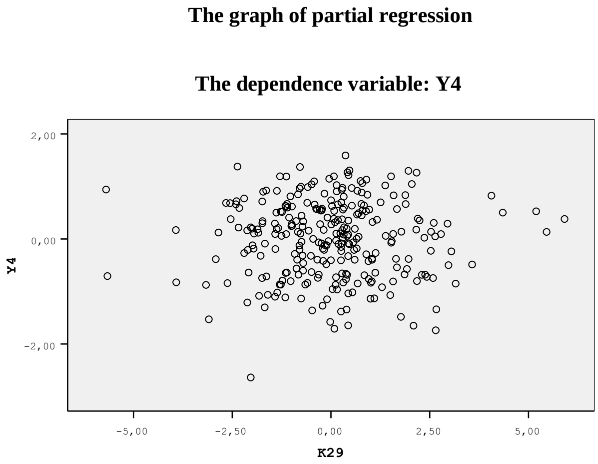


Picture A15.145. The partial regression of figurative originality (K_{27}) and the level of residual knowledge by the exact scale (Y_4)

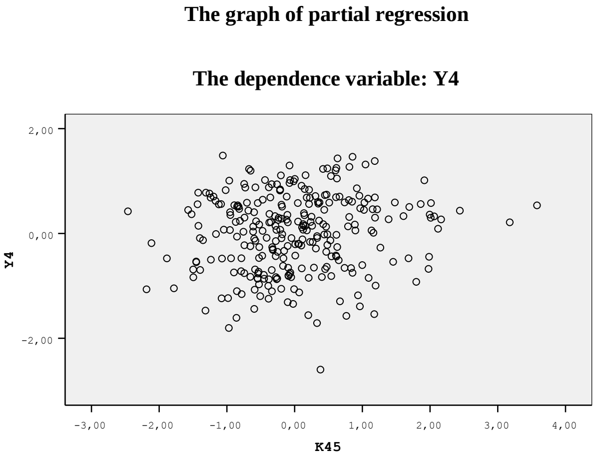


Picture A15.146. The partial regression of figurative associativity (K_{28}) and the level of residual knowledge by the exact scale (Y_4)

The graph of partial regression of LRKT (Y_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.

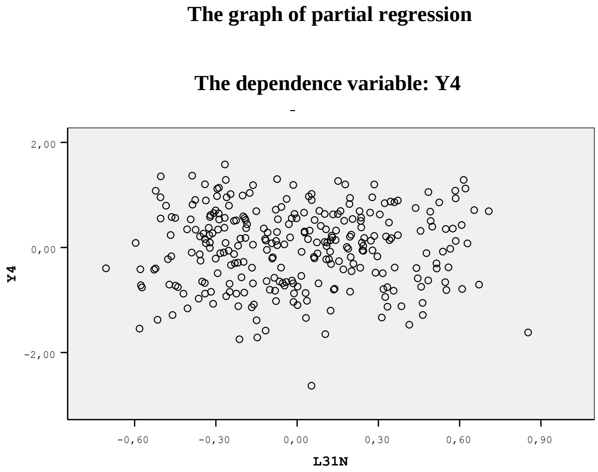


Picture A15.147. The partial regression of figurative selectivity (K_{29}) and the level of residual knowledge by the exact scale (Y_4)

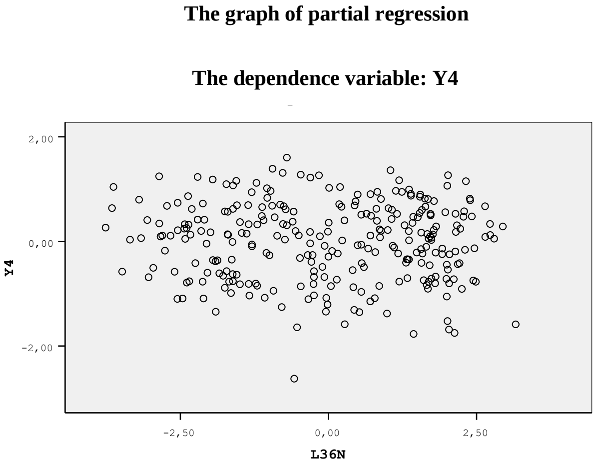


Picture A15.148. The partial regression of the level of proficiency in the language of statement of the information (K_{45}) and the level of residual knowledge by the exact scale (Y_4)

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.

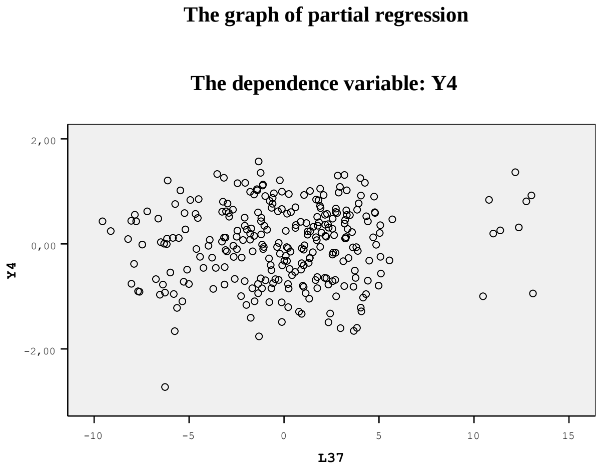


Picture A15.149. The partial regression of the kind of information (L_{31N}) and the level of residual knowledge by the exact scale (Y_4)

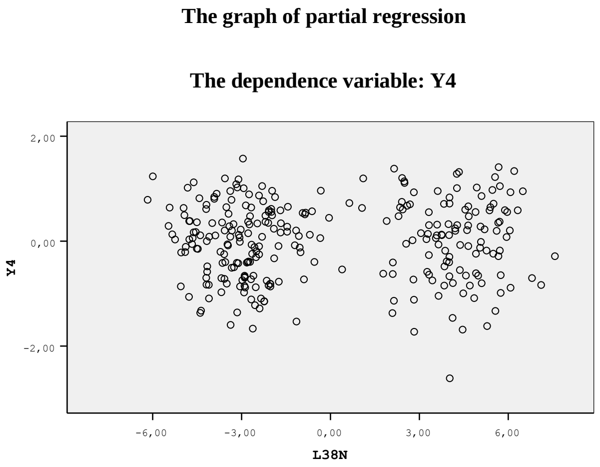


Picture A15.150. The partial regression of the color of background (L_{36N}) and the level of residual knowledge by the exact scale (Y_4)

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.



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)



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 presented in the scale of names (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 assigning 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.

By the centroid of class the geometric place (point) and locality is called:

- the point with the defined geometric coordinates, which are calculated as the average arithmetic of the coordinates of all elements of centroid (of class);
- the locality with the maximal density of distribution of the elements of centroid (of class).

The linear discriminant analysis needs to be performed in relation:

- to the complete set of independent variables – all independent variables are included directly into the statistical discriminant analysis;
- to 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 discriminant analysis act as the multidimensional, so the significant necessity of using of the means of automation is appeared – the packages of the applied programs of statistical appointment (“Statistics” 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 the poor-students, mediocre-students, good-students and excellent-students.

It is proposed to research the available reduced set of independent variables K_i with the taking into account of the dependent variables (factors) Y_2 and Y_4, and also to research the statistical tendences, 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 A15.103

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

3,00	*Age*	18,9429	3,06731	35	35,000	3,00	*Age*	19,7361	3,78281	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
4,00	*Age*	18,2479	2,90928	117	117,000	4,00	*Age*	17,8873	1,86355	71	71,000
	K7	20,6410	2,70205	117	117,000		*K7*	21,1972	2,81130	71	71,000
	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
5,00	*Age*	17,9250	1,94099	120	120,000	5,00	*Age*	17,4141	1,21362	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

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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
Total	*Age*	18,2330	2,63475	279	279,000	Total	*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 the presented 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 among the independent variables were not revealed, 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 scope by 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 impossible to calculate accurately, 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 of the factors Y_2 and Y_4, and also to calculate the statistical dimensions of the analyzed centroids of groups (classes).

Table A15.104

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 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
	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

The completion of tabl. A15.104

	K27	1,8176	1,03507	120	120,000
	K28	2,1218	1,49561	120	120,000
	K29	5,1422	3,39108	120	120,000
	K45	3,9583	1,16241	120	120,000
	L31N	1,3417	,47626	120	120,000
	L36N	5,3333	1,79791	120	120,000
	L37	16,5250	4,74556	120	120,000
	L38N	4,3583	3,99957	120	120,000
Total	*Age*	18,2330	2,63475	279	279,000
	RU	4,0968	,63014	279	279,000
	LIT	4,2186	,66696	279	279,000
	LG	4,3297	,65058	279	279,000
	HIS	4,3333	,56898	279	279,000
	GEO	4,4265	,61235	279	279,000
	BIO	4,3763	,58606	279	279,000
	ALG	4,2724	,68724	279	279,000
	GEOM	4,2975	,70023	279	279,000
	FIZ	4,2330	,66207	279	279,000
	CHE	4,1935	,69310	279	279,000
	SCH	4,5663	,53819	279	279,000
	AST	4,6523	,50635	279	279,000
	K7	20,8889	2,57936	279	279,000
	K8	11,7993	3,39951	279	279,000
	K9	12,2867	3,58005	279	279,000
	K14	14,4373	2,28118	279	279,000
	K15	12,9928	2,07415	279	279,000
	K16	10,7742	3,70920	279	279,000
	K17	4,7348	2,71047	279	279,000
	K18	8,6846	3,98840	279	279,000
	K19	10,9427	3,87627	279	279,000
	K20	16,0036	3,53451	279	279,000
	K21	10,6631	2,46729	279	279,000
	K22	11,1075	3,46969	279	279,000
	K23	2,7332	1,95418	279	279,000
	K24	6,1470	3,32299	279	279,000
	K25	17,2795	8,32442	279	279,000
	K27	1,7180	,93439	279	279,000
	K28	2,0451	1,35791	279	279,000
	K29	4,8457	3,06187	279	279,000
	K45	3,7957	1,16815	279	279,000
	L31N	1,3226	,46830	279	279,000
	L36N	5,4516	1,79437	279	279,000
	L37	15,8351	4,34750	279	279,000
	L38N	4,4194	4,04291	279	279,000

	K27	1,8138	,96164	128	128,000
	K28	1,9945	1,42839	128	128,000
	K29	5,0160	3,09586	128	128,000
	K45	4,0703	1,24346	128	128,000
	L31N	1,3203	,46843	128	128,000
	L36N	5,4063	1,88420	128	128,000
	L37	16,5000	4,69377	128	128,000
	L38N	4,4063	4,01265	128	128,000
Total	*Age*	18,2357	2,63043	280	280,000
	RU	4,0929	,63242	280	280,000
	LIT	4,2214	,66740	280	280,000
	LG	4,3286	,64971	280	280,000
	HIS	4,3321	,56831	280	280,000
	GEO	4,4250	,61179	280	280,000
	BIO	4,3750	,58544	280	280,000
	ALG	4,2714	,68620	280	280,000
	GEOM	4,2929	,70326	280	280,000
	FIZ	4,2321	,66103	280	280,000
	CHE	4,1929	,69196	280	280,000
	SCH	4,5643	,53829	280	280,000
	AST	4,6500	,50694	280	280,000
	K7	20,8750	2,58520	280	280,000
	K8	11,8000	3,39344	280	280,000
	K9	12,2857	3,57367	280	280,000
	K14	14,4393	2,27734	280	280,000
	K15	12,9893	2,07128	280	280,000
	K16	10,7821	3,70494	280	280,000
	K17	4,7357	2,70566	280	280,000
	K18	8,6643	3,99572	280	280,000
	K19	10,9393	3,86973	280	280,000
	K20	16,0107	3,53019	280	280,000
	K21	10,6643	2,46295	280	280,000
	K22	11,1107	3,46388	280	280,000
	K23	2,7358	1,95114	280	280,000
	K24	6,1414	3,31835	280	280,000
	K25	17,2535	8,32087	280	280,000
	K27	1,7154	,93370	280	280,000
	K28	2,0413	1,35692	280	280,000
	K29	4,8426	3,05680	280	280,000
	K45	3,7929	1,16703	280	280,000
	L31N	1,3214	,46786	280	280,000
	L36N	5,4536	1,79145	280	280,000
	L37	15,8321	4,33999	280	280,000
	L38N	4,4071	4,04082	280	280,000

In the course of the primary statistical processing before the conducting of the 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 is revealed (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 impossible to calculate accurately, 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 revealing 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 A15.105

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 sign.		Lambda Wilkes	F	deg. fr.1	deg. fr.2	The sign.
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 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) into the canonical discriminant functions at the discriminant analysis.

Table A15.106

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 sign.		Lambda Wilkes	*F*	deg.fr.1	deg.fr.2	The sign.
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 and more variables.

The covariance table (matrix) is represented a set of named rows and columns on the intersection of which contain the values, characterizing the measure of consistency of the changing of one variable in relation to another.

The correlation table (matrix) is represented 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 the regression analysis the standard correlation tables (matrixes) 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 form the covariance and correlation tables (matrixes) by the means of using of the package of the applied 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 matrixes 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 coordinated 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 coordinated 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. A15.107) and the table of correlation (tabl. A15.108) of the reduced set of independent variables (the dependent variable Y_2) is presented.

Table A15.107

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 A15.108

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. A15.109) and the table of correlation (tabl. A15.110) of the reduced set of independent variables (the dependent variable Y_4) is presented.

Table A15.109

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 A15.110

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. A15.111) and the table of correlation (tabl. A15.112) of the complete set of independent variables (the dependent variable Y_2) is presented.

Table A15.111

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 A15.112

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. A15.113) and the table of correlation (tabl. A15.114) of the complete set of independent variables (the dependent variable Y_4) is presented directly.

Table A15.113

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 A15.114

The correlation of the complete set of independent variables and 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
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 the centroids of selected classes

Let's consider the problem of determination of the deterministic rank as the optimal quantity of variables in the basis of the canonical discriminant functions at the realization of the discriminant analysis with taking into account of the reduced set of independent variables K_i, and also the given dependent variables (factors) Y_2 and Y_4 (see tabl. A15.115).

1. The reduced set of independent variables K_i.

Table A15.115

The ranks of the centroids of selected classes at the reduced set of independent variables

<table>
<tr><td>The reduced set of independent variables K_i and dependent variable Y_2</td><td>The reduced set of independent variables K_i and dependent variable Y_4</td></tr>
<tr><td>
The log. determinants
<table>
<tr><td>Y_2</td><td>The rank</td><td>The log. determinant</td></tr>
<tr><td>2,00</td><td>.(a)</td><td>.(b)</td></tr>
<tr><td>3,00</td><td>20</td><td>19,748</td></tr>
<tr><td>4,00</td><td>20</td><td>30,186</td></tr>
<tr><td>5,00</td><td>20</td><td>29,231</td></tr>
<tr><td>The merged within groups</td><td>20</td><td>30,818</td></tr>
</table>
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)
<table>
<tr><td colspan="2">M Box</td><td>757,371</td></tr>
<tr><td rowspan="4">F</td><td>Approximately</td><td>1,516</td></tr>
<tr><td>deg.fr.1</td><td>420</td></tr>
<tr><td>deg.fr.2</td><td>31268,680</td></tr>
<tr><td>The significance</td><td>,000</td></tr>
</table>
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.
</td><td>
The log. determinants
<table>
<tr><td>Y_4</td><td>The rank</td><td>The log. determinant</td></tr>
<tr><td>2,00</td><td>.(a)</td><td>.(b)</td></tr>
<tr><td>3,00</td><td>20</td><td>27,024</td></tr>
<tr><td>4,00</td><td>20</td><td>27,269</td></tr>
<tr><td>5,00</td><td>20</td><td>28,457</td></tr>
<tr><td>The merged within groups</td><td>20</td><td>30,656</td></tr>
</table>
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)
<table>
<tr><td colspan="2">M Box</td><td>931,856</td></tr>
<tr><td rowspan="4">F</td><td>Approximately</td><td>1,965</td></tr>
<tr><td>deg.fr.1</td><td>420</td></tr>
<tr><td>deg.fr.2</td><td>123726,006</td></tr>
<tr><td>The significance</td><td>,000</td></tr>
</table>
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.
</td></tr>
</table>

2. The complete set of independent variables K_i.

Let's 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 of the complete set of independent variables K_i, and also the dependent variables (factors) Y_2 and Y_4 of variables K_i (see tabl. A15.116).

Table A15.116

The ranks of the centroids of selected classes
at the complete set of independent variables

<table>
<tr><th>The complete set of independent variables K_i and dependent variable Y_2</th><th>The complete set of independent variables K_i and dependent variable Y_4</th></tr>
<tr>
<td>
The log. determinants
<table>
<tr><th>Y_2</th><th>The rank</th><th>The log. determinant</th></tr>
<tr><td>2,00</td><td>.(a)</td><td>.(b)</td></tr>
<tr><td>3,00</td><td>.(c)</td><td>.(b)</td></tr>
<tr><td>4,00</td><td>36</td><td>13,426</td></tr>
<tr><td>5,00</td><td>36</td><td>10,312</td></tr>
<tr><td>The merged within groups</td><td>36</td><td>15,888</td></tr>
</table>
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)
<table>
<tr><td colspan="2">M Box</td><td>2278,997</td></tr>
<tr><td rowspan="4">F</td><td>Approximately</td><td>2,877</td></tr>
<tr><td>deg.fr.1</td><td>666</td></tr>
<tr><td>deg.fr.2</td><td>166413,998</td></tr>
<tr><td>The significance</td><td>,000</td></tr>
</table>
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 21,547.
</td>
<td>
The log. determinants
<table>
<tr><th>Y_4</th><th>The rank</th><th>The log. determinant</th></tr>
<tr><td>2,00</td><td>.(a)</td><td>.(b)</td></tr>
<tr><td>3,00</td><td>36</td><td>8,011</td></tr>
<tr><td>4,00</td><td>36</td><td>5,435</td></tr>
<tr><td>5,00</td><td>36</td><td>9,479</td></tr>
<tr><td>The merged within groups</td><td>36</td><td>15,790</td></tr>
</table>
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)
<table>
<tr><td colspan="2">M Box</td><td>2362,290</td></tr>
<tr><td rowspan="4">F</td><td>Approximately</td><td>1,404</td></tr>
<tr><td>deg.fr.1</td><td>1332</td></tr>
<tr><td>deg.fr.2</td><td>122697,266</td></tr>
<tr><td>The significance</td><td>,000</td></tr>
</table>
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 16,849.
</td>
</tr>
</table>

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 same time the statistical reliability of differences is estimated by means of the criterion χ^2 (tabl. A15.117).

