# LOGICAL ARGUMENTATION ON THE BASIS OF STATE EXAMINATION COMPOSITIONS

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## Abstract

*The present article discusses students' argumentative skills as reflected in state examination compositions. The study focuses on the question whether students can logically argue in state exam compositions. For the given purpose 1700 state examination compositions from the years 1997, 2004, 2005, 2006 and 2008 were analysed employing as methods T.A. van Dijk's macrostructures and M.Hoey's superstructures, the latter was related to the structure of the argumentative text type.*
*The article discusses the logic of the argumentative text type: the correlation between the third paragraph and the logic of the paragraphs is analyzed, the comparison of the two most frequently used clusters deduced from the cluster analysis are presented with the respective examples of argumentation structures. The main problem of argumentation lies in the perception of the types of argumentation structures: as soon as multiple, coordinative or subordinative argumentation was employed in compositions, the logic of the argumentative structure suffered. During the learning process the specific characteristics of argumentation need to be explained in greater detail. Thus far the Estonian teaching materials have discussed single argumentation, however, mostly neglected the topic of text coherence.*
**Key words:** *mother tongue, discussion skills, argumentation, problem solving.*

## Introduction

Native language teaching has a crucial role in the education system. In determining the educational objectives it is stated in the national curriculum that "general education supports the development of civil society" (Riigi Teataja 2002). School activities form the development of critical thinking, analysis of thought and action, and argumentative discussions. These are the general competences developed in the course of native language classes. It is stated in the list of the native language learning outcomes of secondary school graduates that "the graduate is able to express himself creatively and with respective arguments" (ibidem), thus native language teaching plays an important role in developing argumentative skills.

A text exists in the interaction between the author and the reader. In uttering a statement, the speaker always performs a speech act (Austin 1962; Searle 1969, 1979). The focus on speech acts stresses the manner according to which communication is a form of rational activity. The speech acts at the sentence level are called elementary speech acts, and the speech acts at a higher textual level complex speech acts. Argumentation belongs to the latter category. F. H. van Ee-

meren, R. Grootendorst and F. Snoeck Henkemans (1996, p. 5) define argumentation as follows: „Argumentation is a verbal and social activity of reason aimed at increasing (or decreasing) the acceptability of a controversial standpoint for the listener or reader, by putting forward a constellation of propositions intended to justify (or refute) the standpoint before a rational judge." The mental dialogue in the interaction between the author and the reader develops the self-awareness of the subject through partnership.

The present article studies the logic of state examination composition as an argumentative text type on the basis of the structural principle (ibidem, p. 16). In an argumentative text, the information should be presented in a way that guarantees comprehension and acceptability. The present study firstly focuses on the question if students can argue in an argumentative composition, secondly describes the manner of argumentation, and lastly discusses the reasons for the problems in argumentation. In explaining the results the method of macrostructures by T.A. van Dijk (1980) and the method of superstructures by M. Hoey (1983, 2000) are employed.

## Methodology of Research

The research discussed in the article "Logical argumentation on the basis of state examination compositions" was begun with the analysis of the state examination compositions from 2004, 2005 and 2006, the selection included altogether 1500 state exam compositions. In 2008 the empirical study was expanded in order to discuss the changes over the years since the launch of the state examination composition, and thus altogether 200 state exam compositions from 1997 and 2008 were added to the selection. The selection of the material was based on random sampling. On compiling the selection and on the request of the researcher, the IT-specialist of the National Examination and Qualification Centre considered the sex of the student, the school type, and the grade and topic of the composition.

Based on the research question – Can students argue in state examination compositions? – the present study included the reading of empirical material and analysing the texts. Argumentation was examined with regard to the whole of the text, then the number of students able to argue in the third paragraph of the composition was established, and based on the results clusters were compiled. After determining the argumentation in the third paragraph, also the reasoning in other paragraphs came to be studied comparatively with the emphasis of establishing the reasons for the problem: why cannot students argue?

The quantitative data presented in the article have been calculated with the programme SPSS 14, 0. SPSS (Statistical Package for Social Sciences) for Windows is a data processing system allowing the statistical processing of data (Foster, 1993; Niglas, 2004). In the present article the logical argumentation in the third paragraph (values 0-1) and paragraphs (values 0-2) of each composition of the selection were analysed.

