

The 5th International Young Naturalists' Tournament
Municipal Autonomous Institution of General Education of the city of Novosibirsk
«Gymnasium №12»

Problem №5 «Invent Yourself: IYNT grades»



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Original problem:

An upwards of four thousand grades that Jurors have given in Science Fights of previous four IYNTs can reveal properties and hidden regularities of the IYNT grading. Suggest an interesting hypothesis that concerns the IYNT grades and test it with real data from previous IYNTs.

Our problem:

Explore the dependences in ranking based on the fight's number and the phase in it.

Hypothesis

The jury grades depend on the action in Science fights and the activity in the qualifying tournament.

Purpose

To set regularities of ranking during the past and reveal factors affecting the result of participation in the Tournament.



Objectives

1. Do a research of statistical, expert methods of evaluation.
2. Find out the dependence between the total grade for the fight during the qualifying fight and the reporter, opponent or reviewer's grade.
3. Identify a relation between total ratings in each fight and the total sum of the qualifying round grades.
4. Identify the fight, that grades "predict" the team location in the final table of the qualifying round.
5. Determine the influence of the order of the team performance with the report on the jury's grades.
6. Verify the validity of the hypothesis on the real grades of past tournaments.

Theoretical part of the study

In all Science Fights, the Jury evaluates the Team performances by publicly showing integer scores called Grades G . The Grades are used to calculate the Average Point P . Two extreme Grades, one maximum and one minimum, are replaced with one grade equal to their arithmetic mean. P is rounded to the nearest 0.1 points (IYNT rules)

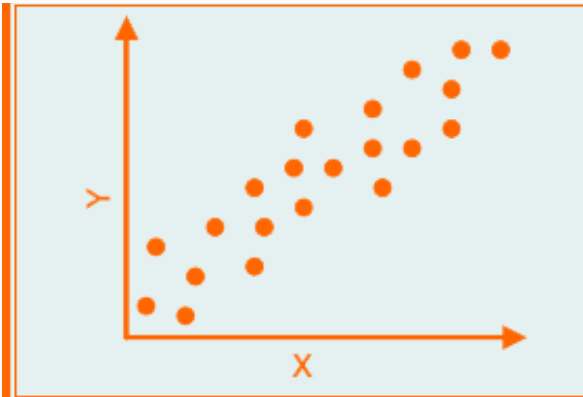
Each Team completes three performances (Reporter, Opponent, and Reviewer) in each Science Fight and earns three Average Points P which are summed up to obtain the Sum of Points SP .

The winners of a scientific fight are: the team that has the highest score (SP) in a given scientific fight and the team whose SP s differ from the highest value by not more than two points.

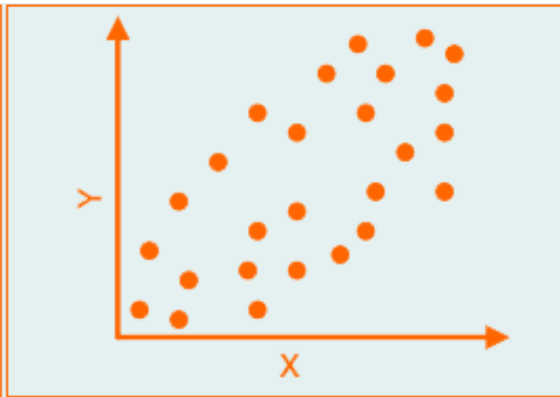
Theoretical part of the study

The scatter diagram is a quality tool that is designed to identify the relationship between two types of data. Also, using this diagram, you can determine the correlation between any quality parameter and the factor affecting it.

