

COMMUNICATIONS

4

Vlasta Cabanova

**SOCIAL ATTITUDES AND VALUES
OF YOUNG PEOPLE IN THE CONTEXT
OF MULTICULTURAL EDUCATION**

9

Katarina Mackova

**FORMATION OF PERSONAL
CAPABILITIES IN THE UNDERGRADUATE
TEACHER TRAINING**

15

Jarmila Zacharova

**THE CZECH - SLOVAK RELATIONSHIPS
IN THE SCHOOL POLICY IN THE YEARS
OF 1918-1939 AND THE PERSONNEL
ISSUE**

20

Adrian Kacian

POTESTAS GLADII IN JESUS' TRIAL

25

Michal Valco - Katarina Valcova

**THE EPISTEMOLOGICAL CHALLENGE
OF KIERKEGAARD'S TRUTH
IS SUBJECTIVITY PRINCIPLE**

29

Marta Lackova - Eva Lelakova

**INTERLINGUAL HOMONYMS
OF POLYSEMIC ORIGIN IN RELATED
LANGUAGES**

36

Michaela Bakay Zahorska - Zdena Kralova
Helen Naine Cincebeaux

**THE HISTORICAL BACKGROUND
OF THE SLOVAK PRESS IN THE USA**

41

Jana Birova

**LESSON EFFECTIVENESS, STRONG
AND WEAK SIDES OF THE INITIAL
IMPLEMENTATION OF THE INTEGRATED
LANGUAGE APPROACH**

46

Marek Hampl

**THE SYSTEM OF TRANSITIVITY
IN THE WAR ON TERROR DISCOURSE**

52

Pavel Urban

**COMMUNICATION FROM
THE EXPRESSION QUALITIES SYSTEM
PERSPECTIVE**

56

Jan Zavodny Pospisil - Lucie Sara Zavodna

**RISKS AND THREATS OF SOCIAL
NETWORKS COMMUNICATION**

60

Ludovit Tomanek - Anna Tomankova

**GROUPS WITH THE INFINITE
NON-QUASICENTRAL NODAL SUBGROUP**

65

Michaela Holesova

**MONOMIAL CURVES IN AFINNE SPACE
AND THEIR ASSOCIATED PRIME IDEALS
WITH SIX GENERATORS
AS SET-THEORETIC COMPLETE
INTERSECTIONS**

69

Maria Kudelcikova

**EXISTENCE OF POSITIVE SOLUTIONS
OF A NONLINEAR DIFFERENTIAL
EQUATION WITH n DELAYS**

COMMUNICATIONS

74

Lydia Kontrova

**MIND MAPPING AS EFFICIENT TOOLS
IN MATHEMATICS EDUCATION**

79

Darina Stachova

**NON-LINEAR MAPPINGS
AND THEIR APPLICATIONS**

86

Alzbeta Kucharcikova

**THE IMPORTANCE OF IDENTIFICATION
AND ANALYSIS OF EDUCATIONAL NEEDS
FOR INVESTMENT IN HUMAN CAPITAL**

93

Josef Vodak - Jakub Soviar - Viliam Lendel

**IDENTIFICATION OF THE MAIN ASPECTS
OF COOPERATION MANAGEMENT
AND THE PROBLEMS ARISING FROM
THEIR MISUNDERSTANDING**

102

Tomas Bakalar - Magdalena Razusova

Henrieta Pavolova - Barbara Hlavnova

**USE OF ACTIVE AND PASSIVE VERB
FORMS IN PAPERS FROM THE FIELD
OF CHEMICAL ENGINEERING**

109

Elena Junova

**PUBLIC INTERACTION OF WEB
SELF-PRESENTATION**

114

Pawel Drozdziel - Leszek Krzywonos

Radovan Madlenak - Iwona Rybicka

**SELECTED ASPECTS OF ANALYSES
OF FAILURE RATES OF ACTIVE SAFETY
SYSTEMS IN BUSES**

120

Radovan Madlenak - Lucia Madlenakova - Jana Strbova

Jozef Stefunko

LOGO CREATION ALGORITHM



Dear Readers,

I am delighted to write a few words of introduction to this issue of Communications - Scientific Letters of the University of Zilina focused on Humanities and Social Sciences. This journal aims to provide readers world-wide with high quality peer-reviewed scholarly articles on a wide variety of issues within the institutional tendency of the University of Zilina to integrate arts, humanities and sciences.

Research is a particular way of asking questions - sometimes hard questions. There are many challenges - identifying suitable questions and capturing the complexity of intra- and interdisciplinary interactions. The papers in this unique collection represent research findings of several dedicated scientists. I am very pleased to present them, and trust that you will find them informative and helpful in your work.

There is clearly an upsurge of interest in science and research in the field of Humanities and Social Sciences and I believe we can all benefit from thinking and dialogue in this issue. I thank the authors for entrusting Communications - Scientific Letters of the University of Zilina with their work and I hope that they will be rewarded with the attention of scholars around the world.

Zdena Kralova

Vlasta Cabanova *

SOCIAL ATTITUDES AND VALUES OF YOUNG PEOPLE IN THE CONTEXT OF MULTICULTURAL EDUCATION

As a result of globalisation, more situations where pupils meet other cultures arise. Fears of unknown and also other factors contribute to the refusal of being alternate, which is expressed, in terms of human behaviour, in the form of prejudices. Educational effect of pedagogues should help eliminate these barriers among children.

Keywords: Other cultures, foreigners, attitude, prejudice, stereotypes, relationships, hostility, animosity, exclusion, inclusion, pedagogue, education, interview, argumentation, empathy, acceptance, tolerance, prosociality.

1. Introduction

This paper concentrates on the analysis of unfriendly, even aggressive behaviour in Slovak society, especially with regard to young people; it analyses how their attitudes are adopted and maintained and special attention is paid to the growth of a social prejudice and stereotypes and its potential rectification through teaching the young tolerance, altruism and giving them unprejudiced upbringing.

2. Social attitudes and values as a result of social environment

The term attitude is found in a variety of scientific disciplines and Vrost [1] explores its explanation force. Attitudes can be defined from various points of view; most frequently as *readiness* for a certain action [2], which is directly connected with a *decision act*. Afterwards, a *concrete action* in a *concrete situation* follows [3]. Matsumoto [4] understands attitude as a *reflection of evaluation* of objects which occur in terms of passing thoughts or memory of an individual. The content of attitudes is determined by an individual experience of a person, social environment, but also media, social climate and public opinion. I. Ajzen and M. Fishbein [1] have attempted to explain the relationship between attitudes and behaviours (see Fig. 1):

Fishbein and Ajzen define the term attitude as emotional attraction or repulsiveness of an object for a particular person; they understand that this term represents the part of a structure which was understood as an affective part and which is closely connected with beliefs. The Fishbein and Ajzen concepts demonstrate

a prevailing tendency in the field of current attitudinal research [1] with regard to noncognitive domain of personality (see Table 1). The valence of an individual or group attitude is reflected in the quality (intensity, interaction frequency) of relation; their objective diagnosis has a crucial importance for the efficacy of educational and reeducational intervention.

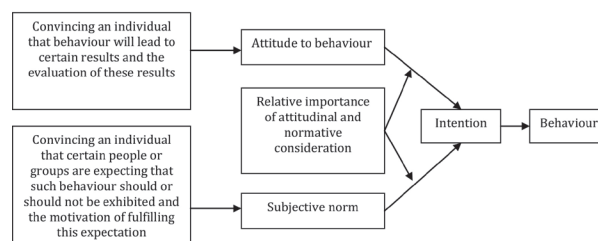


Fig. 1 Link between attitudes and behaviours [1]

A rudimentary base of attitudes is represented by a transgeneration transfer of values through the way of life in a family (for more information, see Napora) [6]. Gradually, the evaluation orientation is becoming not only a reflection of a family [7], but also the reflection of various social communities in an environment where young people can be found. Apart from this, the value system is influenced by a social origin and partial sources of stratification (education, employment, material status) as well as life style, interests (more at www.uski.sk) which determine a rather stable structure demonstrated by *system of preferences* in the forms of value scales. The scales are becoming more and more stable, but they undergo changes due to a consequent cognition and important life events. Maturation is typical for a rapid development of attitudes which affect

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Source sphere of attitudes in the socioaffective domain of personality [5]

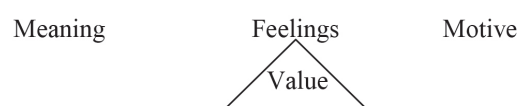
Table 1

Domain	Cognitive domain The most developed sphere of school education	Noncognitive domain of personality	
		2. socioaffective (domain neglected by school)	3. psychomotoric (domain neglected by school)
Representing	Brain and IQ	Feelings and EQ	motoric activity, sensory activity
Is realized in a product	Consciousness, containing information and procedures, understanding terminology, argumentation	<i>Attitudes, preferences and values, character, feelings and will - gaining experiences, attitudes, interpersonal relationships, gradual interiorisation of sociocultural values and norms</i>	skills and habits
Processes of education	LEVEL OF EDUCATION	LEVEL OF UPBRINGING	LEVEL OF TRAINING

nearly all spheres of life – work, learning process, having fun or interpersonal relations. M. Nakonecny [8] defines it as *adopting attitudes on one's own and for oneself*. Apart from this, adolescents are typical for their *high variability* of value preferences, which also prevails in the stage of late adolescence. Gradually, however, it is more and more stable and the importance of values regarding partner relationships and family life is growing. With regard to the values of an individual, not only features of their school institution conditions are reflected, but also the ideal profile of schools is mirrored [9]. Education which is realized in terms of traditionally organized conditions of school institutions creates only few opportunities for reflexive pedagogical situations where learners would have a chance to express their opinions, attitudes and preferences. The lack of opportunities for a closer examination of a learner's personality in an environment which contains too many tasks shows a serious deficit of a pedagogical work.

In the process of adaptation to broader societal conditions, the process itself is at first determined by a family environment; later it is also formed by an individual experience, but also by attitudes and opinions of peers, friends and idols which may display no attitudes or opinions. In this period, their lateral attitudes and opinions are expressed in the form of positive or negative contents that reflect only their momentary basic cognitive orientation and their scale of values [2]. The transparency of attitudes leads to an early detection of prejudices and other negative attitudes. The development of the value orientation depends on important life changes of adolescents (e. g. transition to university, leaving the family, partner relationship) – these may cause the changes in life philosophy and in the value orientation. The significance of family value in later adolescence is, in general, again increasing: *“adolescents consider their parents to be the most influential people in their lives; they rely on their guidance with regard to solving important life questions, moral choices and setting meaningful goals. By passing their system of values on to children, the parents help them fit into society and work out their meaning of life. Moral principles of their parents represent all that is helpful for the children with regard to their orientation and finding the appropriate way”* [10]. The most

important values are life goals as the sources of *sense of one's life* and the formation of an individual as a consequence of the higher feelings presence; ethics, aesthetics and intellectual values are regarded as being the source [8]. Undergoing the process of cultivation, students consider something to be good not only if it is good for them, but when it is good for everyone in general. On the basis of higher feelings, the evaluation of stimuli in terms of the environment and concrete situations are formed. The evaluation leads to the identification or recognition of values [3]. A subjective approach towards good can be regarded as a value in the narrower, i. e. more positive sense. “The triad is formed by motives, values and meaning” In the midst of the triad, there are emotions which influence the intensity of the whole effect and evaluation process [8]. They represent the most important components in the process of value formation:



3. Social prejudices and stereotypes and their negative effects

Social prejudices, being considered as negative attitudes, are considered to be a frequent cause of excluding the individuals and social groups; several experts deem them to be a very important social pathogen: *“prejudices strengthen social discrimination”* [11] and they negatively influence the quality of life and the development of healthy interpersonal relations. Its harmful effect lies in judging people, phenomena and situations of a social life in an unobjective and unjust manner, which results in limited contact and evasive behaviour; it strengthens social prejudices even more, because being evasive due to the unknown is a natural part of a defence mechanism of the human psyche.

From the point of view of the quality of human interaction in groups, limiting the contact with a person who is linked to

a prejudice seems to be a problem. A framework of reference is created about such people in advance. The negative thing about this is the unfavourable connotation reflected from the feelings to the subsequent behaviour. This represents negative schemes that significantly influence attitudes and behaviour. This special kind of prejudice is based on the belief which expects unfriendly or otherwise inappropriate behaviour of other person or groups of people. People with prejudice still have a memory of a situation, state, subject or a person with regard for negative connotation (concern, tension, fear) stored in their long-term memory. When one is in a contact with a person whom they have a prejudice against, it looks like as if the red light turned on and the defence mechanism is on. Thus, the behaviour of an individual is dramatically changed [12]. The prejudiced one will have a closed mind or may even begin to behave in a hostile and unfriendly way or will avoid contact.

Stereotypes represent the next barrier of an objective evaluation. Stereotypes, unlike prejudices, are not always negative (positive stereotypes also exist), to some extent they are the result of a fast modern age and a typical schematisation of people and their roles occurs. Characteristic stereotypes involve deeming countryside clean, good, but regarding a town or a city as decayed, chaotic and full of crime and sin. Stereotypes are often a part of traditions involving humour and jokes – this is a *communication stereotype*.

4. Education as the support for social feelings and solidarity

Social feelings and solidarity among people can be developed through the support of *altruism* (from French *altruisme* pour *altruisme*). Altruistic behaviour is, in the context of philosophy, understood as the opposition to egoism; in the context of psychology it is perceived as the opposite of aggressive or even delinquent behaviour [13]. Altruistic behaviour can be generally understood as unselfish actions within interpersonal relations. Individuals with altruistic orientation behave in an unselfish way, have compassion for other people, their activities (thinking, feeling and performing actions) are focused on the well-being of other people in various forms (e.g. concernedness, participation, emotional support and active help). In comparison with the present, solidarity used to represent a more natural link among groups and social classes [14]. Such behaviour, in which other people are not a tool but a target of behaviour in favour of the wellbeing of other people, was introduced in terms of this theory by the father of positivism Comte as he was convinced that this feeling of an unconditional and altruistic care about the welfare of others has its rightful place in the cerebral cortex of every human being and that it is irreplaceable in society. It is an inescapable part of every human being's personality and the difference among people only lies in the range, quantity and quality, in which altruism is found with

regard to various people. N. Sillamy [15] saw the roots of altruism in the defence mechanism of nature. He is of the opinion that within "beings of the same kind (even animals), one can observe spontaneous, natural and altruistic behaviour. Our brain leads us, logically, towards an altruistic behaviour, because life without altruism is not possible". Altruism represents a higher social feeling representing a sacrifice, altruistic care, interest in problems of other people and a subsequent solution. Solidarity is a part of altruistic behaviour, understood as concord and characterized by a "strategic style of actions which, in an absolute understanding of truth, builds on giving up one's own claims in the name of helping others... It is a transcendental game based on ethic maxima" [16].

5. Pedagogical unprejudiced effect

School is a social institution where educators – professionals are directly expected to have a compensational effect and influence negative behaviour, harmful opinions and prejudice attitudes of pupils in a positive way from the very beginning of the school attendance. Negative attitudes become enrooted in children's mind in the early childhood through family education and a deep conviction presented by the people whom children have a close emotional relationship with and whom children undoubtedly trust – parents, members of family, acquaintances and friends. Thus, memorial experiences occur. Based on the abovementioned reason, it is difficult to behave in an unprejudiced way because every prejudice is specific – it always has a different basis and develops on the ground of reasoning, convincing and often even myths. Paradoxically, it was created on the basis of the relevant information whose core is formed by surmises or even myths with aggressive and unfriendly content. This content pretends to be a protective or a preventive one and its aim is to protect the bearer.

Within an unprejudiced effect, the effort of a pedagogue should be focused on:

- educational and reeducational influence over pupils and students who have prejudices,
- to influence disadvantaged pupils and students or persons with the threat of social exclusion on the basis of prejudices in an educational and compensation way.

Influencing the bearer of a prejudice is a complicated interactive process and it requires time for an objective diagnosis of the prejudice root and subsequent interviews with the subject (the bearer of a prejudice) with the argumentation focused on weakening the conviction. A pedagogue needs to endeavour to cast doubt on the unwavering conviction by using arguments and by logical reasoning to completely root out the prejudice. Direct bargaining is in most cases ineffective and generally, neutral or ambivalent attitude is more easily influenced than the negative one.

Fighting against prejudices needs to be started as soon as possible; the most effective unprejudiced effect occurs in nursery schools. In terms of educational effect at primary and lower secondary school levels, one needs to start with the diagnosis of social relations with the focus on the identification of inappropriate attitudes, relationships and prejudices. Within a closer inspection, one also needs to determine which kind of prejudices people are dealing with [12]. At lower school age, the impact of an educational effect is faster because, in this period, a teacher represents an authority and idol for a pupil, they have a strong educational position and their effect on pupils is more effective than on the lower secondary school level. In this stage, space for parents and educators is opening. Within the formation of tolerance, humanity and the support of democratic feeling, the particular example of a teacher, school climate and the culture of school are important. Mutual respect, politeness and tolerance in school lead to understanding, respecting other nations and their cultures. This is a difficult task and within a normal communication, only rarely the actual cause of a negative attitude can be found.

In the higher school age, involving the cognitive domain highlights the cognitive and educational influence of a multicultural education. From the point of view of efficacy on pupils and students, it seems that solipsistic attitude is the best. The reason for this is that the greatest possible amount of students and pupils in terms of mobility are enabled to enrich their knowledge and personal experiences with other culture. Thus, they experience and understand themselves what it means to be a foreigner in other country – that *being different does not necessarily mean being worse*. This way of eliminating prejudices is connected with the “contact hypothesis which was formulated more than 50 years ago by G. W. Allport” [12] and [17].

In the adolescence period, which is typical for a high degree of criticality, an appropriate interpretation of relevant attitudes of popular personalities and idols provides an effective education [18]. The atmosphere of trust multiplies the effect, mainly if it is realized by a close person or authority with a high range of credit for a target subject. The most durable effect on changing the attitude of an individual has a referential group as: “the opinion of majority influences the opinion of an individual more than the opinions of experts” [11].

From the point of view of methodology, it is necessary, on the basis of the diagnostic process result, to form appropriate socioaffective goals which *pay attention exclusively to procedures...* “concurrently, the range of potential behaviour, which may be the foundation for affective goals, is fairly big” [19]. The strategy of pedagogical procedure of reconstruction of attitudes is, from the point of view of affective goals in terms of prejudices, realized analogically – as it is within stereotypes; it is important that the effect is even and steady regarding particular components of attitudes. The first step is to reinforce the cognitive part by the means of a new cognition (basic data, information, knowledge), suggestively, make the range of these components for the target

attitude available, e. g. about uniqueness, unrepeatedness of sociocultural regulative of human behaviour, about originality of material products of human work of a particular ethnic, nationality, nation, race, other culture or about the occurrence of concrete culture specialties. When information or a fact is being processed, an individual within an emotive component of attitude searches for more meanings of their experiences, after which the strength depends on the sophistication of interaction process. Thus, the efficacy of persuasion increases through using the situation methods and taking roles; narratives enable us empathic experiencing in the context of new information and knowledge. Concerning the improvement of attitude from negative or neutral to a positive acceptance and evaluation of the high value of materialistic and spiritual culture regarding other nation, we deal with a qualitative change of value orientation and the change of preferences within a young individual, which arises from acquired conviction about a high value of national culture. Taking effective impact on both inner components into consideration, the strength of positive emotional experience of attitudes is demonstrated by conative actions such as interests, sympathy, agreement, initiative, engagement and activities. Emotionalisation represents the involvement of socioemotional sphere, the strong emotionalisation of particular information by a close person or recognized authority. It causes the fact that it is deeply-rooted in the long-term memory of an individual and by the means of a similar process, reconstruction of this attitude should be realized. Emotional argumentation has a bigger effect than the rational one.

Guided interviews require a specific preparation according to the conditions of an addressee. The main condition involves the trustworthiness of information interpreter. Effective induction – “*being drawn into a problem*”, involving experiencing in the presence of socio-affective domain of a pupil seems to be the most effective when realized in a trustful atmosphere. Persuasion is usually less effective than open discussion (for further information, see Musil, 1999) [11].

By argumentation, the network of connections is more accessible (phenomenon, circumstances of an eventful action) in the context of yet unknown facts by which a teacher tries to cast doubt on (undermine) unscientific, unobjective conviction of a subject, who can feel uncertain or even confused in the context of new information. A pedagogue continues in creating a new perspective on a problem by adding further information and facts in a guided interview with a subject. On the basis of presented arguments, an addressee – percipient, has to make their preconcept more objective in a scientific way.

Teachers have possibilities to make changes in the following forms:

- discussions about the consequences of societal prejudices in a group or in a class,
- increasing the prestige of pupils coming from endangered minorities,

- making pupils familiar with peculiarities of various world cultures,
- personal interviews with disadvantaged or endangered pupils and their problems,
- increasing the frequency of cooperative and interactive strategies exploitation,
- supporting the open cooperation of school with pupils' parents,
- improving the cooperation of school with pupils' families [18] and [20].

In terms of forming the consistent and unprejudiced attitudes, it is important to acquire social skills and enforcing one's personality within emotional side [21]. Strategies of a direct intervention also require the usage of educational methods of persuasion and suggestion in connection with factual argumentation [22].

6. Conclusion

Prejudices represent a serious barrier among healthy interpersonal relations. On the basis of the above mentioned, it follows that we cannot rely on the natural part of the feeling "other people problem perception"; this social feeling needs to be purposefully formed and developed. Similarly as being prosocial, the empathy of personality is connected with the development of emotional intelligence whose basis is built in families. School education should follow the foundation, which ought to, in terms of forming the tolerance as a personality feature and fighting the prejudices, enforce the "human proportion" - the orientation of a maturing personality on solidarity and being prosocial with regard to other people. The danger of unprofessional educational impact lies mainly in impatience or in creating pressure and this may cause the opposite, boomerang, effect.