The article studies the strength of statistic dependence between the logic of the third paragraph and that of the other paragraphs in the selection. The results were encoded according to the quantitative variable (based on the third paragraph 0 – no occurrence, 1 – occurs; based on the logic of paragraphs 0 – no occurrence, 1 – occurs sometimes, 2 – occurs often). The term 'correlation' was first employed in the 19th century by the English anthropologist F.Galton in order to characterise the objective general connection between data rows or variables that may be described with the theory of probability (Roomets, 2003, p. 54). The indicator of the relation between variables is the correlation coefficient. The article explains the connection between indicators in pairs. In evaluating the strength of the relation Spearman's correlation coefficient was employed (Roomets, 2003; Niglas, 2004; Tooding, 2007) in which the occurrence of the quantitative variables of the elements is characterised by ranks and the concurrence of the ranks of variables are studied.

In case of the indicators of the third paragraph of the compositions of the selection, a cluster analysis was conducted by which the compositions were grouped according to the similarities. As a result of the cluster analysis a typology based on the data was achieved i.e. groups of objects with similar results (Kees, 1984). In the cluster analysis conducted the structure of argumentation is connected with the problem solving aspect. The implementation of the macro structures by Teun

Adrian van Dijk, problem solving and argumentative text type by Michel Hoey is described in M. Kaldjärv's article „The Quality of Argumentation in the Students´ State Exam Compositions in 2006 from the Socio-Cognitive Point of View"(Kaldjärv, 2008, p. 54-55). In the present study argumentation has been analysed both on the micro level in the third paragraph, which forms the basis of the cluster analysis of the research, and on the general macro level.

The present article concentrates on the two most widely used problem solving types (2. category: situation – problem – response (SPR) and 8. category: situation – problem – response – evaluation (SPRE)). The analysis of the argumentation logic is based on „Fundamentals of Argumentation Theory" by F. van Eemeren, R. Grootendorst, F. S. Henkemans describing the types of argumentation structures: singel, multiple, coordinative and subordinative argumentation (1996, p. 16-19). Argumentation for or against a standpoint can be simple, but it may display more complex argumentation structure, depending on how the arguer organizes the defense of the standpoint in view of doubts and criticisms (ibidem, p. 16). Representing the argumentation structure scematically is described in "Argumentation. Analysis, Evaluation, Presentation" (Eemeren, Grootendorst, Snoeck Henkemans, 2002, p. 68-72). In the article examples are given of the implementation of complex argumentation and it is explained why the argumentation of the paragraph is not logical.

## Results of Research

On the basis of the categorical indicators of the percentage distribution it may be stated that only 24, 8% of the students can argue in the third paragraph of the composition, whereas 75, 2% of the students cannot. Argumentation lacks in the paragraphs of 33,7% of the students, whereas argumentation occurs occasionally, i.e. in less than half of the paragraphs, in case of 63,2% of the students, and argumentation occurs often, i.e. in more than half of the paragraphs, in case of 3,1% of the students of the selection (Table 1).

**Table 1.    Percentage distribution in 1997-2008.**

|  | Argumentattion in the 3rd paragraph | | Argumentation in the paragraphs | |
| --- | --- | --- | --- | --- |
|  | **N** | **%** | **N** | **%** |
| No occurrence | 1278 | 75,2 | 573 | 33,7 |
| Occurs | 422 | 24,8 | 1074 | 63,2 |
| Occurs often |  |  | 53 | 3,1 |

Spearman correlation has no prerequisites for the distribution of the variables, it is tested whether the ranks of the values of the two variables are mutually more connected than in case of random coincidence. r marks the strength of the relation (r=, 460), p marks the significance (p=, 000). The logic of the third paragraph and that of the paragraphs are in proportional dependence where there is no strong correlation, however, it is still statistically relevant (Table 2). The logic of the third paragraph and the logic of paragraphs are proportionally dependent on the correlative relation.