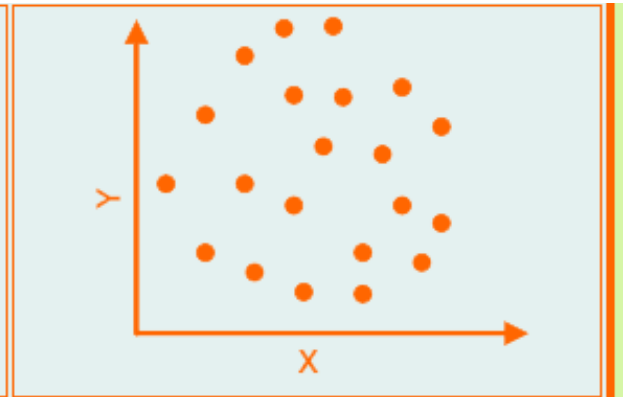
Positive(direct) correlation



Weak positive correlation



No correlation

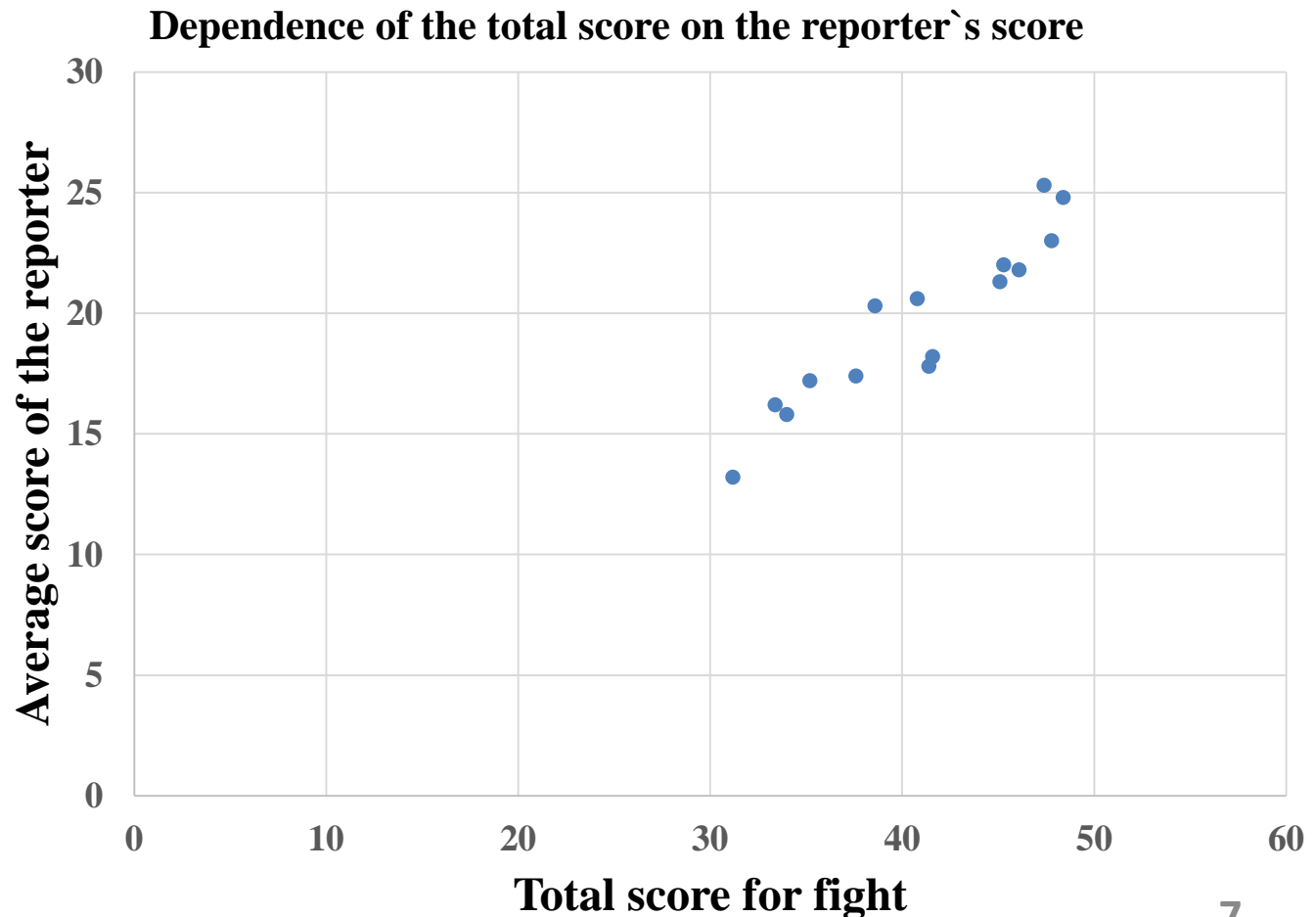


A histogram is a way of graphical representation of tabular data.

Experimental part. Experiment 1

- Aim: to define the dependence on the total score for the science fight from the report, opponent and review's grades.

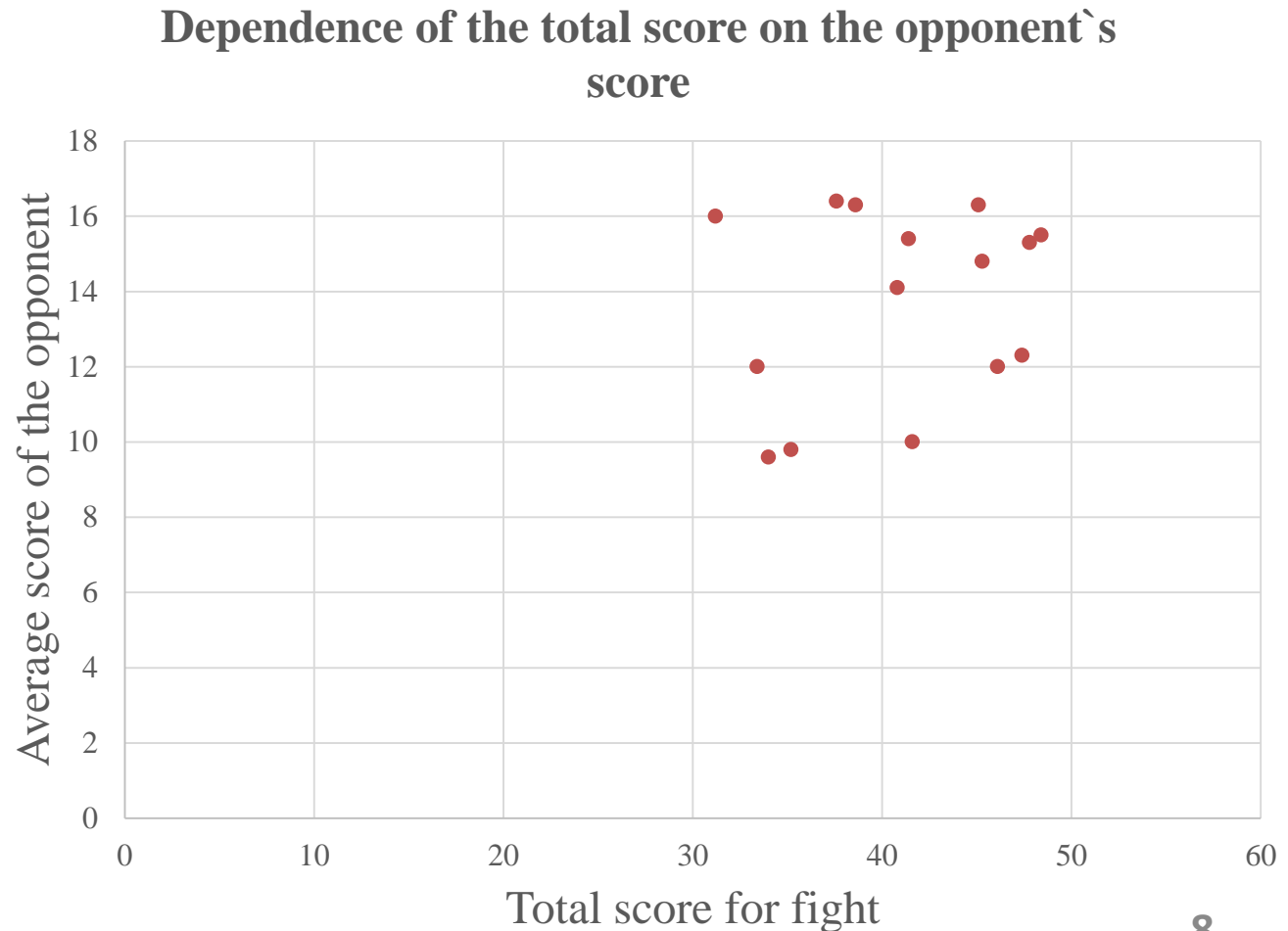
Total score for fight	Average score of the speaker
35,2	17,2
34	15,8
33,4	16,2
46,1	21,8
38,6	20,3
48,4	24,8
41,6	18,2
31,2	13,2
41,4	17,8
37,6	17,4
47,4	25,3
40,8	20,6
47,8	23
45,3	22
45,1	21,3