1. The reduced set of independent variables K_i.

Table A15.117

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 reduced set of independent variables K_i and dependent variable Y_4				
The eigenvalues					The eigenvalues				
The function	The eigenvalue	% of explained dispersion	The cumu-lative%	The canonical correlation	The function	The eigenvalue	% of explained dispersion	The cumu-lative%	The canonical correlation
1	0,183(a)	51,6	51,6	0,393	1	0,414(a)	76,6	76,6	0,541
2	0,131(a)	37,2	88,8	0,341	2	0,082(a)	15,3	91,9	0,276
3	0,040(a)	11,2	100,0	0,196	3	0,044(a)	8,1	100,0	0,205
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 signific.	The checking of function(s)	Lambda Wilkes	Chi-square	deg.fr.	The signific.
from 1 to 3	0,719	87,815	60	0,011	from 1 to 3	0,626	125,181	60	0,000
from 2 to 3	0,850	43,222	38	0,258	from 2 to 3	0,885	32,630	38	0,716
3	0,962	10,371	18	0,919	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 (0,183) and the second (0,131) canonical discriminant function in relation to the third (0,040), which describe respectively 51,6%, 37,2% and 11,2% 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 (0,414) canonical discriminant function in relation to the second (0,082) and the third (0,044), which describe respectively 76,6%, 15,3% and 8,1% 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 A15.118

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 eigenvalues

The function	The eigenvalue	% of explained dispersion	The cumulative %	The canonical correlation
1	0,350(a)	52,9	52,9	0,509
2	0,206(a)	31,1	84,0	0,413
3	0,106(a)	16,0	100,0	0,309

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	0,556	151,651	108	0,004
from 2 to 3	0,750	74,254	70	0,341
3	0,904	25,938	34	0,838

The complete set of independent variables K_i and dependent variable Y_4

The eigenvalues

The function	Eigenvalue	% of explained dispersion	The cumulative%	The canonical correlation
1	0,582(a)	67,8	67,8	,607
2	0,169(a)	19,6	87,4	,380
3	0,108(a)	12,6	100,0	,313

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	0,488	185,909	108	0,000
from 2 to 3	0,772	67,048	70	0,578
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 (0,350) canonical discriminant function in relation to the second (0,206) and the third (0,106), which describe respectively 52,9%, 31,1% and 16,0% 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 complete 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 (0,582) canonical discriminant function in relation to the second (0,169) and the third (0,108), which describe respectively 67,8%, 19,6% and 12,6% 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 function in compare with the second and the third functions 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 and the second 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 assigning 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 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. A15.119 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 A15.119

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 coefficients of classifying function

The indicator	Y_2			
	2,00	3,00	4,00	5,00
Age	4,569	4,313	4,349	4,330
K_7	3,588	3,713	3,671	3,764
K_8	1,375	0,456	0,754	0,794
K_9	-0,621	0,089	-0,104	-0,207
K_{14}	2,624	2,825	2,908	3,033
K_{15}	2,597	2,785	2,757	2,662
K_{16}	-0,057	-0,531	-0,372	-0,436
K_{17}	0,188	0,015	0,087	0,021
K_{18}	-1,230	-1,121	-1,180	-1,049
K_{19}	0,411	0,410	0,492	0,490
K_{20}	1,370	1,311	1,377	1,408
K_{21}	1,155	1,656	1,583	1,653
K_{22}	-0,034	-0,104	-0,152	-0,115
K_{23}	0,500	0,662	0,640	0,541
K_{24}	-0,561	-0,750	-0,701	-0,668
K_{25}	0,119	0,122	0,103	0,085
K_{27}	1,418	1,119	1,670	1,550
K_{28}	1,093	1,192	0,929	0,920
K_{29}	-0,540	-0,439	-0,482	-0,413
K_{45}	4,019	3,703	3,956	3,961
(Constant)	-143,126	-140,060	-144,590	-147,517

The linear discriminant functions of Fisher

The reduced set of independent variables K_i and dependent variable Y_4

The coefficients of classifying function

The indicator	Y_4			
	2,00	3,00	4,00	5,00
Age	4,946	4,805	4,486	4,427
K_7	3,498	3,491	3,642	3,608
K_8	0,505	0,741	0,487	0,670
K_9	0,337	-0,018	0,145	-0,006
K_{14}	2,697	2,677	2,786	2,752
K_{15}	3,135	2,994	2,825	2,868
K_{16}	-0,601	-0,266	-0,458	-0,410
K_{17}	0,032	0,054	0,105	0,048
K_{18}	-1,244	-1,439	-1,220	-1,242
K_{19}	0,469	0,511	0,438	0,441
K_{20}	1,270	1,283	1,288	1,349
K_{21}	1,415	1,339	1,489	1,600
K_{22}	-0,124	-0,026	-0,116	-0,122
K_{23}	0,730	0,856	0,740	0,684
K_{24}	-0,446	-0,705	-0,673	-0,703
K_{25}	0,096	0,079	0,114	0,113
K_{27}	0,437	0,795	1,168	1,087
K_{28}	1,406	1,402	1,248	1,066
K_{29}	-0,601	-0,474	-0,518	-0,440
K_{45}	3,900	3,541	3,703	3,878
(Constant)	-151,857	-145,886	-142,374	-143,327

The linear discriminant functions of Fisher

In tabl. A15.120 proposes the standardized coefficients of discriminant functions for the reduced set of independent variables and the dependent variables Y_2 and Y_4.

Table A15.120

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 assigning 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 the means of use of the rule and procedure of Z-transformation.

In tabl. A15.121 proposes the coefficients of structural matrix directly for the reduced set of independent variables and the dependent variables Y_2 and Y_4.

Table A15.121

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 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_2:

- the dispersion of the first canonical discriminant function are determined the following independent variables: K_{18} (0,706), K_{14} (0,646), K_{19} (0,554), K_{20} (0,456), K_{45} (0,444), K_{21} (0,373), K_{27} (0,364), K_{22} (0,352), *Age* (-0,327), K_{17} (0,322), K_{24} (0,159) and K_{25} (0,158);
- the dispersion of the second canonical discriminant function are determined the following independent variables: K_{16} (0,536) and K_8 (0,327);
- the dispersion of the third canonical discriminant function are determined the following independent variables: K_{23} (0,303), K_{15} (0,296), K_9 (0,227), K_{28} (-0,221), K_7 (0,221) and K_{29} (-0,168).

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 the independent variables.

The nominal values of 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 the following independent variables are determined: *Age* (0,668), K_{18} (-0,495), K_{45} (-0,412), K_{17} (-0,297), K_{20} (-0,287), K_{19} (-0,282), K_{27} (-0,279), K_{14} (-0,274) and K_{29} (-0,142);
- the dispersion of the second considered canonical discriminant function the following independent variables are determined: K_{16} (-0,577), K_{24} (0,417), K_{25} (0,341) and K_{22} (-0,244);
- the dispersion of the third considered canonical discriminant function the following independent variables are determined: K_8 (0,448), K_{21} (0,409), K_9 (0,405), K_{15} (0,370), K_{23} (-0,225), K_7 (-0,199) and K_{28} (-0,177).

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. A15.122 the standardized coefficients of discriminant functions for the reduced set of independent variables and dependent variables Y_2 and Y_4 are proposed.

Table A15.122

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 reduced set of independent variables K_i and dependent variable Y_4			
The coefficients of discriminant function				The coefficients of discriminant function			
The indicator	The function			The indicator	The function		
	1	2	3		1	2	3
Age	-0,018	0,094	-0,086	*Age*	0,266	0,089	0,068
K_7	0,075	-0,090	-0,066	K_7	-0,088	0,039	-0,085
K_8	0,158	0,332	-0,260	K_8	0,065	-0,268	0,219
K_9	-0,169	-0,214	0,311	K_9	-0,009	0,295	-0,092
K_{14}	0,197	-0,093	0,064	K_{14}	-0,057	0,043	-0,070
K_{15}	-0,096	-0,019	0,174	K_{15}	0,106	0,025	0,174
K_{16}	0,001	0,211	-0,043	K_{16}	0,086	-0,211	-0,040
K_{17}	-0,033	0,100	0,042	K_{17}	-0,007	0,034	-0,106
K_{18}	0,100	-0,107	-0,131	K_{18}	-0,129	0,127	0,003
K_{19}	0,053	0,024	0,081	K_{19}	0,046	-0,028	0,004
K_{20}	0,070	0,022	0,000	K_{20}	-0,037	-0,050	0,079
K_{21}	0,065	-0,198	0,136	K_{21}	-0,160	-0,033	0,155
K_{22}	-0,002	-0,009	-0,123	K_{22}	0,060	-0,050	-0,031
K_{23}	-0,098	-0,009	0,169	K_{23}	0,103	-0,030	-0,108
K_{24}	0,049	0,054	-0,092	K_{24}	0,012	0,150	0,073
K_{25}	-0,030	0,002	0,002	K_{25}	-0,023	0,012	-0,003
K_{27}	0,224	0,294	0,492	K_{27}	-0,245	-0,089	-0,386
K_{28}	-0,177	-0,097	-0,191	K_{28}	0,205	0,124	-0,217
K_{29}	0,049	-0,073	-0,056	K_{29}	-0,019	-0,121	0,063
K_{45}	0,147	0,160	0,066	K_{45}	-0,182	0,059	0,378
(Constant)	-6,053	-0,637	-0,879	*(Constant)*	-2,045	-1,595	-4,611
The nonnormalized coefficients				The nonnormalized coefficients			

The presented coefficients (the unstandardized 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 unstandardized 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. The complete set of independent variables K_i.

In tabl. A15.123 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 A15.123

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. A15.124 and A15.125 the standardized coefficients of discriminant functions for the reduced set of independent and dependent variables Y_2 and Y_4 are proposed.

Table A15.124

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 A15.125

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 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 the following independent variables are determined: *HIS* (0,470), K_{18} (0,467), *LG* (0,460), K_{14} (0,449), *GEOM* (0,438), *ALG* (0,404), K_{19} (0,396), *CHE* (0,351), *LIT* (0,341), K_{20} (0,318), K_{45} (0,314), *FIZ* (0,311), *SCH* (0,305), K_{21} (0,288), *BIO* (0,288), L_{37} (0,282), K_{27} (0,273), *Age* (-0,257), K_{17} (0,238), L_{36N} (-0,150), K_{15} (0,133) and L_{38N} (-0,112);
- the dispersion of the second considered canonical discriminant function the following independent variables are determined: K_{16} (0,461), K_8 (0,246), *GEO* (0,221), K_{24} (0,119) and K_{25} (0,115);
- the dispersion of the third canonical discriminant function the following independent variables are determined: K_{22} (0,277), K_7 (0,235), *RU* (0,219), *AST* (-0,211), K_9 (-0,204), K_{29} (0,192), K_{23} (-0,180), K_{28} (0,170) and L_{31N} (0,103).

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 the following independent variables are determined: *Age* (-0,567), *ALG* (0,445), K_{18} (0,415), *FIZ* (0,367), K_{45} (0,352), K_{21} (0,298), *AST* (0,283), *LG* (0,273), K_{20} (0,253), K_{17} (0,248), K_{19} (0,239), K_{27} (0,232), K_{14} (0,229) and K_{29} (0,117);
- the dispersion of the second canonical discriminant function the following variables are determined: K_{16} (-0,385), *CHE* (-0,382), K_{24} (0,311), K_{25} (0,263), *BIO* (-0,219) and K_{22} (-0,158);
- the dispersion of the third canonical discriminant function the following independent variables are determined: *GEOM* (0,369), *LIT* (0,359), *RU* (0,356), *GEO* (0,300), K_8 (0,297), K_9 (0,270), *HIS* (0,257), K_{15} (0,229), *SCH* (0,212), L_{37} (0,188), L_{36N} (0,148), K_{23} (-0,146), K_7 (-0,145), L_{38N} (0,133), K_{28} (-0,112) and L_{31N} (0,031).

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 appearance 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. A15.126 the standardized coefficients of discriminant function for the reduced set of independent variables and dependent variables Y_2 and Y_4 are proposed.

Table A15.126

The unstandardized 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. A15.127).

The research of location of the centroids of classes of excellent-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 A15.127

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 A15.128

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

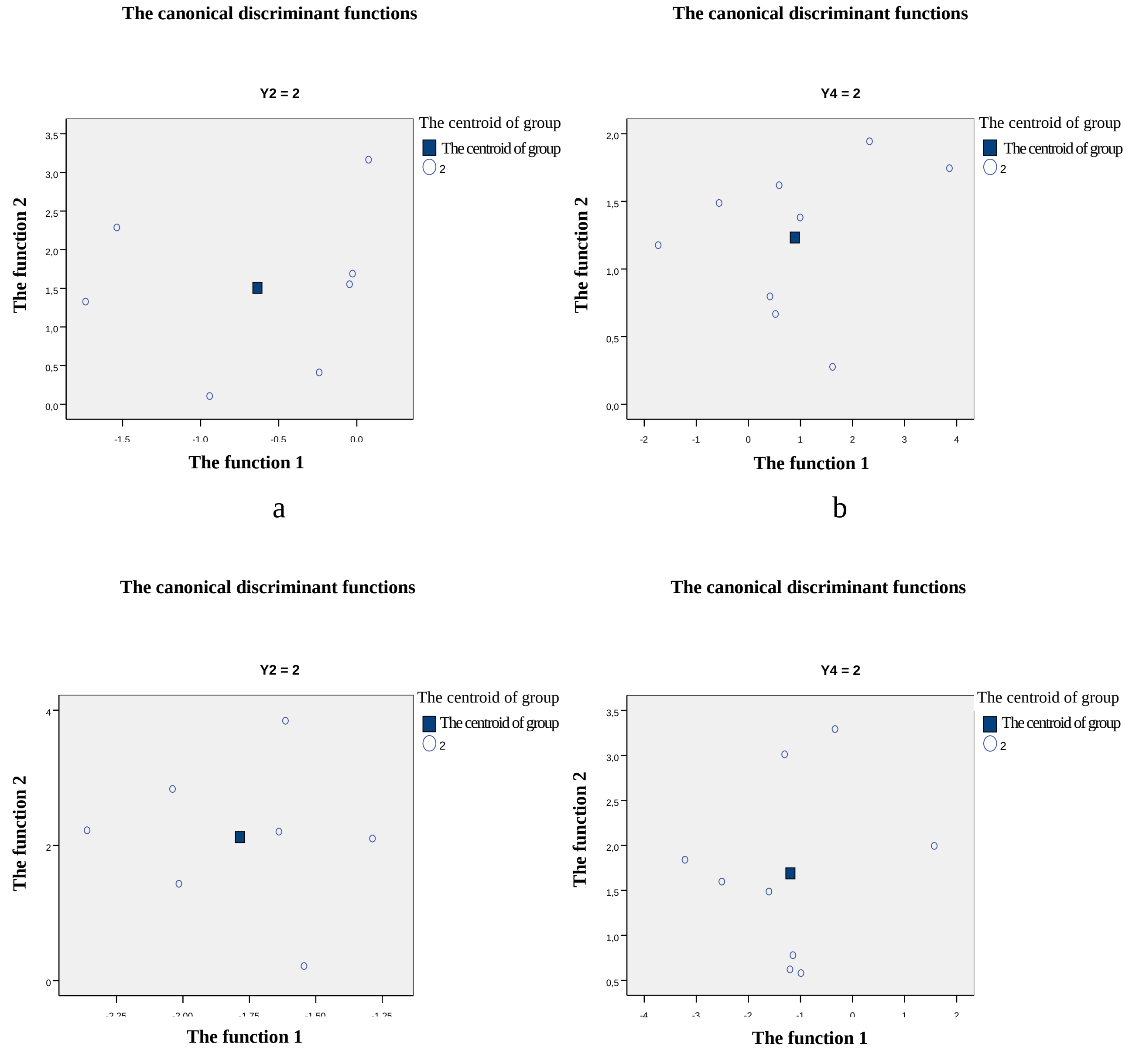
The non-normalized canonical discriminant functions are calculated in the centroids of groups.

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 of 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.



a

b

c

d

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

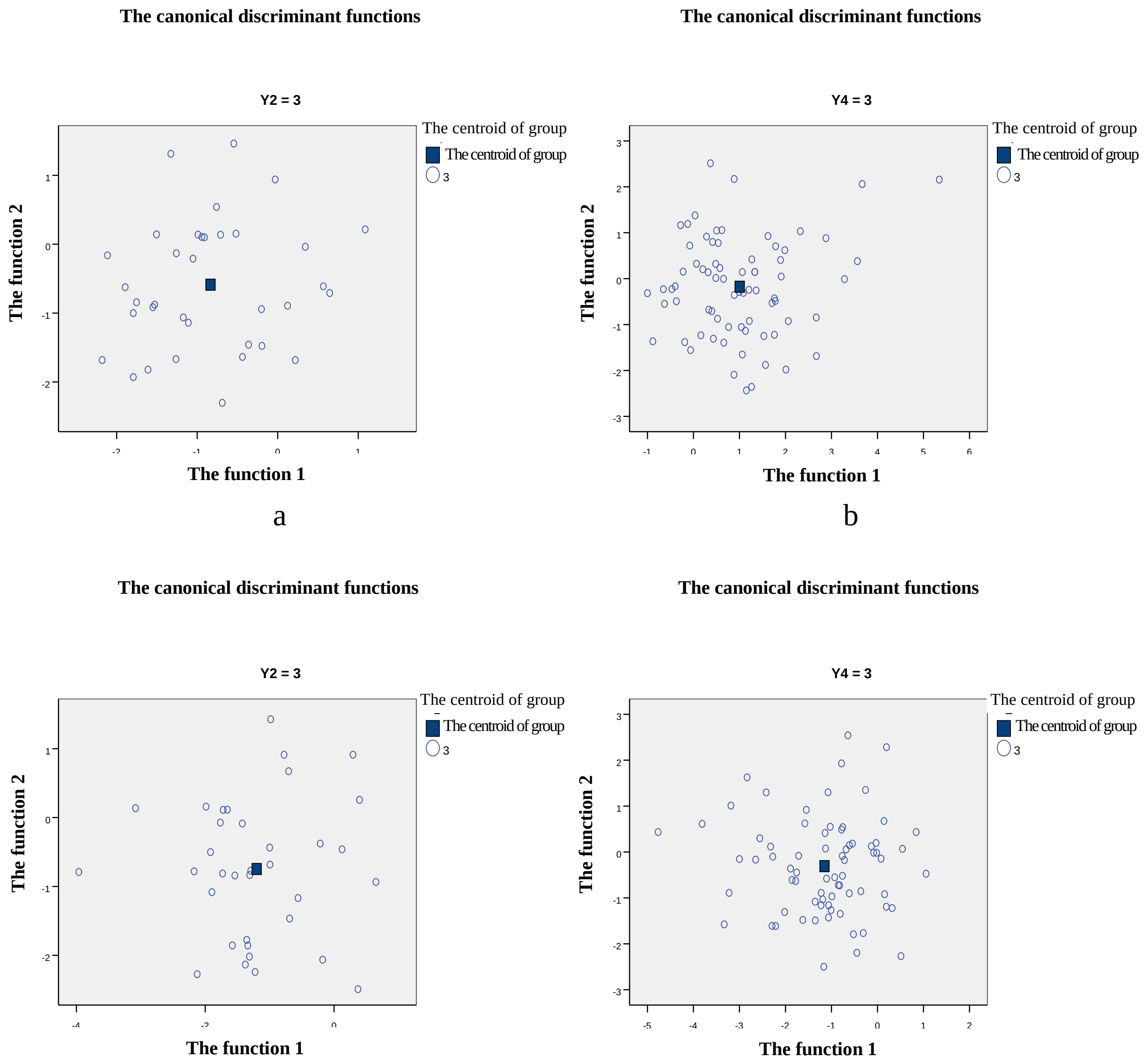
b – at the reduced set of independent variables and the dependent variable Y_4

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.



a b

c d

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

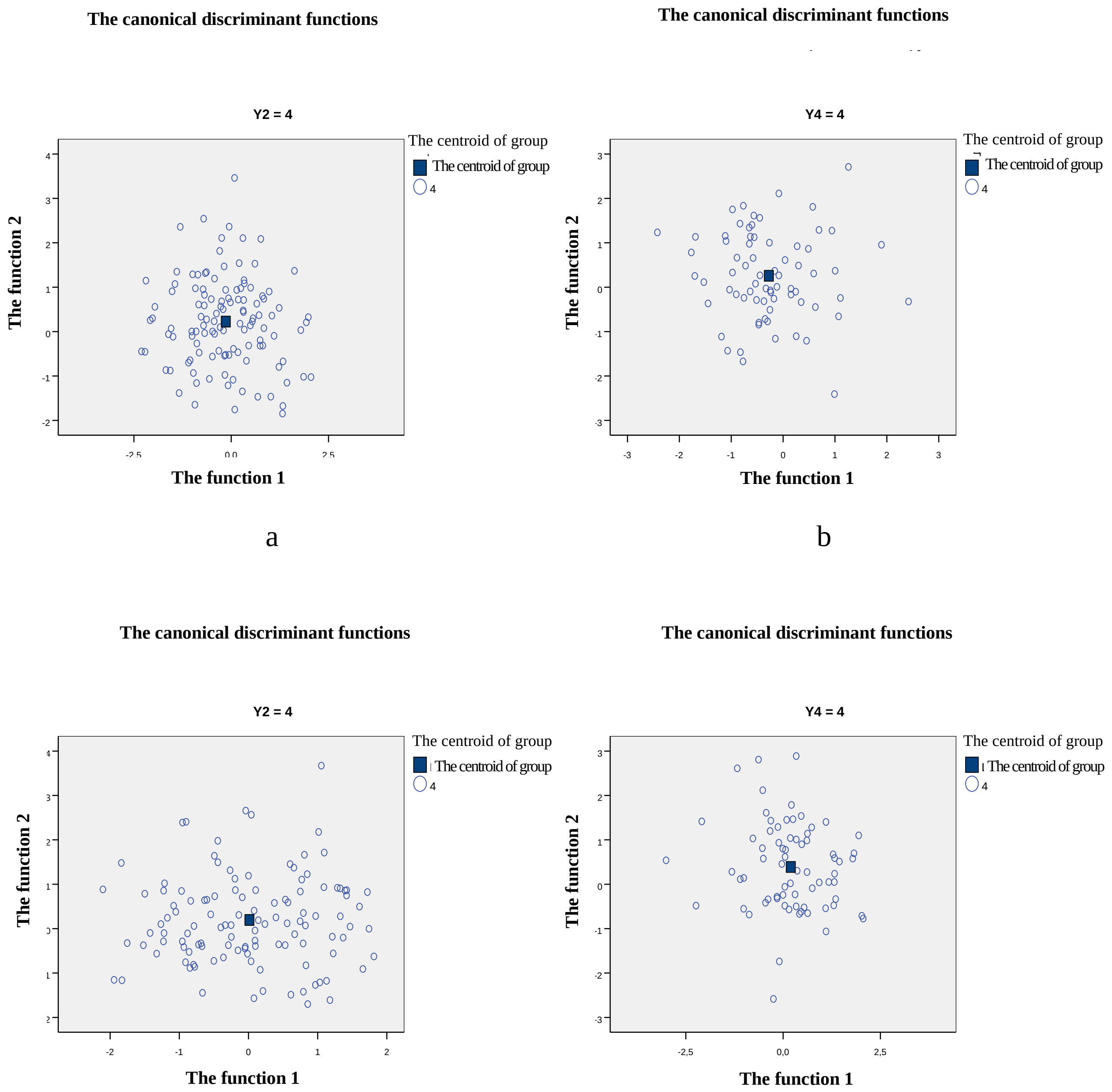
b – at the reduced set of independent variables and the dependent variable Y_4