**Table 2.**  **The logic of the third paragraph and logic of paragraphs according to non-parametric correlation.**

| Correlations | | | | |
|---|---|---|---|---|
| | | | Logic of the third paragraph | Logic of the para-graphs |
| Spearman's rho | Logic of the third paragraph | Correlation Coefficient | 1,000 | ,460(**) |
| | | Sig. (2-tailed) | . | ,000 |
| | | N | 1700 | 1700 |
| | Logic of the para-graphs | Correlation Coefficient | ,460(**) | 1,000 |
| | | Sig. (2-tailed) | ,000 | . |
| | | N | 1700 | 1700 |

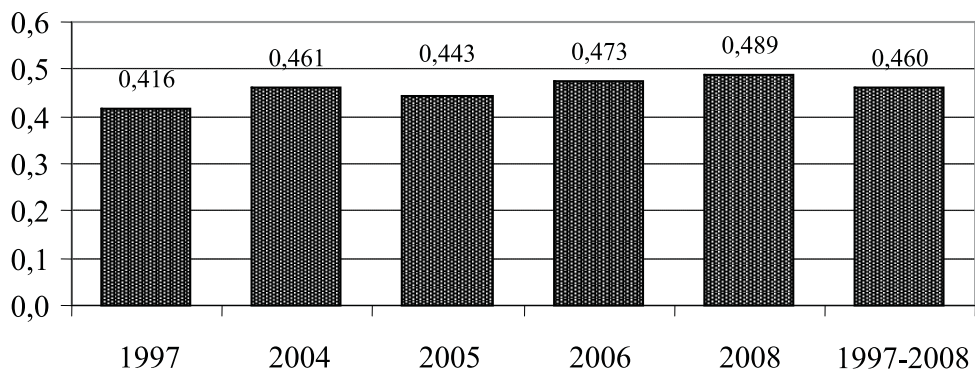** Correlation is significant at the 0.01 level (2-tailed).



**Figure 1.**  **Spearman's correlation between the logic of the third paragraph and the logic of paragraphs.**

Based on the rank correlation in Figure 1 it may be concluded that the correlative relation is the strongest in 2008 (0,489), i.e. compared to the results from other years the logical argumentation skills of the students are better. The weakest results in argumentative skills are from 1997 (0,416), the difference between indicators is small, however all the results are statistically relevant, non-significance p=0,000. Results shows at first that if the student does not argue in the third paragraph, he does not argue in other paragraphs and if he argues in third paragraph, he will argue in others. If the student knows how to use argumentation structure, he uses the method purposely. But the argumentation may also be occasional element and the student uses different strategies of the text. It is revealed in the Figure 1 that the correlative relations between the third paragraph argumentation and the argumentation in the whole text during the 1997-2008 are stronger (0,460): argumentation in the third paragraph and in the other paragraphs have improved over the years.

In determining the research results data cluster analysis is employed which is based on a very simple algorithm: the most similar objects are gradually put together. Situation + problem + response + evaluation (SPRE) is a complete category in which argumentation is genuinely a process of supporting or rebutting arguments and opinions. The most widely used clusters in state examination compositions are the second (SPR) and the eighth (SPRE) (Table 3). The eighth cluster is based on logical argumentation: the situation is described by a statement which is followed by the explanation of the problem, then evidence or arguments are presented in the form of a solution process, and the argumentation is completed with a conclusion that presents an evaluation.

It is revealed in the research results of the selection that in 1997-2008 472 students could logically argue, the largest group being formed by the SPR cluster, which means that students cannot

make conclusions or generalisations. It could be seen in Table 3 and Figure 2 that the second cluster has proportionally diminished over the years (40% in 2004, 37% in 2006), when comparing the results from 1997 and 2008 the decrease is similarly evident. The eighth cluster has increased when comparing 2004 and 2006 (23% and 31, 2% respectively). It may be concluded from the results that the argumentative skills have somewhat improved, however, the proportional results over the years reveal that the logical argumentative skills (SPRE-structure) are poor (Figure 2).