Experimental part. Experiment 1

- Aim: to define the dependence on the total score for the science fight from the report, opponent and review's grades.

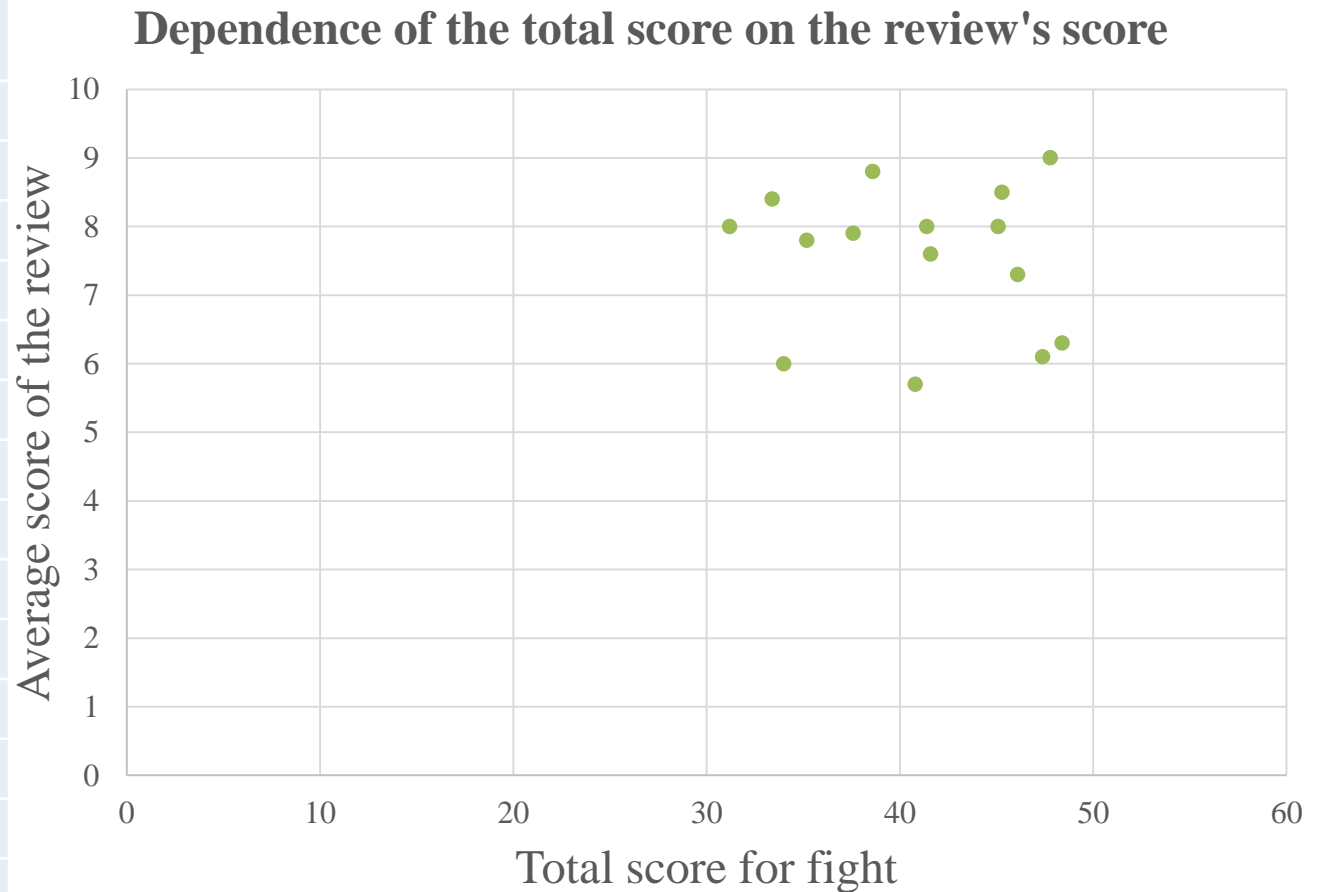
Total score for fight	Average score of the opposition
35,2	9,8
34	9,6
33,4	12
46,1	12
38,6	16,3
48,4	15,5
41,6	10
31,2	16
41,4	15,4
37,6	16,4
47,4	12,3
40,8	14,1
47,8	15,3
45,3	14,8
45,1	16,3



Experimental part. Experiment 1

- Aim: to define the dependence on the total score for the science fight from the report, opponent and review's grades.