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Katarina Mackova *

FORMATION OF PERSONAL CAPABILITIES IN THE UNDERGRADUATE TEACHER TRAINING

In the paper the author deals with her experience with the realization of the intervention training program focused on the self-development related to the personality competencies in the professional preparation of teachers. It points out the efficiency of the experiential forms of education from the point of view of their personal corrective action. To verify the efficiency of the realized program, the Kirpatrick 's evaluation model is applied here.

Keywords: Intervention program, personality abilities, Kirpatrick 's evaluation model.

1. Introduction

The submitted paper focuses on the facts related to "autonomous being" [1] of a future teacher. Too little attention is paid to these facts in the current undergraduate training of teachers. We have to realize that self-concept and self-regulation significantly influence the teacher performance in practice. They compose a substantial part of their expertness and professionalism. Teacher agrees with the expert professional identity and becomes part of his personality [2]. The teacher should rely on personal parameters of his/her teacher identity at least as much as he/she relies on subject expertise and formal authority. The teacher cannot avoid demanding situations, problems and dilemmas, their solution cannot be trained before their real encounter. What the teacher can do is to process this experience in an individual way and try to keep his/her own integrity. In this context we have to remind the fact that the teacher has to know himself/herself if he/she wants to understand others. If a teacher wants to develop the positive self-assessment of children, he/she must also have sufficiently developed self-confidence and be a balanced and integrated personality.

The paper is focused on the self-development related to personal capabilities and competencies in the professional teacher training (Turek 2003, Kasacova, 2006, Kosova, 2006, Zelinova, 2006, Vasutova 2004, Russo, Boman, 2007, Dobbins 1996, Sollarova, 2001, Popelkova, 2000 and others). It accentuates intervention training program, experiential forms of education that lead to strengthening personal competencies in the future teacher training.

Positive findings on intervention training program effectiveness for the support of optimal development or possible correcting of professional capabilities of students for their future teaching profession (level of social interaction, self-image, social and cognitive competence, creativity etc.) are stated by the following authors: Popelkova (2000); Popelkova, Zatkova (2004); Sollarova, Pohanka (2000); Sobolt, Saboltova (1993); Hamranova (2003) and others.

The objective of the realized program "Improvement of the personal capabilities of a future teacher for the needs of professional practice" was to support the optimal development or correct the professional capabilities of students for their future teaching profession. To develop personal capabilities:

To specifically focus on deepening the self-knowledge and self-understanding, to learn more about oneself, to experience the sense of one's own self-worth.

- To support resilience, and to optimize the personal characteristics/authenticity, acceptance, honesty, openness, empathy/.
- To contribute to increasing the perception of self-worth and improving the self-image.

2. Research

Research objectives

1. To determine the rate of efficiency of the realized program from the point of view of subjective evaluation of the program

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by its participants in comparison with their initial analysis of expectations.

2. To determine the rate of influence of the group atmosphere (and its respective variables) by the application of the intervention training program.
3. To evaluate the efficiency of the effects of the realized program from the point of view of development of the monitored intrapsychic personal variables.
4. To evaluate the opinions of the students about the realized program.

The characteristics of the research sample and the conditions of research implementation

We realized the empirical research using the *pedagogical experiment*. The influence of the created training program / independent variable / on a possible development of the observed personal characteristics / dependant variables / was monitored. *The intervention training program for improving the personal capabilities of the future teachers* was realized at the Faculty of Humanities within 40 classes / 5 blocks of sessions, 8 classes each /. An advantage of training blocks that lasted more days and were concentrated into short time period, in our case 2 weeks, is "the intensity of effects of individual training procedures, with the contribution of the group dynamics and the opportunity to work with group atmosphere (concerning strengthening the experiential effects)" [3] With short regular sessions with longer time duration (e.g. 2 classes daily within one semester) there is a disadvantage that it might be a problem for some participants to open up (in such a short time) and subsequently it might be impossible to work with the expressed behaviour and experience. However, an advantage with training designed in this way might be an opportunity to gradually involve the developing capabilities in the real social situations. After considering the above mentioned claims and with regard to the fact that the program concept was also based on the characteristics of the time duration of the encounter group sessions according to C. Rogers (1997) (most often 18 hours at the weekend or 40 hours in one week), we decided for the above mentioned time range and duration [4].

The research sample consisted of 28 students in the second year of a teaching field of study at the Faculty of Humanities of the University of Zilina (2 teaching specializations). The experimental group consisted of 14 students. The control group also consisted of 14 students in the second year of a teaching field of study at the Faculty of Humanities of the University of Zilina. "To develop the personal and social capabilities the optimal group consists of approximately 15 members" [3].

Research methodology

The pedagogical experiment was realized with the pretest-posttest research design. In the experimental group the measurements were realized before and after the application of the intervention training program; in the control group without the

training intervention in the same time range between the first and second measurement as in the experimental group.

Our selection and compilation of the set of research methods to monitor our program efficiency was based on the evaluation model of the *Kirpatrick's model (1959)*, that is cited very often (e.g. Komarkova et al., 2001; Boye, Crosby, 1997; Eseryel, 2002; Kaufman, Keller, 1994; Holton, 1996, etc.). The Kirpatrick's model includes the evaluation of the training program and its effects on 4 levels. To evaluate the program in a complex way, we tried to adapt to this and select the methods that can serve for verification of the stated hypotheses and can be applied to the individual levels of the respective model.

The 1st level is *reactions*: It is the most used method of the training evaluation. Besides the information about the general level of satisfaction, the fact whether the participants consider this program relevant for their personal growth and their work can be found significant. Possibly also the information about the type of applied methods can be considered useful. The awareness of this evaluation level can be a stimulus for the improvement of the training preparation and realization.

The 2nd level is *learning*: The evaluation of the training on the level of learning means capturing the changes in the field of knowledge, attitudes and capabilities of the participants as the training results. Considering the nature of objectives it is important to capture the changes related to the attitudes of the participants. This concerns capturing the changes in the attitudes that are important from the point of view of transfer of new experience in the real situations (a positive attitude to the training program increases the probability that experience gained from it will be used in real situations). It is also important to capture the changes in the attitudes towards oneself, i.e. the changes in the self-assessment of the participants. For example how the self-confidence of a person has been changed, how a person perceives some of his social competencies or some other aspects.

The 3rd level is *behaviour*: The verification of efficiency on this level aims to find out whether after the training some positive changes in the behaviour of the participants occurred. If the training is a part of professional preparation, it is possible to determine after some time after the program completion whether the transfer from training into practice took place. If the confrontation with practice is not possible then it is possible to gain feedback whether the training was profitable for the real life situations of the participants. The opinions of the participants can be obtained via individual or group interviews, questionnaires or assessment scales.

The 4th level is *results*: It predominantly concerns the results that are important for the organization functioning as a whole. It is really problematic to measure the final results of programs dealing with leading the people, communication... Therefore on this level of research we should focus on indicators, possibly the indirect ones that influence achieving the results of the organization. One of the possible indicators is e.g. changes in

the social climate/atmosphere (e.g. using the questionnaire or a structured interview).

- a) To clarify the possible "Expectations within the program" we used the verbal statements of the participants at the beginning of this training program. The statements were spontaneous and of unlimited extent.

The humanistic psychology and its approach to the participants of the training sessions that are considered unique beings having the capacity of personal growth and competent enough to specify their own priority objectives within the program, served as an inspiration for the initial interview realization. The final evaluation had to consider the analysis of achievement of the objectives stated in this way. After the training completion it can be used as a base for the final reflection of participants.

- b) The level of the overall self-assessment was determined with the help of *Rosenberg's self-esteem scale -RSES* (Rosenberg, 1965) (Kirpatrick's evaluation model: 2. Level).
- c) The level of self-esteem was determined with the help of *Questionnaire of Self-Awareness* (Smékal, 2002). The questionnaire consisted of 32 questions. The agreement or disagreement with a statement is expressed on a 5 point scale. After the evaluation the result is characterized by 5 levels (very high, high, healthy, rather low and low self-esteem) (Kirpatrick's evaluation model: 2. Level).
- d) To clarify the influence of application of the training program on the group atmosphere we used the *Questionnaire of the diagnosis of the climate/atmosphere/ in the group* [5] The questionnaire monitored the four components of our experience: empathy, acceptance, appreciation of value and congruence. (Kirpatrick's evaluation model: 4. Level)
- e) To complete the quantitative indicators and to clarify the questions we asked when stating our research objectives we used *the analysis of the records of the observers*. Before the start of each session we randomly chose one of the participants that was given the role of an observer. The observers took parts in the sessions in the role of independent assessors and did not interfere with the group events. The observers were given these instructions before the start of each session:
- to monitor and record the verbal statements of students,
 - to monitor and record the verbal statements of the tutor /towards the students/,
 - to monitor and record the group atmosphere during the sessions,
 - to monitor and record the level of expressions of acceptance of the students by the tutor,
 - to monitor and record the level of expressions of rejection and negative evaluation by the tutor.
- f) With the aim of determination of the possible benefits of the training program after its attendance for the participants of the experimental group we used a slightly modified

questionnaire by Popelková [6]: *Questionnaire of the subjective evaluation of the interventiontraining program* (Kirpatrick's evaluation model: 3. Level).

- g) To complete the quantitative data from the questionnaire methods, we decided to apply the *feedback technique* by the students after the training program realization. Feedback means providing the other person with information about the way other people perceive, understand and experience his/her behaviour. The level and depth of feedback depend on the level of trust among the group members. The feedback information can take many forms. We were interested in the verbal form that enabled us to characterize the group events during the experiment from the point of view of experiencing them by the students and the overall evaluation of the training program /Kirpatrick's evaluation model: 1. level/.
- h) The analysis and interpretation of the research results we used the method of a logical analysis and mathematical statistics. To determine the statistical significance of differences between the measurement results in the experimental and the controlgroup, as a function of application of the intervention/training program to the observed personal variables, we used the *Cochran - Cox test*.

To determine the statistical significance of differences of the observed variables between measurement 1 and measurement 2 we used the *paired t - test* [7].

3. Analysis and interpretation of the research results

Interpretation of the analysis of expectations within the program

In the beginning of the training program the participants were asked to provide us with verbal statements of their subjective expectations related to the intervention/training program they were supposed to attend afterwards. The statements were spontaneous and unlimited in their extent. In our experimental group we recorded 37 expressed expectations altogether. The analysis showed that the most frequent category of expectations was to gain capabilities for the future teaching practice, to improve one's communication skills, to get to know one's personality better and to increase self-esteem.

The free and accepting environment helps the participants consider themselves as personalities competent enough to set their own priority objectives within the respective program.

The mentioned expectations became a basis for stating the objectives of the process by the actual process realization and at the end they served as a basis for the final self-reflection of the participants related to the achievement of the objectives they had set.

Influence of the interventiontraining program on the level of the overall self-assessment and self-esteem of an individual

With the help of methods of the intervention/training program, by discovering new facts about oneself and other people

Significance of differences of the rate of overall self-assessment (RSES) and self-esteem (DSV) between the experimental and control group in measurement 1

Table 1

	EXPERIMENTAL GROUP	CONTROL GROUP	T-TEST
Average RSES	29.29	26.29	1.89
Average DSV	52.36	59.79	1.33

Significance of differences of the rate of overall self-assessment (RSES) and self-esteem (DSV) between the experimental and the control group in measurement 2

Table 2

	EXPERIMENTAL GROUP	CONTROL GROUP	T-TEST
Average RSES	32.14	28.14	2.5470*
Average DSV	45.43	59.79	-2.5180*

we can contribute to a more realistic self-image and higher self-esteem of a person. By positive experience in the social group we contribute to the increased perception of one’s self-worth and improving one’s self-image [8].

The indicator of the rate of the overall self-assessment was the average of the sum of the points of all the group members on the Rosenberg’s self esteem scale (RSES) /the higher the sum of points the higher the level of overall self-esteem/. The resulting level of self-esteem was the average of the sum of points gained in the Questionnaire of Self-Awareness (DSV) /the higher the sum of points, the lower the self-esteem level/. The average values served to determine the significance of differences between the groups as well as in the groups between the measurement no.1 and measurement no.2.

With the aim to determine the differences in the level of overall self-assessment (RSES) and self-esteem (DSV) between the experimental and control group, by the t- test (Cochran-Cox test) we observed the statistical significance of the differences in the results of the students in both groups. From data in Table 1 we found out that both groups (experimental and control group) were equal concerning the overall self-assessment (RSES) and self-esteem (DSV) in the beginning of the experiment. The results of the t- test also confirmed there were no statistically significant differences between the experimental and the control group.

From the data in Table 2, Fig. 1 we found out the averages of the rate of overall self-assessment (RSES) and self-esteem (DSV) at the end of the experiment in both groups. The obtained average points indicate a different level between the experimental and

control group at the end of the experiment. On the basis of the statistical consideration we can subsequently state a statistically significant difference of averages of both variables in favour of the experimental group.

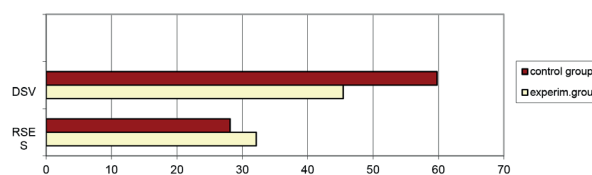


Fig. 1 The average values of the overall self-assessment (RSES) and self-esteem (DSV) coefficient in the experimental (ES) and control group (KS) in measurement 2

The comparison of measurement 1 and measurement 2 showed a significant increase of the level of overall self-assessment and self-esteem in the experimental group only (Table 3).

The average increase of values on the Rosenberg’s self-esteem scale /RSES/ from the statistical point of view revealed a very significant ($\alpha=0.01$) difference in averages between measurement 1 and measurement 2 in the experimental group, although in the control group in measurement 2 the overall self-assessment of the respondents slightly increased compared to measurement 1. The average increase of values of self-esteem /DSV/ in the experimental group showed a shift from the level “rather low self-esteem“ to the border of the level “healthy self-esteem“ . From the statistical consideration we recorded a significant ($\alpha=0.05$) positive increase of the level between the measurements in the beginning and at the end of the experiment.

Significance of differences of the rate of overall self-assessment (RSES) and self-esteem (DSV) within both groups (experimental-ES and control-KS groups) between measurement 1 and measurement 2

Table 3

	Averageatthe beginning X1	Averageatthe endX2	DifferenceX2-X1	T-test
RSES- /ES/	29.29	32.14	2.86	3.09**
RSES- /KS/	26.29	28.14	1.86	1.99
DSV- /ES/	52.36	45.43	-6.93	2.154*
DSV- /KS/	59.79	59.79	0	0

The statistical comparison between two measurements in the control group did not show any significant difference in the rate of the level of the overall self-assessment. The rate of the level of self-esteem in measurement 2 in the control group stayed on the same level when compared to measurement 1. We did not record any statistically significant difference between the measurements.

The results indicate that the training program applied in the experimental group enabled the individual group members to experience positive personal experience that contributed to increased perception of their self worth.

According to Smekal [9] self-assessment scale has 2 ends: satisfaction and dissatisfaction with oneself. We also experience them as higher or lower self esteem. There is a positive linear relation between self-assessment and self-esteem which means that if we increase the overall self-assessment of a person, the self-esteem also increases. These parallels can be drawn in our research, too, where under the influence of the intervention program the values of both observed personal variables (RSES, DSV) increased significantly within the self- image of the students of our experimental group.

Concerning the overall self-assessment that is defined by Rosenberg as the overall relationship to oneself or the awareness of one's personal worth, it is also formed by the factor of self-assessment as a result of social comparison and the factor that represents the consideration of one's self worth, relatively independent on others. However, we cannot state that overall self-assessment is only a sum of these two components of self-assessment. It was found out that self-assessment is also formed by: experiencing positive and negative emotional states, specific view of oneself (concept of one's strengths and weaknesses) and the ways how the people construct various contents related to their own personality. It can be supposed that, during our experiment, we aimed to increase the part of self-assessment that is the result of social comparison /1st factor/, because the purpose of the sessions was to provide positive feedback and appreciation of the performance of an individual by the group. According to Výrost, Slamenik [10] such self-assessment is more dependant on situational changes and is subject to frequent changes. Osecka, Blatny [11] found out in their research that the factors of the self-assessment scale are related to personal characteristics but this relation is not equally strong with both factors. The first factor shows closer relation to the personal characteristics. High self-assessment in both components is shown by those that are dominant, stable and extroverted. The factors also differ in the relation to the interpersonal dimension: hostility - affiliation. The hostile persons have higher global self-assessment (second factor) than affiliate persons. The high self-assessment based on comparison with others is not related to hostility.

If high self-assessment based on the factor of social comparison is not related to hostility then this claim supports our assertion about the possible increase of the rate of overall self-assessment in the experimental group via facilitating psycho-social

atmosphere that was prevalent during the sessions (see analysis of the questionnaire of the group atmosphere and feedback from the participants of the sessions). It means that not only the specific partial self-assessments are important but also the overall emotional state and also the fact whether the person perceives the characteristics of his positive assessment as stable.

By the intervention of the training program we recorded a positive increase of particular variables of the group atmosphere / empathy, congruence, appreciation of value, acceptance/ in the perception of the participants. In all the observed variables except for the variable of empathy these results proved statistically significant compared to the control group.

When forming adequate self-assessment the overall emotional state plays an important role. The stated values help us understand one of the possible reasons of the positive change of overall self-assessment and self-esteem of the training sessions participants. Without accepting, open and emphatic atmosphere in the group the experience leading to increasing the positive self-image would not be fulfilling enough.

From the *recordings of the observers* we found out that the atmosphere in the sessions was relaxed, active, there were many lively discussions, although some tension and expectations were evident in the beginning. The tutor communicated in a relaxed, friendly, lively and understandable way. According to the observers she was tolerant and emphatic, praised the students for their activity and openness. The participants of the sessions spoke in a spontaneous and honest way expressed their current feelings and opinions.

Due to the necessity of completing the quantitative data, besides the method of observation and the initial interview by the verification of the of the program efficiency we applied the final interview *"Feedback of the participants for the training tutor"*.

All the participants, as they confirmed, felt good in the sessions, some of them felt tired at long lasting activities. We realized a necessity to conduct the sessions in short lasting periods. The ability to better and objectively assess other people and to use the gained communication skills and experience in practice were among the expressed positives. Concerning the personal characteristics, some of them confirmed a shift in their self-perception and self-esteem. This fact was confirmed by the results of the *Questionnaire of the overall program assessment*, as well as by the the rate of the perceived overall self-assessment on the Rosenberg's scale (RSES) and self-esteem in the Questionnaire of Self-Awareness (DSV).

4. Conclusion

By the realization of the intervention/training program, concerning the objectives of our research we consider *fulfilling of expectations* by the participants of the intervention/training program significantly high. They aspired *to gain new capabilities*

for the future teaching practice, improve their communication skills as well as get to know their personality better and increase their self-esteem.

The results justify the application of the intervention training programs in the college training of the future teachers as an efficient method that supports the development of personal competencies and enhances the intrapersonal stability of students. The efficiency of the experiential forms of education and the educational environment especially from the point of view of their corrective personal action has also been proved here.

This paper looks at the transformation of teacher professional roles, emphasize personality powers in support of affective components of the „Self“ presents the project of improving

undergraduate training in relation to personal identity parameters of teacher, teacher directed to the development of personal skills, as well as subsequent professional competence of future teachers.

In the Slovak education we are talking about the continuous teacher education where it is possible to intervene in this way conceived competence personality development programs. “The main objective is to increase professional competencies by creating a system of requirements and conditions for their professional development and career growth. The concept of professional development of pedagogical staff is published on the official web site of the Ministry of Education of the Slovak Republic“ [12, p. 52].

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Jarmila Zacharova *

THE CZECH - SLOVAK RELATIONSHIPS IN THE SCHOOL POLICY IN THE YEARS OF 1918-1939 AND THE PERSONNEL ISSUE

Czech-Slovak relations are an important component in the history of our nations. In the historical context they were developed actively in the 1920's. The relations at these levels were mutually influenced and brought about several positive elements to the national heritage. As a consequence of the formation of the Czechoslovak Republic in 1918, there was a thorough spiritual and cultural renewal of the Slovak nation, which included the creation of a network of schools of all grades. The process of its building was not straightforward. It was connected with many obstacles and problems that demanded strategic and operative solutions. This article deals with the reconstruction of Czecho-Slovak relations in school politics in the years 1918-1939 in terms of personnel issues.

Keywords: Czech-Slovak relations, school policy, personnel issues.

1. Introduction

The problem of Czech-Slovak relations is now open. It creates a space for the explorations of the relations in the area of educational policy, while the Czech intelligence in Slovakia during the existence of the first Czechoslovak Republic can be seen in a new, broader context, without ideological restrictions, so even today this problem enables to observe new connections and insights on the issues of Czech-Slovak relations and Czech intelligence operation in Slovakia during the existence of the first Czechoslovak Republic.

2. Mutual State, Mutual History and Czechoslovakism

The establishment of the Czechoslovak Republic in 1918 and the following period of two decades represented a breakthrough for Slovakia. The Slovak nation lagged behind the developed parts of the Habsburg monarchy economically, culturally and educationally, which was a result of the Austro-Hungarian Compromise of 1867. In addition to the economic downturn, a significant population decline was indicated in the last census statistics in Hungary in 1910.

The First World War deepened the conflicts within the Habsburg monarchy and it also opened the way to solve the political problems of the oppressed nations and nationalities. At the end of 1918, thousands of Slovaks were abroad among the victorious allies. The most active of them joined the revolt against the Hungarian domination for freedom of their people.