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 of 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.



a

b

c

d

Picture A15.155. The features of position of the centroid of the fourth class

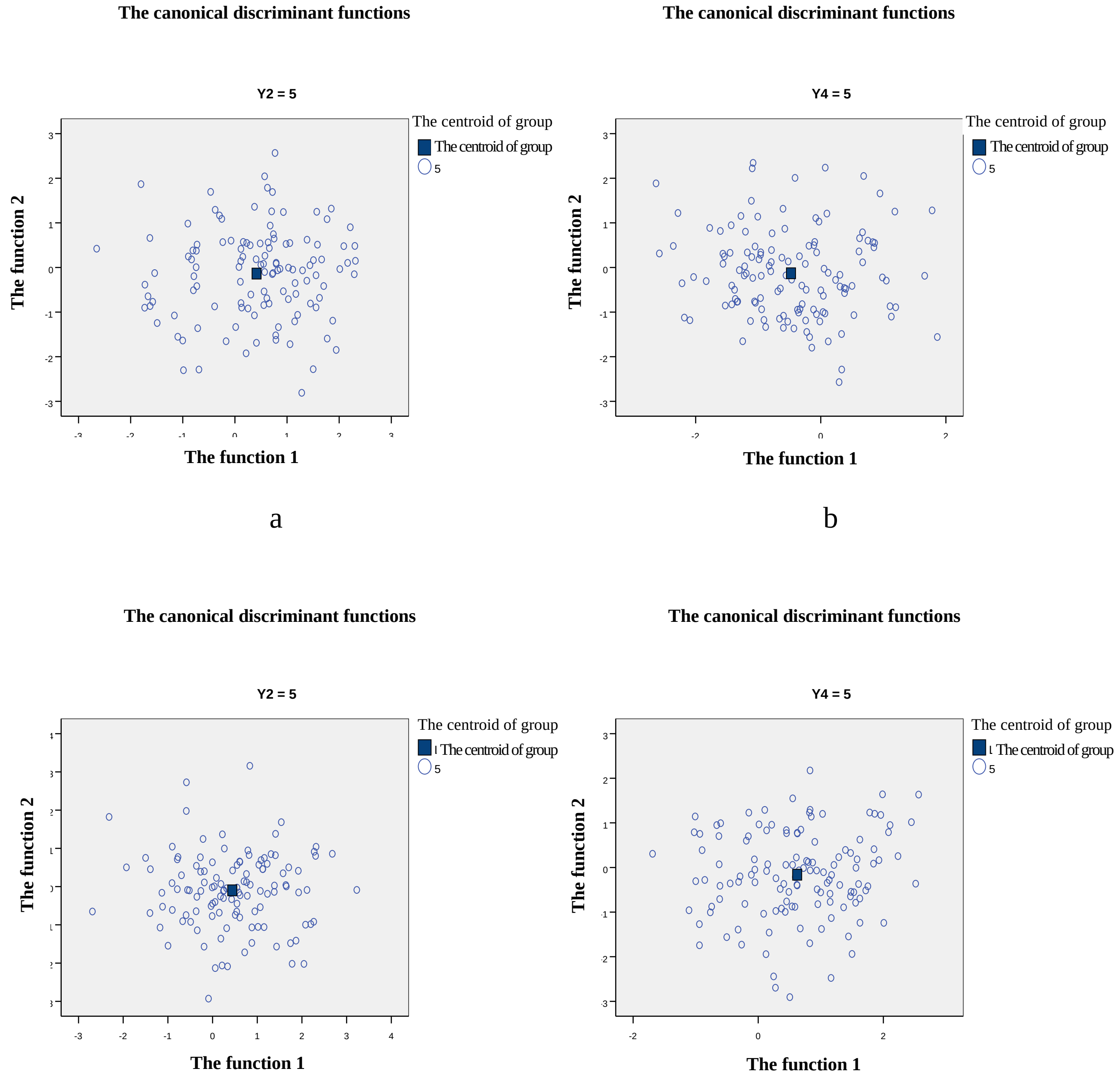
a – at the reduced set of independent variables and the dependent variable Y_2

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

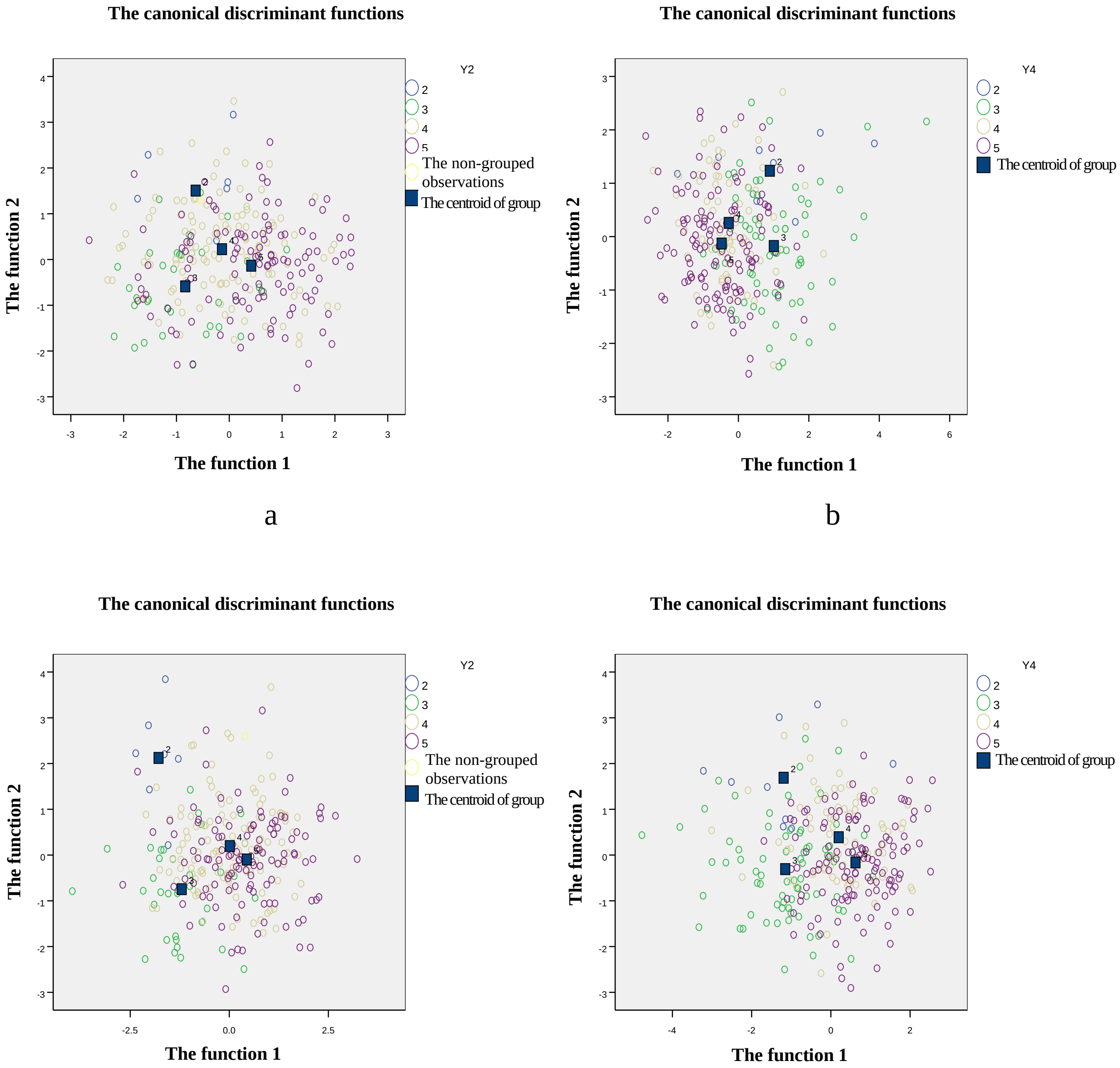
a – at the reduced set of independent variables and the dependent variable Y_2

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 is presented.



a

b

c

d

Picture A15.157. The features of mutual position 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 various classes are clearly visible, at the same time:

- relatively to the first canonical discriminant function are clearly differed: the united centroids of the classes of poor-students and mediocre-students, and separate centroids of the classes of good-students and excellent-students, but the separate centroids of the classes of poor-students and mediocre-students are relatively statistically practically does not differ;
- relatively to the second canonical discriminant function are clearly differed: the separate centroid of the class of poor-students and the united centroids of the classes of mediocre-students, good-students and excellent-students, but the separate centroids of the classes of mediocre-students, good-students and excellent-students are relatively statistically practically does not differ.

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 canonical discriminant function are clearly differed: the united centroids of the classes of poor-students and mediocre-students and the united centroids of the classes of good-students and excellent-students, but the separate centroids of the classes of poor-students and mediocre-students and the separate centroids of the classes of good-students and excellent-students are relatively statistically practically does not differ;
- relatively to the second canonical discriminant function are clearly differed: the separate centroid of the classes of poor-students and the united centroids of the classes of mediocre-students, good-students and excellent-students, but the separate centroids of the classes of mediocre-students, good-students and excellent-students are relatively statistically practically does not differ.

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 are clearly differed: the united centroids of the classes of poor-students and mediocre-students and the united centroids of the classes of good-students and excellent-students, but the separate centroids of the classes of poor-students with mediocre-students and good-students with excellent-students are relatively statically practically does not differ;
- relatively to the second canonical discriminant function are clearly differed: the separate centroid of the of class poor-students and the united centroids of the classes of mediocre-students, good-students and excellent-students, but the separate centroids of the classes of mediocre-students, good-students and excellent-students are relatively statistically practically does not differ.

At the analysis of pic. A15.157, d, the four centroids of various classes are clearly visible, at the same time:

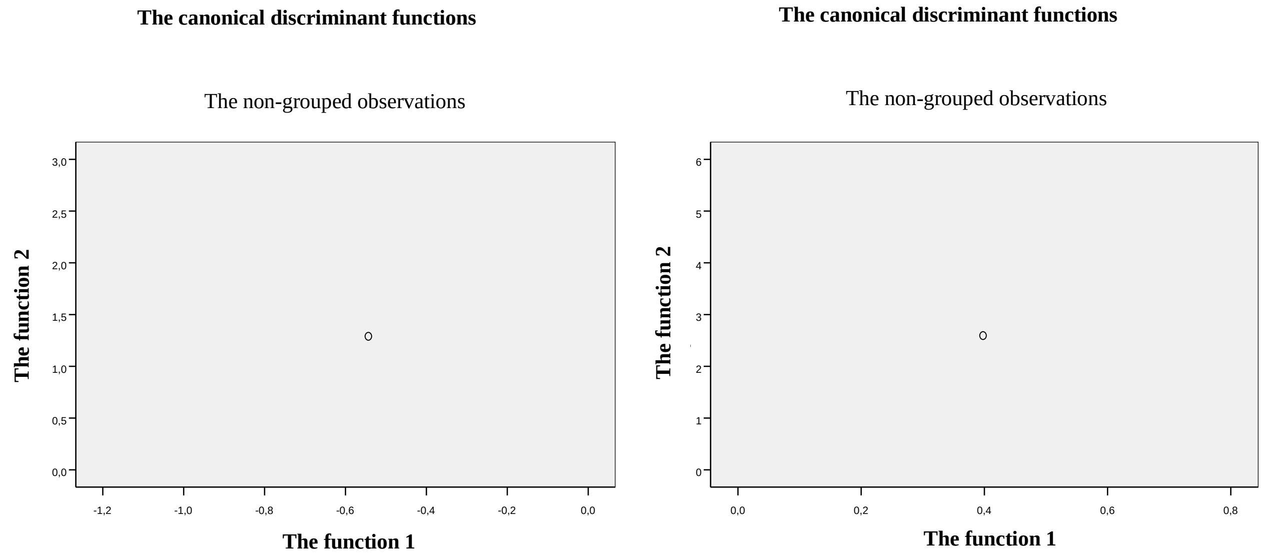
- relatively to the first canonical discriminant function are clearly differed: the united centroids of the classes of poor-students and mediocre-students and the united centroids of the classes of good-students and excellent-students, but the separate centroids of the classes of poor-students with mediocre-students and good-students with excellent-students are relatively statistically practically does not differ;
- relatively to the second canonical discriminant function are clearly differed: the separate centroid of the classes of poor-students and the united centroid of the classes of mediocre-students, good-students and excellent-students, but the separate centroids of the classes of mediocre-students, good-students and excellent-students are relatively statistically practically does not differ.

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 of assigning 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 presented, which is practically impossible to refer to any one from the four presented centroids of classes.



a b

Not detected Not detected

c 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 classes 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. A15.129).

1. The reduced set of independent variables K_i.

Table A15.129

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				Total
			2,00	3,00	4,00	5,00	
The initial	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				Total
			2,00	3,00	4,00	5,00	
The initial	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 A15.130

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				Total
			2,00	3,00	4,00	5,00	
The initial	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 initial 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				Total
			2,00	3,00	4,00	5,00	
The initial	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 initial 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 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 with 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 tabl. A15.131.

Table A15.131

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	104906,252	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	104906,252	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 the 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 K_i is presented in tabl. A15.132.

Table A15.132

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*	*K8*	*K9*	*K14*	*K15*	*K16*	*K17*	*K18*	*K19*	*K20*	*K21*	*K22*	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*	*K45*	*L31N*	*L36N*	*L37*	*L38N*
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	16734,000	15333,000	7954,000	11291,000	22481,000	56022,000	33636,000	22693,000	7853,000	20052,000	20143,000	70702,914	46586,611	22924,697	78853,118	76008,759	55109,301	61264,000	81717,000	48555,000	9379,000	59892,000
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	19786,000	22393,000	31408,000	23391,000	16233,000	2212,000	10112,000	17227,000	43309,000	13810,000	17235,000	1646,134	4227,191	67269,637	1914,098	1780,039	2829,381	428,000	2275,000	1487,000	43745,000	4876,000
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	19308,000	21863,000	30772,000	22833,000	15833,000	2286,000	9928,000	16841,000	42469,000	13426,000	16871,000	1807,714	4159,571	66580,857	2099,358	1961,459	2780,501	514,000	2503,000	1449,000	43075,000	4870,000
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	18723,000	21242,000	30013,000	22240,000	15200,000	2113,000	9495,000	16260,000	41730,000	13019,000	16316,000	1829,874	3935,211	65449,297	2218,238	2039,859	2657,501	429,000	2676,000	1408,000	42332,000	4847,000
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	18768,000	21299,000	30052,000	22213,000	15285,000	2126,000	9554,000	16279,000	41745,000	13006,000	16365,000	1809,734	3939,651	65604,757	2214,078	2061,219	2745,441	500,000	2647,000	1369,000	42175,000	4786,000
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	18411,000	20934,000	29633,000	21810,000	15080,000	2119,000	9417,000	16088,000	41322,000	12679,000	15968,000	1922,694	3839,411	64965,577	2341,038	2173,059	2678,981	543,000	2790,000	1276,000	41762,000	4735,000
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	18661,000	21188,000	29815,000	22032,000	15262,000	2115,000	9489,000	16176,000	41524,000	12823,000	16078,000	1855,294	3925,111	65380,697	2283,018	2119,879	2722,961	529,000	2706,000	1316,000	42046,000	4739,000
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	19024,000	21561,000	30388,000	22529,000	15581,000	2122,000	9608,000	16433,000	42123,000	13112,000	16495,000	1834,954	4123,571	66161,517	2171,798	1975,059	2666,781	490,000	2579,000	1473,000	42599,000	4762,000
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	18976,000	21501,000	30296,000	22417,000	15429,000	2118,000	9576,000	16317,000	41997,000	13082,000	16449,000	1866,574	4120,411	66075,257	2195,378	2033,399	2753,201	500,000	2623,000	1443,000	42435,000	4796,000
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	19223,000	21760,000	30633,000	22728,000	15712,000	2153,000	9753,000	16620,000	42402,000	13281,000	16690,000	1807,514	4146,691	66479,997	2119,098	1938,299	2776,001	513,000	2506,000	1468,000	42894,000	4877,000
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	19439,000	21996,000	30807,000	22930,000	15904,000	2269,000	9901,000	16778,000	42746,000	13535,000	16886,000	1753,234	4134,511	66614,717	2052,338	1891,339	2763,741	485,000	2458,000	1484,000	43110,000	4881,000
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	17798,000	20265,000	28856,000	21183,000	14645,000	2150,000	9170,000	15601,000	40443,000	12084,000	15359,000	2089,614	3800,511	64227,997	2574,538	2351,939	2658,401	602,000	3011,000	1177,000	40819,000	4700,000
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	17335,000	19796,000	28361,000	20712,000	14310,000	2093,000	8985,000	15280,000	39820,000	11873,000	15158,000	2077,594	3597,991	63461,117	2709,138	2492,199	2627,761	661,000	3160,000	1136,000	40288,000	4839,000
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	27668,000	25493,000	14814,000	20345,000	33599,000	76838,000	47770,000	33377,000	11867,000	32838,000	31715,000	95357,214	65635,171	24695,837	104985,718	101728,419	76252,321	83888,000	108537,000	69201,000	14169,000	82260,000

The continuation of tabl. A15.132

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. A15.132

L38N	L37	L36N	L31N	K45
59892,000	9379,000	48555,000	81717,000	61264,000
4876,000	43745,000	1487,000	2275,000	428,000
4870,000	43075,000	1449,000	2503,000	514,000
4847,000	42332,000	1408,000	2676,000	429,000
4786,000	42175,000	1369,000	2647,000	500,000
4735,000	41762,000	1276,000	2790,000	543,000
4739,000	42046,000	1316,000	2706,000	529,000
4762,000	42599,000	1473,000	2579,000	490,000
4796,000	42435,000	1443,000	2623,000	500,000
4877,000	42894,000	1468,000	2506,000	513,000
4881,000	43110,000	1484,000	2458,000	485,000
4700,000	40819,000	1177,000	3011,000	602,000
4839,000	40288,000	1136,000	3160,000	661,000
82260,000	14169,000	69201,000	108537,000	83888,000
23218,000	11543,000	15417,000	33663,000	21366,000
25725,000	11032,000	17614,000	37018,000	24019,000
34312,000	7149,000	25003,000	49501,000	33288,000
26651,000	8724,000	17998,000	39084,000	25015,000
20389,000	15804,000	12704,000	28698,000	17103,000
6502,000	41193,000	3201,000	5219,000	2364,000
15030,000	23703,000	8379,000	19377,000	10454,000
21539,000	15556,000	13994,000	29846,000	18069,000
46349,000	8266,000	36198,000	63920,000	45359,000
17342,000	13597,000	10125,000	25927,000	15136,000
20575,000	14776,000	13330,000	29550,000	18307,000
6226,774	54478,994	4114,814	1627,634	1474,714
9189,751	34481,631	4326,171	9501,571	4484,831
71934,897	24041,317	59523,077	90083,817	68853,977
6841,778	61372,698	5123,858	340,158	1680,658
6691,239	59008,899	4739,379	718,419	1712,399
7208,701	41747,561	3663,661	6100,781	3025,401
5146,000	46207,000	2139,000	2107,000	,000
7159,000	63960,000	5636,000	,000	2107,000
6273,000	36646,000	,000	5636,000	2139,000
46139,000	,000	36646,000	63960,000	46207,000
,000	46139,000	6273,000	7159,000	5146,000

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 (relationship) – 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 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-numerical 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. A15.133.