**Table 3.    Clusters based on the third paragraph 1997-2008.**

| Cluster Number of Case | Category | Year | | | | | Count |
|---|---|---|---|---|---|---|---|
| | | 1997 | 2004 | 2005 | 2006 | 2008 | |
| 1 | SPE | 0 | 0 | 1 | 3 | 5 | 26 |
| 2 | SPR | 46 | 40 | 41 | 39 | 37 | 681 |
| 3 | SP | 16 | 15 | 11 | 11 | 13 | 213 |
| 4 | R | 4 | 4 | 3 | 5 | 4 | 65 |
| 5 | SR | 1 | 5 | 4 | 1 | 5 | 57 |
| 6 | S | 2 | 3 | 1 | 3 | 1 | 38 |
| 7 | SRE | 0 | 4 | 2 | 0 | 4 | 33 |
| 8 | SPRE | 22 | 23 | 32 | 31 | 21 | 472 |
| 9 | RE | 9 | 7 | 6 | 2 | 9 | 88 |
| 10 | PR | 0 | 0 | 0 | 5 | 1 | 27 |
| | | | | | | | 1700 |



⊞ SPE   ⊡ SPR   ☐ SP   ▨ R   ▨ SR   ⊠ S   ⊟ SRE   ▨ SPRE   ⊡ RE   ▨ PR
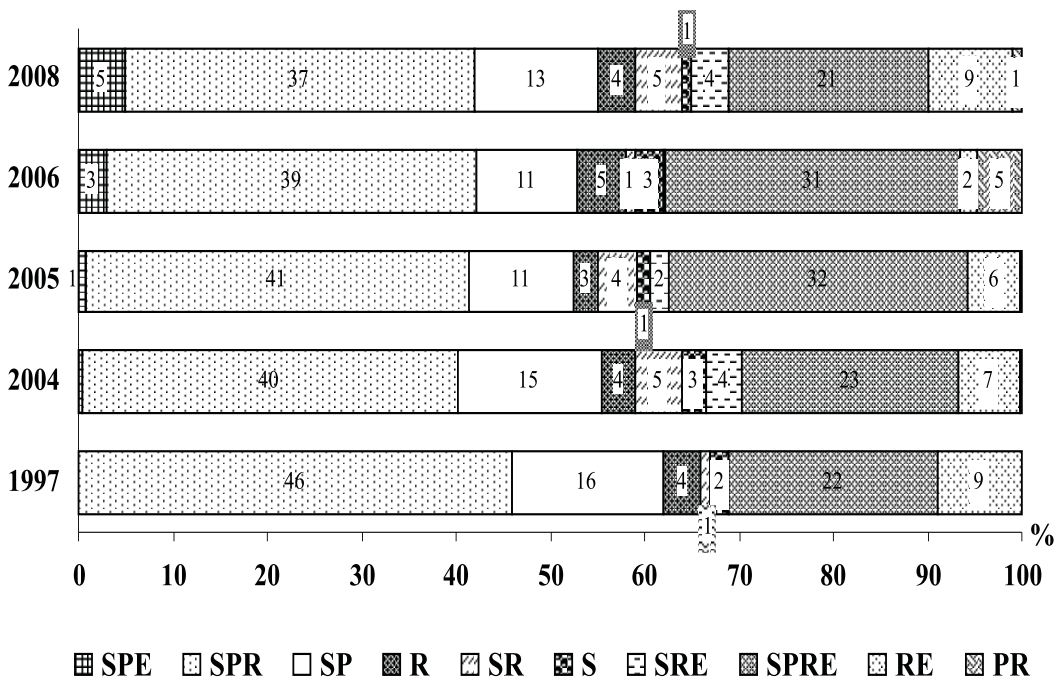
**Figure 2.    Clusters over the years 1997-2008.**

The division into clusters according to the school types in 1997-2008 is analogous: the dominant groups are the second and the eighth. The second cluster (SPR) was employed by 39, 4% of the secondary school students, 44, 8% of vocational school students and 42, 3% of adult secondary school students. The eighth cluster (SPRE) was respectively employed by 30, 3% of the secondary school students, 9, 5% of vocational school students and 19, 4% of adult secondary school students. As the process of justification is essential for an argumentative text type, it is important to focus on the conclusion inferred from the statement and reasons. It is thus necessary to stress the problem solving aspect of the argumentative text type.