At the end of the war, a joint Slovak and Czech resistance was formed and the idea of common state based on the language and Slavic closeness and traditionally good neighborhood in the region of Central Europe was born. Despite many questions and controversies, the birth of the idea of Czechoslovakism, which was at that time declared at home and among the members of foreign resistance, is currently considered as a victory of freedom. V. Srobar, one of the most active of the Slovak politicians, initially defined Slovaks as a *Hungarian line of the Czechoslovak - Hungarian tribe*, then later as a *segment of the Czech-Slovak nation*. Professor T. G. Masaryk, the philosopher and ideologist of the common state, declared that the Czech-Slovak nation, at that time as a Czechoslovak nation succeeded abroad. The idea of Czechoslovakism was accepted by Slovaks because it was a clear starting point for solving of their national problems with Hungarians. V. Srobar actually stated at that time that it was political nation ideologically and conceptually formed at an ad hoc basis for the coexistence with Czechs. The aim of it was to form an independent Czechoslovak state. It was legislatively based on the Act No. 11/1918 Coll. stating that the Czechoslovak state was established by the National Committee, "in the name of the Czechoslovak nation" [1]. The idea of the Czechoslovak state was founded by Czechs. However, it has to be acknowledged that it was a great achievement of the Czech politicians and the Czech nation that they gave up the idea of declaring of pure "Czechism" in the process of formulating this idea. In 1916, E. Benes stated: "In today's international situation we could hardly discuss the question of an independent Bohemia without Slovakia and the

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idea of an independent Slovakia without Bohemia we could not raise at all" [2].

On the basis of the fact that the Czechoslovak state existed there was an implication of the existence of history of that state, thus, Czechoslovak history has existed at least since 1918. There was a complication with the question whether the Czechoslovak history existed earlier. From the fiction about the existence of the Czechoslovak it would follow that Slovak history was a regional part of Czechoslovak history. However, if the Slovaks were a separate nation, they would have their own history that is different from the history of Czech [3]. The idea of the common history of Czechs and Slovaks, or of the notion that they had in common a few points, was maintained by Vaclav Chaloupecký, who was Head of the historical seminar at Comenius University in Bratislava, later its dean and rector. In the work *Old Slovakia* he tried to prove the assumption that the area of today's western Slovakia was inhabited by "Slavs and Czechs" (Sclavi et Boemi) [4]. The continuity of Czechoslovak history was proved by the historian Kamil Kroft who also worked at Comenius University in Bratislava. In the work of Czechs and Slovaks before their national unification, he demonstrated their shared history in the so-called Czechoslovak national story that began in the Great Moravia and ended in 1918, joining the Czechs and Slovaks in one State [5]. Among Slovak historians who supported the idea of a single history were Branislav Varsik and Daniel Rapant. Nevertheless, Rapant later refused the concept of shared history and in the study of Czechoslovak history, he showed certain effort to their "spasmodic" integration into Czech history. He regarded The Concept of continuous Czechoslovak history as a political order [6].

The new state was founded in an exposed area where all the power interests of neighboring countries met. It was tendentially stated that it had been founded without any tradition of statehood and therefore it was an artificial state. It was said that this state connected the inhomogeneous units and disrupted the power relationships and the balance in Europe. These efforts were directed with the purpose to undermine the stability and unity of the young state.

3. School policy in Slovakia and the personnel issue

The Slovak culture including education was to become one of the important factors in forming of the Czech-Slovak statehood. The idea that "Slovakia can grow into the life of Czechoslovakia only by developing its own cultural life" [7] reflected the reality of that time. But at the same time, there was a contradictory reality not seen by the official government circles and this reality was disguised by the fiction of a homogeneous Czechoslovak nation and culture which became evident in the 1930's.

The origin of new state brought about also the formation of new social - political and administrative structures. On

November 2, 1918, the Office for Administration of Education and Culture was created by the Act No. 2/1918 Coll. [8]. A. Stefanek, who worked as an editor of The National Newspapers in Prague was authorized in the position of the Education Commissioner for Slovakia on December 10, 1918. His task was to prepare the reorganization of the Slovak educational system. The Interim Government headed by V. Srobar fully accepted his appointment [9]. Stefanek worked as a government officer in the Educational Department of the Ministry of Education and Culture in Bratislava. All the activities of this department were liable to V. Srobar who was a Minister Plenipotentiary for the administration of Slovakia. A. Stefanek was a supporter of the idea of the Czech-Slovak solidarity and a spirited enthusiast of building Czechoslovakia. Although he did not complete the education as a teacher, he was familiar with the school situation in Slovakia and its inherited problems, which were a result of the previous Hungarian governments' activities.

The situation in the educational system in Slovakia was critical. After the establishment of Czechoslovakia, there were 3, 298 Hungarian primary schools, 140 Slovak, 7 German and 186 mixed language schools in Slovakia. The task to introduce the Slovak language to schools became very resonant [10]. The Interim Government abolished the teaching of the Hungarian language in Slovak towns and villages on November 6, 1918. According to the Act of December 10, 1918, Article 3, the Slovak language became the official language of Slovakia.

The staff of the Department of Education set the basic priorities whereby their starting point was the statistics of illiteracy from 1910. According to it, there were, for example, up to 67.9% illiterates in the Orava region, 62.1% in the Trencin County, 69.9% in the Spis region, 58.6% in the Saris region and 61.1% in the Zemplin region [11]. A. Stefanek's conceptions were associated with the compulsory school attendance and with a completion of a democratic educational system at all levels in towns and villages. The quick liquidation of illiteracy and school administration takeover in Slovakia became a categorical imperative. There was a need to occupy official posts with pro-Czechoslovak oriented staff. The Department in cooperation with the Department of the Ministry of Education and Culture replaced the staff at 37 inspector's posts during 1919 and it continued also in the following year. Each inspector was given a Czech teacher and counselor [12].

The lack of teachers became evident immediately after the foundation of the Czechoslovak Republic. On the one hand, it was the result of the departure of Hungarian teachers and professors from Slovakia who did not want to take a vow - a primary teacher's oath to the newly established state according to the Government Regulation No. 495 of August 28, 1919. On the other hand, the graduates of teacher institutes who declared their support to the Slovak nation were educated in the Hungarian language.

V. Srobar said about the situation in the Slovak educational system that they found here *"... about 300 loyal Slovak teachers for primary schools and about 20 secondary school Slovak teachers while they had known just a small part of them from the previous periods. More than 4,000 elementary schools and all secondary schools and schools of higher education were in the hands of Hungarians, Magyarones (Slovak renegades) or half-Slovaks. We can claim with confidence that except for a few schools where children were taught in Slovak by a few mostly Evangelical teachers everywhere else they were taught in the Hungarian language, both in word and spirit* [13]. The solution of the problem with the teaching staff became one of the most important tasks in the school department. The Minister Plenipotentiary for the administration of Slovakia V. Srobar, a government officer A. Stefanek and a government officer of the Ministry of Education and Culture J. Vlcek were the authors of the idea of the arrival of Czech teachers to Slovakia. The lack of skilled staff was solved in a similar way as in other branches of the Civil Service [14]. According to A. Stefanek, the task of the Department was "to fill schools with the Czechoslovak element. Not only with the Slovak one, i.e. by the staff speaking the Slovak language a bit but by the staff respectful to the Czechoslovak state" [15]. This goal was legally supported by the Act No. 605/1919 Coll. dated 29th October 1919 and it enabled to decree a civil servant, teacher or professor to work at any place in Czechoslovakia [16].

The government officer A. Stefanek and the department in Bratislava were appointed to organize the transfer of teachers from Bohemia and Moravia to Slovakia. The problem of quantity and professional quality of the teachers in the Slovak educational system was solved by the presence of Czech teachers numbering 1400 [17]. Their number was gradually complemented by Slovak graduates. The approach to filling of teaching jobs was not always standard and, therefore, it was met with negative responses.

There was a large migration throughout the existence of Czechoslovakia. It was a new stage in the development of Czech-Slovak relations which, as to their importance, went beyond any previous contacts. Czech intelligentsia helped the Slovak nation to establish itself among the developed modern nations in Europe. As early as the first year of the young state, A. Štefánek acknowledged the positive influence of the Czech teachers on building of the Slovak educational system in the Budget Committee Report on the state budget of the Czechoslovak Republic for 1919: "The Czech teachers proved themselves worth and their activities and influence has been sensed everywhere they had come. I am just saying that during seven months we have organized and filled up about 70 secondary, vocational and higher secondary schools with good Czech professors and teachers; then we settled down several hundreds of Czech teachers at primary schools" [18].

It is clear that after 1918, Slovakia could not do without the help of Czech intelligentsia. On the other hand, it must be admitted that the Czechoslovak government sent people to

Slovakia who were sometimes not needed, which caused the problem - the so-called solving of the Czech question. The term "Czech question" and solving of the Czech question are terms related to the terminology of that period; they are technical terms [19]. The solution of the so-called Czech question became one of the essential idea of the Hlinka's Slovak People's Party. The basis of their program was expressed by two slogans: "Slovakia to Slovaks!" and "In Slovakia, speak Slovak" (free translation). It consisted of the idea that the civil servants of the Czech nationality should have been transferred from Slovakia and this would have vacated working places for unemployed Slovak intelligentsia.

It was stated on the argument that the representation of Slovaks in Czechoslovakia government is inadequate. Divergent views were also represented by the Czech officers and teachers in Slovakia. Konstantin Culen wrote in 1944 with regard to this: "It is certain that Slovakia would not exist without Czech help. This is a fact that cannot be changed. But this aid came too strong" [20]. Creating an atmosphere of nationalist tensions in society helped to recruit followers for Hlinka's Slovak People's Party program. The argument that the Czechs took Slovaks jobs, "Czechs take Slovaks bread", was very effective. This was mainly related to jobs like Czech officers and teachers who were definitively nominated.

When on October 6, 1938 the Hlinka's Slovak People's Party took over the political power in Slovakia, it launched this program. The first steps were made in the field of language rights. On October 10, 1938, the President of the Autonomous Government J. Tiso published the Regulation No.1/1938 according to which the Slovak language was the only official language in Slovakia. The regulation got into the Constitutional Law on the Autonomy of Slovakia No. 299/1938 of the Collection of Laws and Regulations [21]. Some Czech began to actively teach in Slovak, but the Regulation also provoked demonstrative resistance, e.g. Czech professors from Comenius University continued to lecture in Czech. Professor of Law Zdenek Peska rejected the amendment language law, which Slovak university students, who were associated with the Hlinka academics Club, considered as provocation. Complaints were peaking. An incident was recorded in connection with the laying of the foundation stone for the student dormitory Lafranconi in Bratislava. On a festival President Dr. Eduard Benes spoke Slovak, while Rector of Comenius University professor Wroclaw Busek spoke Czech, which was considered as the devaluation of the Slovak language [22]. The situation for the Czechs in Slovakia was not developing favorably. In autumn of 1937 Hlinka academics Club organized a mass protest against a Czech professor who refused to lecture in Slovak. The so-called national committees were coming into existence and they were "revolutionary" casting out Czechs and Jews from Slovakia with the help of the Hlinka Guards. There were anti-Czech demonstrations. In Bratislava, students and the Hlinka Guard supporters from the Svorad dormitory provoked riots and prohibited Czech professors to lecture at Comenius

University [23]. Anti-Czech tendencies were fuelled by the contemporary press, especially by the periodicals *The Slovak*, *The Slovak Language* and *The Guardsman* as well as the Vienna Radio Broadcasting which broadcast in Slovak and called for a radical solution of the Czech question, i.e. for the banishment of all the Czechs from Slovakia [24]. The collegiate relationships between Czechs and Slovaks in staffrooms also changed. The contacts were restrained to a minimum; there were even attempts to instigate students against Czech teachers by their Slovak colleagues. "What to say when Slovak professors instigate students against Czech professors and encourage them not to believe Czech professors and to report all the anti-Hlinka manifestations? What to say when a young Slovak professor under the pretence of Scouting invites pupils to meetings where they discuss politics, i.e. anti-Czech issues; where he asks questions about hated Czechs - what they said again and he gathers accusatory materials against them which he uses for anti-Czech and even personal attacks against them in the newspapers?" [25]. Typical relationships between Slovak students and Czech teachers were crooked by several factors. The number of attacks in the press, radio and at demonstrations increased. Many students of higher classes became members of the Hlinka Guard, where they received direct instructions to watch Czech teachers and professors and recorded any anti-Slovak statements. The result of the status disparagement of teachers and professors was the decline of students' discipline. Czech teachers and professors could hardly protest, if students, members and mainly top members of the Hlinka Guard were called out of lessons because of the service in the Hlinka Guard [26]. The situation escalated so much that "... students refuse to fulfill their tasks ... they talk about unwelcome, uneasy professors who have to be discharged from Slovakia, or ... at the moment when a Czech professor is to come into a classroom, they yell the Hlinka Guard political slogans uproariously and sing liets such as: the Czech and the Jew - the same vermin ... the Czech into the sack, the sack into the water ..." (free translation) [27].

The situation in Slovakia was permanently complicated - to the disadvantage of Czech teachers, and, therefore, most of them tried to leave for Bohemia and Moravia. After the announcement

of the independent Slovak Republic on March 14, 1939, the Government accepted a resolution on dismissal of all employees and workers in public offices, institutions and businesses on March 18, 1939 because they were not of the Slovak nationality. There were exceptions for those whose services were described as "absolutely necessary" [28]. Following the Slovak government decree dated from March 18, 1939, it was ordered to dismiss every teacher who was not of Slovak nationality from the school service on April 30, 1939 [29]. The explosive and hostile social atmosphere in Slovakia convinced the majority of Czech teachers and professors of the necessity of rapid departure. Although many of them had worked here for two decades, the seditious anti-Czech policy did not offer them any other solution.

4. Conclusion

The relations between Czechs and Slovaks during the first two decades were evolving with different intensity, and were characterized by constituting of two separate nations living in one state, connected with signs of resistance and even with grudge for the Czechs in Slovakia. This process culminated in the years 1938 - 1939 when their position significantly changed. The activities of anti-Czech party supported unhealthy, hostile atmosphere against Czech teachers and professors at Slovak schools. And although many of them spent the most active years of their professional life in Slovakia, under the pressure of legislative changes, they were gradually leaving. Despite a brought to boil Despite an escalated socio-political situation in Czechoslovakia at the end of the 1930's, the engagement of Czech teachers and professors in Slovakia can be positively evaluated. They are responsible for shaping of the democratic spirit of Slovak schools and contributed to the overall development of the Slovak nation. They laid foundations not only for education, but also for science. They raised the first generation of Slovak intelligence, and therefore their professional and human trace in Slovak Education and Slovak Science is indelible.

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Adrian Kacian *

POTESTAS GLADII IN JESUS' TRIAL

The question of potestas gladii in Jesus' trial, i.e., who had the legal authority to put him to death has been for a long time one of the puzzles of the New Testament scholarship. The present article resolves the question with a balanced view that even if the ultimate potestas gladii belonged to the Roman procurator, the Jewish Sanhedrin possessed the right to condemn and execute Jesus to death on charges of the Temple offences and blasphemous utterances. However, Jesus' activity encompassed more than just a religious threat. The Jewish representatives feared also a public tumult and uprising if they had tried to put Jesus to death by themselves. They also did not want to be publicly blamed by the masses for killing a prophet of a person and thereby adding to their negative public reputation. Therefore they handed Jesus to Pilate even though they could execute him by themselves on the basis of blasphemy.

Keywords: *Potestas gladii, Jesus' trial, Pontius Pilate, Sanhedrin.*

1. Introduction

Jesus' trial before the Jewish Sanhedrin and Pontius Pilatus presents numerous puzzles for the New Testament scholarship (Mk 14:53-15:15; par.). One of the puzzling issues revolves around the so called *potestas* or *ius gladii*, literally "the right of the sword". The phrase encapsulates the legal authority to supreme jurisdiction, i.e., the right to absolve from, or condemn a person to death. The Jews in Palestine in the times of Jesus of Nazareth (first half of the 1st century CE) were under the rule of the Roman Empire. Their governing body (the Sanhedrin with the high priest in the lead) was not independent in its decisions and sentences and had to report to the Roman procurator - the representative of the Roman rule. This double type of rule is reflected at Jesus' trial who as a victim faced both sides: the Jewish first and then the Roman.

It is indeed this double rule status that historically makes the decision about judicial and moral responsibility regarding Jesus' death an uneasy one. It is beyond doubt that ultimately Jesus was put to death by the Roman procurator Pontius Pilatus who condemned him to crucifixion that was executed the very same day outside Jerusalem. This historical anchor of the Christian gospel and creed (see for example Valco [1] for a theological discussion) is strongly supported not only by the Gospel writers (Mk 15:15 and par.) but also by the ancient sources outside of the New Testament (the Jewish historian Josephus Flavius writes in Ant. 18,3,3 (§§ 63-64) "He was (the) Christ; and when Pilate, at

the suggestion of the principal men amongst us, had condemned him to the cross ..." [2];¹ the Roman historian Tacitus, Annals 15.44: "Christus, ..., suffered the extreme penalty during the reign of Tiberius at the hands of one our procurators, Pontius Pilatus..." [3]). But what role was played by the Jewish representatives? Did they have to deliver Jesus to Pilate because they could not sentence him to death? In other words, did the Jewish Sanhedrin hold the *potestas gladii* under the Roman rule or not?

The aim of the present paper is to answer the above posed questions and investigate whether the Jewish Sanhedrin in the times of Jesus had the *potestas gladii* in general and in Jesus' case particular. The proposed investigation will primarily throw light into the historical realms regarding Jesus of Nazareth particularly the end of his public carrier. It is evident that a more profound understanding of the historical context of Jesus' death secures a better understanding of the message of the Gospels. Secondly, it might contribute to the Jewish-Christian dialog stigmatized in past by the propaganda that the Jews as the nation were guilty of Jesus' murder. Bearing in mind problematic history of Christian-Jewish relationship and especially the Nazism holocaust in the 20th century, it is an imperative to access the historical data a fresh and not read the Scripture as a proof text to authorize a certain ideology (For more info see [4 - 5]).

As R. E. Brown [6] wrote, the history of research of the *potestas gladii* issue "altered from one extreme to the other." At the beginning, scholars like Leitzmann [7], Horvath [8] and Winter [9] and others argued that the Sanhedrin had indeed legal

¹ According to the scholarly consensus, the final version of this text is an outcome of Christian redaction (*Testimonium Flavianum*). However, it is beyond doubts that Josephus' original contained the basic message of Jesus existence and his death under Pilate.

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authority to carry out the death sentence. The fact that Jesus was executed by the Roman authorities proves that the Jewish Sanhedrin was not involved in the trial and the Gospels as sources are historically not reliable. Later, scholars like Blinzler [10], Bock [11], Catchpole [12], Gnilka [13], Jeremias [14], Lapidé [15], Matera [16], Schubert [17], Flusser [18], just to mention a few, challenged this view and argued that under the Roman prefecture only the Roman procurator had the power to apply the capital sentence. Variety of above mentioned opinions reflect the given ambiguity of the primary sources that are relevant to the *potestas gladii* issue. In the following lines we will turn to them and investigate them.

2. Primary sources for the *potestas gladii* issue

The texts under the consideration come from three sources: the New Testament, the Jewish writers of the 1st century CE. Josephus Flavius and Philo of Alexandria, and Mishnah. Even though the Mishnah was redacted sometimes at the beginning of the 3rd century CE, the material often comes from the earlier period as it is the case with the text M Sanh 7:2 that is used in this article.

The view that the Jewish Sanhedrin did not hold the competence of the capital punishment is mainly based on the two following witnesses. The first comes from the New Testament, particularly the Gospel according to John. The verbal interchange between the representatives of the Sanhedrin and Pontius Pilate over the arrested Jesus is recorded as follows: "Pilate said to them (the Jewish representatives), "Take him yourselves and judge him according to your law!" The Jews replied, "We are not permitted to put anyone to death" (Jn 18:31).² The statement reflects the existence of two jurisdiction systems that applied to Jesus: the Jewish law on one side and the Roman law on the other. The dialogue also reveals Pilate's hesitation to be the judge in Jesus' case. This rather unusual Pilate's behavior is mainly explained as a political defense from the evangelist perspective, who aimed to describe Jesus as innocent before the Roman law and so to show that Christians as Jesus' followers were not a threat to the Roman Empire. (For example, in one of the New Testament Apocrypha, Anaphora Pilati 7 - 9, versions A, B, Pilate is mentioned even as a witness of Jesus' crucifixion and a believer of his resurrection [19 - 20]). Even though it might be true, the dialogue over the arrested Jesus reveals also the possibility that the Jewish Sanhedrin could have had the authority to judge Jesus. This is indirectly supported also by the Gospel of Peter. In this Christian apocryphal document, the disciples are full of fear from the Jews, because right after Jesus' crucifixion they were falsely accused of the attempt to burn the Temple and their lives were at stake (GPet 15:60,52,54) [19 - 20].

² English Bible quotations, used in this paper, follow the New Revised Standard Version.

The other main witness that confirms the *potestas gladii* exclusively to the Roman procurator comes from Josephus Flavius. During the year 6 CE, Archelaus, the son of the Herod the Great, was replaced by Roman equestrian Coponius. His etnarchy (Judea and Samaria) was reduced to a province of Syria and a direct rule of the Herodian dynasty fell into the Roman hands. Josephus writes that Coponius "was sent as a procurator, having the power of life and death put into his hands by Caesar" (Bj. 2,8,1 (§§117) [2]). This was true also during the reign of Pontius Pilatus (26-36 CE.) who executed Jesus of Nazareth. Such juridical situation was common in the imperial provinces like Syria and particularly in its subdivision. It reflected the dominance of the Roman Empire rule over the subdued nations and countries. Pilate showed his dominion for example, by keeping the Jewish high priest's vestments under his custody. When Pilate lost his prefecture in 36 CE, the vestments after proper purification returned back in to the Temple under the seal of the priests (Ant. 18,4,2 (§§ 88-95) [2]).