Table A15.133

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 A15.134).

Table A15.134

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 A15.135.

Table A15.135

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 the given numbers directly at the consideration of a sequence of uniting of the initial independent variables.

Table A15.136

The vertical icicle diagram

The vertical icicle diagram

The observation

Кл.	L38N		K24		K29		K28		L31N		K27		K23		K17		L36N		K45		AST		SCH		GEO		BIO		HIS		LG		CHE		FIZ		GEO		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		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		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		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		X
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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		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		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		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		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 uniting.

The uniting 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 of 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 uniting 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 uniting (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 uniting, the distance between the clusters and 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 uniting 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 uniting of the independent variables.

The uniting of the reduced or complete set of independent variables is carried out directly in dependence from the selected method of uniting (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 uniting (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.

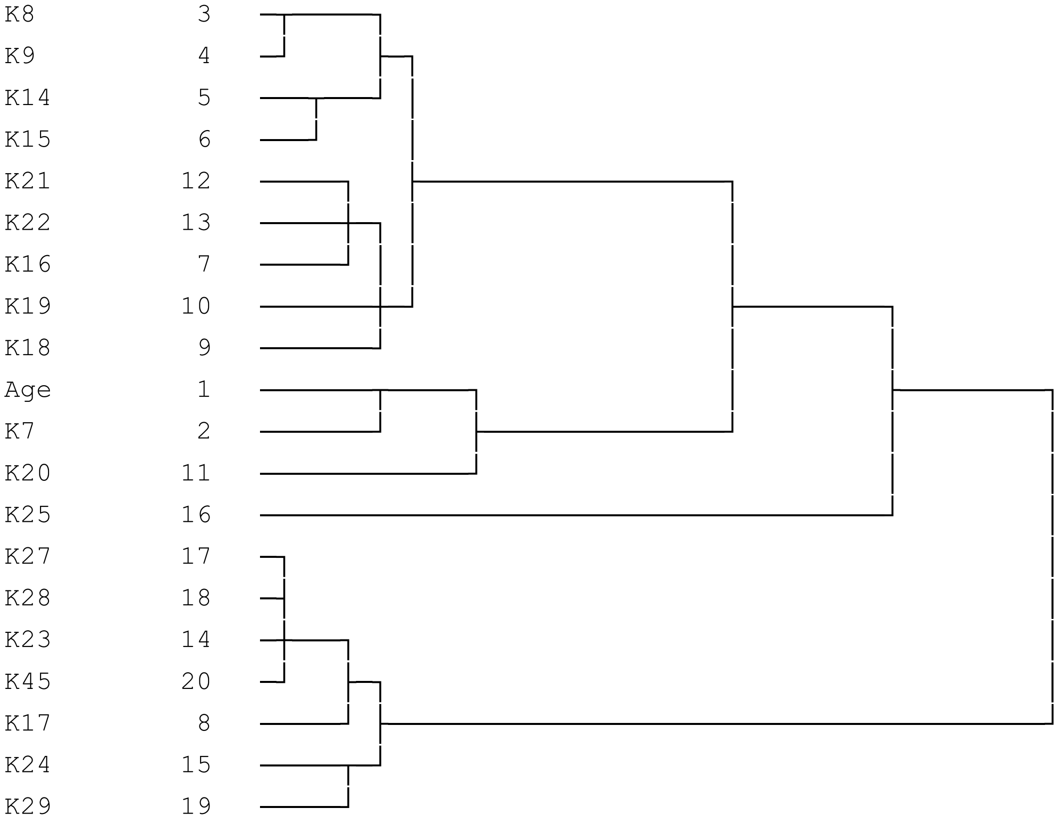
In pic. A15.159 the dendrogram, which reflects the sequence of uniting (merging) of independent variables into the unique cluster of data is presented directly.

```
 * * * * * * 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  +---------+---------+---------+---------+---------+
```



Picture A15.159. The dendrogram of the sequence of uniting 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 uniting (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 on the basis of the variables it is necessary to take into account the corresponding scientific justification (cognitive informatics, psychophysiology of sensory systems, cognitive psychology and cognitive linguistics).

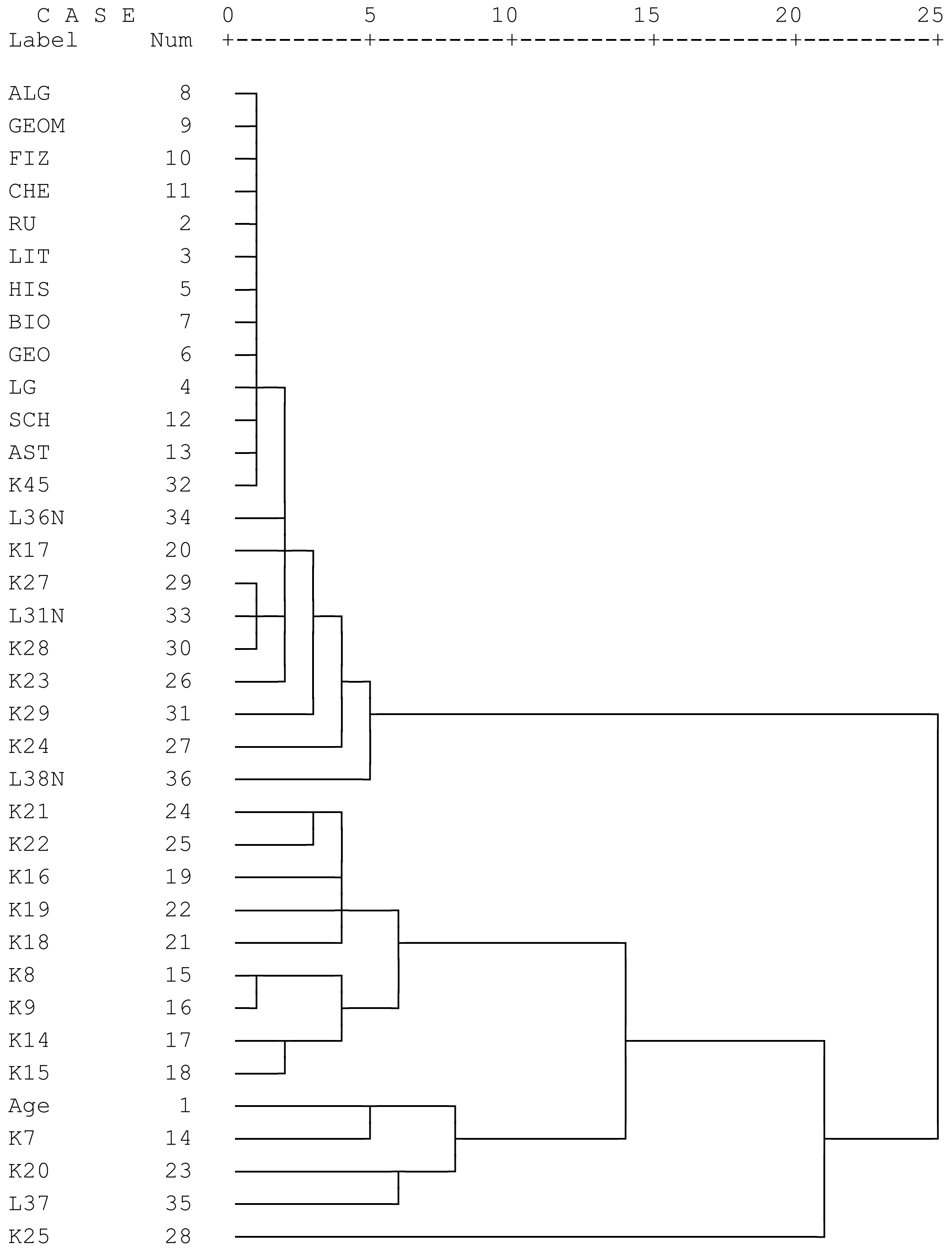
2. The complete set of independent variables K_i.

In pic. A15.160 the dendrogram, which allows to determine directly the sequence of uniting of the complete set of independent variables is presented.

```
 * * * * * * 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
```



Picture A15.160. The dendrogram of the sequence of uniting of the complete set of variables into the generalized classes

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 the factor and cluster analysis of a posteriori data of 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 one-to-one the position of a set of independent variables in the space of two or more scales.

The dual interpretation of the multidimensional scaling as the method of analysis is arose:

- 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 A15.137

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. A15.137 the degree of proximity between the independent variables is reflected.

Table A15.138

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. A15.138.

2. The complete set of independent variables K_i.

Table A15.139

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	K15	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
Age	.																																			
RU	241,193	.																																		
LIT	239,027	9,165	.																																	
LG	237,487	11,136	10,392	.																																
HIS	237,148	11,091	9,327	9,539	.																															
GEO	235,693	12,689	11,180	11,958	10,000	.																														
BIO	236,493	11,091	10,149	11,091	8,944	9,798	.																													
ALG	238,516	10,198	10,770	11,136	11,000	12,845	11,269	.																												
GEOM	238,126	11,045	10,583	11,314	10,149	11,958	10,817	7,616	.																											
FIZ	238,946	10,440	9,849	11,269	9,695	11,225	10,296	9,000	8,660	.																										
CHE	239,595	10,583	10,392	11,489	10,344	12,042	10,630	10,583	10,100	10,149	.																									
SCH	233,135	14,000	13,115	13,266	11,446	11,180	10,909	13,038	12,329	12,845	13,416	.																								
AST	231,784	15,684	14,697	13,266	12,450	12,369	12,610	14,353	14,071	13,892	15,100	11,662	.																							
K7	78,058	284,269	282,151	280,401	280,321	278,833	279,528	281,363	281,046	281,943	282,569	276,317	274,884	.																						
K8	129,553	141,372	139,628	137,586	137,735	136,261	137,314	138,651	138,412	139,345	140,136	134,037	132,295	165,979	.																					
K9	124,073	150,067	148,257	146,212	146,366	144,959	145,983	147,262	146,997	147,936	148,755	142,681	141,018	159,346	21,354	.																				
K14	89,135	177,181	175,377	173,254	173,378	172,012	172,638	174,279	174,014	174,980	175,519	169,838	168,336	121,828	82,492	81,074	.																			

The completion of tabl. A15.139

L38N	*L37*	*L36N*	*L31N*	*K45*	*K29*	*K28*	*K27*	*K25*	*K24*	*K23*	*K22*	*K21*	*K20*	*K19*	*K18*	*K17*	*K16*	*K15*
244,810	97,206	220,325	286,493	247,499	234,695	275,636	280,781	151,403	215,685	265,755	141,849	141,633	88,899	150,589	183,276	236,719	149,963	106,297
69,828	209,153	38,562	48,249	20,688	53,311	42,166	43,746	259,712	65,129	40,684	131,282	117,516	207,531	131,252	100,558	47,032	127,409	152,941
69,785	207,545	38,066	50,557	22,672	52,812	44,219	45,827	258,302	64,484	42,661	129,888	115,871	205,507	129,773	99,639	47,812	125,829	151,106
69,584	205,828	37,563	52,230	20,736	51,661	45,068	47,070	256,170	62,778	42,951	127,801	114,140	203,772	127,534	97,417	45,935	123,317	149,168
69,130	205,431	36,986	51,952	22,428	52,432	45,278	46,975	256,473	62,826	42,612	127,969	114,066	203,814	127,609	97,760	46,098	123,709	149,097
68,782	204,265	35,665	53,432	23,259	51,881	46,733	48,516	255,132	62,005	44,104	126,238	112,521	202,559	126,807	97,000	46,054	122,727	147,574
68,840	205,051	36,277	52,583	23,000	52,303	46,019	47,777	256,050	62,767	43,183	126,799	113,239	203,185	127,185	97,411	45,989	123,539	148,432
69,007	206,395	38,380	51,284	22,136	51,666	44,373	46,581	257,457	64,159	43,037	128,433	114,508	204,653	128,191	98,020	46,065	124,824	150,097
69,253	205,998	37,987	51,633	22,361	52,461	44,992	46,863	257,249	64,076	43,476	128,254	114,377	204,355	127,738	97,857	46,022	124,214	149,723
69,836	207,109	38,314	50,606	22,650	52,826	44,002	46,029	258,188	64,508	42,626	129,190	115,243	205,334	128,919	98,757	46,400	125,348	150,758
69,957	207,661	38,613	50,040	22,045	52,720	43,396	45,250	258,474	64,410	41,952	130,035	116,404	206,245	129,549	99,539	47,645	126,115	151,483
68,557	202,037	34,307	55,426	24,536	51,682	48,475	50,736	253,789	61,766	45,815	123,931	109,927	200,517	124,904	95,760	46,368	121,017	145,544
69,484	200,691	33,630	56,833	25,729	51,356	49,981	52,093	252,236	60,101	45,761	123,033	108,904	198,894	123,600	94,763	45,760	119,629	143,865
286,833	118,735	263,146	330,056	289,608	275,876	318,812	323,892	156,643	255,970	308,457	177,843	181,948	110,000	182,833	218,474	277,177	183,935	142,948
153,343	107,401	125,032	184,472	146,847	135,667	173,432	178,401	169,776	120,613	165,419	78,949	65,818	110,068	85,024	100,210	136,894	80,443	65,795
160,904	105,190	133,218	193,106	155,332	143,997	182,274	187,110	166,582	128,749	174,092	82,638	71,358	107,299	88,989	106,358	145,396	86,470	66,686
185,232	84,546	158,101	223,108	182,414	171,968	211,874	216,331	144,764	151,985	201,125	81,988	80,306	69,986	86,799	113,978	169,850	84,841	51,517
163,251	93,402	134,157	198,275	158,161	149,027	187,754	192,241	157,285	130,965	177,866	66,948	60,490	82,329	73,959	96,317	146,079	68,949	.
142,790	125,714	112,712	169,950	130,778	128,522	160,720	163,662	181,811	112,676	150,895	68,103	65,506	117,499	72,319	71,561	120,420	.	
80,635	202,961	56,577	72,622	48,621	64,165	66,756	67,861	250,370	71,901	62,711	121,980	110,309	201,403	121,000	88,510	.		
122,597	153,958	91,537	139,685	102,245	99,729	129,523	132,642	198,471	88,752	121,786	80,592	71,484	146,407	71,993	.			
146,762	124,724	118,296	173,364	134,421	127,566	162,259	166,498	167,707	107,569	153,166	73,007	67,283	112,659	.				
214,590	90,940	189,573	252,866	212,356	201,894	241,850	246,106	146,095	181,579	231,460	110,653	111,530	.					
131,689	116,606	100,623	161,629	123,028	115,584	151,304	155,519	179,205	100,730	142,558	60,075	.						
143,440	121,557	115,456	172,346	135,303	127,181	163,457	167,162	176,668	111,935	154,181	.							
79,339	233,401	64,036	40,945	38,585	67,618	37,879	34,387	274,942	73,681	.								
95,237	185,425	66,107	98,190	66,937	62,489	85,412	89,901	209,496	.									
267,872	154,703	244,511	301,047	262,650	240,397	286,018	292,213	.										
82,706	247,744	71,589	18,160	40,988	68,584	21,470	.											
81,609	242,860	68,872	26,721	41,307	60,028	.												
84,654	204,211	60,759	78,391	55,082	.													
71,736	214,958	46,249	46,390	.														
85,041	253,529	75,783	.															
79,202	191,431	.																
214,800	.																	
.																		

In tabl. A15.139 the degree of proximity between the independent variables is reflected.

A15.9.2. The finite coordinates of variables in the space of the functions of scaling

It is proposed to consider the final 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} – analyticity, K_{17} – classification, 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 and 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} – analyticity, K_{17} – classification, 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. A15.140 the reduced set of independent variables K_i is presented.

Table A15.140

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. A15.141 the complete set of independent variables K_i is presented.

Table A15.141

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. A15.141 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 final 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.

1. The reduced set of independent variables K_i.

In tabl. A15.142 the relative distance (proximity) between the independent variables from the reduced set of independent variables K_i is presented directly.

Table A15.142

The relative proximity (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. A15.143 the relative transformed (final) distance (proximity) between the independent variables from the reduced set of independent variables K_i is presented.

Table A15.143

The converted proximities (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																

The completion of tabl. A15.143

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 following of nominal values is not observed, therefore it is potentially possible to carry out the visual interpretation by the means of building of the dendrogram directly.

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. A15.144 the relative distance between the independent variables from the complete set of independent variables K_i is presented.

Table A15.144

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	K16	K17	K18	K19	K20	K21	K22	K23	K24	K25	K27	K28	K29	K45	L31N	L36N	L37	L38N
Age	,000																																			
RU	1,789	,000																																		
LIT	1,772	,032	,000																																	
LG	1,745	,058	,070	,000																																
HIS	1,743	,048	,030	,054	,000																															
GEO	1,724	,065	,058	,038	,030	,000																														
BIO	1,740	,062	,034	,075	,021	,046	,000																													
ALG	1,756	,039	,050	,020	,039	,035	,060	,000																												
GEOM	1,754	,035	,029	,042	,016	,031	,036	,025	,000																											
FIZ	1,764	,047	,014	,079	,031	,061	,025	,061	,037	,000																										
CHE	1,773	,019	,038	,039	,040	,050	,058	,020	,024	,051	,000																									
SCH	1,711	,089	,063	,086	,041	,050	,029	,077	,057	,053	,082	,000																								
AST	1,693	,098	,079	,075	,051	,039	,051	,073	,062	,075	,085	,031	,000																							
K7	,504	2,033	2,010	2,000	1,985	1,972	1,977	2,006	1,998	2,000	2,021	1,948	1,936	,000																						
K8	,812	1,011	,998	,961	,969	,946	,969	,974	,977	,994	,993	,942	,919	1,174	,000																					
K9	,773	1,083	1,072	1,032	1,042	1,018	1,044	1,046	1,049	1,068	1,065	1,017	,993	1,165	,091	,000																				
K14	,508	1,299	1,284	1,253	1,255	1,234	1,254	1,265	1,265	1,278	1,283	1,226	1,205	,898	,305	,272	,000																			
K15	,683	1,109	1,090	1,067	1,063	1,044	1,058	1,077	1,074	1,083	1,094	1,029	1,012	,966	,250	,297	,248	,000																		

The completion of tabl. A15.144

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. A15.145 the relative transformed (final) distance between the independent variables from the reduced set of independent variables K_i is presented.

Table A15.145

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
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
K16																		
K17																		
K18																		
K19																		
K20																		
K21																		
K22																		
K23																		
K24																		
K25																		
K27																		
K28																		
K29																		
K45																		
L31N																		
L36N																		
L37																		
L38N																		

The completion of tabl. A15.145

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.

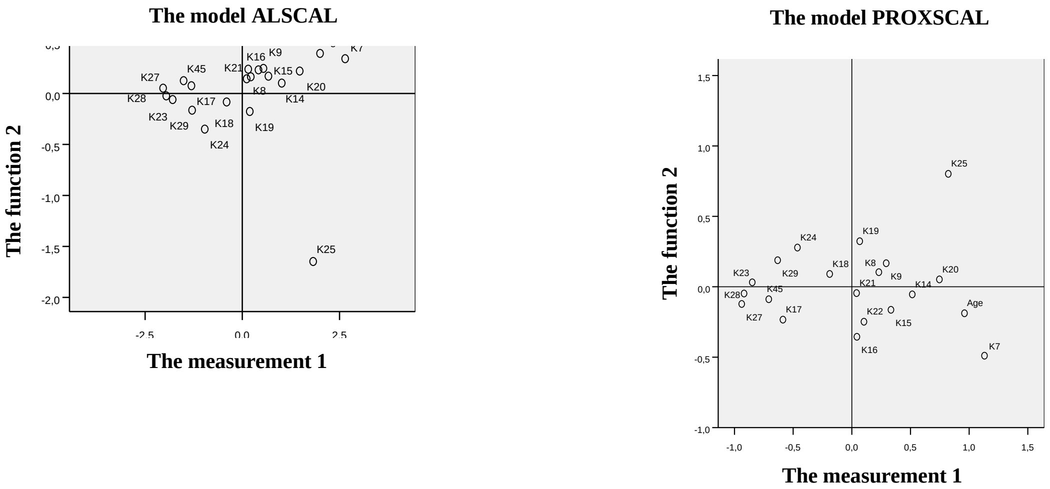
In the presented tables with the reduced and complete set of independent variables the significant anomalies in the sequence of following of nominal values is not observed, therefore it is potentially possible to carry out the visual interpretation by the means of building of the dendrogram directly.