Total score for fight	Average score of the review
35,2	7,8
34	6
33,4	8,4
46,1	7,3
38,6	8,8
48,4	6,3
41,6	7,6
31,2	8
41,4	8
37,6	7,9
47,4	6,1
40,8	5,7
47,8	9
45,3	8,5
45,1	8



Experimental part. Experiment 1



Conclusion: the total score in the fight directly depends only on the report`s grades.

Experimental part. Experiment 2

Aim: to determine the dependence of the grades for the concrete Fight on the all grades for the selective science fights.

Team	Total score for fight 1	Total score for fight 2	Total score for fight 3	Total score for fight 4	Amount of points for fight 1-4	The total score for the semi-final	The overall result
Team 1	35,2	36,7	35,5	37,2	144,6	39,8	184,4
Team 2	34	43,5	43,2	39,9	160,6	43,4	204
Team 3	33,4	35,2	47,8	39,4	155,8	37,1	192,9
Team 4	46,1	40,6	37,6	39,2	163,5	35,5	199
Team 5	38,6	37,4	37	34,8	147,8	39,5	187,3
Team 6	48,4	39	43,7	38,6	169,7	51,6	221,3
Team 7	41,6	47,2	40,2	36,8	165,8	47,6	213,4
Team 8	31,2	41,4	42,2	27,5	142,3	46,1	188,4
Team 9	41,4	40,9	39,9	44,5	166,7	40,6	207,3
Team 10	40,8	42,3	40,4	42,3	165,8	44,8	210,6
Team 11	24,8	36,1	34,8	23,6	119,3	34,6	153,9
Team 12	41,6	34,4	38,7	42,8	157,5	44,4	201,9
Team 13	41,6	43	42	30,1	156,7	46,6	203,3
Team 14	26,6	32,4	23,1	38,7	120,8	40	160,8
Team 15	42	41,6	44,3	31,2	159,1	49	208,1
Team 16	36,4	30,6	30	27,8	124,8	34,7	159,5
The average score for the fight	37,7	38,9	38,8	35,9		42,2	

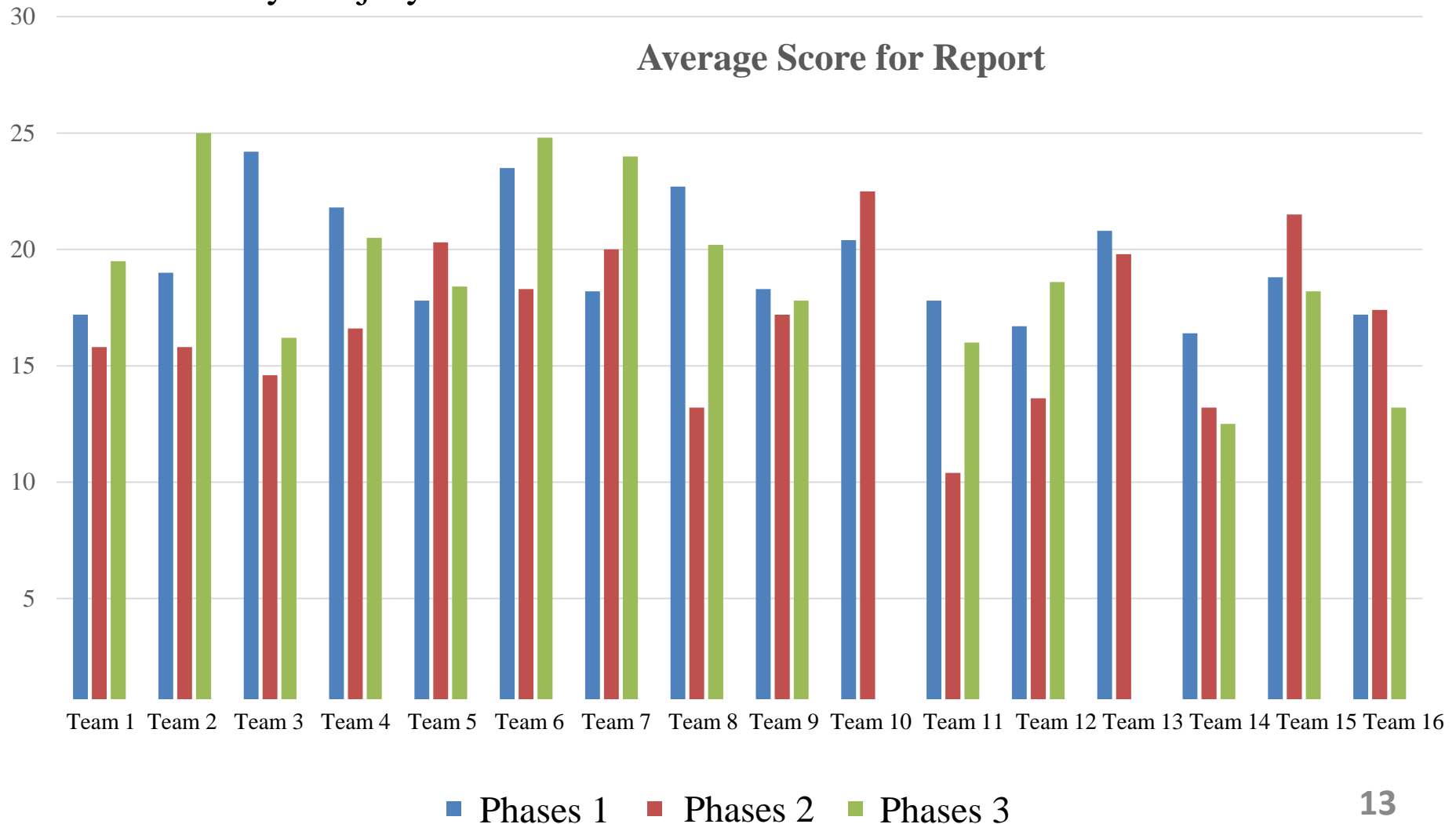
Experimental part. Experiment 2



Conclusion: The greatest contribution to the total amount of points for selective science fights is made by fights No. 2, No. 3; The smallest – during the experimental fight. The score is not the determining factor for reaching the final.