Although the two above cited ancient sources portrait the Roman procurator as the omnipotent ruler over the life and death in his province, the actual *status quo* was not as definite as it might look like *prima facie*. The same sources also betray that the Jewish representatives (mainly high priests, Jewish nobility - persons who were members of the Sadducees party) had considerable power to influence the political affairs in Palestine under the Roman prefecture. Josephus and Philo mention several Pilate's actions that provoked the Jews. (Josephus mentions three incidents: bringing imperial standards with the emperor's portrait into Jerusalem (Bj. 2,9,2 (§§169-174); Ant. 18,3,1 (§§ 55-59); seizing sacred funds from the Temple to build an aqueduct (Bj. 2,9,3 (§§172-174); Ant. 18,3,2 (§§ 60-62); killing Samaritans at the Mount Gerizim (Ant. 18,4,1 (§§ 85-89) [2]; Philo mentions one: setting up the gilded votive shields of the emperor in the former palace of Herod the Great in Jerusalem (De Legationem ad Gaium XXXVIII. (§§ 299-305) [21]). Three of the four above listed reports involved the Jewish or Samaritan representatives and in all these three cases Pilate had to adjust or change his decisions and actions due to the pressure from the Jewish or Samaritan nobility [19]. Moreover, following the Samaritan complaints, Pilate was ordered to report to the emperor and was replaced by Marcellus. These incidents demonstrate that the local representatives' opinion had to be respected by the Roman procurator and they even had power to orchestrate his dismissal.

In addition to the texts that confirm the power of the Roman procurator over the death sentences, there are also texts in which the Jewish local representatives play the major role over the capital penalty. In Jn 8:1-11 we read that the scribes and the Pharisees brought an adulterous woman to Jesus. According to the law of Moses she was supposed to be stoned to death (Lev 20:10; Deut 22:23-24) and they wanted to find Jesus' opinion.

Although the historicity of this account is questioned and the narrative's objective is to portray Jesus as the proper interpreter of the Mosaic Law, nevertheless, this story contributes also to the *potestas gladii* issue. Firstly, it confirms that Jesus was ultimately executed by the Roman procurator, since the Jewish death penalty execution according to the Jewish Bible and later Mishnah, Sanh 7:1 involved stoning, burning, beheading and strangling but not crucifixion. Although in the Temple Scroll (11QMiqdash) 64:7-13 [22] the ascetic religious community that lived in Qumran expected the crucifixion as a death penalty for high treason and blasphemy [23], it is highly improbable that this opinion of a minor sect could have made its way to the ruling representatives of the Jewish nation. Secondly, the adulterous woman account displays the strong validity of the Jewish law that was inherent in the Jewish society. Jewish representatives were the first instances especially in the religion related cases and it is not too far from the truth to state that the Roman procurator did not have to know or even care about every transgression against the Jewish law (see for example, Galio's reaction to the apostle Paul case, Acts 18:12-16).

The Jewish autonomy in religious cases including the capital punishment is explicitly demonstrated in Mishna Sanh 7:2 [24]. In this text we read about an event that happened sometimes in the last 10 years of the Jerusalem Temple before its destruction in 70 CE. The Sages reported that the Rabbi Eleazar ben Zadok as a child witnessed an execution of a priest's daughter who was burnt at the stake because she committed adultery. The discussion follows stating that the way she was burnt did not follow the customs of the Pharisees (the Pharisaic way of execution would probably prefer strangulation) therefore the Mishna concludes that the court at that time was not properly trained. The dating of the event is not secured. Jeremiah puts it into the reign of the Herod Agrippa I. (41-44 CE) who for period of time replaced the Roman procurators in Judea and Samaria [14]. However, more probable dating falls into years 62-63 during the prefecture of Festus and Albinus [6]. In this case it demonstrates that the Jewish Sanhedrin possessed authority for capital punishment under the rule of a Roman procurator in the area of religious cases. The text does not mention the involvement of any higher official so we do not know whether a Roman procurator possibly knew about this death sentence or not.

Another example of Jewish autonomy in religious cases comes from the so called Temple ban. Three texts of Josephus (Ant. 15,11,5 (§417); Bj. 5,5,2 (§§193-194); 6,2,4 (§§124-126) [2] and one from Philo (Ad Gaium XXXI. (§212) [21] describe the warning for foreigners not to step from the outer court of the Gentiles into the inner court of the Temple "under pain of death" (Ant 15,11,5 (§417)). The zeal of Jews to keep the inner court clean of the Gentiles is demonstrated, for example, in Acts 21:27-36 where they intended to kill apostle Paul, a Jew himself, because according to them he brought the Greeks into the inner court of the Temple. The fact that the Jewish representatives got this authority with the agreement of the Roman Empire is

clearly witnessed by the words Titus addressed to the revolting Jews in Josephus: "Have not we given you leave to kill such as go beyond it, though he were a Roman?" (Ant. 6:126). It was an extraordinary concession as Gnika [13] writes, but real and without need for further consulting with the Romans, as he thinks. It is more plausible to understand it as another expression of Jewish religious autonomy where the Romans did not interfere.

The evangelist Luke reports in Acts 12:1-5 how the king Herod Agrippa I. (41-44 CE) had beheaded the apostle James, brother of John the Zebedee. This example does not correspond to the Sanhedrin - Pilate interchange over Jesus since the Herod Agrippa I. as a Jew was the ruler of the Jews who replaced the rule of the Roman procurators for a while. The text does not explicitly state the reason for James' death. We can guess that it was connected with his missionary work spreading the Christian gospel that did not please the majority of the Jews including the Jewish representatives who actually opposed it. Herod Agrippa I., a Jew himself, fell into this category and used his right in agreement with the representatives of the Sanhedrin. With all the probability the case was religious but since a Roman procurator is missing in the picture, this case does not directly apply to our debate.

Another capital punishment authorized by the Jews only is described by Josephus in Ant. 20,9,1 (§§200-203) [2]. He tells us how James, the brother of Jesus was stoned due to the decision of the high priest Annus and "the sanhedrin of judges" because he broke the Jewish law. Josephus clearly states that the killing happened in a short time span of no procurator present in Palestine, after the death of the procurator Festus (62 CE) and before the new procurator Albinus arrived. The report goes on that "the most equitable of the citizens" disliked this decision and complained to the Herod Agrippa II. and later to Albinus himself who was on his journey from Alexandria. It seems that the reasons for complaining to Agrippa II. and Albinus were different. While the former had to do with the Jewish law that Annus broke, the latter is reported as follows: "it was not lawful for Annus to assemble a Sanhedrin without his (Albinus) consent". Albinus endorsed this reason and ultimately Annus was removed from the office of the high priest. This instance shows clearly the control of the Roman procurator over the Sanhedrin decision in the area of capital punishment. On the other hand, it has to be kept in mind that all the opposition against Annus and his decision began because he broke the Jewish law putting James to death. Probably James and his case was not worth of capital punishment from the perspective of some respected Jews (or the part of the Sanhedrin?), who tried to stop Annus with whatever help they could find. We can only speculate whether the case would have come to Albinus, if Annus and the Sanhedrin had done everything according to the Jewish law and were unanimous with their decision.

Albinus as a Roman procurator plays an important role in an incident with a man called Jesus, the son of Ananus. Josephus (Bj.

6,5,3 (§§301-309) [2] writes that this Jesus was walking around the city of Jerusalem announcing the doom of the city and the Temple in a prophetic way. First he was brought before the “the most eminent Jews” (probably the Sanhedrin?) who then sent him to Albinus. Albinus after examination that included a severe torture came to a conclusion that this man was insane because he answered nothing to all the questions but was instantly repeating the single phrase “Woe, woe to Jerusalem!” The story confirms that Albinus exercised control over the Sanhedrin decisions as it was seen at the case of James, the brother of the Christ. Moreover, it tells us that Jesus ben Ananus was not a religious law breaker and his activity caused turmoil more in the political realm. Therefore it was natural for Albinus to take the lead in this case.

The final text under the investigation comes for the New Testament and describes the activity, process and stoning of Stephen, the first Christian martyr (Acts 6:8-7:60). His mission caught the attention of the Jews, he was brought before the Sanhedrin (Acts 6:15; Greek original *synedrion*) and accused of speaking blasphemous words against the Temple and the Law (Acts 6:14). After the high priest question: “Are these things so?” (Acts 7:1) Stephen offered a long speech that enraged the hearers and resulted in Stephen’s execution by stoning outside of Jerusalem city limits. Stephen’s process resembles similarities with the one of Jesus of Nazareth, especially the Markan version [25]. Several scholars [13, 19 and 26] regard this incident as an example of a lynch law without a trial. Hence it does not give a clue regarding the Sanhedrin’s right to issue a capital sentence. On the other hand, scholars like Bruce [27] understand it as an example of the Sanhedrin’s religion autonomy in the capital sentence. Stephen’s speech against the Temple could belong to the category of blasphemy and therefore the Jewish authorities did not have to consult the Roman procurator.

3. Conclusion

After screening all the relevant ancient sources we can offer a conclusion to the *potestas gladii* case during Jesus’ time. The outcomes demand a more balanced view of the power of the capital punishment in the Palestine during the Pilate’s procuratorship. It is clear that the right belonged primarily to the Roman procurator. It was a sign of his position as he represented the dominance on the Roman Empire. However, the actual realization of this right and duty might have varied from one procurator to the other. For example, as we saw, Albinus strictly followed this rule having a negative experience with autonomous decision of the Sanhedrin over James, the brother of the Christ during the interregnum period. Also the Jewish representatives during Albinus’ term learned their lesson since they reported the case of Jesus ben Ananus to him. However, in the case of Pontius Pilate, it seems that the Jewish Sanhedrin exercised a greater autonomy even in the capital cases. The stoning of Stephen and

also the Pilate’s words: “Take him yourselves and judge him according to your law!” (Jn 18:31) when Jesus was brought to him, point this direction. Therefore, it is very probable to conclude that the execution of reign including *potestas gladii* was not unanimous with all the procurators and that the Jewish Sanhedrin could have gained more ground under a certain procurator.

It is evident that any competence of the Jewish representatives during the procuratorship was dependent on the procurator’s decision. Yet, on the other hand, there were domains in which the Sanhedrin was autonomous in its sentences including even the capital one. The sources demonstrate that the religious agenda connected with the Temple (Stephen’s blasphemy, breaking the Temple ban, adultery of the priest’s daughter) was one of the domains that the Jewish Sanhedrin had the authority of *potestas gladii*. Although its reach and actual execution might vary, this limited capital authority is best to be understood as an exception in connection with the Temple and the Jewish religion. For example, the Temple tax falls also in this category that incorporated peculiarities of the Jewish religion from the Roman perspective and aimed to secure religious peace in their occupied territories. (Adultery may not seem to fit under the same cultic category with blasphemy or breaking the Temple ban, but, as Hrobon [28] points out, according to the law of Moses, it defiles not only the adulterer, but also the sanctuary of God and even the land of Israel (see, e.g., Lev 18). However, the authority was not limited only to the acts that are explicitly referred to in biblical sources as defiling).

Finally, we can state with the all probability that in Jesus’ trial, the Sanhedrin had the authority to put Jesus to death, if Jesus had been guilty only on the religious terms as a blasphemer and Temple breaker (see Mk 14:53-65 and par.). However, it seems that it was more to Jesus’ case than a religious accusation of a blasphemer. The Sanhedrin evaluated his activities as a threat also in the political area. He attracted big crowds, performed many signs and the Jewish representatives feared that all this could easily turn in to a riot or uprising against the Romans (see Jn 11:45-53). It has to be kept in mind that few of Jesus’ actions could be interpreted along these lines, especially his words about the destruction of the Temple (Mk 13:1-2 and par.) and his cleansing of the Temple (Mk 11:15-19 and par.). The leading Jews were content with the political *status quo* under the rule of the Romans and a possible uprising would destroy their power, wealth and status. The later Jewish war against the Romans (66-70 CE) proved this fear to be true.

The threat of a tumult caused by Jesus’ execution was probably the main reason why the Sanhedrin turned to Pilate even though it did not necessarily had to. Jesus was not a marginal figure at the end of his public career and his activities especially during the Jewish festivals where the multitudes of Jews gathered in Jerusalem could not be overlooked. To execute him secretly was not an option for the Sanhedrin because the risk of a riot was very high as was the Pilate involvement that would immediately

follow. In addition they would risk the anger of the multitudes having executed Jesus as a religious blasphemer. Therefore, they handed him to Pilate and presented him as a political threat to the Roman Empire. Pilate recognized the trap and wanted to escape from it via the *privilegium paschale* – the ancient right to release

a prisoner (Mk 15:6-15 and par.). However, the Jewish leaders were a step ahead of the game and causing a public tumult (Mk 15:11) pushed Pilate to a decision he did not favor. For the *Pax Romana* was more important for Pilate than the truth standing in front of him.

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Michal Valco - Katarina Valcova *

THE EPISTEMOLOGICAL CHALLENGE OF KIERKEGAARD'S TRUTH IS SUBJECTIVITY PRINCIPLE

Kierkegaard rejects the modern concept of objective knowledge and focuses instead on subjectivity, defined as 'inwardness' and 'passion' in determining what might be called 'relevant' or 'existential' truth. Truth should thus be understood as an objective uncertainty appropriated passionately by the inward reflective experience of love and faith of the self. Such 'Kierkegaardian' primacy of epistemology implies that one must first discover the truth about morality and life, in order to try to live out that truth. The proud pursuit of objectivity without a recognition of human limitations, and the dimension of subjectivity in the process, has proved to be a dead end that emits the stench of manipulation, loss of human dignity, and finally nihilism. Understanding the limits of reason will help us avoid the pitfall of 'scientism'.

Keywords: Soren Kierkegaard, epistemology, truth, reason, subjectivity, science, faith.

1. Introduction

Kierkegaard does not accept typical, modern epistemology's concept of moral and religious knowledge, wherein philosophers focus on objective justification (evidence) for our beliefs. We continue to see this futile emphasis being used against an ever-increasing threat of nihilism and moral relativism today. However, the solution of summoning more and more intellectual, rational support for whatever ethical principles we wish to promote is not working and will not work. Similarly, we tend to think that it is the lack of objective evidence that causes the decline in religious faith, whether individually or collectively. According to Evans, Kierkegaard poses a permeating challenge here: "If our grasp of moral knowledge is less secure, it may be because we have become less moral. If religious faith has declined, it is not because we are now more rational and demand more evidence than people did in earlier times, but because we lack the imaginative and emotional capacities to understand the power of religious beliefs" [1]. Not the evidence itself, but rather the character of the knower should be under primary scrutiny. This, however, is difficult to promote because humans prefer the position of 'detached observers' (or, supposedly, 'objective scientists') to that of 'engaged participants' who, by their own attitudes and actions, influence the very process of knowing and thus the results of their scrutiny. Søren Kierkegaard serves as an inspiration and a valuable resource in coping with the intricately connected challenges of personal ethics and epistemology.

2. The Character of the Knower and the 'Truth is Subjectivity' Principle

The Kierkegaardian statement 'truth is subjectivity' [2] can mean a lot of different things [3]. Kierkegaard is highly suspicious of the one-sided focus on objective reflection for it leads into existential indifference (the loss of the subject and subjectivity). In his *Concluding Unscientific Postscript* he argues that "[t]he way of objective reflection turns the subjective individual into something accidental and thereby turns existence into an indifferent, vanishing something. The way to the objective truth goes away from the subject, and while the subject and subjectivity become indifferent, the truth also becomes indifferent, and that is precisely its objective validity, because the interest, just like the decision, is subjectivity" [2, p. 193]. Truth should rather be understood as an objective uncertainty appropriated passionately by the inward reflective experience of love and faith of the self. This is what Kierkegaard considers to be the highest truth a person can attain [4, p. 158]. The reading of Kierkegaard that might prove most useful on this subject understands this statement in the sense that "[t]he quest for truth, at least the truth about the most important things, cannot be divorced from the quest to become the kind of person we need to become. The primacy of epistemology implies that we must first discover the truth about morality and life, and then perhaps we can try to live out that truth. Perhaps it is true that we can only acquire the truth as part of the process whereby we learn to live out the truth" [1, p. 26-7]. One of the reasons why this tends to be so difficult for Christians to practice might be the nature of the process – trying

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to live out the truth of Christ, the crucified Messiah. Luther was one of the few medieval theologians to depict the Christians' experience of suffering as a key hermeneutic component in understanding Christ's message. Hinkson is right to argue that for both, "Kierkegaard and Luther alike, suffering and discipleship remove the theology of the cross from the realm of mere cognitive theory (and hence from the danger of degenerating into a theology of glory) to the personally costly realm of praxis" [5].

This brings us to what some authors have come to call the principle of 'experiential epistemology' [6]. A strong emphasis on memory, logical argumentation and confessional purity of theological education (and thus on the objective aspects of religious faith) does not reflect the new dynamics of our culture. It omits, among other things, the focus on intuition, on emotional processing of events, and the intensity of experience. In fact, it does not reflect the complexity of the process of learning. This trend is further reinforced by a growing suspicion of all meta-narratives – whether they are religious, political, or philosophical – in the fragmented world of Western post-modernism. Kierkegaard should rightly be considered a prophet in this respect. The neglect of the subject and his inner world results in ambitious projects of human ideologies at the expense of the individual. The proud pursuit of objectivity without a recognition of human limitations, and the dimension of subjectivity in the process, has proved to be a dead end that emits the stench of manipulation, loss of human dignity, and finally nihilism. Harries is right to remind us of the necessity to acknowledge the limitations of our epistemological and scientific endeavors: "to understand that what we experience is only an appearance, bound by a particular perspective, is to be already on the road towards a more adequate, and that means here first of all less perspective-bound and in this sense freer understanding. The pursuit of truth demands a movement of self-transcendence that, by leading us to understand subjective appearance for what it is, opens a path towards a more adequate, more objective understanding" [4, p. 161]. Harries doesn't suggest that the way to go is to get lost in mere subjective fancies. On the contrary, "[t]he pursuit of truth demands objectivity. But... truth here is not thought in relation to God. When we attempt to do so we discover ourselves to be in the wrong" [4, p. 161].

3. Limits of Human Reason – Implications for Epistemology

In addition to the welcomed emphasis on the nature and the importance of the knower in the process of acquiring true knowledge, Kierkegaard reminds us of the limits of human reason. It should be no surprise to finite, mortal creatures that "there are limits to human reason, limits that make it necessary for humans to respond in faith to a divine revelation if we are to reach the truth about ourselves" [1, p. 31]. There are some truths which the human mind (being naturally limited in both the scope and nature

of knowledge) cannot comprehend. The best and most important example that Kierkegaard points out is the phenomenon of Incarnation (John 1:1-3.14). It would certainly be unfounded to blame Kierkegaard of irrationalism on this point. After all, the human mind as a 'conscious reality' remains essentially an impenetrable mystery to scientists. Both philosophy and the cognitive sciences have begun an ambitious enterprise: "to get beyond the confines of our individual minds, with their personal histories and idiosyncrasies, to grasp how reality is in itself, right down to its ultimate principles" [7] so that we (thinking humans) can "bring the world up close and gaze into its inner constitution, so that everything falls into place under the bright light of *universal reason* [emphasis added]" [7]. Yet there is a remaining sense of awe and mystery, or at least there should be. For just like the separation of spirit (that is, conscious mind with its conscious will) remains a mystery in our understanding of evolution, our minds are not able to comprehend the mystery of the uniting of spirit with matter in the event of the 'Word becoming Flesh,' personified in Jesus from Nazareth [8]. Philosophers, scientists, as well as theologians should rather humbly concede that neither science nor religion can claim to give a total account of reality. Science, philosophy, and theology rather operate in different dimensions, using different perspectives to answer the same or similar questions, as McGrath suggests in his *Science and Religion: A New Introduction*. McGrath indicates: "Science does not answer every question that we might have about the world. Neither does religion. Yet taken together they can offer a stereoscopic view of reality denied to those who limit themselves to one discipline's perspective on things. The science and religion dialogue allows us to appreciate the distinct identities, strengths, and limits of each conversation partner. It also offers us a deeper understanding of things than either religion or science could offer unaided" [9].

4. Distinguishing 'Science' from 'Scientism'

Thus there are good reasons to believe that the human society would be better off if it resisted the tempting delusions of 'scientism' and treated science for what it actually is: a specific, distinct culture with its own methodology, presupposition, and values [10]. Much like theology, science is "a network of material practices, built environments (including laboratories, instrumentation, etc.), traditions of apprenticeship, and learned rituals that emerged over time, in particular configurations, in different places" [10, p. 5]. So, epistemologically speaking, science – like ethics, as well as 'Kierkegaardian' faith – takes place within a complex human tradition. If we agree with the previous conclusion that "we can only acquire the truth as part of the process whereby we learn to live out the truth" [1, p. 26-7] then it follows that in order to acquire new scientific knowledge, the scientists themselves 'create their own phenomena' (so to speak) and are changed in the process of a disciplined study of

nature: “While science seeks to be disciplined by nature, there is also a sense in which science *creates* its own phenomena. It constitutes its world through experimental performance which is a *learned* performance requiring its own set of virtues and skills, deft employment of instrumentation, and a kind of ‘know-how’ that is not theoretical, and perhaps not even ‘intellectual’ [10, p. 6]. This leads us to reject the unscientific assumptions of metaphysical naturalism – which is, in fact, not primarily a product of the 18th and 19th centuries but rather of the 20th century [11]. Such assumptions are really nothing but unfounded, metaphysical presuppositions at variance with the legitimate methodological naturalism of science [12]. What we are thus dealing with here under the guise of science, is a distinct, materialistic philosophy of reality, promoted dangerously as the only viable – that is, ‘objective, scientific’ – account of reality. A hidden ideology is thereby portrayed as respectable science, causing people to lay down their defenses and to readily accept everything such ‘science’ has to offer.