Assuming that the logical structure of argumentation yields better marks from the evaluators of state exam compositions, the analysis of the average results reveals somewhat surprising data (Figure 3). The highest scores are awarded to situation – response – evaluation SRE (64,2p), followed by situation - problem - evaluation SPE (62,6p), SPRE (58,7p). Thus the eighth cluster only comes in third place and the second cluster (SPR) in sixth place (52,4p). It would not be right to presume that the whole composition is written according to one cluster type. However, based on the present research results may state that the selection featured all superstructure combinations and these varied even within one composition. Student consciously employ only SPRE-category, however, there are only very few students who compose the whole text according to it.
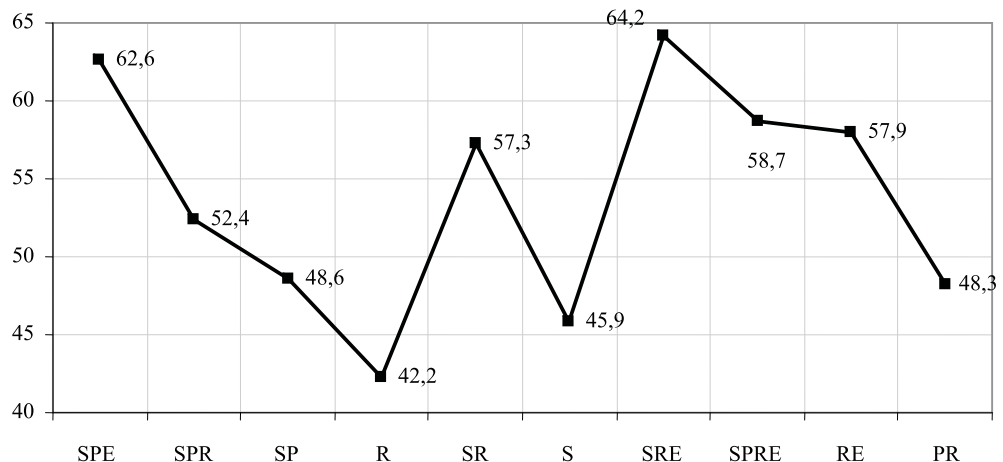


**Figure 3.     Average results according to clusters 1997-2008.**

It may be concluded from the research results that the largest cluster is formed by the SPR combination, although generalisation plays an important role in argumentation. The implementation of logical argumentation is not supported by the abundance of argumentation structure types: the coherence of the paragraph is often disrupted by the use of multiple, coordinative or subordinative argumentation instead of single argumentation. The text exists as part of the interaction between the writer and the reader and thus it must be sufficiently homogenous, i.e. coherent. Coherence marks the deep structure relations, the network of relations between concepts and meanings. The logical argumentation structure sustains the text's consistency of thought and allows to create coherence.

The following is an example is an example of the SPR combination structure (Table 4), the composition entitled "Self-Actualisation and its Price" was written in 2006 (code 565014).

**Table 4.     SPR-combination.**

| |
|---|
| 3 |
| The more one has power, the worse the consequences. |
| 3.1 |
| History with all its wars and battles has been a witness that as soon as one person has too much power, the consequences may be disastrous. |

| 3.1.1 | 3.1.2 |
|---|---|
| Both First and Second World War put an end to millions of lives, robbing innocent people of homes and families. | It is also evident today that some heads of state seem to think that they are allowed to do more than others, justifying their deeds with the defence of their country or world peace. |
| 3.1.1.1 | 3.1.2.1 |
| And all this took place only because one head of state wanted to show his power and become the leader of the world. | How can this be called goodness if it brings about the loss of innocent lives. |
| 3.1.1.1.1 | 3.1.2.1.1 |
| Quoting Joseph Stalin,"The death of one is a tragedy, the death of millions is a statistic", it may be presumed that he cared for nothing else but the realisation of his own plans and the domination of the Aryan race. | It sometimes seems that George Bush considers himself a super-man by doing things that others do not approve of. |
| | 3.1.2.1.1.1 |
| | The beginning of the war in Iraq was only based on the assumption that they have nuclear weapons, not on firm evidence. |
| | 3.1.2.1.1.1.1 |
| | As armed forces were brought into the country, the Iraqi people were naturally ready to defend their country. |
| | 3.1.2.1.1.1.1.1 |
| | Endless turmoil of war was begun where neither of the sides wanted to surrender. |
| | 3.1.2.1.1.1.1.1.1 |
| | All this, for what purpose? |
| | 3.1.2.1.1.1.1.1.1.1 |
| | Only to show and reinforce the supremacy of the United States in the world. |