Experimental part. Experiment 3

Aim: to determine the influence of the order of the team's performance on the assessment by the jury members.



Experimental part. Experiment 3

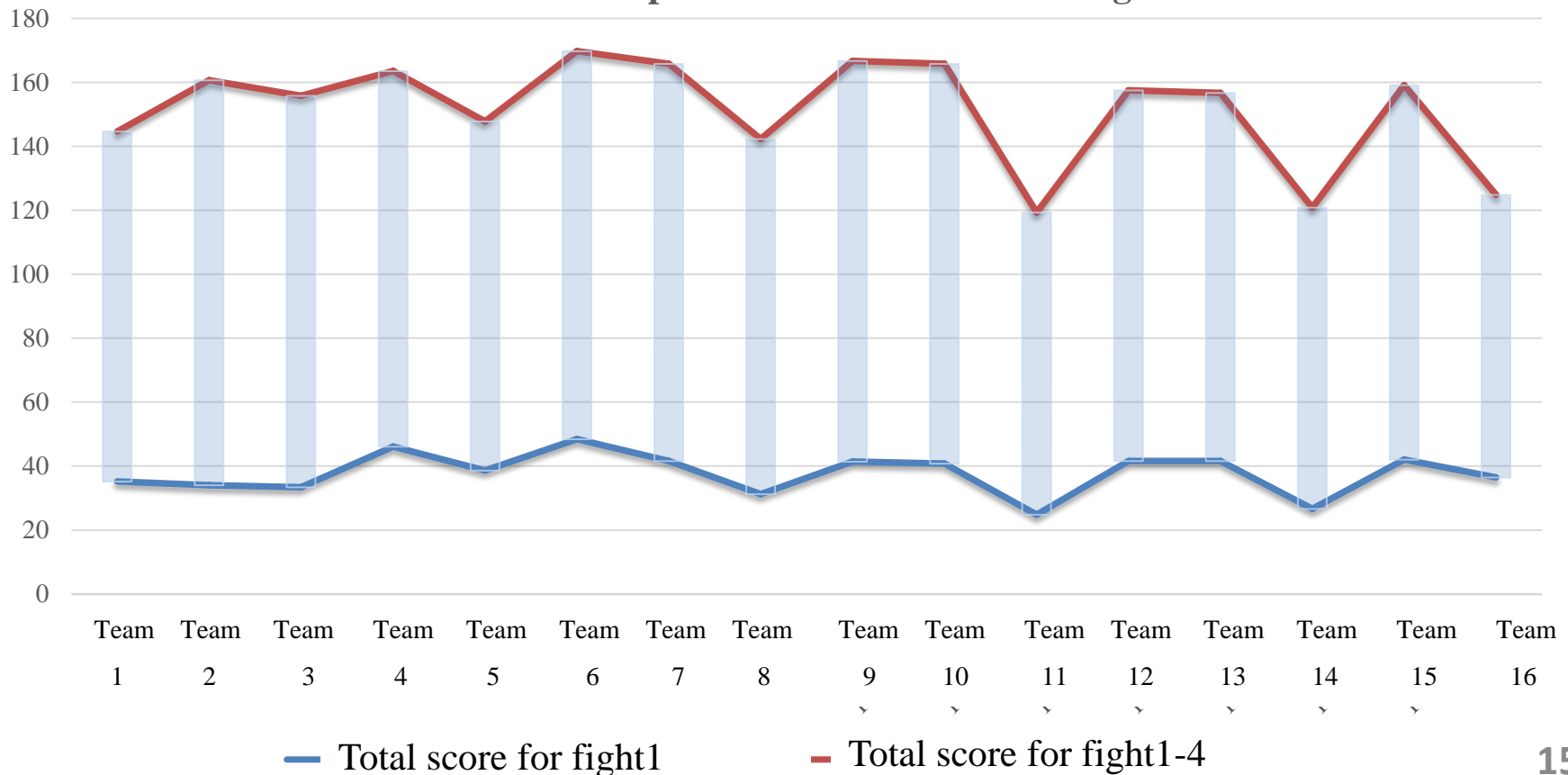


Conclusion: the most objective assessment within one fight might be set in the third phases, when the jury members have their own opinion about all speakers of this fight, so they have an opportunity to influence on the outcome of the fight.

Experimental part. Experiment 4

Aim: to find out the Fight the grades for which influence on the teams` ranking in the table after selective science fights.