Our Central and Eastern European societies have had a direct experience with a radically militant strand of such metaphysical naturalism in the form of the atheistic materialism of Communist ideology – with grave socio-political, economic, and especially moral consequences [13]. Severed from faith, the pragmatic reason of the ideologists had no convincing answer to the questions: ‘*what constitutes moral action?*’, and ‘*why should I be moral?*’ This is what already in the 18th century Kant suspected in his doctrine of radical evil [4, p. 167]. Our totalitarian experience validates Harris’ thesis that “[t]here is no argument that can make an evil person embrace the good, no good argument, e. g., that will force someone who finds the claim that we should strive to maximize pleasure and minimize pain in our own case quite

persuasive, but sees no good reason to extend that principle to all human beings or perhaps even further, to change his mind. That would require a change of heart. Ethics presupposes faith in some power that calls us to that respect of others and their rights that found expression in Kant’s categorical imperative. In that sense when we dig into the foundations of ethics we will inevitably hit sooner or later on religious ground” [4, p. 167].

5. Conclusion

Faith and reason, theology and philosophy, should instead be seen as different ways of organizing affects, both being reconceived as assemblages. If we follow the lead of Adkins and Hinlicky in their *Rethinking Philosophy and Theology with Deleuze: A New Cartography*, perhaps we can constructively reinvent the relation between reason (philosophy) and faith (theology) in a way that allows their proper distinction while differentiating various domains of thought on the bases of what they create [14]. What we see in Kierkegaard is an abrupt departure from the European metaphysical tradition which favored the noetic certainty of knowledge. For Kierkegaard, truth is more than a noetic, objective category, accessible to intellectual inquiry by a thinking subject. There must be a deeper, existential basis, related to the deepest aspirations and, yes, fears and doubts of the individual – a desire permeated by passion. The truth cannot be meaningful and relevant without this ‘subjective desire,’ whose doubt is the beginning of the highest form of existence. This leads us beyond delineating the boundaries of the unknown (and the unknowable) in the negative form, all the way forward to the positive question: ‘who am I and what am I to do?’.

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which is universally good: “Our failure to discern a universal good does not record any lack of insight or ingenuity, but merely demonstrates that nature contains no moral messages framed in human terms. Morality is a subject for philosophers, theologians, students of the humanities, indeed for all thinking people. The answers will not be read passively from nature; they do not, and cannot, arise from the data of science.” Ibid., p. 3; original source: GOULD, S. J.: *Hen’s Teeth and Horse’s Toes: Further Reflections in Natural History*, New York : W. W. Norton, 1994, p. 42.

- [10] SMITH, J. K. A.: Science and Religion Take Practice: Engaging Science as Culture, *Perspectives on Science and Christian Faith*, vol. 65, No. 1 (March 2013): 3-9. Much of the modern conflict between science and theology can be attributed to the fact that “the theology/science conversation has tended to ignore the fact that science is a *cultural* institution. By a ‘cultural institution,’ I mean, first of all, an institution that is a product of human *making*, a contingent product of *poiesis*. Culture is the unfolding of potentialities that are latent or implicit in ‘nature,’ as it were.” Ibid., p. 4.
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- [14] ADKINS, B., HINLICKY, P.: *Rethinking Philosophy and Theology with Deleuze, A New Cartography* : London : New Delhi : New York : Sydney : Bloomsbury, 2013, 214-216. It might be worth considering what kind of new questions, if any, arise from this (that is, Adkins’ and Hinlicky’s) juxtapositioning of Deleuze and Christian theology on the same plane of immanence.

Marta Lackova - Eva Lelakova *

INTERLINGUAL HOMONYMS OF POLYSEMIC ORIGIN IN RELATED LANGUAGES

The article deals with lexical units of homonymic character functioning on the inter-linguistic level in Slavic languages. The emphasis is put on interlingual homonyms with the origin in the semantic relation of polysemy. In order to provide a theoretical background, the differences between homonymy and polysemy are highlighted. Moreover, homonyms are defined and classified taking into account their etymology. The principal part focuses on the relation: a polysemic homonym in one language - a monosemic homonym in the other one and vice versa.

Keywords: Homonym, monosemy, polysemy, interlingual homonymy, etymology.

1. Introduction

The topic of interlingual homonyms is a linguistic phenomenon which very frequently preoccupies both academics and foreign-language translators and teachers. From the perspective of didactics, interlingual homonyms or false friends are words that are similar in spelling and/or pronunciation in two languages but have different meanings. A common mistake that beginning students of foreign languages make is the assumption that a word that looks similar to the one they know will have the same meaning.

It is crucial to supplement the existence and functioning of homonymic elements also by other linguistic criteria and phenomena such as word-formation features, the criterion of synonymic lexemes, stylistic aspects and the place of homonyms both in paradigmatic and syntagmatic hierarchies. Our primary role is to analyse the mutual relationships of interlinguistic homonyms from the point of view of polysemy and monosemy in the compared languages. At the beginning we briefly define the notion of homonyms in the sphere of semantics; we point out that their theoretical and terminological specification is not unified in linguistic literature.

2. Homonymy and polysemy

Slavic and Anglo-Saxon linguistic literatures offer tens of various definitions of homonymy and also theoretical disputations concerning boundaries between homonymy and polysemy. At the same time, the disunity of lexicographical elaboration of possible homonyms illustrates that the boundary is not impervious.

Within the context of Slovak linguistics, Findra contributed to the research of differences between these two categories. If polysemy and homonymy should stay individual (bordered lexicological) categories then it is crucial to arise from the view according to which the origin (the way of creation) of two or more identically sounding naming units having a different meaning is the most verifiable criterion when setting boundaries between them [1].

In addition to this, Findra evaluates homonyms as two words whose phonetic form is the result of chance [1]. Each of the two homonymic words denotes a different (individual) object, phenomenon, feature or process. On the other hand, analysing polysemy we proceed from one, basic, initial or primary meaning. The other meanings of a polysemic naming unit originate usually by a metaphorical way so that the original (primary) meaning is divided into several individual secondary meanings.

Considering this, polysemy and homonymy as system lexicographical categories, are in the relationship of similarity and difference mostly with synonymy and antonymy. Complex mutual connections among words of lexicon and their meanings are reflected within the relationships and at the same time they demonstrate the structural nature of the language layer which also creates a mutually interconditioned and logically correlated system of elements.

Out of the Slavic linguistics, the Bulgarian lexicology pays a closer attention to the differentiation of polysemy and homonymy [2]. It is possible to use four methods in order to define differences between polysemy and homonymy:

1. Semantic – it is based on the usage of a word in a context – it is the method applied also within the Slovak lexicology,

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2. Synonymic – it utilizes the creation of new synonymic rows; when it is not possible to use a synonym from one synonymic row in another synonymic row, we talk about homonymy.
3. Word-formation – homonymy is defined by its capacity to create new words and
4. Grammatical – homonymy might be identified as a condition when each word has its own paradigm which is different from the paradigms of other words.

Russian linguistics in particular determines the following basic attitudes to the interpretation of lexical homonymy and polysemy [3]:

The first attitude is based on the recognition of both monosemic and polysemic words. Three procedures are applied in order to define differences between homonymy and polysemy:

1. Homonyms are only the identically sounding words which originally had a different form and they were mutually equal from the point of view of phonetics or orthography under the influence of various reasons,
2. Homonyms are words with different etymology but with a corresponding phonetic form and
3. Homonyms originate when the meanings of polysemic words digressed so much that new words have the conditions to originate.

The second attitude is connected with the recognition of only monosemic words existence; each of them is associated only with one denotate.

The studied issue is closely interconnected with diachronic aspects. The relation of polysemy and homonymy changes during the language development. This state is determined by the dialectic unity of content and form of a word as a linguistic sign. During the development of the language semantic system there are two processes in the direction from polysemy to homonymy and vice versa.

Changes in the meanings of words are determined by numerous reasons both of linguistic and extralinguistic characters. Psychological and social aspects like prejudices or stereotypes as fixed attitudes aimed at certain objects or phenomena with which one does not have any experience are counted among them [4].

Generally speaking, the following processes are observed when taking into account the origin and etymology of homonyms [5]:

1. Taking over of foreign words,
2. Calques,
3. Word-formation processes and
4. Semantic development of a word – splitting of polysemy (historical, homogenous homonymy).

Homonymy from split polysemy is considered to be the most common source of intralingual homonyms [6]. These homonyms appear when their meaning digress to such an extent that they lose the relationship which had connected them. The relationship of development is becoming illegible from the synchronic point of

view and completely independent lexical units originate. This type is characterized as a homogenous type of homonymy as it is the consequence of the semantic development of a lexeme. In order to differentiate homogenous homonyms from a polysemic lexeme a complex semantic and word-formation analysis is essential.

From the point of view of semantics, homonymy appears when:

1. Originally one word is decomposed into two or three meanings,
2. Originally one word is decomposed into two or three lexemes via a semantic change of its base and by a different, but in its result the identical derivation and
3. Two from their origin different native words merge during the language development [7].

Only the type of lexical polysemy which Dolnik calls the indirect (mediated) polysemy might turn into homonymy [7].

Homonymy represents the limit of a semantic modification of a word and a contextual influence on one of its meanings. The semantic modification of a word is a potential process of its homonymization. It is necessary to add that the potential homonymization of a word is acceptable with specific types of a semantic modification so only a certain type of lexical polysemy might lead to homonymy.

Furthermore, homonymy becomes the limit of semantic modification of a word exclusively at indirect polysemy. The difference between the direct and indirect polysemy lies in the extent of affinity of the original and derived meanings.

With direct polysemy the higher extent of semantic affinity is reflected in the fact that a common, connecting element is a constituent of both the meanings. With contrasting the indirect polysemy, the common element is only an implicated element of the original meaning. The weaker the implicated relationship between the connecting element and the original, or derived meaning is, the lower the extent of affinity between the original and derived meanings is – the more semantic modification is approaching the limits of homonymy.

Studying the last type of homonyms it is found out when and how the semantic decomposition of the word is realized; it is the object of diachronic lexicology. Homonyms, as the result of this process, are evaluated as a synchronic dynamic lexico-semantic phenomenon. Thus they become the subject of synchronic lexicology.

3. The concept of interlinguistic homonyms of polysemic origin

While contrasting two or more typologically close or diverse languages, interlinguistic homonymy of polysemic words represents a specific instance of the homonymy and a constant source of interference.

Loan words represent a frequent source of partial or complete interlingual homonyms (i.e. false friends) in three ways [8]:

1. In the target language loan words might be restricted only to one of possible meanings of a polysemic word from the source language,
2. Loan words might develop polysemies which are missing in the source language, and
3. The meaning of loan words might digress from the meaning/meanings of the source language because have been used metaphorically.

We observe the above mentioned semantic processes in these examples (i.e. a monosemic word along with polysemies):

магазин (Bulgarian) 'shop' ≠ *магазин* (Ukrainian) = *magasin* (French) 'shop'; 'storehouse' ≠ *magazin* (Czech) 'magazine', 'magazine (programme)' ≠ *магазин* (Russian) 'shop'; 'storehouse'; 'magazine'; 'decade box' ≠ *Magazin* (German) 'glossy magazine'; 'storehouse'; 'magazine';
artikl (Croatian) = *Artikel* (German) 'item'; 'grammatical article'; 'article' ≠ *artikl* (Czech) = *артикул* (Russian) = *artikel* (Slovak) 'item' ≠ *article* (French) 'item'; 'grammatical article'; 'article'; 'article of faith'; 'item'; 'article of law'.

Lotko provides an extensive classification of interlinguistic homonyms which operate in Slavic languages [8]. He analyses numerous aspects of these lexical units (grammar, pronunciation, origin, and stylistics) but for the needs of our research we concentrate on their semantic subgroups. False friends are equally as other lexical units either monosemic or polysemic. Polysemic false friends are divided into fully false (all the meanings are different) and partially false (some meanings are the same and the others are different).

False friends might be not only polysemic but also to a lesser degree homonymic. Usually we deal with homonymy in one of the compared languages. Homonymic words are either of the identical origin or they come from various languages. Khutsishvili introduces several types of semantic relations in the sphere of interlingual homonyms [3]:

1. Relations of semantic exclusion – semantic disjunction and
2. Relations of semantic identity – semantic inclusion or intersection.

For the purposes of our research these two groups provide the ground for the following correspondences:

- a) a monosemic word corresponds to a polysemic word (the most frequent combination; either semantic inclusion or exclusion are present):

jar (Slovenian) 'spring'; 'angry' ≠ *jary* (Czech) 'fresh';
знак (Bulgarian) 'sign' ≠ *znak* (Czech) 'feature'; 'symptom'; 'sign'; 'symbol'; 'backstroke';
fřkati (Slovenian) 'to run around'; 'to flip'; 'to lock' ≠ *fřkat* (Czech) 'to snort'; 'to huff';
bànkēt (Croatian) 'banquet'; 'bench' ≠ *banket* (Czech) 'banquet';
kúkati (Slovenian) 'to cuckoo'; 'to be peeing out'; 'to stick out' ≠ *kukat* (Czech) 'to cuckoo';
будова (Belorussian) 'building'; 'structure' ≠ *budova* (Czech) 'building'.

- b) a polysemic word corresponds to a polysemic word (there must be at least one differentiating seme; couples where the "falseness" is manifested only at some meanings of polysemic lexical units and other meanings of word counterparts correspond mutually):

jadrn (Slovenian) 'fast'; 'sailing' ≠ *jadrny* (Czech) 'earthy'; 'apt';
kaliti (Slovenian) 'to make cloudy'; 'to spoil'; 'to quench'; 'to germinate' ≠ *kalit* (Czech) 'to make cloudy'; 'to spoil'; 'to quench'.

One of the reasons of their existence is that there are not corresponding polysemic words according to the number of lexico-semantic variants:

ljubiti (Croatian) 'to love'; 'to like'; 'to kiss' ≠ *любить* (Russian) 'to love'; 'to like'.

In addition to this, the examples below illustrate the employment of metaphorical meanings in the framework of this relationship:

hlád (Croatian) 'shadow' ≠ *hlad* (Czech) 'hunger'; 'lack of food'; 'cold'; 'heartlessness'; 'desire';
nop (Bulgarian) 'polecat'; 'to stink like a skunk' metaphor, jargon ≠ *por* (Czech) 'leek'; 'pore';
завем (Bulgarian) 'lee'; metaphor; 'message' ≠ *zavět* (Czech) 'testament';
еръх (Bulgarian) 'top'; 'tongue tip'; 'crest' metaphor; 'authority' metaphor ≠ *vrch* (Czech) 'hill'; 'hillside'; 'top';
amázōnka (Croatian) 'Amazon' mythological; 'woman rider'; 'Amazon'(virago) metaphor 'long woman shirt for riding' ≠ *Amazonka* (Czech) 'Amazon' mythological; 'Amazon'(virago) metaphor;
mrâk (Croatian) 'darkness'; 'dark night'; 'ignorance' metaphor ≠ *mrak* (Czech) 'cloud'; 'mass';

nápoj (Croatian) 'drink' bookish; 'pigswill' metaphor; 'swill' ≠ *nápoj* (Czech) 'drink';

zmija (Croatian) 'snake'; 'Ophidia serpents'; 'harpy' metaphor ≠ *zmije* (Czech) 'viper'; 'harpy' metaphor ≠ *змия* (Bulgarian) 'snake'; 'harpy' metaphor.

- c) a monosemic word corresponds to a monosemic word (semantic exclusion – a couple of words semantically completely different):

алеў (Belorussian) 'vegetable oil' ≠ *alej* (Czech) 'lane';

veš (Croatian) 'clothes' ≠ *veš* (Czech) 'lice';

моторка (Ukrainian) 'motor boat' ≠ *motorka* (Czech) 'motor cycle'.

Moreover, regular semantic correspondences do not appear within languages which belong to the same branch of the Slavic language family (east Slavic languages, west Slavic languages): *вид* (Ukrainian) 'kind, type'; 'face'; 'look'; 'branch'; ≠ *вид* (Russian) 'type, kind'; 'grammatical aspect' ≠ *vid* (Czech) 'there is no trace of him'; 'grammatical aspect' ≠ *vid* (Slovak) 'grammatical aspect'; 'there is no trace of him'.

4. Linguistic characteristics of interlinguistic homonyms of polysemic origin

Interlingual homonyms of polysemic origin are further described from the point of view of the phonetic, orthographic, morphological and stylistics aspects. The following lexical units demonstrate certain phonetic and orthographic peculiarities on the base of which they are traditionally divided into the following subgroups [5]:

1. Phonetic-graphic homonyms – the graphic and phonetic forms of the lexical units are the same; there exist differences in their meaning:

завод (Macedonian) 'factory'; 'bureau, institution' ≠ *завод* (Russian) 'factory';

2. Phonetic homonyms – the lexical units correspond to each other from the point of view of phonetics but there appear differences in their graphic form:

булка (Belorussian) = *bulka* (Polish) = *булка* (Russian) 'baked yeast dumpling' ≠

булка (Bulgarian) 'bride'; 'young woman' ≠ *bulka* (Czech) 'swelling'; 'bull';

булка (Ukrainian) 'baked yeast dumpling' ≠ *булька* (Ukrainian) 'bubble' ≠ *булка*

(Ukrainian) 'bride' obsolete (homonyms also in Ukrainian);

3. Graphic homonyms – the lexical units correspond to each other from the point of view of graphics but there appear differences in their phonetic form:

листопад (Russian) 'falling of leaves' ≠ *листопад* (Ukrainian) 'falling of leaves';

'November' (differences in the pronunciation of vowels *u* and *o*).

The formal criterion determining the forms agreement which is necessary for setting the boundaries between individual types of lexical units of homonymic character has to take into account the agreement principle in conformity with which we do not find relevant regular graphic, phonetic and morphological differences.

In other words, when conceiving homonymic couples and rows orthographic peculiarities of individual compared languages do not play the crucial role while Roman and Cyrillic alphabets do not represent any obstacle when analysing semantics of the studied lexical units. At the same time, we have to count with natural alternations of consonants and vowels:

grđ (Slovenian) 'ugly'; 'disagreeable'; 'nasty' expressive ≠ *hrdy* (Czech) 'proud'; 'self-confident';

лицè (Bulgarian) 'face'; 'facade'; 'expression'; 'person' ≠ *lice* (Czech) 'face' book. ≠

лицо (Russian) 'face'; 'profile, plasticity, character'; 'person'; 'cheek'; 'person'

linguistic ≠ *lice* (Slovak) 'cheek'.

Morphological features of interlingual homonyms copy general principles of grammatical systems functioning of individual Slavic languages and at the same time, they highlight the differences between them. On the one hand, the languages show corresponding features (lexical units with the same grammatical paradigm), on the other hand, we observe differences in the grammatical categories of interlingual homonyms:

- a) number of nouns:

бою (Bulgarian) 'fight' (only singular); 'stature' ≠ *boj* (Czech) 'fight'; 'struggle';

вкус (Bulgarian) 'taste' (only singular); 'flavor' (only singular); 'style'; 'elegance' ≠

vkus (Czech) 'taste'; 'style';

височина (Bulgarian) 'pitch of tone' (only plural); 'altitude' geometrical; 'hill';

'height' ≠ *vkus* (Czech) 'highlands';

b) gender of nouns:

закуска (Ukrainian) 'starter'; 'bite'; 'breakfast'; 'snack'; 'dessert' feminine ≠ *закуска* (Russian) 'bite' feminine ≠ *zákuska* (Croatian) 'dessert'; 'refreshment' feminine ≠ *zákusek* (Czech) 'dessert' masculine.

Generally, homonyms which operate on interlinguistic level have become members of open word classes (marginally pronouns and adverbs) but the studied homonyms are noted exclusively within:

a) nouns:

lichva (Bulgarian) 'interest'; 'charge' ≠ *lichva* (Czech) 'usury';
кадръ (Bulgarian) 'cadres' (either singular or plural); 'staff'; 'core group'; 'reserves';
 'shot' ≠ *kadr* (Czech) 'core group'; 'cadres';
образец (Bulgarian) 'model'; 'sample'; 'specimen'; ≠ *obrazec* (Czech) 'figure';

b) adjectives:

kímen (Slovenian) 'fodder'; 'rear' ≠ *krmný* (Czech) 'fodder'; 'for fattening';
obraten (Slovenian) 'opposite'; 'company' ≠ *obratný* (Czech) 'skillful'; 'clever';
konieczny (Polish) 'necessary' ≠ *konečný* (Czech) 'final, bounded, definite';

c) verbs:

moriti (Slovenian) 'to kill'; 'to exhaust'; 'to torment' ≠ *mořit* (Czech) 'to torment';
 'to annoy'; 'to stain';
dotírati (Slovenian) 'to subsidize'; 'to bring, to drive'; ≠ *dotírat* (Czech) 'to pester';
 'to badger'; 'to harass'; 'to bug';
baviti (Slovenian) 'to occupy' ≠ *bavit* (Czech) 'to talk to sb'; 'to have good fun'.

Semantic features of the analysed lexical units represent the essence of their functioning and the interference they cause. The reasons of the origin of semantic differences within the studied issue are to be found – except for extralinguistic features – also in their etymology. The number and role of possible sources of interlinguistic homonyms in a specific group of languages are different and they are determined by genetic and historical language contexts.