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.

1. The reduced set of independent variables K_i.

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":

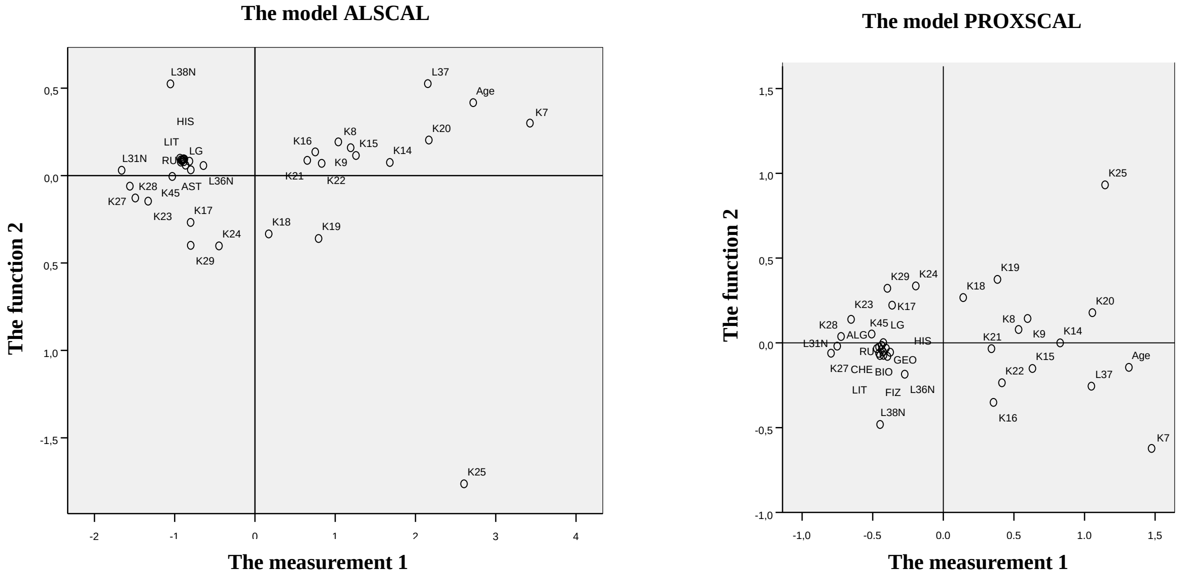
- the first group is formed directly by the independent variables K_{17}, K_{18}, K_{19}, K_{23}, K_{24}, K_{27}, K_{28}, K_{29} and K_{45};
- the second group is formed directly by the independent variables K_8, K_9, K_{14}, K_{15}, K_{16}, K_{20}, K_{21} and K_{22};
- the third group is formed by the 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 directly by the independent variables K_{23}, K_{24}, K_{17}, K_{27}, K_{28}, K_{29} and K_{45};
- the second group is formed directly by the 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 is presented: 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 directly by the independent 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 directly 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 directly by the independent 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 directly by the 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 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.

To 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, the relative distance in relation to the main component is reflected directly);
- 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 initial and restored coefficients is estimated.

In the process of the component analysis the basic equation of the factor analysis is solved:

$$R = A \cdot A'$$, 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.

$$r_{ij} = \sum_{k=1}^{M} a_{ik} a_{jk}$$, where

i – the index of the number of variable in the correlation matrix by the string; 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 carrying out of the factor analysis; a_{ik} – the nominal value of component load in the i^{th} string by the k^{th} component; a_{jk} – the nominal value of component load in the j^{th} string by the k^{th} 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 of 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.

Directly for the 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 string) 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 string is equal to the commonality of variable, which directly designates the aggregative dispersion of initial variable, caused by a certain set of all available components (factors);
- 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 communities of the matrix;
- the factor structure a set of the nominal values of factor loads, which are contained in the matrix of factor loads of a given size is represented;
- 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 A15.146

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 then or equal to 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 by 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 understands 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 string);
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 A15.147.

Table A15.147

The descriptive statistics of initial (source) independent variables

The reduced set of independent variables K_i				The complete set of independent variables K_i			
The ind.	The mean	The std. dev.	The analysis of N	The ind.	The mean	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. A15.148 and A15.149) and the complete set of independent variables (tabl. A15.150 and A15.151).

1. The reduced set of independent variables K_i.

Table A15.148

The common (conventional) 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 significance (1-tailed)	*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 A15.149

The inverse (reciprocal) correlation matrix (the inversion of 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 inverse (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 wrote;
- 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 for the obtaining of identity matrix (on the right) is carried out: the multiplying on the certain number, the addition of linearly independent strings or columns (the linear dependence of the presented linear combination of strings or columns causes the degeneracy of the result of subtraction or addition – the rank or determinant as the quantity of linearly independent columns or strings 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 A15.150

The common (conventional) 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

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The significance (1-tailed)																								
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

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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 A15.151

The inverse (reciprocal) correlation matrix (the inversion of correlation matrix) of the complete set of variables

K19	*K18*	*K17*	*K16*	*K15*	*K14*	*K9*	*K8*	*K7*	*AST*	*SCH*	*CHE*	*FIZ*	*GEOM*	*ALG*	*BIO*	*GEO*	*HIS*	*LG*	*LIT*	*RU*	*Age*	
,183	-,019	,216	,053	,037	-,058	-,060	,018	,121	-,016	-,083	-,034	-,063	,028	,254	,048	,109	-,103	,080	-,027	-,078	1,304	*Age*
,157	-,102	-,008	,066	-,125	-,147	,346	-,384	,012	,127	-,103	-,194	-,130	,156	-,718	-,266	,032	,217	-,279	-,949	2,531	-,078	*RU*
,091	-,096	,177	-,009	,075	,243	,033	,022	-,093	,181	,008	-,236	-,251	-,230	,016	-,199	-,348	-,504	-,501	2,933	-,949	-,027	*LIT*
,071	,171	-,120	-,290	,112	-,132	-,273	,148	,081	-,279	,154	-,144	,044	,055	-,277	-,032	,040	-,559	2,244	-,501	-,279	,080	*LG*
-,059	-,114	-,111	-,247	-,027	,088	-,200	,239	,091	,017	-,126	-,193	-,311	-,242	,143	-,442	-,216	2,431	-,559	-,504	,217	-,103	*HIS*
,179	,001	-,072	-,019	-,083	,028	,231	-,277	,164	-,126	-,211	-,170	-,425	-,011	,307	-,368	1,823	-,216	,040	-,348	,032	,109	*GEO*
-,005	-,006	-,042	,168	-,005	-,021	,274	-,145	-,099	-,004	-,204	-,313	-,159	-,070	,045	2,079	-,368	-,442	-,032	-,199	-,266	,048	*BIO*
,022	-,142	,095	,171	,051	-,034	,088	-,083	,030	,020	,033	-,247	-,657	-1,828	3,507	,045	,307	,143	-,277	,016	-,718	,254	*ALG*
-,226	,169	-,146	-,199	-,101	,005	-,357	,300	,216	-,182	-,421	-,439	-,780	3,825	-1,828	-,070	-,011	-,242	,055	-,230	,156	,028	*GEOM*
-,059	-,076	-,007	,009	,056	,034	-,332	,398	-,138	-,213	,066	-,201	2,906	-,780	-,657	-,159	-,425	-,311	,044	-,251	-,130	-,063	*FIZ*
-,157	,012	,231	,115	-,052	-,332	,001	,059	-,106	,009	-,081	2,375	-,201	-,439	-,247	-,313	-,170	-,193	-,144	-,236	-,194	-,034	*CHE*
,051	,091	,084	-,050	,177	,112	,074	-,030	-,181	-,020	1,463	-,081	,066	-,421	,033	-,204	-,211	-,126	,154	,008	-,103	-,083	*SCH*
,052	-,007	-,019	-,132	-,034	,021	,252	-,329	-,137	1,342	-,020	,009	-,213	-,182	,020	-,004	-,126	,017	-,279	,181	,127	-,016	*AST*
-,039	-,076	-,014	-,099	,015	-,043	-,274	,089	1,165	-,137	-,181	-,106	-,138	,216	,030	-,099	,164	,091	,081	-,093	,012	,121	*K7*
-,053	,449	-,258	-,983	,008	,157	-9,633	10,443	,089	-,329	-,030	,059	,398	,300	-,083	-,145	-,277	,239	,148	,022	-,384	,018	*K8*
,047	-,350	,243	,834	-,097	,037	10,091	-9,633	-,274	,252	,074	,001	-,332	-,357	,088	,274	,231	-,200	-,273	,033	,346	-,060	*K9*
-,037	-,330	-,116	-,268	-,038	1,660	,037	,157	-,043	,021	,112	-,332	,034	,005	-,034	-,021	,028	,088	-,132	,243	-,147	-,058	*K14*
-,010	-,087	-,178	-,349	1,332	-,038	-,097	,008	,015	-,034	,177	-,052	,056	-,101	,051	-,005	-,083	-,027	,112	,075	-,125	,037	*K15*
-,051	-,587	,187	1,992	-,349	-,268	,834	-,983	-,099	-,132	-,050	,115	,009	-,199	,171	,168	-,019	-,247	-,290	-,009	,066	,053	*K16*
-,226	-,448	1,693	,187	-,178	-,116	,243	-,258	-,014	-,019	,084	,231	-,007	-,146	,095	-,042	-,072	-,111	-,120	,177	-,008	,216	*K17*
-,619	2,459	-,448	-,587	-,087	-,330	-,350	,449	-,076	-,007	,091	,012	-,076	,169	-,142	-,006	,001	-,114	,171	-,096	-,102	-,019	*K18*
1,878	-,619	-,226	-,051	-,010	-,037	,047	-,053	-,039	,052	,051	-,157	-,059	-,226	,022	-,005	,179	-,059	,071	,091	,157	,183	*K19*
-,243	,110	,103	,091	-,031	-,006	,158	-,015	,028	-,182	,109	,173	-,066	,006	-,054	-,005	,068	-,082	,017	-,192	-,143	,104	*K20*
-,032	-,342	-,297	-,006	-,145	-,070	-,078	-,175	,261	-,030	-,291	,134	-,170	,160	-,208	-,008	,063	,186	,111	-,073	,011	-,047	*K21*
-,013	-,090	-,243	-,482	-,019	-,546	-,174	,070	,019	,281	-,115	,172	-,172	,217	-,112	-,250	,043	,293	-,025	,050	,162	,020	*K22*
,130	,105	-,122	-,001	,016	-,105	,045	,015	,077	-,202	,083	,003	-,046	,230	-,144	-,109	,186	-,093	,144	,047	-,071	,064	*K23*
-,030	,050	,507	,517	-,098	-,237	,439	-,547	-,149	-,350	-,048	,107	,103	,052	,100	,036	-,145	-,159	,064	-,138	,215	,131	*K24*
-,494	-,013	-,489	-,371	,108	,182	-,634	,629	,131	,215	,046	-,064	,052	-,042	,102	,002	-,107	,057	-,071	,133	-,448	-,227	*K25*
-,070	-,206	,024	-,175	,142	-,058	-,026	,018	,091	,147	-,059	-,110	,184	-,265	,326	-,008	-,167	-,121	-,038	,050	,041	,106	*K27*
-,190	-,157	,119	,023	,033	,028	,616	-,622	,037	,387	-,114	-,145	-,273	-,065	,093	,085	,042	,060	-,317	,341	-,032	-,018	*K28*
,341	-,010	-,043	,411	-,131	,037	-,124	-,014	-,159	-,397	,080	,109	,172	,251	-,550	-,003	,053	,074	,131	-,342	,268	-,012	*K29*
-,066	-,386	,110	-,192	-,045	,153	-,222	,294	-,044	,234	-,098	-,060	,182	-,165	,048	,093	-,138	,177	-,528	,312	-,181	,225	*K45*
-,087	-,032	-,041	,137	-,081	,676	-,106	,256	-,093	-,200	-,021	-,199	,237	-,213	,035	,092	-,144	-,027	,105	,157	-,187	-,139	*L31N*
,116	-,021	,028	-,060	,011	-,001	-,135	,245	-,067	-,047	-,020	,010	,116	-,101	,189	,005	-,107	,036	,069	,072	-,263	,072	*L36N*
,035	,039	-,043	,011	,098	,018	,238	-,416	-,027	-,009	,037	-,134	,041	-,138	,044	,087	,014	-,220	,118	,206	-,210	,118	*L37*
,079	,117	-,092	-,038	,038	-,065	-,073	,147	-,079	,179	,021	,114	,146	-,113	-,115	-,041	-,108	,025	,020	,061	,076	-,005	*L38N*

The completion of tabl. A15.151

K20	*K21*	*K22*	*K23*	*K24*	*K25*	*K27*	*K28*	*K29*	*K45*	*L31N*	*L36N*	*L37*	*L38N*
,104	-,047	,020	,064	,131	-,227	,106	-,018	-,012	,225	-,139	,072	,118	-,005
-,143	,011	,162	-,071	,215	-,448	,041	-,032	,268	-,181	-,187	-,263	-,210	,076
-,192	-,073	,050	,047	-,138	,133	,050	,341	-,342	,312	,157	,072	,206	,061
,017	,111	-,025	,144	,064	-,071	-,038	-,317	,131	-,528	,105	,069	,118	,020
-,082	,186	,293	-,093	-,159	,057	-,121	,060	,074	,177	-,027	,036	-,220	,025
,068	,063	,043	,186	-,145	-,107	-,167	,042	,053	-,138	-,144	-,107	,014	-,108
-,005	-,008	-,250	-,109	,036	,002	-,008	,085	-,003	,093	,092	,005	,087	-,041
-,054	-,208	-,112	-,144	,100	,102	,326	,093	-,550	,048	,035	,189	,044	-,115
,006	,160	,217	,230	,052	-,042	-,265	-,065	,251	-,165	-,213	-,101	-,138	-,113
-,066	-,170	-,172	-,046	,103	,052	,184	-,273	,172	,182	,237	,116	,041	,146
,173	,134	,172	,003	,107	-,064	-,110	-,145	,109	-,060	-,199	,010	-,134	,114
,109	-,291	-,115	,083	-,048	,046	-,059	-,114	,080	-,098	-,021	-,020	,037	,021
-,182	-,030	,281	-,202	-,350	,215	,147	,387	-,397	,234	-,200	-,047	-,009	,179
,028	,261	,019	,077	-,149	,131	,091	,037	-,159	-,044	-,093	-,067	-,027	-,079
-,015	-,175	,070	,015	-,547	,629	,018	-,622	-,014	,294	,256	,245	-,416	,147
,158	-,078	-,174	,045	,439	-,634	-,026	,616	-,124	-,222	-,106	-,135	,238	-,073
-,006	-,070	-,546	-,105	-,237	,182	-,058	,028	,037	,153	,676	-,001	,018	-,065
-,031	-,145	-,019	,016	-,098	,108	,142	,033	-,131	-,045	-,081	,011	,098	,038
,091	-,006	-,482	-,001	,517	-,371	-,175	,023	,411	-,192	,137	-,060	,011	-,038
,103	-,297	-,243	-,122	,507	-,489	,024	,119	-,043	,110	-,041	,028	-,043	-,092
,110	-,342	-,090	,105	,050	-,013	-,206	-,157	-,010	-,386	-,032	-,021	,039	,117
-,243	-,032	-,013	,130	-,030	-,494	-,070	-,190	,341	-,066	-,087	,116	,035	,079
1,331	-,105	-,315	,114	-,077	,091	-,254	-,089	,209	-,194	,161	,077	-,041	-,025
-,105	1,537	-,152	,068	-,187	,213	-,060	,016	-,022	,053	,042	-,118	-,155	-,035
-,315	-,152	2,588	,020	-,095	-,083	,041	,293	-,420	-,023	-1,527	,013	,010	,103
,114	,068	,020	1,817	-,878	-,014	-,687	-,267	,728	-,215	-,018	-,055	,045	-,131
-,077	-,187	-,095	-,878	4,838	-3,788	-,197	-,332	,532	-,140	-,294	,095	,053	,055
,091	,213	-,083	-,014	-3,788	5,035	,320	,133	-1,293	-,024	,528	-,003	-,135	,082
-,254	-,060	,041	-,687	-,197	,320	2,119	,027	-1,183	,004	-,126	,094	,100	,032
-,089	,016	,293	-,267	-,332	,133	,027	2,644	-1,917	,362	-,226	,027	,002	,034
,209	-,022	-,420	,728	,532	-1,293	-1,183	-1,917	3,600	-,284	,258	-,122	,029	-,138
-,194	,053	-,023	-,215	-,140	-,024	,004	,362	-,284	1,631	,075	,085	,032	,014
,161	,042	-1,527	-,018	-,294	,528	-,126	-,226	,258	,075	2,138	,024	-,007	-,099
,077	-,118	,013	-,055	,095	-,003	,094	,027	-,122	,085	,024	1,128	,085	,158
-,041	-,155	,010	,045	,053	-,135	,100	,002	,029	,032	-,007	,085	1,160	-,048
-,025	-,035	,103	-,131	,055	,082	,032	,034	-,138	,014	-,099	,158	-,048	1,132

A15.10.6. The checking of adequacy of the factorized 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 A15.152

The adequacy of factorized space

<table>
<tr><th colspan="3">The reduced set of independent variables K_i</th><th colspan="3">The complete set of independent variables K_i</th></tr>
<tr><td colspan="3">The measure of adequacy and the criterion of Bartlett</td><td colspan="3">The measure of adequacy and the criterion of Bartlett</td></tr>
<tr><td colspan="2">The measure of sampling adequacy of Kaiser-Meyer-Olkin</td><td>0,745</td><td colspan="2">The measure of sampling adequacy of Kaiser-Meyer-Olkin.</td><td>0,809</td></tr>
<tr><td rowspan="3">The criterion of sphericity of Bartlett</td><td>The approximate of chi-square</td><td>2417,952</td><td rowspan="3">The criterion of sphericity of Bartlett</td><td>The approximate of chi-square</td><td>4706,140</td></tr>
<tr><td>The degrees of freedom</td><td>190</td><td>The degrees of freedom</td><td>630</td></tr>
<tr><td>The significance</td><td>0,000</td><td>The significance</td><td>0,000</td></tr>
</table>

A15.10.7. The transposed matrixes of covariance and correlation

1. The reduced set of independent variables K_i.

Table A15.153

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 A15.154

The inverse (reciprocal) correlation matrix (the inversion of correlation matrix) of the reduced set of independent variables