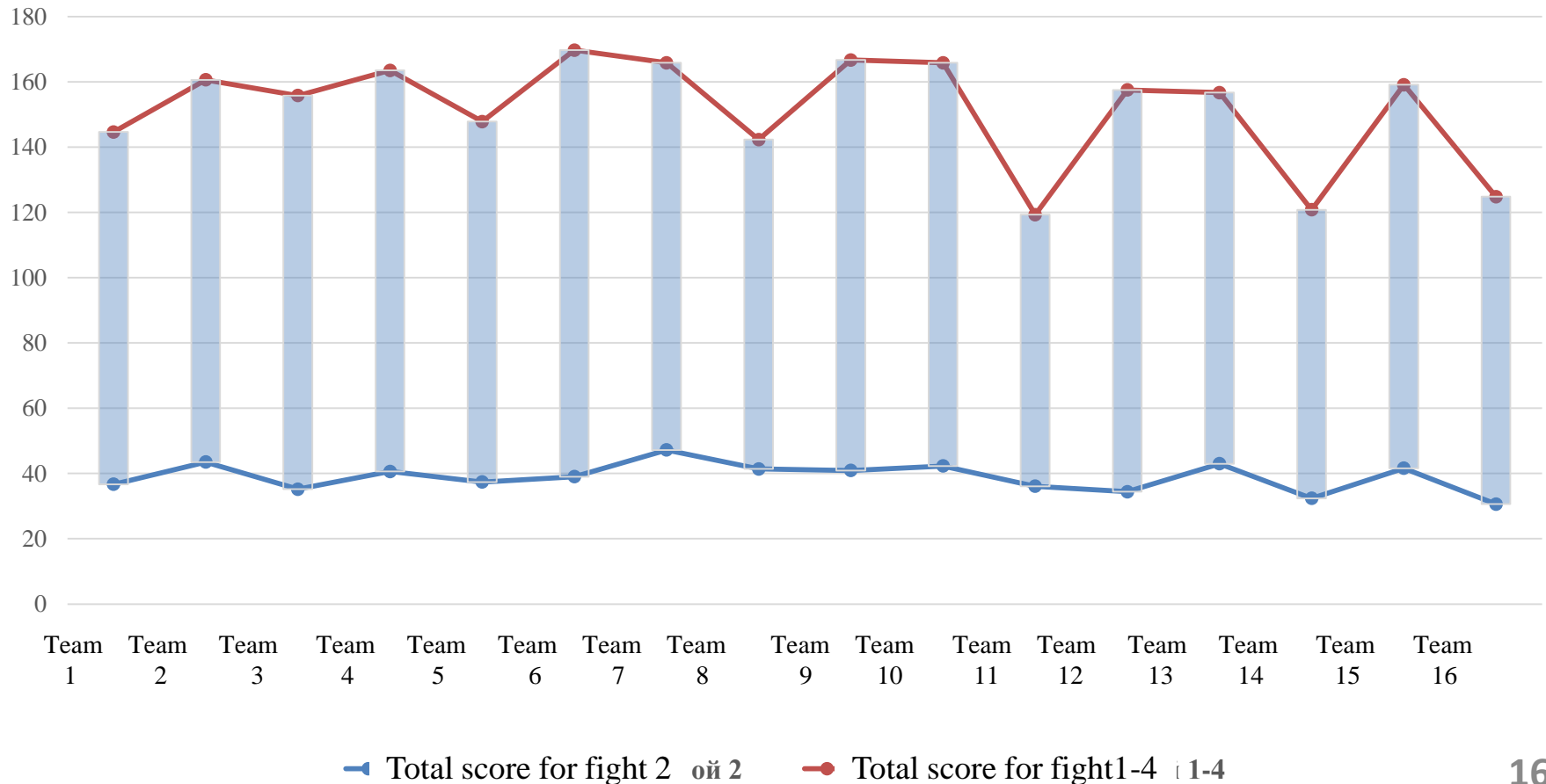
The graph of the sum of points effect for the 1st fight on the total sum of points the selective science fights



Experimental part. Experiment 4

Aim: to find out the Fight the grades for which influence on the teams` ranking in the table after selective science fights.

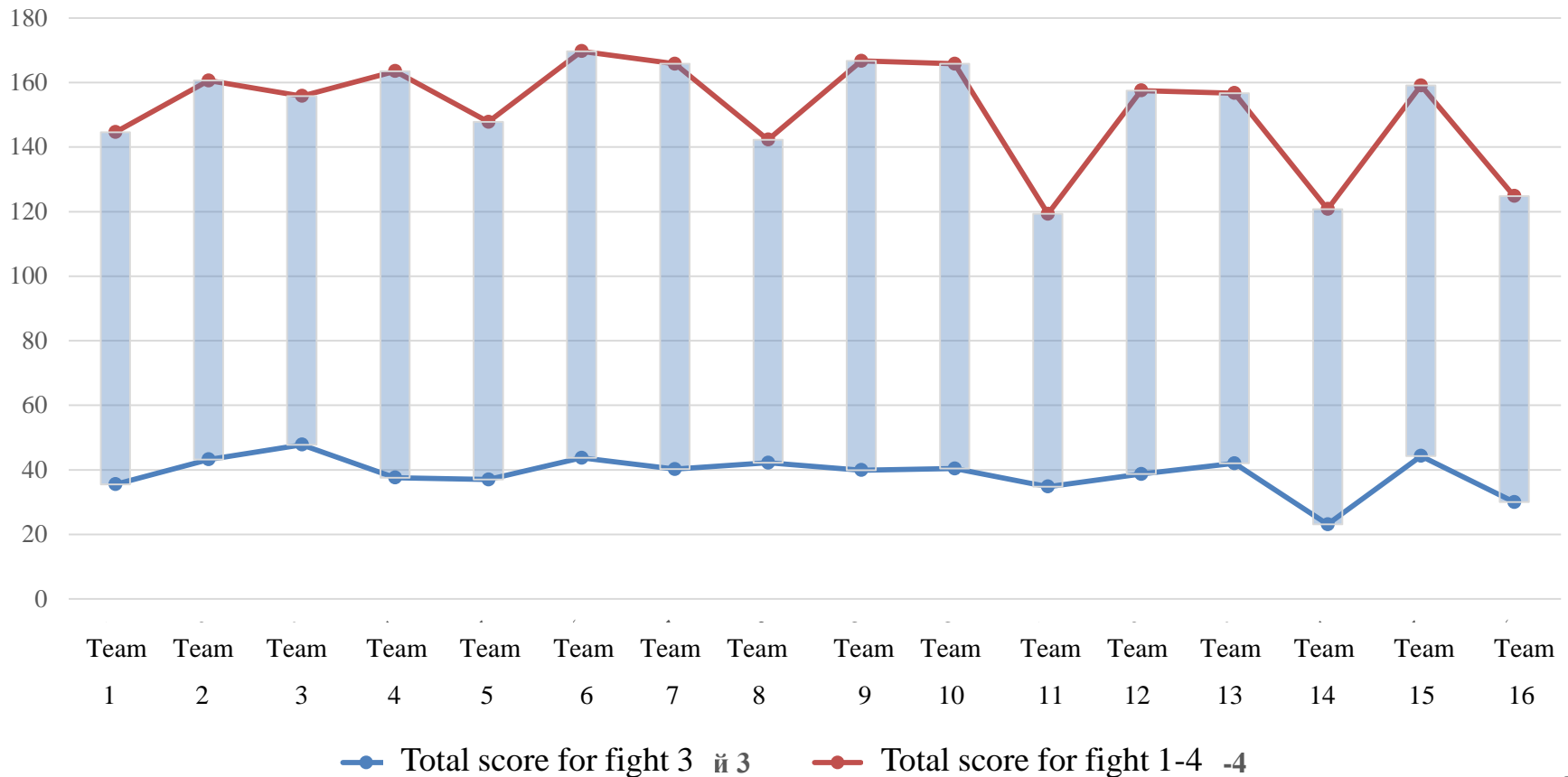
The graph of the sum of points effect for the 2nd fight on the total sum of points the selective science fights