International lexis represents a special layer within the studied issue. Recently the words of English origin which have penetrated into contemporary Slavic languages [9] have acquired an important position within the context. The typology of differences in the field of international lexis is to be divided into three subgroups [3]:

1. Semantic differences – connected with the fact that a word might have a more general meaning in one language and a more specific meaning in the other one; a word is monosemic in one language and polysemic in the other one,
2. Historical differences and
3. Functional and stylistical differences – the group of meaning of international origin in one language might be of neutral nature and in the other language it might belong to stylistically marked words. These discrepancies are connected with the accessibility of the word usage predominantly or marginally in certain functional styles – the phenomenon is very common in Slavic languages:

dóza (Croatian) = *доза* (Ukrainian) 'dose' ≠ *dóza* (Czech) 'decorative case' ≠ *doze* (Czech) 'dose of medicine'; 'medicine' ≠ *Dose* (German) 'little box'; 'cigarette case'; 'tin'; 'dose of medicine' colloquial; 'socket' technical, colloquial.

From the perspective of stylistics, the above mentioned lexical units find their realization within several stylistic layers both in literary and non-literary forms of language (see Table 1 and Table 2):

Interlingual homonymy in literary forms of language

Table 1

stylistically neutral lexical units	<i>krčiti</i> (Slovenian) 'to shrink'; 'to cause cramps'; 'to stamp'; 'to clear fell'; ≠ <i>krčit</i> (Czech) 'to furrow'; 'to crease'; 'to huddle'; <i>graditi</i> (Slovenian) 'to build'; 'to create'; 'to divide'; 'to place' ≠ <i>hradit</i> (Czech) 'to enclose'; 'to pay';
a stylistically neutral lexical unit in opposition to a term	<i>множина</i> (Ukrainian) 'plural of nouns'; 'set' ≠ <i>množina</i> (Slovak) = <i>množina</i> (Czech) 'set of elements determined in a certain way'; 'set of numbers';
a stylistically neutral lexical unit in opposition to a bookish word	<i>vekovít</i> (Slovenian) 'imperishable'; 'eternal' ≠ <i>věkovitý</i> (Czech) 'age-old'

Interlingual homonyms in non-literary forms of language

Table 2

a stylistically neutral lexical unit in opposition to an obsolete word	<i>díven díven</i> (Slovenian) 'beautiful' obsolete ≠ <i>dívny</i> (Czech) 'strange', 'suspicious', 'fishy' ≠ <i>дивный</i> (Russian) 'beautiful'; 'extraordinary' obsolete; <i>narôčen</i> (Slovenian) 'wrist' obsolete ≠ <i>náročný</i> (Czech) 'demanding', 'sumptuous', 'difficult';
a stylistically neutral lexical unit in opposition to a colloquial word	<i>pohitéti</i> (Slovenian) 'to be in a hurry' ≠ <i>pochytit</i> (Czech) 'to catch'; 'to grasp' expressive; 'pick up' colloquial;
a stylistically neutral lexical unit in opposition to a slang word	<i>laska</i> (Croatian) 'compliment' ≠ <i>laska</i> (Polish) 'stick' 'beauty' slang ≠ <i>laska</i> (Czech) 'love, beloved thing'; <i>покарання</i> (Ukrainian) 'punishment', 'fine' ≠ <i>кара</i> (Russian) 'punishment' ≠ <i>kára</i> (Czech) 'handcart'; 'car' slang;
a stylistically neutral lexical unit in opposition to a dialectal word	<i>čárka</i> (Czech) 'short line'; 'comma'; 'decimal point' ≠ <i>čárka</i> (Croatian) 'magician' dialectal; 'battle'; 'variance'; <i>číslo</i> (Slovenian) 'prayer beads' dialectal ≠ <i>číslo</i> (Czech) 'number'; 'issue'; 'act'; 'size'; 'grammatical number';
a stylistically neutral lexical unit in opposition to a poetic word	<i>szumny</i> (Polish) 'effervescing' poetic, 'extraorbitant, ostentatious' ≠ <i>šumný</i> (Czech) 'effervescing' bookish, 'handsome, nice' expressive;
a stylistically neutral lexical unit in opposition to a vulgarism	<i>hlástati</i> (Slovenian) 'eat noisily' (animals, people vulgar); 'have a desire' expressive; ≠ <i>chlástat</i> (Czech) 'drink (animals)'; 'drink voraciously' = <i>chlástat</i> (Slovak) 'drink voraciously' expressive;

Some of these lexical units are false several times as they together with their special semantics and in comparison with their dialecteme in the original language can function in individual meanings with a different semantic value. It is possible to observe combinations of several stylistic layers within one homonymic row:

vážen (Slovenian) 'important, serious' obsolete; 'boastful' slang ≠ *vážený* (Czech) 'having respect' ≠ *важный* (Russian) 'important'; 'looking important' ≠ *важен* (Bulgarian) 'important'; 'serious';
staw (Polish) 'joint' anatomic; 'water reservoir' ≠ *stav* (Czech) 'conditions'; 'stratum'; 'loom';
кутка (Bulgarian) 'bunch'; 'tuft', 'cluster'; 'flowers' colloquial; 'wrist' ≠ *kytka* (Czech) 'bunch'; 'flower' regional.

Finally there exists a transition group between stylistic and semantic interlingual homonyms - formal-semantic interlingual homonyms. They demonstrate not only a diverse stylistic value of individual meanings of a polysemic word but also differences in denotation.

5. Conclusion

For terminological, didactic and translation practice it is crucial to realize that it is not possible to take into consideration only the meaning which is indicated by the interlingual homonym from the original language on the basis of its form but it is

necessary to search also for its semantic elements in the target language.

Another aspect covers the fact that such a lexical unit might have the same meaning in several languages while the differentiating meaning appears only in one of the studied languages. At the same time, interlingual homonyms have the ability to utilize forms of the borrowed word adaptation into the target language.

The practical value of the interlingual homonyms of polysemic origin research in related and non-related languages is important for the correct understanding of contemporary fiction, films, newspaper texts, and academic and professional pieces of writing.

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THE HISTORICAL BACKGROUND OF THE SLOVAK PRESS IN THE USA

It was the Slovak-American press that had unified the Slovak community in the USA. It had represented a relevant source of information about the Slovak community life as well as about the situation back home in Europe. The preservation of Slovak cultural heritage in a specific heterogeneous environment helped to awaken Slovak interest in national issues and encouraged the Slovak nation to speak up for their rights.

Keywords: Slovak immigration, USA, Slovak-American press.

1. Introduction

The term “Slovak-American press” requires an attempt to account for a concept of the notion “the Slovakist document” within the concept of a library document. The Slovakist document is defined as a library document written in Slovak or related to Slovakia or the Slovak nation issued in or outside the Slovak Republic whose author or authors are of Slovak nationality or Slovak roots [1]. The press of Slovak Americans represents highly valuable documentary heritage which contributes to a community identity and helps to preserve the Slovak identity and nationalism in or outside the Slovak minority living in the USA. The section of Book Culture History of the Slovak National Library in Martin represents the main sector for research and development of book collections, both territorial and extraterritorial Slovak related prints.

2. The historical background of the Slovak press in the USA

2.1 The first Slovak Fraternal Organizations

The well-known source book about the first Slovak institutions abroad is the one written by a great Slovak historian Konstantin Culen “*The History of Slovaks in America*”, 1942 [2]. A current historical researcher, Marian Mark Stolarik, the professor at the Cleveland State University of Minnesota, whose publications include valuable information about the beginnings of the first Slovak organizational, cultural and political activities, argues that the cornerstone of Slovak cultural heritage preservation is built

on three essential pillars: parish churches, press and fraternal organizations.

Even in the early years of settlement in North America, the ethnic minorities had learnt the principles of collectivism to deal with the hard time they came across in a new world. In need of help in case of illness, fatal or serious injury, there were no social services provided by American employers. The beginnings of the first societies date back to the early 17th century and had primarily social character. It was not Slovaks but Scottish immigrants who set up the first so called self-help organizations that provided the essential services to their members. Later on they were followed by other ethnic groups – Polish, Irish and Czech [3].

Catholic religious traditions supported the Slovak intentions to gather for both their protection and loyalty. Soon, they formed their own institutions that helped them to survive in a capitalist economy. Their primary intention was to follow their social and national program, to offer their members help in need, to assist in parish churches, education centre and first press institution establishment. M. M. Stolarik [3] reports about fifty beneficial societies that had been established by 1890, twenty-five of them in Pennsylvania. *Persi Uherszko-Szlovenszky v Nyemocz Podporujuci Szpolec* is reported as the first fraternal institution founded in 1883 in New York [2]. Soon, more than 40 fraternal associations had been formed in the northeastern and midwestern part of the United States. Many priests had left Austrian-Hungarian Empire to help to build the intellectual life in Slovak communities in the USA. By 1896 the scattered regional societies were affiliated and transformed into full-fledge insurance companies.

The most influential *The National Slovak Society* was established in Pittsburgh in 1890. The organization was led

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by Peter V. Rovnianek who was the father of the first Slovak daily newspaper in Pittsburgh, *Amerikansko-Slovenske Noviny* [4]. The rivalry national body, *The First Catholic Slovak Union* was established by Reverend Stefan Furdek in February 1890. The need for one united organization rose. This fact led to an ideological clash between Furdek and Rovnianek in which the Slovak American press played an important role. While Furdek's idea was to build one primarily religious institution, Rovnianek called for the national one [2]. Though they belonged to the opposing religious divisions, they used their editorial skills to gain new members.

The abolition of *Matica Slovenska* together with anti-Slavic activities organized by Hungarian authorities resulted in the birth of *Matica Slovenska in America* in Chicago on 26th September 1893 headed by Stefan Furdek. The aim of the institution was to take care of Slovak cultural and national life both in America and back home [2]. But the ideological conflict between Rovnianek and Furdek continued and resulted in the establishment of the *Matica Slovenska* rivalry institution called *Majak* in Pittsburgh in 1894. It issued the literary magazine *Majak* [2]. The conflict continued and resulted in the dissolution of the institution.

The formation of *the Slovak League of America* in 1907 meant a breakthrough in the Slovak national and political activities. It was this institution that managed to affiliate several rival fraternal-benefit associations under one strong institution. The League helped to declare the common state of Czech and Slovaks on the federation basis by signing the Cleveland Agreement on 22 October 1915 followed by the Pittsburgh Agreement on 31 May 1918. It was the sign that Slovak Americans were strong enough to control their activities not only in the USA but, which is more important, also in Europe.

The Slovak-fraternal organizations represented a radical change in thinking and allowed the Slovak communities to interfere with the political situation even in their home land in Europe during the years of the formation of the first independent Slovak Republic. Slovak Americans believed in the rights of Slovaks to self-determination also during the World War II and *the Slovak League of America* supported the idea of the independent Slovakia at the Conference in San Francisco in 1945. But the discontent with the post war situation resulted in the next wave of immigration into the USA.

2.2 The beginnings of Slovak press activities in the USA

It is the press that acts as a great background material on Slovak American community life. It was formed as the reaction to the lack of relevant and unbiased international and local news for Slovak workers. It reflected a harsh battle between the major Slovak American religious groups. It called for liberation movement back home in Austria-Hungary, and expressed the

Slovak American attitude to a postwar Czechoslovakia and independent Slovakia. The history of the first Slovak press activities in the USA dates back to 1885. According to L. Bartalska [5] there had been about 250 Slovak daily, weekly and monthly newspapers issued mostly in North America since then and their number had culminated over the years.

The respected historian on this subject, K. Culen [2] classified the Slovak American publications into nine categories (Fig. 1) and listed about 246 titles in his work from which M. M. Stolarik left out about 39 titles but added another 13. Subsequently, he arrived at the total number of 220 releases [6]. What is more, M. M. Stolarik provides a valuable demographic profile and a rate of press survival in his work. "Twenty-six of all Slovak-American newspapers published since 1885 have originated in Pittsburgh region and 41 percent in the Commonwealth of Pennsylvania. 50 percent of all Slovak-American newspapers lasted less than two years and 66 percent lasted less than seven years" [6].

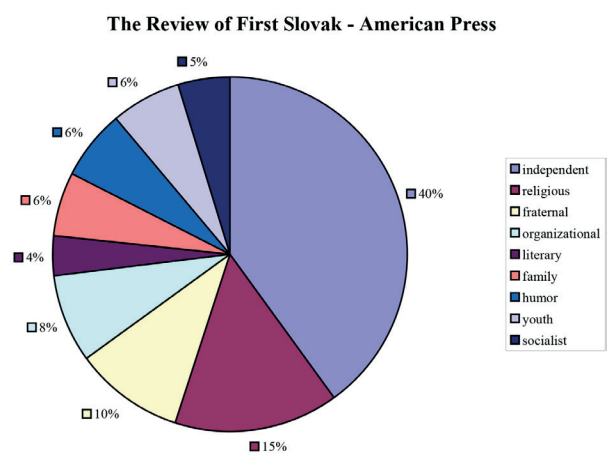


Fig. 1 Classification of the first Slovak press in the USA

3. The first Slovak-American editors

One of the first editors of the articles for Slovak communities in the USA was Janko Jesensky. The first issue of his *Bulletin* was released in 1885 in Pittsburgh, Pennsylvania. At that time the *Bulletin* was not printed but written in ink. *The Bulletin* appeared as one of the first independent, general news press that was distributed among American Slovaks in the 19th century [5]. The first printed Slovak newspaper was called the *Amerikanszko-Szlovenszke Noviny* that appeared in Pittsburgh in 1886. The editor of the newspaper was Julius Wolf who teamed up with Janko Jesensky. The newspaper was written in the eastern Slovak dialect which called for the radical change. In 1889 Peter V. Rovnianek became a new editor of the newspaper. P. V. Rovnianek published the *Amerikanszko-Szlovenszke Noviny* in the central Slovak dialect and renamed it to the *Amerikansko-Slovenske Noviny*. This act was a breakthrough in

the Slovak American press activities. Since then all Slovak American press had adopted the nationalist philosophy [6].

According to P. Holestiak [7], in 1910 the weekly, the *Amerikansko-Slovenske noviny*, recorded the highest circulation of all compatriotic newspapers (40,000 issues). At the beginning of the 20th century the *Amerikansko-Slovenske Noviny* folded. Soon after, Peter V. Rovnianek established his new newspaper called *Slovensky Dennik. The Slovak in America* has been the longest-lasting Slovak newspaper issued in northern America. The newspaper was founded in 1889 by a fraternal leader Anton S. Ambrose as the worker's weekly in Plymouth, Pennsylvania [6]. The newspaper has been one of the most influential and significant publications in Slovak American national and political battle over the centuries. What is more, the newspaper is published in the Slovak language up to now.

Later on almost all religious denominations published their own periodicals. M. M. Stolarik [6] reports the *Catholic News* as the earliest religious weekly of thirty-three religious periodicals published between 1889 and 1984. The publisher of the periodical was Reverend Ignac Jaskovic from Hazelton, Pennsylvania. *The Witness* was reported as the official monthly released by the Synod of Slovak Evangelical Lutheran Churches in America in Pittsburgh. The Slovak Evangelical Zion Synod started to publish the *Good Shepherd* as a rival publication to the *Zion* of Pittsburgh, 1920 [6].

Besides the editors of the first independent and religious Slovak press in the USA, the fraternal communities worked on their own newspapers or bulletins for their members. These newspapers reported on their activities and agitated for their new members. The press represented one of the most influential factors of all Slovak fraternal societies in America since it acted as their official organ reflecting their religious and national orientation.

It is important to mention the most significant publications that supported the Slovak national identity. The first weekly fraternal publication has remained active over the centuries up to the present, was the *Catholic Jednota* founded by Reverend S. Furdek in 1891 in Cleveland. The newspaper brought both domestic and international news, news about the activities of the fraternal benefit organization The First Catholic Slovak Union. Besides the others, The National Slovak Society issued the *National News* as their official weekly and a rival to *Jednota* in 1910. The First Catholic Slovak Ladies Union, settled in Cleveland, Ohio, released the *Women's Union* and later a magazine called the *Fraternally Yours* as their official organ [6]. The weekly *Slovak Falcon* was issued in Passaic, New Jersey together with the weekly the *Catholic Falcon* that was published by the Slovak Catholic Sokol. The Pennsylvania Catholic Slovak Union's official organ was *The Brotherhood*, and the *Slovak Herald* was the official weekly of the Slovak Evangelical Union headquartered in Pittsburgh. The Slovak Gymnastic Union Sokol settled in New Jersey. The organization issued the weekly *Slovak*

Falcon which was pro-Czechoslovak even though together with the *Slovak Calvin* which was an official publication of the Slovak Calvin Presbyterian Union.

Besides the above mentioned publications, M. M. Stolarik [6] surveyed eight literary journals, for instance the *Lighthouse*, and only thirteen family magazines with short longevity. In his work M. M. Stolarik mentions fourteen humor magazines, for example *The Demon. The Demon* was published from 1896 to 1912. Seventeen organizational publications were connected mostly with workers' organizations such as the *Worker* or the *Progressive Union*. Slovak Americans published about fourteen youth and student periodicals that were issued mainly as a monthly supplement to their weekly publications, for example the *Youth Folks* or the *Friend of Children* [6].

L. Bartalska [5] reports that since the 1960s the number of Slovak-American periodicals has declined. It is the result of a new formation of immigrants who moved out from the original settlements of their predecessors in seek of new job opportunities. This trend has led to a huge assimilation process.

4. Current situation

The turbulent years throughout the history have changed the way of life of the Slovak community in the USA. A new generation of Slovak-Americans living in North America has adopted bi-national identity that allowed them to scatter all round the United States. The globalization and huge assimilation process resulted in a prevalent use of the English language in a new generation community of Slovaks living in the USA. It allows them to find better job opportunities in their area. This trend calls for the need to strengthen the ways of communication among people in a minority community in order to preserve their national identity, ethnicity and their language [8]. The language and patriotism awareness are one of the most essential elements of the national identity preservation. What is more, these elements represent an important link between the Slovaks living abroad and those in Slovakia.

The number of Slovak press releases in the USA has dramatically changed over the past centuries. The first value-creating compilation of the Slovak-American press was made by a well-known Slovak historian and journalist Konstantin Culen (1904-1964). In his work he agitated for the manifestation of Slovak cultural and national life in American and Canadian exile. His valuable publication, *Slovak Magazines in America*, was issued by The First Catholic Slovak Jednota in Cleveland, Ohio in 1970. Although some information lacks verification, the publication is considered one of the most authoritative works on this subject. The publication reflects the history of the first Slovak American press from 1898 to approximately 1962.

One of the most cited authors within this field of research is Marian Mark Stolarik, who was born in Slovakia but was

evacuated to Canada in 1945. After earning his Ph.D. degree at the University of Minnesota, he taught history at the Cleveland State University. From 1979 to 1991 he worked as the president and CEO of the Balch Institute for Ethnic Studies in Philadelphia. In 1992 M. M. Stolarik took up the position of a chairman in Slovak History and Culture at the University of Ottawa [4]. As an author and an editor of about eight books and sixty articles in professional journals, he is considered one of the most respected historians and researchers on Slovak-American exile. M. M. Stolarik completed the list of K. Culen's newspapers and magazines and added their demographic profile; and surveyed eleven kinds of periodicals published by Slovak-Americans from 1885 to 1984. His book *"Where is My Home"* [4] depicts the Slovak immigration to North America from 1870 to 2010.

The history shows that the Slovak and Czech communities had got together in order to protect their identities in the multinational melting pot of America. Therefore, it is important to mention at least some Czech editors of both Slovak and Czech exile. For example, Jozef Heller is the author of the publication *"Cesky a Slovensky Tisk v Amerike do 1910"* that was issued in a magazine *"Svobodne školy politických nauk"* in 1933. It is worth mentioning the work of Vladimír Pekelsky dealing with the Slovak exile press till 1958. The bibliographer and Czech-American compatriot, Esther Jerabek, provides a full inventory of published documentation on Slovak and Czechs in North America in her work *"Czechs and Slovaks in North America"* [9].

Czechoslovak archivalia and library holdings have been surveyed by the Czechoslovak Society of Arts and Sciences in cooperation with other international institutions in order to protect the Czech and Slovak cultural heritage abroad. As the result of this detailed survey (1999), the book, *"Czechoslovak American Archivalia"* [10] published in 2004. The author of the book is a respectful Czech historian Miloslav Rechcigl, Jr. who compiled both the Slovak but mostly Czech-related archival and library collections of all emigrant and exile groups and divided them into seven major categories:

- Government repositories;
- University-based collections;
- Collections maintained by public museums and libraries;
- Collections of ethnic organizations;
- Personal papers and collections;
- Repositories abroad bearing on the subject;
- Virtual archives and the internet [9].

One of the largest list of the Slovak archival material is kept in the Immigration History Research Center (IHRC) at the University of Minnesota, USA. The listings include approximately 850 books and pamphlets, 154 serial titles, 375 linear ft of manuscript material and 26 newspaper titles dated from 1893 to 1983. The work of M. Rechcigl, Jr. is extensive and represents a valuable source of information about the Czech but also on the Slovak immigrant work. However, the publication does not

include current press activities of Slovak immigrants living in North America and does not provide a detailed form and content analysis of Slovak-American newspapers and magazines.

The first review of Slovak compatriot periodicals after 1989 was made by the Slovak Institute for the Study of Journalism in 1990. Their year-book provides a list of worldwide issued Slovak compatriot periodicals that are categorized by the country in which they are published. Their work mapped the overall situation of the Slovak compatriot press in the world, the USA included. The genre structure of the Slovak compatriot press issued in the USA was made by Maximilian Horansky [11] who provided brief and fragmental characteristics of the Slovak compatriot press, genre framework and orientation of each periodical that was published from 1989 to 1990.