The student employs multiple argumentation to give proof of the statement in the third paragraph, presents two explicit arguments, however, does not give the argument that is referred to in sentence 3.1.1. (First World War). The first argument is generalised in sentence 3.1.1.1. and the second argument 3.1.2. from the present context. The paragraph is finished by the generalisation of the second argument, however, the student cannot connect the two different arguments with one another, and thus in terms of structure, the third paragraph actually resembles simple argumentation. In case of multiple argumentation the arguments must support the same statement. If two or more arguments are placed in the same paragraph, it would be more logical to present the generalisation based on both.

The example of the structure of SPRE-combination (Table 5) is written on the topic "To be like everyone else or to remain oneself?" in 2008 (code 782026) and it includes the fifth paragraph of the composition.

**Table 5.    SPRE-combination.**

| 5 | | |
|---|---|---|
| One must often make choices in life. | | |
| 5.1 | | |
| Many of the choices will determine the person's fate and future. | | |
| 5.1.1 | | |
| There are both disappointments and happy moments. | | |
| 5.2 | | |
| The novel by Tammsaare „Kõrboja peremees"tells the story of Katku Villu's life and his difficult relationships with women. | | |
| 5.2a | 5.2b | 5.2c |
| Anna wanted Villu to become the master of the Kõrboja farmstead, however, the latter refused the offer. | He had made his choice in favour of Eevi and their child. | His final choice was suicide. |
| 5.2a-1 | | |

| | | | |
|---|---|---|---|
| The man was crippled and he did not want to live in Kõrboja farm as an invalid. | | | |

| | |
|---|---|
| 5.2a-1, 5.2b – joins the arguments | |
| After the proposal by Anna, Villu was confused and could not make a firm judgement. | |

| |
|---|
| 5.3 |
| People often let themselves be influenced by what their loved ones think or believe. |

| |
|---|
| 5.3.1 |
| The final decision needs to be made independently and it often requires the rejection of many good opportunities. |

It may be concluded from the above composition that all the components of coordinative argumentation were indeed employed: statement (5) describing the situation; explanation revealing the problem (5.1., 5.1.1.), sentence 5.2. presenting the argument which refers to the coordinative connection as all examples (5.2.a, 5.2.b and 5.2.c) are related to Villu's choice. If the first two arguments are closely connected with one another and a generalisation is presented, then sentence 5.2.c is not fully developed, i.e. the student does not explain the reason for Villu's third option. In the conclusion providing an evaluative generalisation (1.3), the author of the composition criticises the strong pressure by others, however, does not specify that the third option was chosen by the character himself. The given example shows that even in SPRE combination there are complex connections in a paragraph containing several arguments.

It may be difficult for the reader to understand the argumentation that lacks some of the components. The argumentative composition is a problem text and according to Hoey's problem solving treatment, the problem component is mandatory. In the following composition written in 2004 and entitled "Literature is a journey to find the truth" (code 420048), there is a multiple argumentation that lacks the problem and the generalising conclusion or evaluation (Table 6).

**Table 6.    SR-combination.**

| 3 | | | |
|---|---|---|---|
| Also educated people can be "small" people. | | | |
| 3.1 | 3.2 | 3.3 | 3.4 |
| Chekhov has written: "I am writing about a schoolteacher, an atheist who adores Darwin and is committed to battling the prejudices and superstitions of the people. However, she boils a black cat in a cauldron so as to get a wishbone for attracting men." | Also Jack London's novel "Martin Eden" could be mention, which tells the story of a sailor who wishes to belong to the educated class. | Chekhov has written a story entitled "Ionitch". | When I was younger, I often changed my attitude and speech manners when meeting new people. |
| | 3.2.1 | 3.3.1 | 3.4.1 |
| | He does achieve it, however, also understands that scholars are like any other people, if not even worse. | It tells the story of a highly educated doctor who moves into a town the citizens of which he despises. | It was due to fear of rejection or ridicule. |
| | | 3.3.1.1 | 3.4.1.1 |
| | | He does not like the people, however, in the course of time becomes similar to them. | Now I have new friends who take me as I am and I do not have to act with them. |
| | | | 3.4.1.1.1 |
| | | | I could not care less about what my old friends think of me. |