Experimental part. Experiment 4

Aim: to find out the Fight the grades for which influence on the teams` ranking in the table after selective science fights.

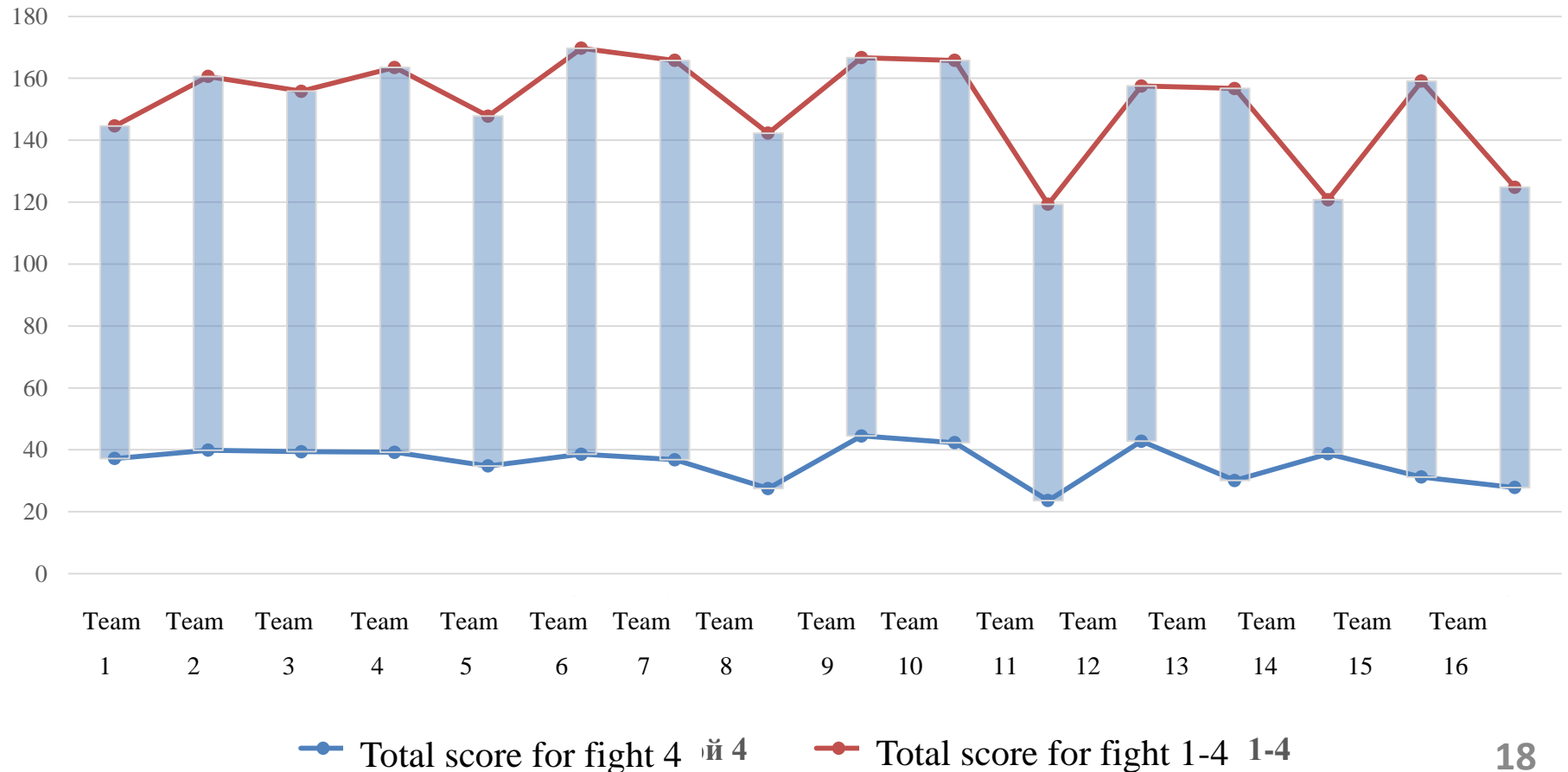
The graph of the sum of points effect for the 3rd fight on the total sum of points the selective science fights