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 sampling adequacy

2. The complete set of independent variables K_i.

Table A15.155

The antiimage of covariance matrix of the complete set of independent variables

The covariations in the antiimage																	
K14	*K9*	*K8*	*K7*	*AST*	*SCH*	*CHE*	*FIZ*	*GEOM*	*ALG*	*BIO*	*GEO*	*HIS*	*LG*	*LIT*	*RU*	*Age*	
-,027	-,005	,001	,080	-,009	-,044	-,011	-,016	,006	,056	,018	,046	-,032	,027	-,007	-,024	,767	*Age*
-,035	,014	-,015	,004	,037	-,028	-,032	-,018	,016	-,081	-,051	,007	,035	-,049	-,128	,395	-,024	*RU*
,050	,001	,001	-,027	,046	,002	-,034	-,029	-,021	,002	-,033	-,065	-,071	-,076	,341	-,128	-,007	*LIT*
-,036	-,012	,006	,031	-,093	,047	-,027	,007	,006	-,035	-,007	,010	-,102	,446	-,076	-,049	,027	*LG*
,022	-,008	,009	,032	,005	-,035	-,033	-,044	-,026	,017	-,087	-,049	,411	-,102	-,071	,035	-,032	*HIS*
,009	,013	-,015	,077	-,052	-,079	-,039	-,080	-,002	,048	-,097	,549	-,049	,010	-,065	,007	,046	*GEO*
-,006	,013	-,007	-,041	-,002	-,067	-,063	-,026	-,009	,006	,481	-,097	-,087	-,007	-,033	-,051	,018	*BIO*
-,006	,002	-,002	,007	,004	,006	-,030	-,064	-,136	,285	,006	,048	,017	-,035	,002	-,081	,056	*ALG*
,001	-,009	,008	,048	-,035	-,075	-,048	-,070	,261	-,136	-,009	-,002	-,026	,006	-,021	,016	,006	*GEOM*
,007	-,011	,013	-,041	-,055	,016	-,029	,344	-,070	-,064	-,026	-,080	-,044	,007	-,029	-,018	-,016	*FIZ*
-,084	2,18E 005	,002	-,038	,003	-,023	,421	-,029	-,048	-,030	-,063	-,039	-,033	-,027	-,034	-,032	-,011	*CHE*
,046	,005	-,002	-,106	-,010	,684	-,023	,016	-,075	,006	-,067	-,079	-,035	,047	,002	-,028	-,044	*SCH*
,009	,019	-,023	-,087	,745	-,010	,003	-,055	-,035	,004	-,002	-,052	,005	-,093	,046	,037	-,009	*AST*
-,022	-,023	,007	,858	-,087	-,106	-,038	-,041	,048	,007	-,041	,077	,032	,031	-,027	,004	,080	*K7*
,009	-,091	,096	,007	-,023	-,002	,002	,013	,008	-,002	-,007	-,015	,009	,006	,001	-,015	,001	*K8*
,002	,099	-,091	-,023	,019	,005	2,18E 005	-,011	-,009	,002	,013	,013	-,008	-,012	,001	,014	-,005	*K9*
,603	,002	,009	-,022	,009	,046	-,084	,007	,001	-,006	-,006	,009	,022	-,036	,050	-,035	-,027	*K14*
-,017	-,007	,001	,010	-,019	,091	-,017	,014	-,020	,011	-,002	-,034	-,008	,037	,019	-,037	,021	*K15*
-,081	,042	-,047	-,042	-,049	-,017	,024	,002	-,026	,025	,040	-,005	-,051	-,065	-,002	,013	,020	*K16*
-,041	,014	-,015	-,007	-,009	,034	,057	-,001	-,022	,016	-,012	-,023	-,027	-,032	,036	-,002	,098	*K17*
-,081	-,014	,017	-,027	-,002	,025	,002	-,011	,018	-,016	-,001	,000	-,019	,031	-,013	-,016	-,006	*K18*
-,012	,002	-,003	-,018	,021	,018	-,035	-,011	-,032	,003	-,001	,052	-,013	,017	,017	,033	,075	*K19*
-,003	,012	-,001	,018	-,102	,056	,055	-,017	,001	-,012	-,002	,028	-,025	,006	-,049	-,043	,060	*K20*
-,027	-,005	-,011	,146	-,015	-,129	,037	-,038	,027	-,039	-,003	,022	,050	,032	-,016	,003	-,023	*K21*
-,127	-,007	,003	,006	,081	-,030	,028	-,023	,022	-,012	-,046	,009	,047	-,004	,007	,025	,006	*K22*
-,035	,002	,001	,036	-,083	,031	,001	-,009	,033	-,023	-,029	,056	-,021	,035	,009	-,016	,027	*K23*
-,030	,009	-,011	-,026	-,054	-,007	,009	,007	,003	,006	,004	-,016	-,014	,006	-,010	,018	,021	*K24*
,022	-,012	,012	,022	,032	,006	-,005	,004	-,002	,006	,000	-,012	,005	-,006	,009	-,035	-,035	*K25*
-,017	-,001	,001	,037	,052	-,019	-,022	,030	-,033	,044	-,002	-,043	-,024	-,008	,008	,008	,038	*K27*
,006	,023	-,023	,012	,109	-,030	-,023	-,036	-,006	,010	,016	,009	,009	-,053	,044	-,005	-,005	*K28*
,006	-,003	,000	-,038	-,082	,015	,013	,016	,018	-,044	,000	,008	,008	,016	-,032	,029	-,002	*K29*
,056	-,014	,017	-,023	,107	-,041	-,015	,038	-,027	,008	,027	-,046	,045	-,144	,065	-,044	,106	*K45*
,191	-,005	,011	-,037	-,070	-,007	-,039	,038	-,026	,005	,021	-,037	-,005	,022	,025	-,035	-,050	*L31N*
-,001	-,012	,021	-,051	-,031	-,012	,004	,035	-,023	,048	,002	-,052	,013	,027	,022	-,092	,049	*L36N*
,009	,020	-,034	-,020	-,005	,022	-,049	,012	-,031	,011	,036	,007	-,078	,046	,061	-,071	,078	*L37*
-,035	-,006	,012	-,060	,118	,013	,043	,044	-,026	-,029	-,018	-,052	,009	,008	,018	,026	-,004	*L38N*

The completion of tabl. A15.155

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 A15.156

The inverse (reciprocal) correlation matrix (the inversion of 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. A15.156

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	,789(a)	,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 sampling 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. A15.157.

Table A15.157

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 (principal) 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 (principal) 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. A15.158.

1. The reduced set of independent variables K_i.

Table A15.158

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		
	Total	% of dispersion	The cumulative %	Total	% of dispersion	The cumulative %	Total	% 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 string, 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 allow 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 A15.159

The complete explained dispersion of independent variables

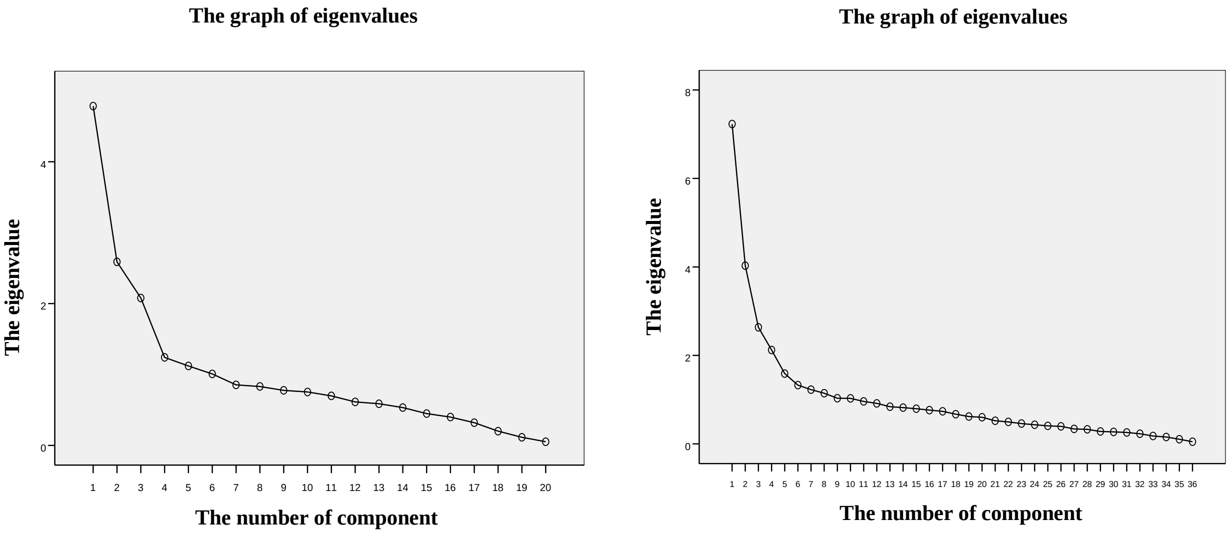
The component	The initial eigenvalues			The sums of squares of the loads of extraction			The sums of squares of the loads of rotation		
	Total	% of dispersion	The cumulative %	Total	% of dispersion	The cumulative %	Total	% of dispersion	The cumulative %
1	7,230	20,082	20,082	7,230	20,082	20,082	6,248	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 for the carrying out of the factor analysis is determined by the 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 the 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 strings (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 A15.160

The matrix of component (factor) loads

The var.	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 (principal) components.

a The extracted components: 6

According to the analysis of the nominal values of component loads the first component describes in the greatest degree the influence on the set of independent variables K_i.

2. The complete set of independent variables K_i.

Table A15.161

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 (principal) 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. A15.162.

1. The reduced set of independent variables K_i.

Table A15.162

The recovered 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 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 A15.163

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 (principal) 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 A15.164

The recovered correlation matrix of the complete set of variables

The replicated correlation																	
K14	*K9*	*K8*	*K7*	*AST*	*SCH*	*CHE*	*FIZ*	*GEOM*	*ALG*	*BIO*	*GEO*	*HIS*	*LG*	*LIT*	*RU*	*Age*	
-,237	,045	,040	-,296	-,107	,012	-,152	-,164	-,215	-,250	-,079	,009	-,102	-,216	-,071	-,167	,500(b)	*Age*
,182	-,051	-,044	,018	,229	,353	,592	,625	,628	,595	,547	,475	,580	,536	,612	,584(b)	-,167	*RU*
,082	-,063	-,061	-,011	,222	,382	,638	,654	,649	,605	,592	,529	,636	,586	,697(b)	,612	-,071	*LIT*
,213	,051	,053	,043	,184	,213	,540	,538	,552	,533	,468	,416	,560	,635(b)	,586	,536	-,216	*LG*
,157	-,039	-,033	-,023	,234	,355	,600	,606	,604	,551	,583	,530	,630(b)	,560	,636	,580	-,102	*HIS*
,102	-,028	-,023	,028	,224	,410	,515	,502	,493	,421	,547	,525(b)	,530	,416	,529	,475	,009	*GEO*
,142	-,136	-,131	,058	,210	,444	,591	,584	,585	,520	,607(b)	,547	,583	,468	,592	,547	-,079	*BIO*
,151	-,018	-,011	,024	,169	,364	,603	,670	,706	,703(b)	,520	,421	,551	,533	,605	,595	-,250	*ALG*
,144	-,027	-,020	,034	,215	,420	,643	,703	,731(b)	,706	,585	,493	,604	,552	,649	,628	-,215	*GEOM*
,129	-,037	-,029	,007	,253	,413	,634	,693(b)	,703	,670	,584	,502	,606	,538	,654	,625	-,164	*FIZ*
,144	-,080	-,076	,090	,206	,414	,629(b)	,634	,643	,603	,591	,515	,600	,540	,638	,592	-,152	*CHE*
-,010	-,024	-,022	,170	,159	,456(b)	,414	,413	,420	,364	,444	,410	,355	,213	,382	,353	,012	*SCH*
-,072	,134	,145	,140	,489(b)	,159	,206	,253	,215	,169	,210	,224	,234	,184	,222	,229	-,107	*AST*
-,032	,169	,158	,759(b)	,140	,170	,090	,007	,034	,024	,058	,028	-,023	,043	-,011	,018	-,296	*K7*
-,075	,925	,933(b)	,158	,145	-,022	-,076	-,029	-,020	-,011	-,131	-,023	-,033	,053	-,061	-,044	,040	*K8*
-,088	,920(b)	,925	,169	,134	-,024	-,080	-,037	-,027	-,018	-,136	-,028	-,039	,051	-,063	-,051	,045	*K9*
,536(b)	-,088	-,075	-,032	-,072	-,010	,144	,129	,144	,151	,142	,102	,157	,213	,082	,182	-,237	*K14*
,313	,173	,181	-,029	,041	-,005	,040	,081	,090	,080	,055	,073	,068	,150	,026	,096	-,111	*K15*
,437	,140	,146	,108	,057	,046	,175	,185	,207	,184	,185	,174	,205	,314	,145	,217	-,249	*K16*
,407	,077	,095	-,014	-,021	,030	,026	,080	,120	,134	,042	,018	,013	,033	-,074	,075	-,247	*K17*
,522	,045	,060	,044	,022	,054	,183	,213	,254	,267	,167	,131	,167	,277	,105	,231	-,339	*K18*
,374	,021	,038	,027	,093	-,008	,140	,183	,229	,258	,105	,061	,133	,238	,068	,186	-,392	*K19*
,063	-,131	-,123	-,117	,186	-,043	,167	,251	,285	,313	,111	,050	,181	,276	,183	,215	-,320	*K20*
,275	,195	,217	-,197	,037	,086	,031	,150	,169	,181	,042	,045	,022	-,018	-,026	,102	-,071	*K21*
,156	,051	,058	,069	,029	,126	-,031	,008	,059	,040	,050	,067	-,054	-,032	-,114	-,024	-,124	*K22*
,180	-,078	-,062	-,035	,163	-,020	,028	-,053	-,062	-,096	,105	,140	,124	,072	-,024	,012	-,088	*K23*
,167	,102	,124	,013	,248	,028	,094	,031	,026	,016	,119	,168	,155	,148	,035	,079	-,127	*K24*
,240	,136	,158	,007	,185	,030	,133	,078	,081	,091	,124	,160	,169	,198	,070	,124	-,159	*K25*
,182	,026	,036	,005	,008	,065	,133	,080	,115	,138	,118	,134	,118	,198	,079	,102	-,129	*K27*
,048	,114	,123	,033	-,064	,092	,110	,074	,108	,170	,031	,044	,020	,106	,057	,066	-,050	*K28*
,057	,184	,192	,097	-,050	,084	,093	,054	,089	,153	,008	,030	-,003	,110	,035	,050	-,070	*K29*
,301	-,004	-,002	,154	,039	-,053	,172	,132	,176	,188	,133	,096	,194	,362	,143	,177	-,365	*K45*
-,181	-,014	-,016	,110	,088	,225	-,051	-,018	,018	-,028	,064	,092	-,084	-,159	-,102	-,087	,050	*L31N*
,068	-,145	-,143	,190	,148	,113	,001	-,011	-,075	-,102	,025	,030	-,070	-,129	-,025	,008	,073	*L36N*
,010	,204	,220	,063	,133	,102	,090	,175	,206	,223	,056	,008	,072	-,036	,018	,111	-,210	*L37*
,009	-,063	-,071	,054	-,384	,034	-,067	-,141	-,075	-,066	-,028	-,058	-,083	-,151	-,143	-,142	,013	*L38N*

The completion of tabl. A15.164

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 A15.165

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. A15.165

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 (principal) 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 The 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 for the interpretation and scientific justification was formed directly.

1. The reduced set of independent variables K_i.

Table A15.166

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 (principal) components.

The method of rotation: Varimax with the normalization of Kaiser.

a The rotation is converged in 6 iterations.

Table A15.167

The matrix of the transformation of components

The component	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 A15.168

The matrix of component loads after the 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 (principal) components.

The method of rotation: Varimax with the normalization of Kaiser.

a The rotation is converged in 10 iterations.

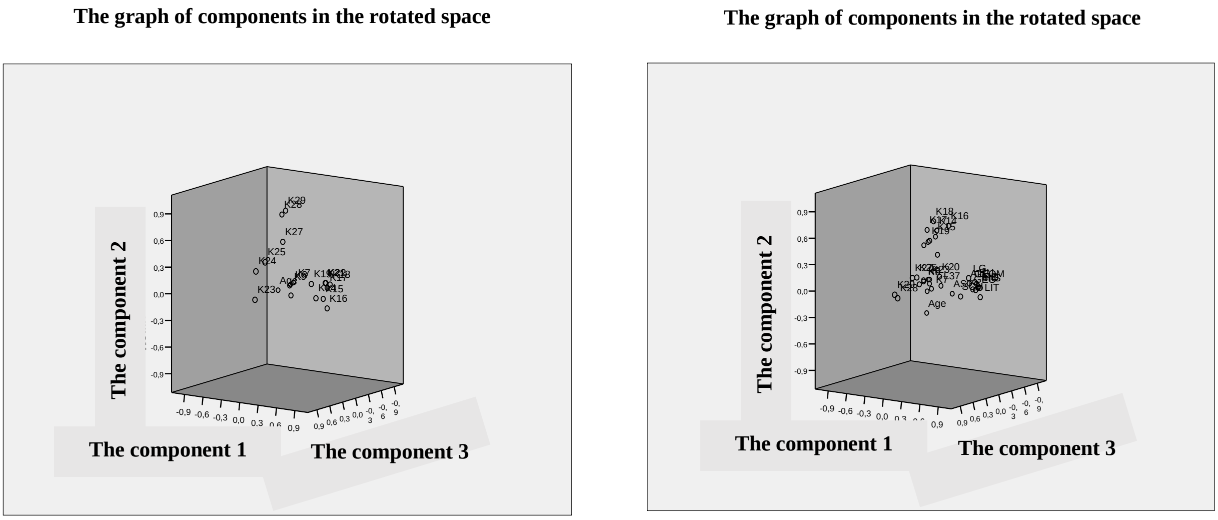
Table A15.169

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 (principal) 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 basic 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) were 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. A15.170.

Table A15.170

The results of primary statistical processing of the data of experiment

The name of indicator	The number of the experimental group of examinees							
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
AQD 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
AQD 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 AQD	-0,144	-0,051	-0,215	-0,136	-0,131	-0,129	-0,141	-0,061

The values of indicators in tabl. A15.170 evidence about the increasing of average point on 0,82-7,62% and the decreasing of AQD 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 indicator of the resultativity of training for the several years, and also the setting up and conducting of a series of experiments with the purpose of the estimation 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 last 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 in tabl. A15.171 are presented.

Table A15.171

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 Y_1	4,05	4,286	4,24	4,611	4,056	4,4	-	-
AQD 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 Y_2	4,333	4,046	4,375	4,16	4,042	4,091	4,696	4
AQD 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 Y_3	4,5	4,609	4,379	3,708	3,92	3,773	4,455	3,818
AQD 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 Y_4	4,524	4,5	4,588	4,174	4,571	4,375	3,9	3,167
AQD 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 Y_5	4,588	4,550	4,684	4,167	4,45	4,778	3,933	4,111
AQD 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 Y_6	4,6	4,571	4,714	4	4,357	4,786	3,944	-
AQD of average point	0,507	0,756	0,469	0,679	0,633	0,426	0,725	-

The completion of tabl. A15.171

The results of the statistical analysis								
The indicators, reflecting the changing of the 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 AQD	0,13	-0,06	0,045	0,298	0,056	0,304		
The indicators, reflecting the changing of the 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 AQD	-0,109	-0,129	-0,049	-0,049	-0,287	-0,199	0,299	-0,042
The indicators, reflecting the changing of the 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 AQD	-0,028	-0,024	-0,268	0,027	-0,065	0,007	0,110	-0,469
The indicators, reflecting the changing of the 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 AQD	-0,172	0,127	0,075	-0,071	0,179	-0,191	-0,169	0,375
The indicators, reflecting the changing of the 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 AQD	0,000	-0,003	-0,114	-0,028	-0,053	-0,002	-0,074	-0,758

In tabl. A15.171 the resultativity (efficiency) of training for 2004-2006 y., characterizing LRKT of day (the groups 1-6) and evening department (the groups 7-8) is reflected. The values of indicators for 2004-2005 y. in the table evidence 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 content of the 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 in the context of the separate sections of discipline were carried out, 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 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.) evidence 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).

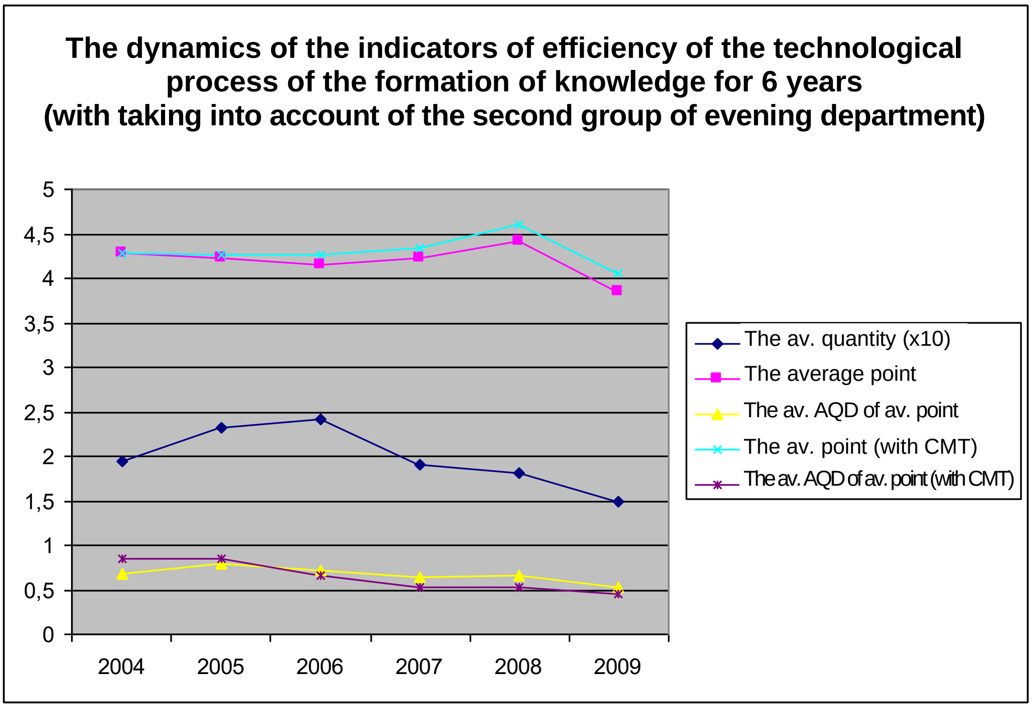
According to the method of research of the parameters of CM of the subject of training at the stage of testing of IFPST the vectors of parameters of the physiological (acuity of vision, field of vision and color-perception), psychological (the convergent and divergent intellectual abilities of trainee) and linguistic (the level of proficiency in language) portraits were diagnosed by means of the applied DM with the using of the methods of research.