One of the latest publications on the most famous and significant Slovak compatriot press was written by Pavol Holestiak in 2002 [7]. It provides brief and fragmental characteristics of the Slovak compatriot press, genre framework and orientation of each periodical that was published from 1989 to 1990 and an overall typology of the worldwide issued Slovak compatriot press in terms of their periodicity and location. The primary goal of his work was to give a complex review of Slovak immigrant press activities that include Europe, the USA and Canada from 1993 to 2000. Despite of valuable and rich work of the writers mentioned above, neither of them has made a detailed content analysis of at least one exile release issued in the USA. Similar research has not been made since the last survey made by P. Holestiak in 2002.

5. Conclusions

The idea of mapping the current situation of Slovak-American compatriot press has arisen in compliance with a policy concept of the Slovak Republic as well as other international organizations that deal with the cultural heritage preservation [12]. We have focused on the data collection by searching the internet to find the contact addresses of Slovak fraternal organizations and publishers mentioned in P. Holestiak's publications. We have looked up the web site of the Office for the Slovaks Living Abroad that gives to publicity the subsequent internet addresses:

- The National Slovak Society: www.nsslife.com;
- The First Catholic Slovak Union of the USA and Canada: www.fesla.com;
- The Slovak Catholic Sokol: www.slovakcatholicsokol.org;
- The Slovak Garden: www.slovakgarden.com;
- The Slovak Institute: www.slovakinstitute.com;
- The Slovak Heritage and Folklore Society International: www.SlovakPride.homestead.com.

After analyzing the above mentioned web sites we contacted the societies by email. Most of the societies were willing to help and showed interest in our research. Eventually, we have come to

the solution that the current situation of the Slovak compatriot press activities in the northern part of the USA are highly dependent on fraternal societies which work as the only editorial offices of the current compatriot press. We have come up with the sample that represents current electronic periodicals published in the North of the USA:

1. Jednota;
2. Slovak in America;
3. Slovak Catholic Falcon;
4. Fraternally Yours;
5. Floridian Slovak;
6. Slovak American Society of Washington Newsletter;
7. National News;
8. Youth Circle;

9. Wisconsin Slovak;
10. Slovakia;
11. Bridge;
12. The Morning Star;
13. The Zion.

Since the Internet represents a new form of media, almost all publishers of the Slovak-American press release their issues on their websites. This fact allowed us an easy access to the sample needed for our further research. What is more, the societies, including the editorial office of Slovaks in America, enable their members to keep in touch with them via Facebook as well. The Internet copies correspond to their paperback originals as they are still mailed to their subscribers.

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Jana Birova *

LESSON EFFECTIVENESS, STRONG AND WEAK SIDES OF THE INITIAL IMPLEMENTATION OF THE INTEGRATED LANGUAGE APPROACH

We analyse effectiveness of the French lesson in the initial implementation of the method called integrated language approach at primary school. The article presents the results of the qualitative research methods - indirect observation, interaction analysis and collective observation and content analysis. We summarise also strong and weak sides of the implementation of the method.

Keywords: *Integrated language approach, FREPA, French, English, effectiveness.*

1. Introduction

In this paper, we deal with teaching French by the aid of English. In the European Centre for Modern Languages in Graz (Institution of the Council of Europe), teaching second language with the aid of the first foreign language is generally called language integrated approach (see FREPA - Framework of reference for Pluralistic Approaches). In 2012, we tried to implement language integrated approach within the selected schools in Nitra's region. To conclude, we proceeded by means of indirect observation (video records and records' protocol), interaction analysis, collective observation and feedback.

2. General background about pluralistic approaches

Pluralistic approaches to teaching languages and cultures are new didactic trends in language policy. The general aim for learner [1] is to cognitively link all knowledge from languages and cultures he/she learned or acquired, to use it in order to construct and enrich self plurilingual and pluricultural competence and thus to communicate [2], [3] and [4], to live and to socialise in multicultural and multilingual Europe. Within the learning process, learners are to develop their plurilingual and pluricultural knowledge, skills and attitudes through four pluralistic approaches.

Early acquisition of modern languages develops metacognitive functions. It positively influences mother tongue and mastery of other school subjects. Pluralistic approaches [5] interconnect

school subjects and thus create and strengthen cross-curricular teaching. When applying the integrated language learning (approach), we teach, e.g., French language through Slovak and English. This approach aims to develop, compare, analyse, synthesise knowledge and cognitive processes involved in the learning of second foreign language through the first foreign or native language. Inter-comprehension between related languages which is the second pluralistic approach confronts multiple language understanding (languages from the same linguistic branch) on different levels and in different areas. It initiates understanding of languages and can be carried out through contrastive analysis, a sort of systematisation of similar lexical units (dialexemes), similar mechanisms in syntax, spelling, pronunciation or through related or identical etymological bases. Awakening to languages approach activates learner's interest for a variety of languages and cultures. Desire and curiosity of small learners to see or to learn foreign languages the school does not tend to offer in curriculum is considered as sort of pluricultural and plurilingual warm up. Since the cultural adaptation competence is a part of language learning, language communication and everyday socialisation tasks, the intercultural approach which is present in all approaches and mingle with them, aims to create a positive and anti-prejudiced attitudes to people who we do not know. Intercultural approach includes techniques and principles of multicultural education, ethical education, history, geography and others.

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3. Integrated language approach

Approaches developing plurilingual competence are based on the results of the examination of contrastive and comparative linguistics [6] and [7]. Contrastive linguistics is the scientific discipline that deals with synchronous comparing of linguistic systems. Based [8] (p. 113) on linguistic structuralism, its aim is to compare languages from a linguistic point of view. Other equally important linguistic starting-points for foreign language teaching are comparative and cognitive linguistics, inspired by Chomsky and his conviction of the need to study languages by deduction from the human mind [8]. The subject of comparative linguistics is the application of research results [9] (p. 33) which concern two or more compared languages but not for the purpose of linguistics, but for the teaching foreign language objectives. Experts examine [9] (pp. 144-116) mutual influences of foreign languages and influence of the mother tongue. Each of the learners meets other procedures and strategies. Explicit comparisons [10], interferences and transfers are made on phonological, grammatical, lexical and etymological level. The techniques comparing sociolinguistic and pragmatic aspects such as language functions or speech acts in situational contexts focus on some points from cognitive linguistics. When comparing, teachers primarily centre upon positive transfer from one language to another, but also upon negative interference. Learning process of pronunciation or grammar is often manifested by positive transfers from a foreign language. When learning vocabulary, positive transfer of the first foreign language is often overlapped with interference effects of the mother tongue [10].

Debyser [9] assumes that researchers in the field of comparative linguistics will deal with other problem areas in foreign language learning and other problems in mother tongue acquisition - hence the need of psycholinguistic studies, the need of theory of interference studies as well as deeper comparative reviews.

4. Techniques and principles of integrated language approach

The following concepts are the theoretical basis for the application of pluralistic approaches to teaching languages and cultures.

Concepts	Education of tolerance with respect to otherness
Tolerance	
Values	
Representations, imaginations	
Worldview	
Attitudes, prejudices, stereotypes	
Awareness of oneself	
Myself and others, ethnocentrism	
Discrimination, racism	
Empathy, acceptance and cooperation	
Conflict, critical moment intercultural	Sociocultural and sociolinguistic contents
Sociocultural aspects of the A1-B2 curriculum (content, similarities, differences)	
<i>Sociolinguistic units</i>	
<i>words and expressions of politeness</i>	Plurilingual education
<i>language in information texts, call, expressive texts (official, literary, propaganda)</i>	
<i>culturemes</i>	
<i>logo-epistemes</i>	
<i>politically correct language</i>	
<i>dialexemes, linguistic layers (phonemic, spelling, lexical, morphological, semantic, speech acts, language functions)</i>	

5. FREPA descriptors as means to evaluate pluralistic subcompetences

The framework FREPA, issued by the European Council [11], represents main ideas for creating pluralistic activities developing linguistic and cultural awareness, metacognition as well as plurilingual and pluricultural competence. Since the framework should have the role of application, the creative team of the European Centre for Modern Languages in Graz (institution of the Council of Europe) has also created a bank of activities. Tasks are available on the project website <http://carap.ecml.at>. Activities are accompanied by descriptors that indicate the developed knowledge, skills and attitudes [12].

FREPA is to lead language teachers to the creation of new activities for the further context of multi or plurilingualism.

6. Research procedure

6.1 Research questions and methodology

This paper integrates both qualitative and quantitative research. We focus on determining the how as well as the what, where, and when of our research topic. The study poses these research questions. How did learners succeed in performing in a variety of languages? What content and how much did they perform? Under what conditions did they perform? What advantages and disadvantages does the approach bring into foreign language teaching? In order to determine answers to these questions, we must have created a lesson plan respecting principles of language integrated approach. The method of indirect observation (video record) of the lesson was realised after.

To do a deep interaction analysis of teacher's talk and students' talk and performances, to see task comprehension as well as language content appropriateness, construction of record protocol was needed. The interaction analysis is in its principle a quantitative research method. It's easy to measure minutes of teacher's or learners' talk and in this regard we answer the question how much and what learners performed.

To make crucial points on effectiveness of the first implementation, we needed to realise a collective experts' observation of the video record. Methodology experts as well as experts in teaching process and language policy met in order to evaluate strong and weak sides of the first implementation.

Content analysis was the last research method by which we summarised (analysed) the FREPA descriptors [11] within the activity design and objectives.

6.2 Research starting points and research sample

The research was carried out in primary school Kniezata Pribinu, Nitra on 5th June 2012 in the class of 5 14 years-old learners (a group of 8.A class) whose mother tongue is Slovak, first foreign language is English (6-years study) and second foreign language is French (2-years study). As the integrated language approach can be applied mainly during presentation and practice stages of learning process with the final impact on metacognition and on achieving plurilingual and pluricultural communicative competence, our research was held within these stages, too.

Pluralistic approaches are new trends in language policy and teachers of French are not aware explicitly of their principles and techniques. For the initial implementation, we opted for teaching trainees who attend methodology of teaching French classes. They became our multiplier approach agents.

As for the content analysis, this was held after class video-record. FREPA document defines a list of classified descriptors

which are to evaluate the development of pluralistic competences within the designed activity. Evaluation of activity by means of descriptors was the main objective of the mentioned content analysis.

7. Discussion

Qualitative research consisted of initial application of the approach in the teaching process, as well as of assessment of the strengths and weaknesses in applying the approach through a case study. Teaching trainee - multiplier, Martina Sulikova worked 25 minutes of the lesson with pupils of 8.A class (Kniezata Pribinu primary school in Nitra) on the theme of vocabulary - the human body. Video protocol is in the annex. Multiplier has defined the objectives within the presentation and practice stages: students will learn and practice new vocabulary of human body parts in French - using the equivalents in English (vocabulary they have already learned). From the temporal analysis of interactions multiplier - learner within the presentation and practice stages, we can conclude that during the learning process learners were actively involved. These video sequences indicate and confirm our research question: 01':00 - 01':17, 02':16 - 23':14. Level and content were consulted with the teacher of the class before creating the activity, and are consistent with the national and school curriculum.

From the indirect observation (video analysis) and content analysis, these FREPA descriptors were filled: "K 6.7.1 - Knows that languages may use different ways to indicate categories / relations (agreement / plural / possession), K 6.7.2 - Knows that the order in which elements making up a single word are placed may differ from one language to another, K 7.1.2 - Knows that it is normal to commit errors when one has not yet mastered a language, K 7.2 Knows that one can build on the (structural / discursive / pragmatic) similarities between languages in order to learn languages, K 7.4 - Knows that the perception one has of a language influences the learning of that language, Attitudes: A 2.3 - Sensitivity to linguistic / cultural similarities, A 4.2 - Accepting the fact that another language / culture may function differently from one's language / culture, A 4.3 - Accepting the fact that another language / culture may include elements which differ from those of one's own language / culture, A 7.5 - Motivation to study / compare the functioning of different languages (structures, vocabulary, systems of writing) / cultures, A 17.4 - Having confidence in one's own abilities in language learning / in one's abilities to extend one's own linguistic competences, A 18.1.1 - Interest in the learning of language / languages of schooling (especially for allophonic learners), A 18.1.3 - A desire to learn other languages, A 18.3 - Being disposed to follow up autonomously, language learning started in a formal teaching context, S 1.2.1 - Can listen attentively / in a selective manner to productions in different languages, S 2.5 - Can identify languages

on the basis of identification of linguistic forms, S 3.1.1 - Can establish similarity and difference between languages / cultures from observation / analysis / identification / recognition of some of their components, S 3.3.1 - Can perceive similarities and differences between graphic forms, S 7.3.2 - Can use knowledge and skills acquired in one language to learn another" [11]. The author and FREPA conceptor, Michel Candelier, added also following descriptors to the activity: "K 1.7 - Possesses knowledge of a linguistic nature about a particular language (the mother tongue / the language of schooling / foreign languages), K 6.3 - Knows that categories used to describe the workings of a language (the mother tongue / the language of education) may not necessarily exist in others (number, gender, the article), K 6.4.1 - Knows that the number of elements which make up a category may vary from one language to another (masculine and feminine / masculine, feminine, neuter), A 9.2.1 - Considering the way languages and their different units (phonemes / words / sentences / texts) function as objects of analysis and reflection, A 15.2 - Considering every language / culture as "something" accessible (some aspects of which are already known)" [11].

In terms of the methodologists, who met during the joint observation, we can summarise that the integrated language approach, as well as other pluralistic approaches, should be applied adequately in order to develop the learner's plurilingual and pluricultural competence as well as general competences. This means working with languages to communicate - and not just for a mechanical comparison. Furthermore, in terms of age teachers are to customise tasks and cognitive goals. The analysis of the vocabulary forms and comparisons should not be applied, according to observers, in class where the case study was conducted. There should now be a discussion that could be maintained between FREPA conceptors and teachers and scientists in methodology of teaching foreign languages.

When teaching foreign languages with integrated language approach, we would need to have in class two or more teachers. Each of them would be approached by students with different communication needs and through different languages. Native speakers could have an essential role here. Though, such a requirement might be costly.

According to the teachers, the implementation of these approaches should follow the communicative objective specified in the situation, in a particular social activity. Teachers should prepare playful activities activating learner's spontaneity and his/her ability to express ideas within a theme in multiple languages. Teachers - observers also declared that some modification is necessary for the state / school curriculum. Other stated that there is no need to include any changes in the contents of curricula, since the method chosen by the teacher depends mainly on his/her motivation.

8. Conclusion

FREPA framework, in addition to communication specifically focuses on the comparison of linguistic aspects; especially in terms of otherness of languages and cultures. Plurilingual tasks can also be the restricted pre-communicative activities as well as communicative ones. During the collective observation, participants suggested several ideas for activities: pluricultural breakfast and conversation during breakfast, plurilingual commenting on the topic during discussion, role play in multiple languages.

Another condition or disadvantage is the lack of teaching materials or activities appropriate to their development and use.

When applying the integrated language approach, thus applying the teaching of the French language through the mother and first foreign language - English, teachers meet with a number of differences in language levels.

Common criteria for such foreign language teaching is richer time allocations, willingness of directors and teachers' qualifications, availability, or creation of activities and learners' interest to link knowledge with real communication needs and usage.

No pedagogical or methodological research in the domain of teaching techniques, of content for students of different ages and varying levels of interest for languages or are other pitfalls for the initial formal introduction of such approaches to foreign language lessons.

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THE SYSTEM OF TRANSITIVITY IN THE WAR ON TERROR DISCOURSE

The paper focuses on the presentation of social actors in the discourse of George W. Bush in the period from October 2001 to March 2003. The first part of the paper deals with the theoretical elaboration of the system of transitivity within M. A. K. Halliday's Systemic Functional Linguistics (SFL). In this part of the article, the relevant components of the system of transitivity are introduced and discussed. The focus of the analytical part of the paper is on the representation of social actors in the discourse of the speaker. The aim of the paper is to observe the creation of the "Us" and "Them" camps with the help of the selections in Material processes.

Keywords: Transitivity, political speech, discourse, "Us" and "Them."

1. Introduction

Language is used not only in interactions with other people but also in discussions about the world – either the world around us represented by objects, things, typical features and also about the inner perceptions of the world represented by emotions, or assumptions. When the world is looked on from this point of view, the focus is mainly placed on the content of communication [1]. The area of grammar of a clause which is associated with the content of a message, conceptualisation and depiction of the world is in functional linguistics referred to as transitivity. In M. A. K. Halliday's Systemic - Functional Linguistics (SFL), language is a resource for making meaning and it fulfils three metafunctions: ideational, interpersonal and textual.

The objective of this article is to present descriptions of the text's ideational function and to relate these features and descriptions to the ideologies that they help to realize. Another objective is to focus on the exploration of linguistic presentation of what political actors view as the real world and on how particular fields of social activity associated with actors are represented in discourse. In the first part of the article, the system of transitivity and its main aspects will be briefly introduced. This theoretical introduction of the aspects of the system of transitivity will serve as a point of departure for further analysis of actual instances from political discourse of George W. Bush. The speeches that are analyzed cover the period of the rhetorical preparation for the military operations in Afghanistan and in Iraq. The speeches present instances of interventionist discourse and their nature may be described as "call to arms" as well.

The system of transitivity is the element of the lexicogrammar which realizes the ideational metafunction. Halliday [2, p. 53]

claims that the ideational function of a clause deals with "the transmission of ideas"; and that "the role of the ideational function is to introduce the schemes of 'experiences' or, in the broadest sense, 'processes', which typically include "actions or events of consciousness and relations" (ibid.). Halliday [3, p. 66] also observes that the ideational function is "concerned with the content of language, its function as a means of our experience, both of the external world and of the inner world of our own consciousness." Thus, the ideational metafunction may be useful in observing of how meaning is construed and how events, and the world around us are represented.

Halliday (quoted in [4, p. 34] suggests that "it is through this function that the speaker or writer embodies in language his experience of the phenomena of the real world; and this includes his experience of the internal world of his own consciousness [...] and also his linguistics acts of speaking and understanding."

Similarly, Martin and Rose [5, p. 66] argue that "**ideation** focuses on the 'content' of a discourse: what kinds of activities are undertaken, and how participants in these activities are described, how they are classified and what they are composed of. Ideation is concerned with how our experience of 'reality', material and symbolic, is construed in discourse" (emphasis in original). Thus, the analysis of selection of the patterns of transitivity may present an effective tool in uncovering various ideological positions in discourse.

The system of transitivity is concerned with how reality (including fictional and mental reality) is presented in language. Its main elements are the processes in texts and the types of participants and circumstances that are usually identified with them. One of the most important assumptions behind the use of this concept is the notion that transitivity is "concerned with

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the transmission of ideas“ [6, p. 88]. According to Halliday [2, p. 101], if we are exposed to seeing something, “perceptually the phenomenon is all of a piece but when we talk about it, we analyse it as a semantic configuration“, which means that it has to be depicted as a certain composition of meaning.

2. Analytical approach

In order to investigate the representation and construction of various social actors [7] in political speeches with the help of the system of transitivity, I will look at the processes by which the nature of identities such as “Us“ and “Them“ (or enemy) was created and presented in political speeches.

For this purpose, the concepts of Actor, Process, and Goal from the transitivity theory of Systemic - Functional Linguistics (SFL) are used as analytical tools. I will look at how the clauses are arranged in order to present action and events. I will also discuss how the theory is relevant to exposing ideology in political discourse in general and to the specific instances of the analysis of political discourse. For the exemplification, I will examine data from political texts to show how these analytical tools can be used in this type of text analysis. Finally, there will be a discussion about the portrayal of political actors and groups of individuals in discourse. Analysing the system of transitivity in political speeches enables us to understand the fact how ideologies are created in political discourse. Therefore, analysing of the system of transitivity enables us to observe how linguistic framework of a text constructs particular ideologies, in this case, the creation of the dichotomy “Us“ vs “Them.“

3. Defining the system of transitivity

Transitivity is an essential element of the ideational function of language and it examines how meaning is present in a clause. It primarily deals with how meaning is present in a clause, and with how concepts or thoughts are conveyed and communicated.

According to [2, p.101], the real world as we perceive it is composed of various types of processes:

[a] fundamental property of language is that it enables human beings to build a mental picture of reality, to make sense of their experience of what goes on around them and inside them. Here again the clause is the most significant grammatical unit [...] because it is the clause that functions as the representation of processes. [...] Our most powerful conception of reality is that it consists of “goings-on”: of doing, happening, feeling, being. These goings-on are sorted out in the semantic system of the language and expressed through the grammar of the clause.

According to [8, p. 106], the transitivity system “construes the world of experience into a manageable set of **PROCESS TYPES**.“ It is concerned with how reality is presented in language. Halliday [3, p. 134] defines transitivity as

the set of options whereby the speaker encodes his experience of the processes of the external world, and of the internal world of his own consciousness, together with the participants in these processes and their attendant circumstances; [...] Transitivity is really the cornerstone of the semantic organization of experience.