Experimental part. Experiment 4

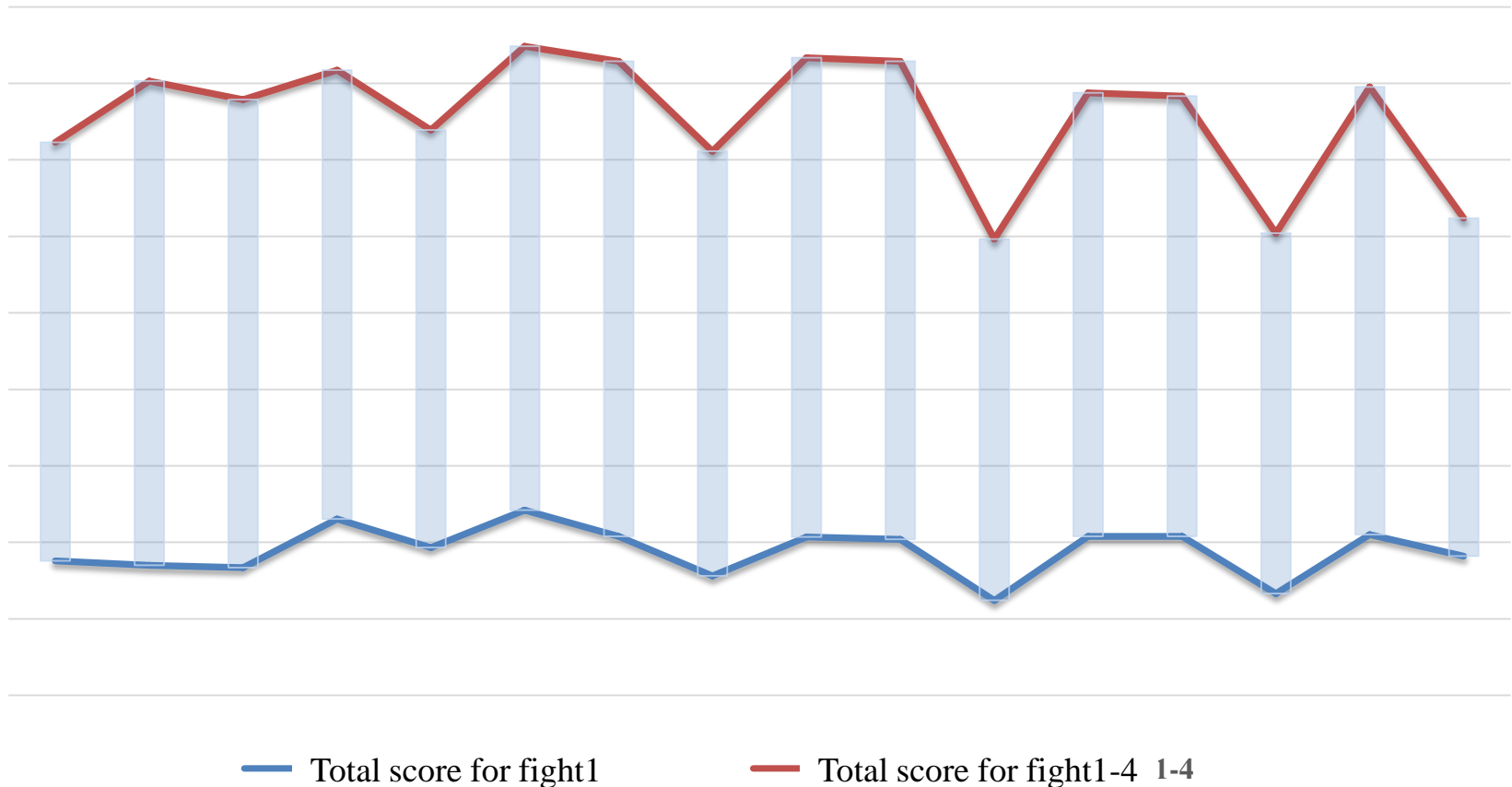
Aim: to find out the Fight the grades for which influence on the teams` ranking in the table after selective science fights.

The graph of the sum of points effect for the 4th fight on the total sum of points the selective science fights



Experimental part. Experiment 4

Conclusion: The curve of average ratings for the first fight coincides with the minimum and maximum with the curve of total ratings for the selective science fight.



Conclusions

1. The total score in the fight directly depends only on the report`s grades.
2. The greatest contribution to the total amount of points for qualifying fights is made by fights No. 2, No. 3; The smallest – during the experimental fight.
3. The most objective assessment within one fight might be set in the third action, when the jury members have their own opinion about all speakers of this fight, so they have an opportunity to influence on the outcome of the fight.
4. The curve of average ratings for the first fight coincides with the minimum and maximum with the curve of total ratings for the selective science fight.

References

1. Gromova N.M., Gromova N.I., Fundamentals of Economic Forecasting, Academy of Natural History, 2006
2. [Http://rynt.org/arhiv](http://rynt.org/arhiv)
3. Sidnyaev N.I., Melnikova Yu.S., Estimates of the statistical parameters of distributions, 2011
4. Collection of problems in mathematics for technical colleges. P.3. Theory of Probability and Mathematical Statistics, ed. A.Efimova - Moscow: Nauka, 1990