At the stage of the analysis of the nominal values of parameters of the physiological portrait of CM among the contingent of examinees the subjects of training (examinees) with the various anomalies of perception of the information by the visual sensory system were not revealed. The research of the linguistic portrait of CM is directed on the revealing of correspondence between the level of statement of the material of the (adaptive) means of training 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.

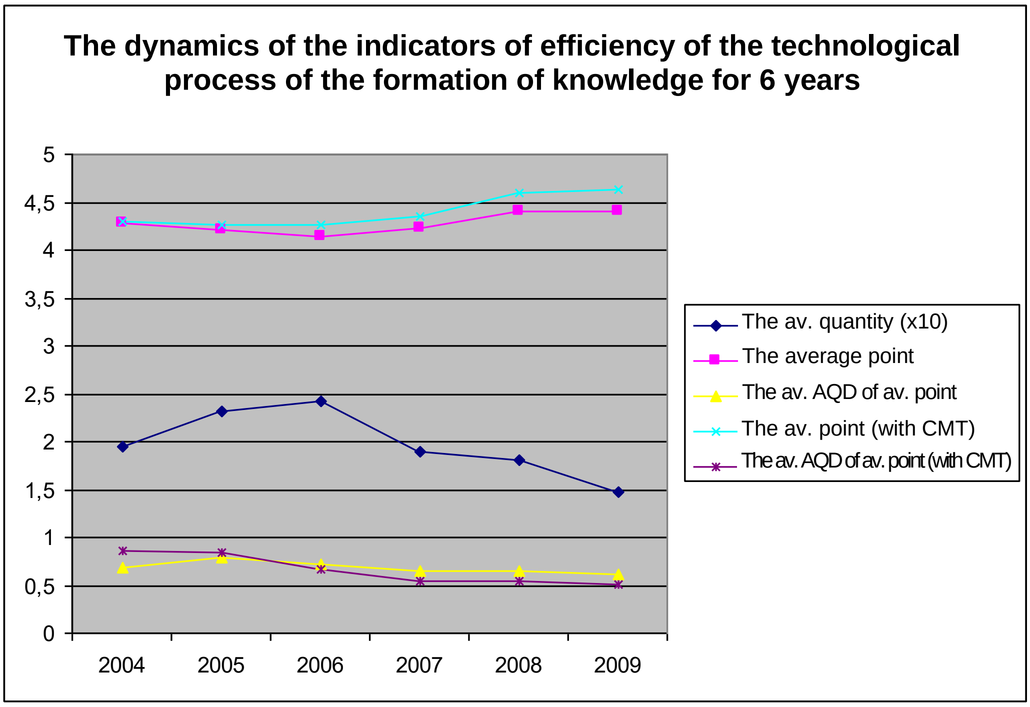
At the stage of the adaptive training the automated representation of information fragments by means of the adaptive means of training (ET), taking into account the parameters of IFPST, contained directly in CM of the subject of training was carried out. At the representation of the learning material the information-educational influences of the several various kinds were used in the quality of the main ones: verbal (textual), tabular (tables) and schematic (flat schemes).

At the final stage the automated diagnostics of LRKT with the using of the basic DM, containing in their basis of the two scales of estimation is carried out. There is the essential 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 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 growth is observed, and from 2006 y. to 2009 y. the decline is observed, which is explained by the demographic decline directly;
- the average point of the contingent of trainees without CMT is changing: from 2004 y. to 2006 y. the insignificant decreasing is observed, from 2006 y. to 2008 y. the relative increasing is observed, from 2008 y. to 2009 y. the intensive decreasing of indicator is observed;
- the average average quadratic deviation of average point with the using of CMT: from 2004 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the decreasing is observed;
- the average point of the contingent of trainees with the using of CMT: from 2004 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the decreasing of indicator is observed.

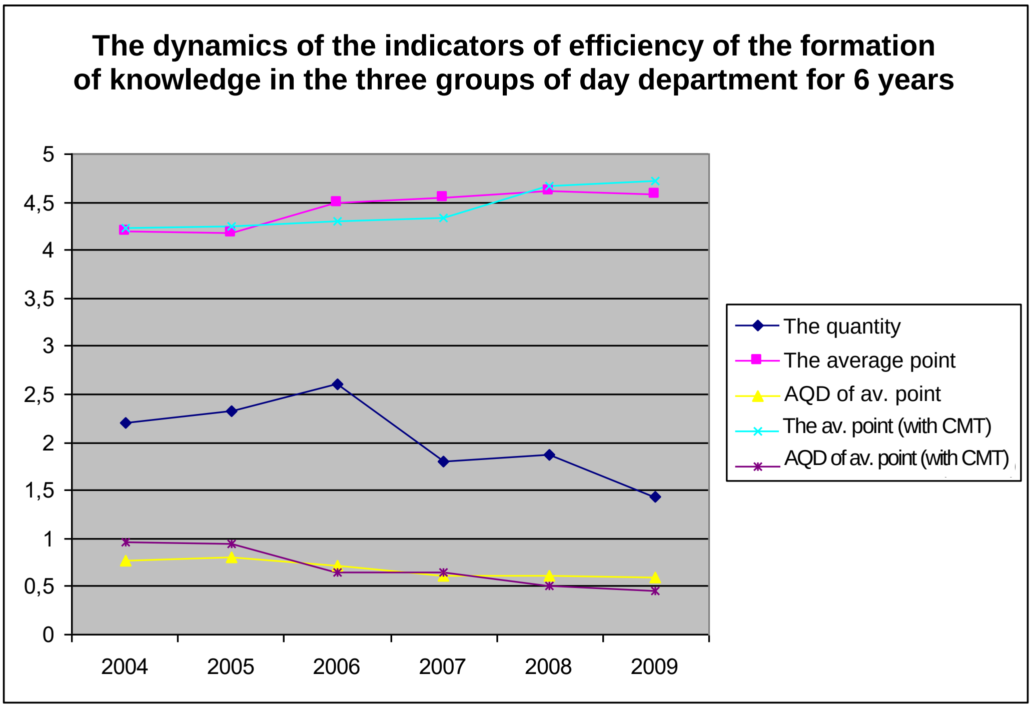
The analysis of the second diagram allows to make a row of important conclusions directly:

- the quantity of trainees without CMT is changing: from 2004 y. to 2006 y. the growth 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 quadratic deviation of average point without CMT: from 2004 y. to 2005 y. the increasing of indicator is observed [as the samples are expanded], from 2005 y. to 2007 y. the decreasing is observed, from 2007 y. to 2009 y. the indicator without changes;
- the average point of the contingent of trainees without CMT is changing: from 2004 y. to 2006 y. the insignificant decreasing is observed, from 2006 y. to 2008 y. the increasing is observed, from 2008 y. to 2009 y. the significant changes of indicator is not observed;
- the average average quadratic deviation of average point with CMT: from 2004 y. to 2005 y. the indicator is remaining without changes, from 2005 y. to 2007 y. the decreasing of indicator is observed [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. the insignificant increasing is observed, from 2006 y. to 2008 y. the increasing is observed, 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 the resultativity of functioning of the automated training system based on CM for 2004-2009 y. by the 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 application of the rough scale based on the quantity of valid 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.

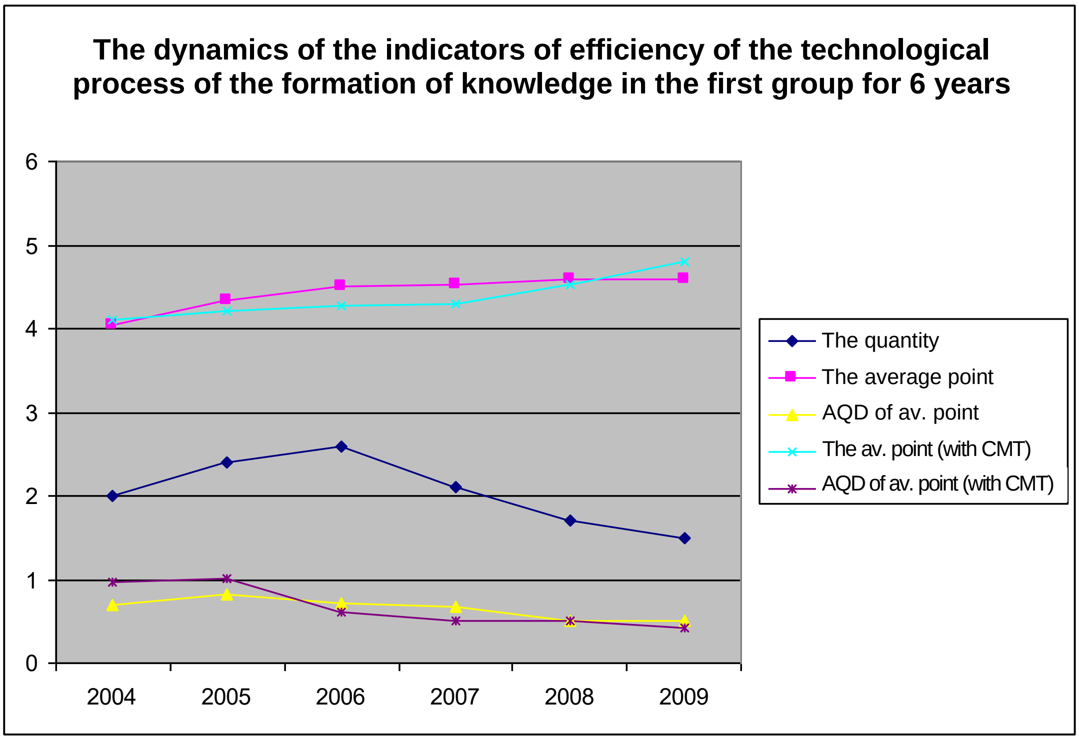


Picture A15.167. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the three groups of day department for 2004-2009 y.

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 growth 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 quadratic 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 is changing: 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 of indicator is observed;
- the average average quadratic 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 the means of application of the rough scale on the basis of the quantity of valid answers and the exact (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.

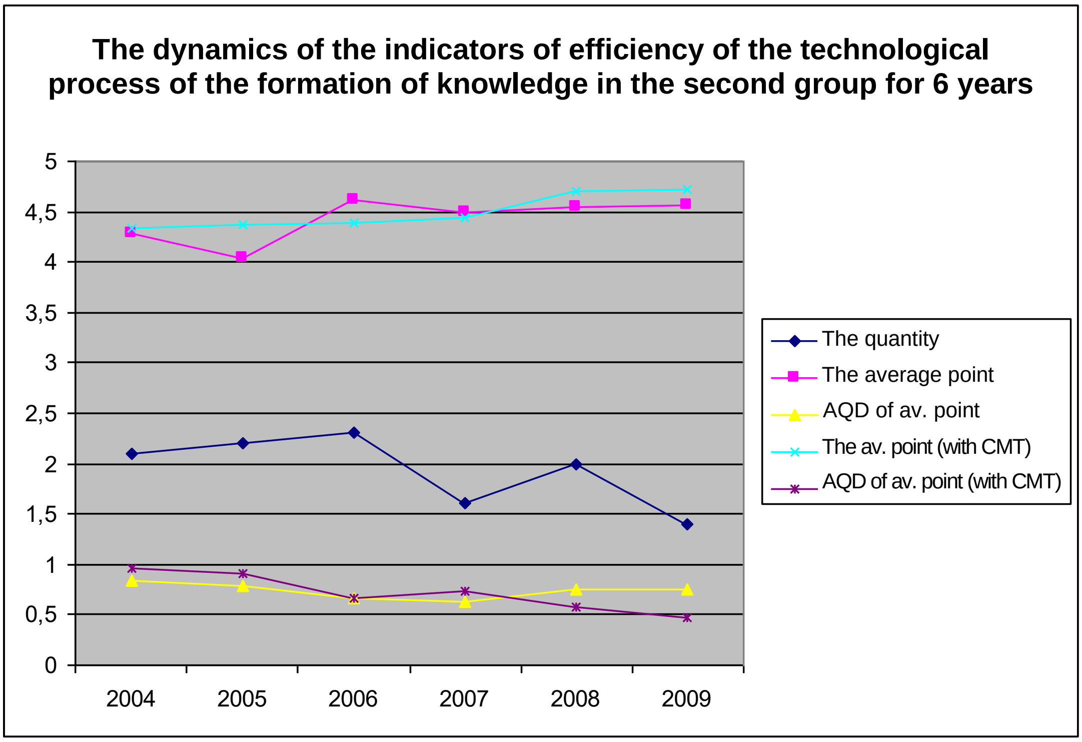


Picture A15.168. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the first group of day department for 2004-2009 y.

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 growth 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 quadratic 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 is changing: 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 quadratic 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 does not change, from 2008 y. to 2009 y. the insignificant decreasing of indicator is observed [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 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 valid 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.

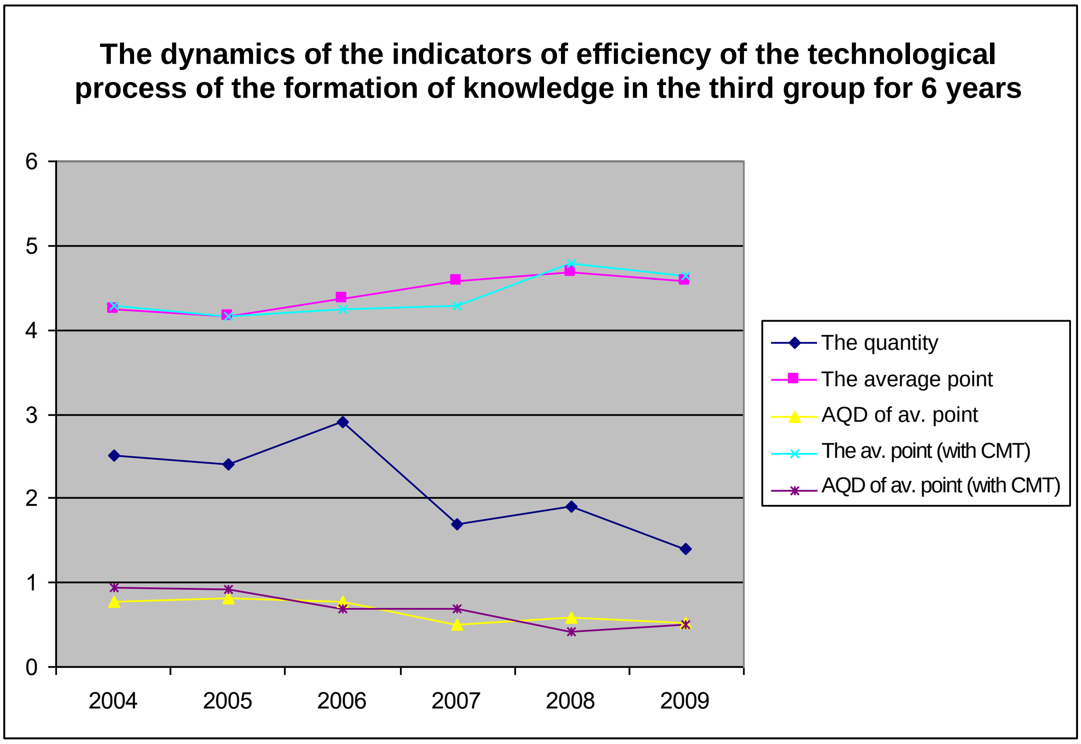


Picture A15.169. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the second group of day department for 2004-2009 y.

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 growth is observed, from 2006 y. to 2007 y. the declining is observed, from 2007 y. to 2008 y. the growth 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 quadratic 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 is changing: 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 valid 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.

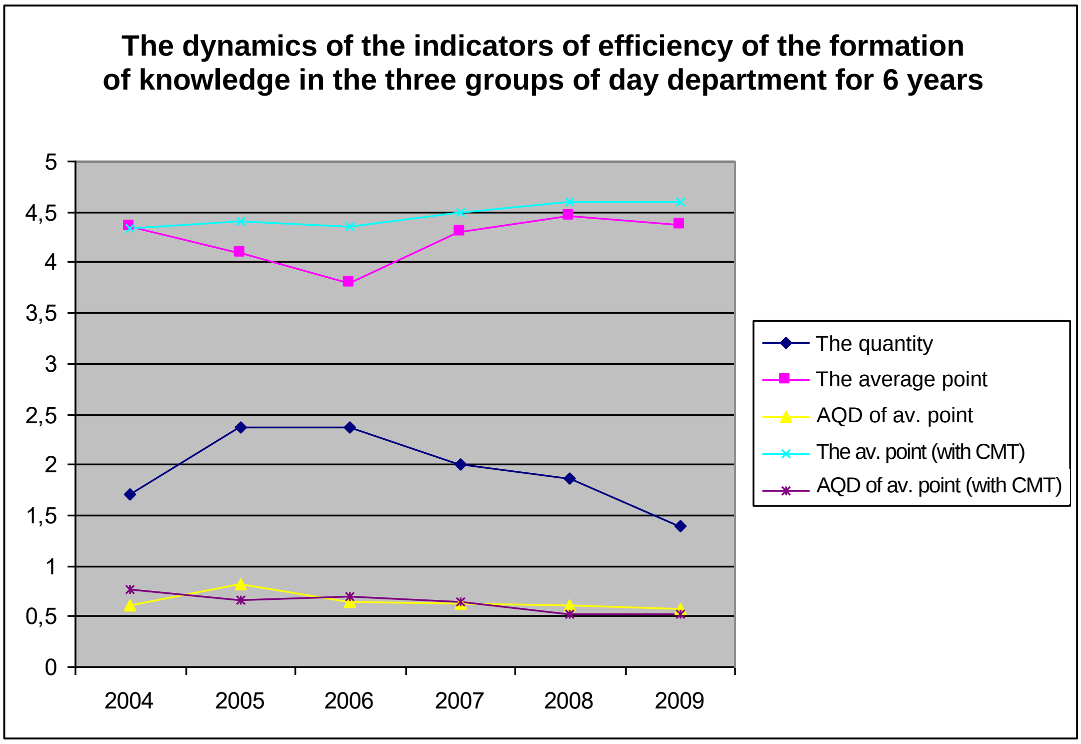


Picture A15.170. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the third group of day department for 2004-2009 y.

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 y. to 2007 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 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 is changing: 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 average average quadratic 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.

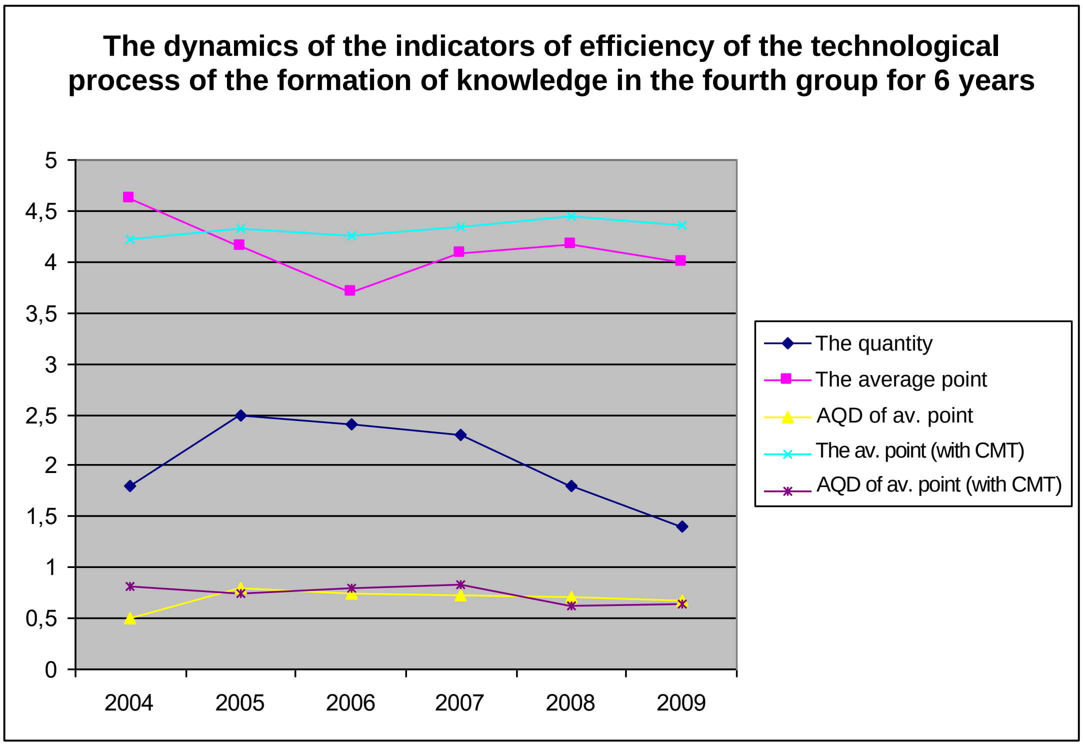


Picture A15.171. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the three groups of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees is changing: 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 is changing: 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 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 valid 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.