It is revealed in the given multiple argumentation example above that there is a statement (3), however, there is no explanation of the problem. The student adds four arguments: there is no justification for 3.1.; evaluations are given with the arguments of 3.2. and 3.3.; the argument of 3.4. is not closely connected with the statement. The paragraph does not contain a generalised evaluation. The paragraph homogeneity or coherence is problematic in the given text example, however, also in other clusters (Table 3) where the structure does not comply with the superstructure category.

## Discussion

It was revealed in the course of the research that only a small proportion of students can successfully manage logical argumentation. In the conducted cluster analysis the structure of argumentation was connected with the problem solving aspect where the problem component is mandatory. Although as a result of the cluster analysis a specific typology was established – the most widely used clusters in state exam compositions being the second (SPR) and the eighth (SPRE) – it is not all. The optimum number of clusters is ten, among the given variation there are no problems in five clusters. In the course of the study it was revealed that there are more clusters, which, however, are not based on the basic structure of argumentation that relies on the logical process of justification. The structure of argumentation is disordered in the paragraphs of the composition, often certain important components are missing. Elementary speech acts are not typical of argumentative texts. Complex speech acts based on the construction of the text would allow a more efficient implementation of an argumentative text type.

The present article was concerned with the study of logical argumentation where the determination of clusters relied on the statistical possibilities based on argumentative text type. In examining the development it is evident that the SPR-combination is decreasing and the SPRE-combination gradually increasing. According to Spearman's correlation may state that the SPRE-combination characterising the argumentative text type and problem-solving structure has increased when comparing the selection from different years. Based on the statistical data analysis of the state exam compositions of the selection, may state that the argumentation in the third paragraph and in the whole text are connected stronger (Figure 1), whereas the number of other clusters has not decreased. In addition it was revealed in the analysis of the argumentation structure based on the clusters that it is highly important to teach the single, multiple, coordinative and subordinative argumentation together with the paragraph structure, and similarly also give specific textual examples explaining the concept of homogeneity on the paragraph level. If the students use various arguments in the argumentation, it is difficult to use single argumentation. Single argumentation as the basic structure of argumentation does not allow adequate connection of several arguments. In order to arrive at a reasonable evaluation of the argumentation its structure must be carefully identified: Is it single, multiple, coordinative, or subordinative, or even more complex (Eemeren, Grootendorst, Snoeck Henkemans, 2002, p. 73)? The given explanations would help the students to understand the construction of an argumentative text.

The occurrence of numerous clusters suggests problems with regards to text coherence. In order to show their erudition and reading, the students refer to more than one argument in a paragraph, however, cannot join the argument logically or develop continuously into a conclusion. By using single argumentation, students often forget to express the conclusion, and multiple, coordinative and subordinative argumentation are characterised by the lack of connection between the arguments. Homogenously connected complex speech acts guarantee the clarity of the paragraph structure, similarly the whole text will be more comprehensible. The present article was concerned with the argumentation structure in state examination compositions. The results of the research explain how the students argue and why problems occur in the process of discussion. The article additionally makes a suggestion how to teach argumentation in argumentative composition writing courses, given training sessions are already being conducted in The Open University Centre for Continuing Education of Tallinn University.

In everyday communication people discuss according to a reduced scheme. In an enthymeme, i.e. the reduced syllogism, some parts are omitted. According to Aristotle, an enthymeme is imperfect in expression, however, completely comprehensible in human mind. If in oral communication there

is the possibility to specify the argumentation with complementary questions, then the discussion represented in the state examination compositions takes place in the writer's mind. The more logically the student follows the structure of argumentation in the composition, the more comprehensible is the text to the reader.

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