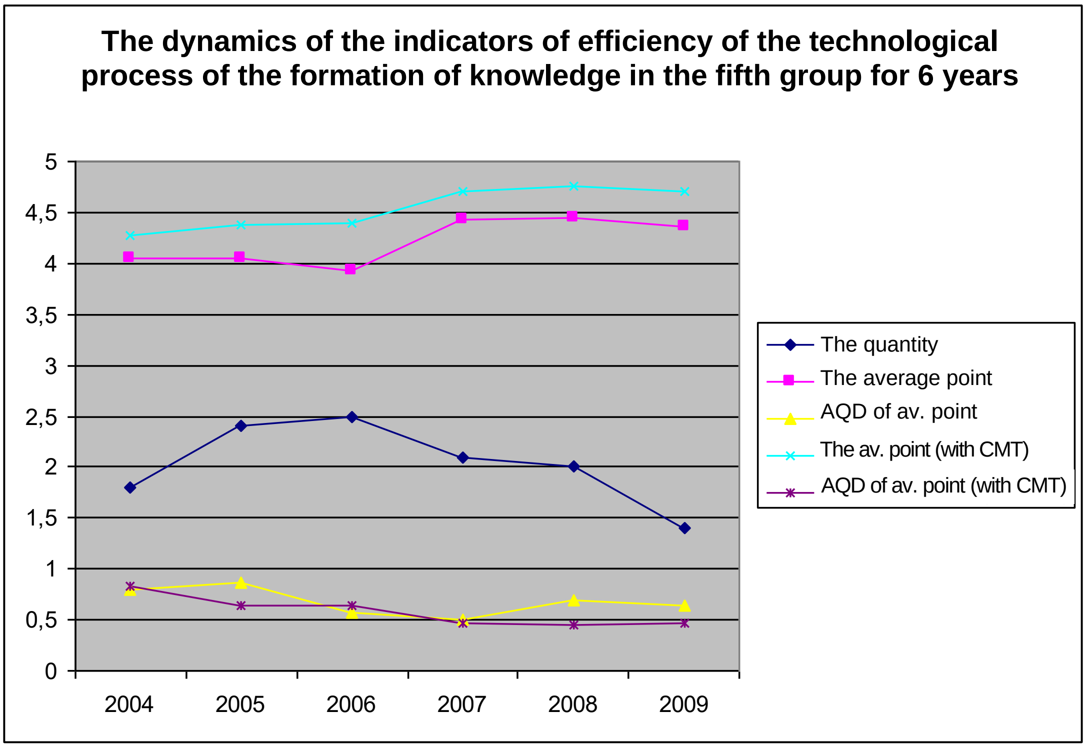


Picture A15.172. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the fourth group of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees is changing: 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 is changing: 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 with 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 valid 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.

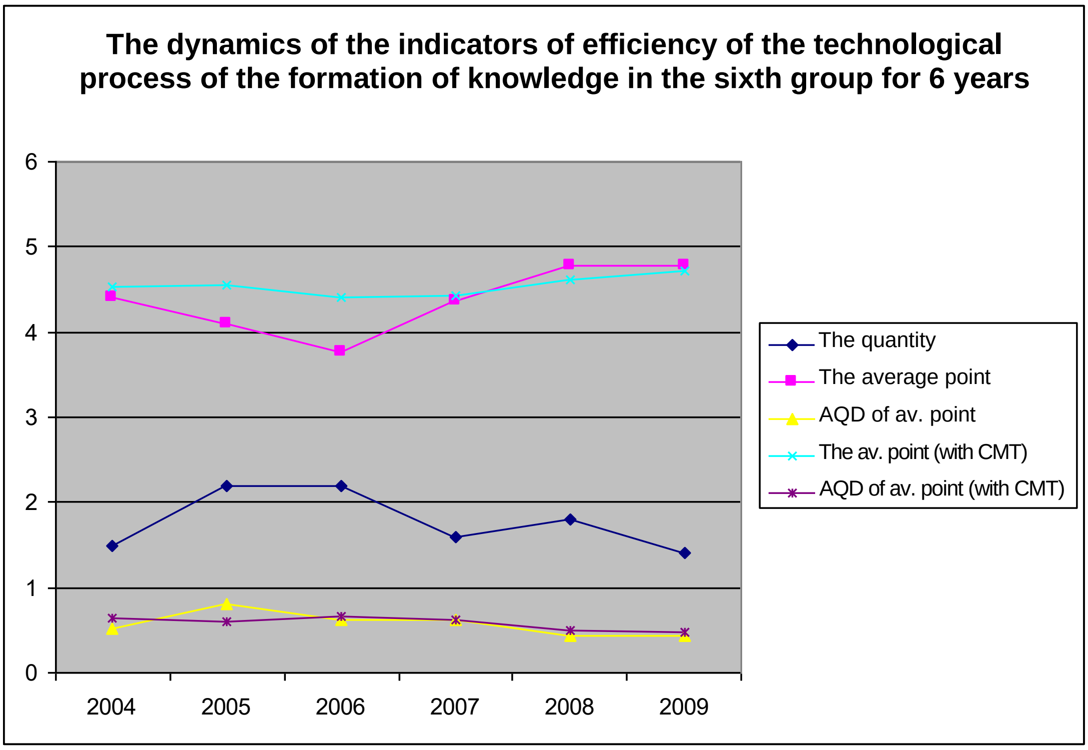


Picture A15.173. The dynamics of changing of the indicators of resultativity of the formation knowledge of the contingent of trainees in the fifth group of day department for 2004-2009 y..

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees is changing: 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 is changing: 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 valid 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.

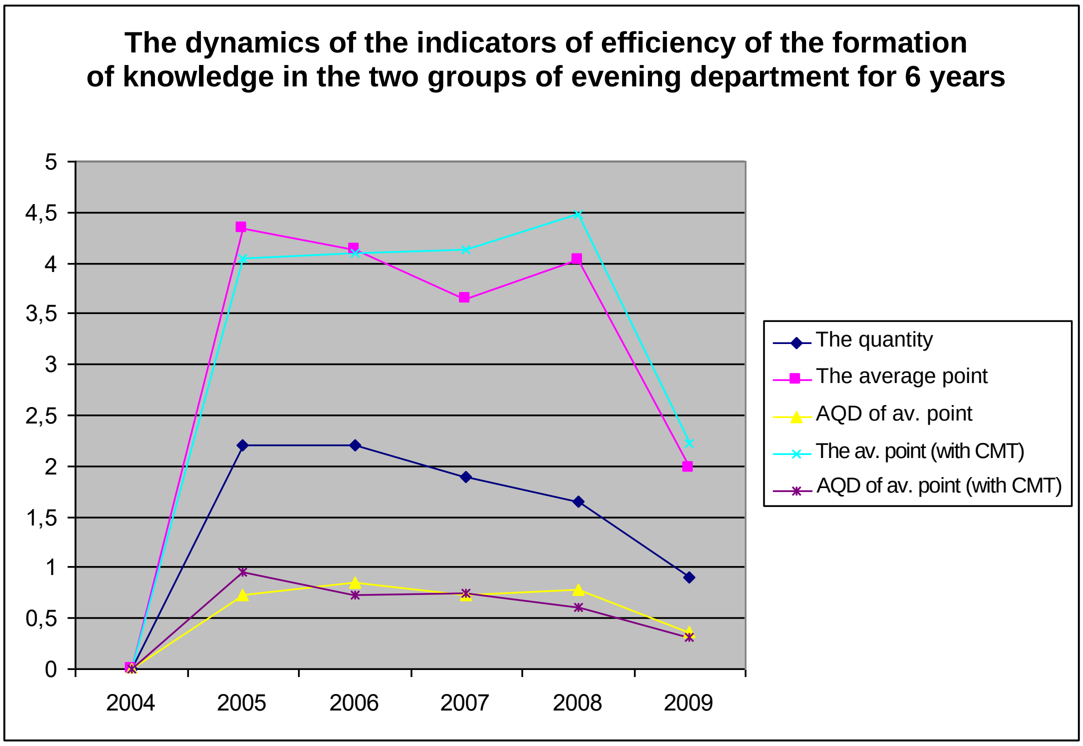


Picture A15.174. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees in the sixth group of day department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees is changing: 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 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 decreasing is observed, from 2008 y. to 2009 y. the indicator does not change [established];
- the average point of trainees without CMT is changing: 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 valid 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.

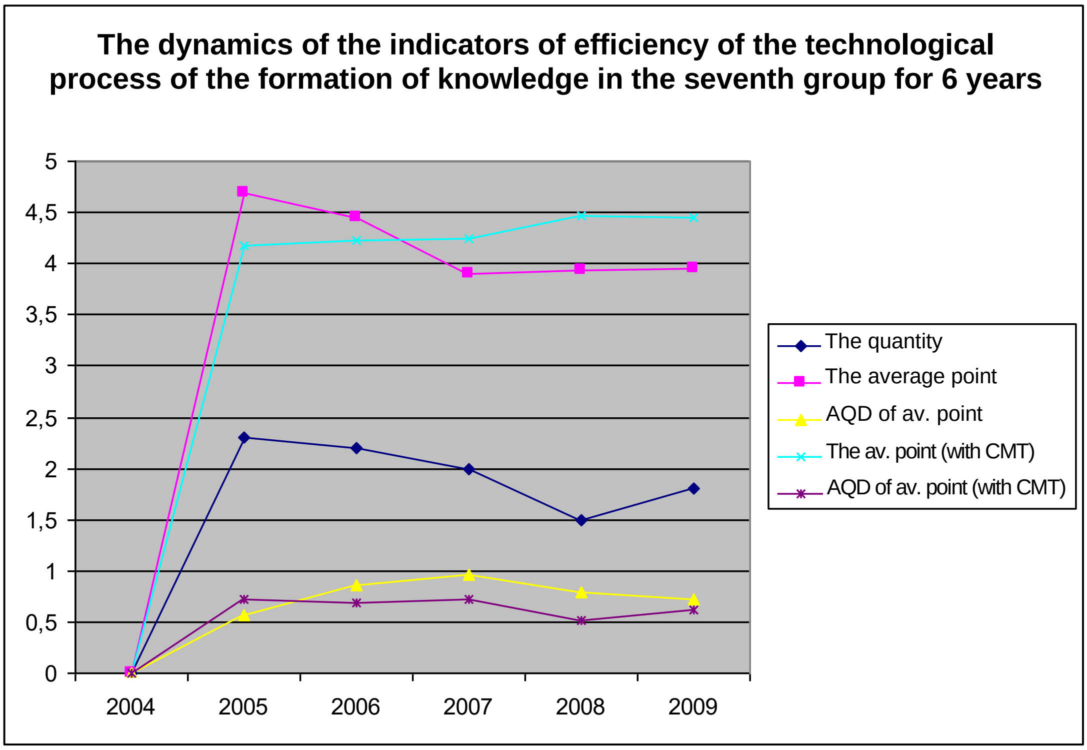


Picture A15.175. The dynamics of changing of the indicators of resultativity of the formation knowledge of the contingent of trainees in the two groups of evening department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees is changing: 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 the using of 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 is changing: 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 valid 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.

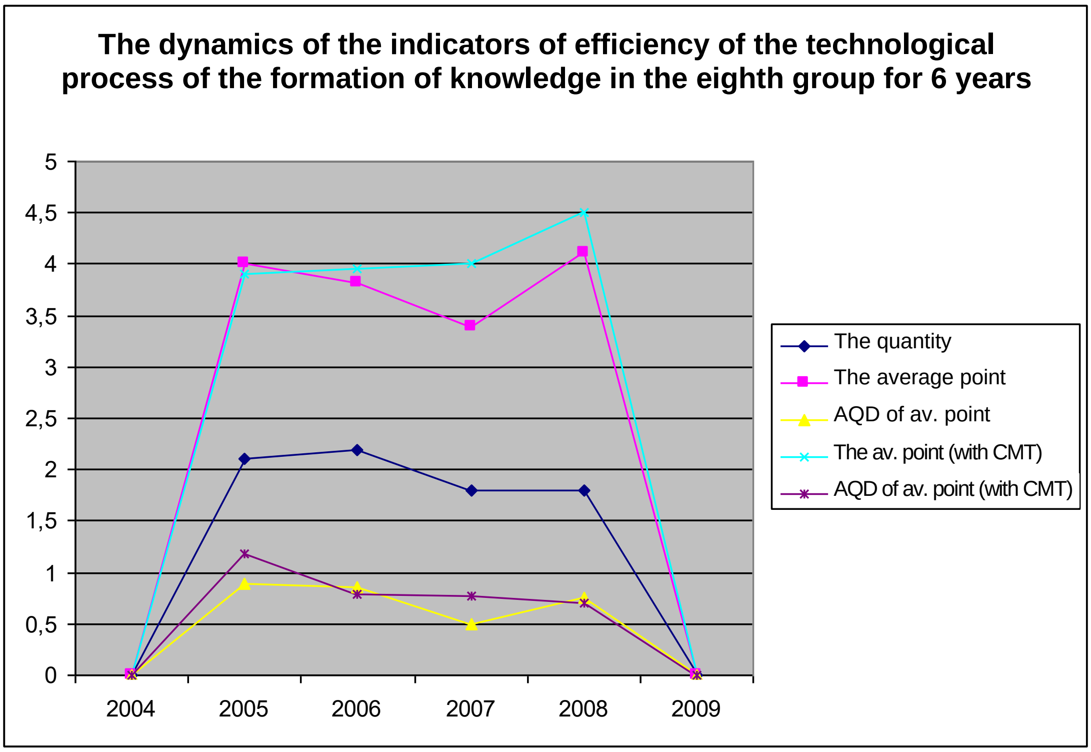


Picture A15.176. The dynamics of changing of the indicators of resultativity of the formation of knowledge of the contingent of trainees of in the seventh group of evening department for 2004-2009 y.

The analysis of the first diagram allows to make a row of important conclusions directly:

- the quantity of trainees is changing: 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 is changing: 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 valid 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 is changing: in 2004 y. the classes in the evening department are absent, from 2005 y. to 2008 y. the decreasing is observed, 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 is changing: 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 [the eighth group of evening department is absent].

A15.11. The conclusions and remarks 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 by means of a set of statistical methods was developed;
- 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 of 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, which directly characterizes IFPST was verified;
    - 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, which reflects the technical characteristics of ET was verified;
    - 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 the 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, included in the analysis were defined (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 (un)standardized coefficients in the four linear equations of multiple regression with taking into account of the procedure of standardization by the means of using of the Z-normalization based on the rule $X_{cp}\pm\sigma$, $X_{cp}\pm2\sigma$, $X_{cp}\pm3\sigma$ were calculated;
  - the coordinated change and interrelationship of four sets of independent variables by means of the correlation tables and covariance tables were researched;
  - 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 on all the selected centroids of class was formed, the significant statistical heterogeneities in the samples were not revealed;
  - the test of the equality of average indicators by the groups for the revealing of the inclusion of variables with using of the method of sequential inclusion was carried out;
  - the research of covariance as the measure of coordinated change of the values in the reduced and complete sample of independent variables was carried out;
  - the research of correlation as the measure of the coordinated dependence (relationship) in the reduced and complete sample of independent variables was conducted;
  - the ranks of the centroids of class, which were obtained during the analysis was determined;
  - the eigenvalues of the canonical discriminant functions, which characterize the share of dispersion of the dependent variable under the influence of factors were computed;
  - the features of the functions of classification of the discriminant analysis were highlighted;
  - the direct geometric location of the centroids of classes in the space of the canonical discriminant functions was reflected;
  - the analysis of the presence of ambiguously classified values, which impossible to assign directly to one from the centroids of classes in the space of the considered canonical discriminant functions was carried out;
  - the analysis of the quality of classification of the canonical discriminant functions of the centroids of classes showed the high prognostic ability: the analysis of residues showed, that the exact point scale of estimation based on the analytical coefficients system allows to obtain directly the more exact 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 of variables in the view of the table, which characterizes the sequence of uniting of the independent variables into the clusters;
    - the dendrograms in the view of the horizontal or vertical picture, which allows to reveal directly the sequence of uniting of 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 based on the variables were determined;
    - 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 built 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 were used directly at the solving of the problem of community and characterization;
    - the completeness of factorized space follows from the analysis of structural matrix for the structural decomposition of factors and variables in relation to the factor loads;
    - the descriptive statistics of the initial (source) set of variables reflects the absence of abnormal outliers, artifacts and deviations from the measure of central tendency;
    - the common and reciprocal (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 for the estimation of covariance and correlation of the reduced and complete set of independent variables are obtained, 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”) evidence about the increasing of efficiency of the indicator on 7%;
    - for 2005 y. (without CMT in the three groups, the private estimation in the fourth section of the discipline “Informatics”) evidence 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”) evidence 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”) evidence 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”) evidence 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”) evidence 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 the author) 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 were 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 parametrical 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 for the formation and parametrical identification of CM of the subject of training was applied successfully;
        - the technique of research of the parameters of CM of the means of training for the formation and parametrical identification of CM of the means of training was applied successfully;
        - the algorithm of processing of a posteriori data of testing of LRKT and the research of IFPST for the estimation of the resultativity (efficiency) of technological process of the formation of knowledge of the contingent of trainees was applied successfully;
    - the efficiency of practical use of the complex of programs for the automation of the system analysis of IEE and the automated training system is substantiated;
        - the means of training (ET) based on the adaptive representation of information fragments processor and PCMB is used successfully, 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 for the testing of LRKT by means of the formed set of tests in one or several subjects of studying was applied successfully;
        - the applied DM 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 was used successfully;

- 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 researched;
- 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 by means of the coarse scale based on the quantity of valid answers and the exact (point) scale based on the formed weight coefficients system was researched, 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 valid 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., evidences 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 valid 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. evidences 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 valid 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., evidences 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. was researched – takes place the significant increasing of the speed of growth of the estimation of LRKT (the testing on the paper carrier), the relative declining 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 declining 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 valid 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. evidences about the steady growth of estimation of LRKT (the testing on the paper carrier) and the relative declining of LRKT (final) [the difference of program of the theoretical lectures and practical classes], but in 2009 y. there is the declining 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 directly;
    - 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 valid 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. evidences 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 directly;
    - 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 means of the coarse scale based on the quantity of valid 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. evidences about the relative fluctuation and the growth of estimation of LRKT (the testing on the paper carrier) and the relative declining 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 declining of estimation of LRKT (final), as the presented indicator goes into the saturation directly;

- 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 the means of application of the coarse scale based on the quantity of valid 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. was researched – 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 declining 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 declining 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 valid 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. evidences about the relative growth of estimation of LRKT (the automated testing) and the relative declining and insignificant growth of LRKT (final) [the classes in the evening time], but in 2009 y. there is the insignificant declining 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 goes into the saturation directly;
    - 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 valid 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. evidences about the relative growth of estimation of LRKT (the automated testing) and the relative declining 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 declining of indicator of the estimation of LRKT (the automated testing) [the classes in the evening time], and the very significant declining 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.

“The cognitive modeling technology
for the system analysis of the information-educational environments”
(“The environment of automated training with the properties of adaptation
based on the cognitive models” – the research and processing of data)

The specialty 05.13.01 – “The system analysis, control and information processing” (technical sciences) [the adaptive systems of automatic control with the determined entrance influences and the reference cognitive models of the subject of training and the means of training, the reconstructed models of the cognitive processes]

The appendices to the dissertation

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

The translator Vetrova E.I.

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