Thus, the analysis of the system of transitivity may indicate how linguistic selections in texts present various actions, events and states. Transitivity, according to Halliday (in [9, p. 159]) includes the whole clause, and it “refers to the “content“ or factual - notional structure of the clause in its entirety.“ Halliday (quoted in [9, p. 159]) defines transitivity as the “representation in language of **PROCESSES**, the **PARTICIPANTS** therein, and the **CIRCUMSTANTIAL** features associated with them.“

3.1 Transitivity - concepts and terms

It is vital to clarify particular concepts and terms associated with the system of transitivity. In spite of the term “transitivity“, this area deals with more elaborate elements than with just simple difference between transitive and intransitive verbs. In this part of the article, the main concepts and terms associated with transitivity will be described, and also the types of processes. This difference in terms of syntax overlooks essential distinctions with regards to meaning within particular types of verbs and clauses. Halliday’s model is highly semanticized and it investigates deeper elements of the connection between verbs and the phrases connected with them. The system of transitivity does not pay attention explicitly to verbs as being syntactic category, but on the types of processes represented in a clause, and on how meaning is present, realised and expressed in a clause.

Halliday (quoted in [9, p. 159]) argues that the term process is “understood in a very broad sense, to cover all phenomena to which a specification of time may be attached - in English, anything that can be expressed by a verb: event, whether physical or not, state, or relation.“ The complete representation of processes, on the basis of this definition, includes the relationships between a particular process and the participants included in it. The participant can be seen as a linguistic representation of abstract, or inanimate objects, and of human beings as well. The main features and their components (such as participants, processes, circumstances) are the essential elements of ideational meaning, in spoken as well as in a written form of communication.

3.2 Types of processes and respective participants associated with them

Within semantic properties of a text, it is noticeable what types of predicates are present: these are expressions referring to actions, states, processes. Predicates (and participants connected with them) perform the primary responsibility for the presentation of events and actions to which text refers. Halliday (quoted in [9, p. 20]) argues that “functions such as ‘agent’ and ‘process’ are significant in relation to the meaning potential of the ideational element in language.” According to Bloor and Bloor [10, p. 109] “the process centers on that part of the clause that is realised by the verbal group, but it can also be regarded as what “goings-on” are represented in the whole clause.” Simpson [6, p. 88] notes that “processes can be classified according to their main features: they represent actions, speech, states of mind or simply states of being.”

Halliday [2, p. 101] argues that “transitivity specifies the different types of processes that are recognized in the language, and the structures by which they are expressed.” The main components of the transitivity system are Material, Mental and Relational processes. These are the three main types of processes in the English transitivity system and they are differentiated on the basis of the fact whether they represent sensing, actions, or being. In addition, there are, according to Thompson [1, p. 96], “three less central types which can be distinguished on the basis of the usual combination of semantic and grammatical criteria.” These processes are Behavioural, Verbal, and Existential Processes.

For the objective of the analysis, processes are essential, as they deal with forms of verbs and with the character of particular “doings.” Processes (and the participants associated with them) have the principal responsibility for expressing the actions and states to which texts refer. The processes will illustrate important aspects about the manner in which actors and the world are presented in any type of discourse, and also in political speeches. There are three elements of the grammar of the clause, including a process. Halliday [2, p. 101] suggests that “the basic semantic framework for the representation of processes is very simple. A process consists potentially of three components:

- (i) the process itself;
- (ii) participants in the process;
- (iii) circumstances associated with process.”

Halliday [2, p. 102] goes on to argue that the notions of “process, participant and circumstance are semantic categories which explain in the most general way how phenomena of the real world are represented in linguistic structures.” The focus of transitivity is placed predominantly on the first two elements, i.e. on the processes and participants.

3.3 Participants

Each process is associated with participants – they are essential in processes – it is difficult to think about an event without participants - there should be at least one participant involved. Participants take the forms of nouns phrases (generally subjects) direct objects, or indirect objects and they involve entities, persons, abstractions, or things. Young and Fitzgerald [11, p. 39] propose a scheme which illustrates the above presented semantic framework for the representation in discourse.

Who and whom =	Participants	(nouns/ pronouns)
Is doing what =	Process	(verbs that realize action/ states)
When, where, =	Circumstances	(adverbs, prepositional and adverbial phrases)
And how		

3.4 Material processes

This type of process is characterized by the involvement of physical action or involvement of an event. A typical interpretation of a verb is that of “doing word.”

Thus, “figures of ‘doing’ represent material actions: “what people do or what happens” [5, p. 72]. Halliday (quoted in [9, p. 161]) entitles Material processes also “action clauses” (related only to Material, but also to Mental and Relational processes). Halliday and Matthiessen [12, p. 170] state that in Material processes, “things happen and people or other actors do things, or make them happen.” Examples of verbs that realize Material processes are provided by verbs such as “kick”, “kill”, “attack”, etc. The “doer” of this category of activity is referred to as “Actor” and this entity can be animate or inanimate. The Actor “does the deed” [13, p. 224] or performs the action and is responsible for causing the action or event and thus, Actors are considered powerful entities – as they are, according to [13, p. 224] “the source of energy bringing about the change.” The second participant is labeled as “Goal” and this is because the action, or activity is directed at this entity, which is the most affected. Despite the fact that Goals are “autonomous” participants, they are usually the least powerful entities because the activity of Actors is performed on them. Actor and Goal are the two regular participants in clauses associated with Material processes. The aim of the analysis of Material processes is to expose who is presented as the most powerful entity in discourse. E.g., if there are Actors and Goals (represented as affected participants), Actors are powerful entities, initiators of actions and usually those responsible for particular “doings.” A brief illustration of a Material process is presented below, taken from the discourse of George W. Bush (Sept. 15, 2001).

We	will find	them
Actor	Pr.: material	Goal

4. The process of analysis

4.1 The patterns of transitivity in political speeches of George W. Bush

In order to analyze the patterns of transitivity in political speeches, the focus will be placed on the clauses from the political speeches that illustrate the presentation of social actors, actions and events.

The initial step in the organizing of the patterns of transitivity was to collect “the clauses in which each entity or group of entities in the text is represented in a particular participant role” [14, p. 18]. When certain patterns are extracted from a set of texts of the same type, they enable general observations about the manner in which important participants in discourse are portrayed. The presentation of the clauses with respective participants and processes will be followed by discussion about their representation in the discourse of the speaker. The tables below (with respective Material processes) summarize the participants and actors presented in the discourse of George W. Bush. The patterns in Material process clauses will be examined - the aim of these examinations in the selections of the system of transitivity is to explore how these selections create particular presentation of reality for the audiences in the domestic and in international context as well.

4.2. Material processes

The meanings about the actions in discourse (the action of enemies and the actions of the United States and its allies) can be most powerfully conveyed with the help of Material processes. As Material processes are regularly employed in the discourse of

the speaker, it is vital to discuss the aspect of power related to participants in the discourse. The Tables 1 and 2 below illustrate the actions taken by the Actors in discourse of George W. Bush - the actions taken by the enemies and by the United States, respectively.

Political leaders, when discussing their enemies or opponents and their actions usually do not make assertions that attribute dynamic grammatical descriptions to them. However, in the discourse of George W. Bush, the intense and utterly unfavourable description of the “other” with the help of Material processes suggests that the world - under the influence of the enemy’s actions is a more insecure place.

The enemy is presented as being active - it is presented in specific and purposeful actions. However, their activities are related to destructive actions and are inhuman in their nature. The speaker constructs the ideological polarization between “Us” and “Them” on the basis of the destructive behaviour of the enemies. This is realized by locating of the agency, negatively evaluated Material processes and Goals of the actions of the enemies.

The presentation of enemies in their roles of Actors and their attempts to kill innocent people construct the enemy as a threat to the civilized world. The Goals of the enemies’ actions are realized through Material processes or “doings” performed over living entities (“thousands of our citizens”, “thousands of innocent people”, “fellow Muslims”) [15].

According to [6, p. 109], within Material processes, “lexical choices are just as strong an indicator of the respective political stances adopted.” In the clauses within which enemies are presented, the speaker employs a number of words which have affective connotations and most of these words have negative evaluations of the activity to which they refer. Therefore, the negative evaluation can be observed in clauses with Material processes such as “kill”, “violate” as they are usually negatively perceived in most contexts. Thus the Actors in the clauses are evaluated negatively in the processes that they perform. The choices of tense in verbal groups in clauses (3), (4), (6) (simple present suggests habitual action) suggest that the behaviour of the

The Enemy as Actor in Material Processes in the Discourse of George W. Bush

Table 1

No.	Date	Actor	Process: Material	Goal
1	Nov. 21, 01	They	have killed	thousands of our citizens
2	Nov. 21, 01	They	seek	weapons of mass destruction
3	Nov. 10, 01	They	kill	thousands of innocent people
4	Nov. 10, 01	They	Kill	fellow Muslims
5	Nov. 6, 01	They	are seeking	chemical, biological and nuclear weapons
6	Oct. 10, 01	They	plan, promote, and commit	murder
7	Nov. 10, 01	The terrorists	are violating	tenets of every religion...
8	Oct. 2, 02	The regime	has developed	weapons of mass death
9	Oct. 2, 02	It	has sponsored and sheltered	terrorists;
10	Oct. 7, 02	It	is seeking	nuclear weapons

The USA as Actor in Material Processes in the Discourse of George W. Bush

Table 2

No.	Date	Actor	Process: Material	Goal
1	Jun. 24, 02	We	defend	freedom
2	Dec. 11, 01	We	will defeat	the enemies of freedom
3	Apr. 17, 02	We	will defeat	global terror
4	Oct. 7, 02	We	defend not only	our precious freedoms...
5	Mar. 19, 03	We	will defend	our freedom
6	May 23, 02	We	defend not just	America or Europe
7	May 23, 02	We	will defeat	the enemies of freedom
8	Oct. 8, 01	We	will confront	the threat of terrorism
9	Oct. 17, 01	We	will defeat	terror
10	Nov.21, 01	We	will fight	these evil ones

enemy is constant and typical of the terrorists, which contributes to their demonization. The enemies are construed as dynamic participants who have the ability to affect other entities in discourse and therefore, they have to be confronted.

In all of the Material processes above, the United States takes the role of the Actor, and the processes are classified as those of the *action* type. The United States is in all of these clauses firmly in control of all action that it performs – the clauses illustrate Material processes that are *intended*. In the examples above, the speaker presents a firm resolution to act and to defend values such as freedom, or to defeat “the enemies of freedom” or “global terror” that are positioned as Goals in the clauses and are essential for the United States.

In these clauses, the speaker reassures the recipients of his discourse that these values (especially freedom) are under the control of Actors. At the same time, the speaker presents the power and resolution of the USA to act against “global terror”, “terrorist organizations”, “enemies of freedom”, or “the threat of terrorism.” The use of the future tense in certain clauses (e.g., in clauses 2, 3, 5-9) solidifies the resolution to act and gives the power to act in the near term. The use of “will” may be observed in threats or promises, and the speaker, on the basis of his institutional status can issue such threats as he has capabilities to carry out the action that would involve the use of power. The speaker’s discourse also points to the ability of the USA to confront the enemy and win – this can be observed in the selection of Material processes and Goals of the actions of the “We” group.

Overall, in selecting the patterns of transitivity in his discourse, the President employs an effective way of creating “otherness” – he presents the enemy by pointing to, e.g., physical actions over people that they commit, and also negatively evaluates the actions of “Them.” Thus, he creates a viewpoint and presentation of the events that empower “Us” in the action against the enemy.

5. Conclusion

Transitivity allows to analyse how, by selecting and preferring particular processes to others the author (or presenter) of the text is able to highlight specific meanings in discourse and to restrain other meanings. The analysis of the patterns of transitivity in discourse offers a tool for exploring of how the organization of texts encodes certain system of ideas.

This paper has discussed the suitability and relevance of the system of transitivity within Systemic – Functional Linguistics (SFL) in uncovering ideological positions and attitudes of the speaker - more specifically, the ideology of polarization into two opposing camps – “Us” and “Them.” The analysis of representation of social actors and of Material processes associated with them in discourse through the system of transitivity may indicate how political actors (in this case George W. Bush) in their discourse develop and sustain the ideological picture of the world.

Corpus of Speeches delivered by George W. Bush

- October 8, 2001 Remarks by the President from Speech at the Swearing-in Ceremony for Governor Thomas Ridge
- October 10, 2001 Remarks by the President from Speech Unveiling “Most Wanted” Terrorist List
- October 17, 2001 Remarks by the President from Speech to the California Business Association
- November 6, 2001 Remarks by the President from Speech to the Warsaw Conference
- November 10, 2001 Remarks by the President from Speech to the United Nations General Assembly
- November 21, 2001 Remarks by the President from Speech to Military Personnel at Fort Campbell
- December 11, 2001 Remarks by the President from Speech to Citadel Cadets
- April 17, 2002 Remarks by the President from Speech to the George C.Marshall ROTC Award

	Seminar on National Security at the Virginia Military Institute	October 2, 2002	President, House Leadership Agree on Iraq Resolution
May 23, 2002	Remarks by the President from Speech to the German Bundestag	October 7, 2002	Remarks by the President from Speech at the Cincinnati Museum Center
June 24, 2002	Remarks by the President from Speech at Ceremony Honoring Port Authority Heroes	March 19, 2003	Presidential Address the Nation on the Commencement of Military Operations Against Iraq

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Pavel Urban *

COMMUNICATION FROM THE EXPRESSION QUALITIES SYSTEM PERSPECTIVE

The focus of this paper is to state a categorization of expressions for a qualitatively correct media communication. For our starting point, we have chosen the systematic categorization of aesthetic expression qualities based on the pragmatic aesthetics by Professor Frantisek Miko, which also constitutes the main scope of research for Institute of Literary and Art Communication at the Faculty of Arts of Constantine the Philosopher University in Nitra. However, our aim is to extend the original applicability of the aesthetic expression qualities categorization outside the artistic and aesthetic reality specifically for the use in the mass media environment. In other words, we aim to develop the existing methodology of the expression qualities system of the modern aesthetic categories - the so-called Nitra pragmatic aesthetics - on a media platform for the study of communication.

Keywords: Expression qualities system, aesthetic categories, iconicism, operability, recipient.

1. Introduction

Our adoption of the aesthetic expression qualities categorization merges two main theoretical concepts. Our principal term *the expression category* that can be traced back to the research material by Professor Miko - Thesaurus of aesthetic expression qualities published by Institute of Literary and Art Communication in Nitra in 2008 - is at the core of a modern perspective of the categorization of expressions as perceived by the recipient. Our extrapolation that understands the expression category as the quality of a media message, its pragmatic effect on its recipient, and its stylistic function with its information value in the general sense, follows the declared interdisciplinary characteristics, conceptual openness and accessibility of the original term [1].

The second theory is understandably the theory of communication which provides the necessary means to explain a qualitatively correct media message. Mathematician Claude E. Shannon in his study *A Mathematical Theory of Communication* for the first time introduced the term *information entropy* as the level of uncertainty with respect to the information contained in a specific message. In this ground-breaking Theory of information, which analyses the issue of coding, storing, and transmitting of information, other terms like redundancy, communication channel capacity, or bit as the basic information unit are also defined [2].

There are many factors that suggest the suitability of the extended application of aesthetic expression qualities within the media environment the way we propose in the following pages.

2. Expression quality as a dynamic factor of communication

In our perception, the expression categories are represented in the form of diverse stylistically coloured adjectives of the full range of media messages in the consciousness of a recipient (addressee). In particular, however, in the form of a desired response largely determined by emotional characteristics of the recipient and author as well as the message. The original state is the recipient's empirical experience as it is subjected to the media message during its reception. Alternatively, the expression categories can be considered *a synonym of the style* in which the media information is presented to the recipient, where the "style is the result of the theme and language of the statement" [3] that is, *what* the message is about and *how* it was communicated. It should be mentioned at this point that Professor Miko himself sees the potential for a synonymic relationship between the terms expression category and semantic terms such as expression value, e. characteristics, e. modality, e. register, or expression mode [4]. After all, quite often the context of a conversation about a specific media artefact (such as a movie, an advertisement, a news report, a multimedia work on the web, etc.) with another subject transpires using questions such as *How did it reflect on you?*, or *In*

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what way/style was it directed or presented? The style can be, in the (media) communication practice, carried out in two distinct ways:

- a) The perceptual attributes of the artefact as perceived by the audience are dominant to the extent premeditated by the author during the creation process. In other words, the style of the author serves to deliberately provoke the audience to a certain (emotional) state; alternatively, its stylised elements serve to disrupt stereotype.
- b) It projects the author's self-expression in such a way the external recipient - audience - is not taken into account. The author him/herself becomes both the addresser and the addressee of the communication.

As mentioned before, we originate in the model of the binary expression system methodologically developed by Professor Miko. The systematic consistency of this model lies in the fact that it is not only a sort of an inventory listing of aesthetic expression categories, but it is multifocally anchored in the principles of their interrelatedness. Furthermore, this systematic organisation is determined by principles of hierarchy further illustrating their similar or contradictory relations. From the pragmatic perspective this organisation documents the way the categories interact and connect while forming superior-inferior structures and framework blocks [5]. The primary expression qualities are arranged on the principles of binary opposition:

- operability - iconicism
- sensuality - factuality
- subjectivity - sociability

The competitive relationship between these three fundamental oppositions reflects the ever-present strengthening of one of the qualities from the pair at the expense of its partnered quality, e.g. "the increased subjectivity (a focus on self-expression such as expressing anger) weakens the sociability (caring for the recipient such as respect)" [6]. At the same time, both members of each of these pairs are complements on the principles of expression inclusion: "one of the categories is in a way broader, the second is its particular specialty" [7]. Keep in mind that the external manifestations of the individual expression categories are being expressed specifically through *structural indicators* - the verifiable signs of the existence and intensity of that particular "expression quality in the message" [8].

We now have identified the basic features according to which the model of the expression system works. The fundament of its applicability is the communication process which can be represented using the following generic model (Fig 1):

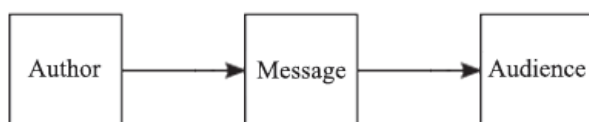


Fig. 1 General diagram of a communication process

3. The structure of the general model of communication

In general, we can say that human communication participates in the creation and regulation of a subject's behaviour in the way it directs the allocation of information because we communicate in order to receive data, or to exchange and modify it and, using such data, we perceive and can persuade thus potentially forming social ties. The theory of communication per se considers the communication process to be an interactive instrument for the exercising of power among its subjects who are connected through the belief in the same set of meanings across their social group. The general model of the communication transfer/process, which forms the base for other interdisciplinary schematic modalities of communication, can be altered to a model that we shall call 3C:

communicator - *communiqué* - *communicant*
(author/sender/expedient) - (transmission/message/data) - (recipient/audience)

Subject - communicator translates the information (concept, intention) into the *communiqué* which he/she aims to share with another *subject - communicant* using meaningful forms, that is, by *encoding* the information into the common communication language (verbal and/or non-verbal) and sharing it with its recipient over the *communication channel*. The recipient perceives the information through his/her senses and then *decodes/interprets* it into a meaningful form. After the interpretation, the communicant *responds* in a specific way suitable for the particular communication environment thus completing the communication context of the *communication process*. The result of this information sharing is the understanding based on the perception of a certain "objective reality, as one of the ways in which the subject acts, his/her creative activity is manifested" [9]. One of the key components of this information exchange system is the feedback/response with its varying level of dynamics which shapes the entire communication process for the (most effective) acquisition of new knowledge. These new data lead to the changes in the state of understanding signifying the reduction of *entropy* in the communication system.

While analysing the theory of communication from the technical perspective, it is worth to mention the functional model describing the process of the information transfer as suggested by Claude E. Shannon in Fig. 2:

- An *information source* producing a specific (desired) message.
- A *transmitter* coding a message using the type of signal, which allows for as lossless transmitting across an information channel as possible.
- The *information channel* simply as the transitory medium which serves to distribute the signal.
- A *Receiver* decoding the signal back to the understandable form intended for perceiving.
- A *Destination* or the intended recipient of the message - human or machine.

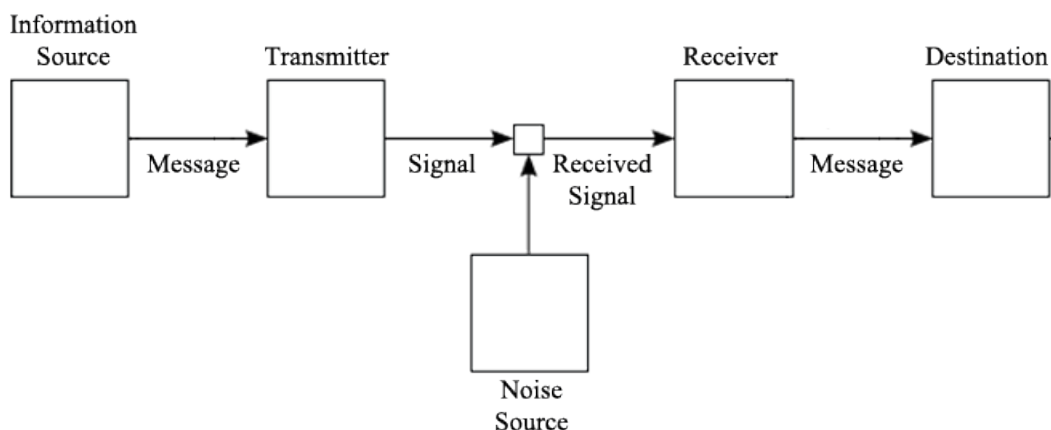


Fig. 2 Schematic diagram of a general communication system [10]

Before we return to the issue of the expression system, let us recall one more important phenomenon underlying the qualitatively, from the informational standpoint, correct communication. This phenomenon is the feedback which serves to diminish the level of entropy by allowing the participating subjects to reduce the volume of redundant and irrelevant data through the refinement of criteria for selecting, processing, and organising of the information reservoir.

4. The core of the expression system - operability versus iconicism

The key issue of the expression system, which resides in the interpersonal communication, concerns *someone* referring *something to someone (else)*. This initial structure of communication consists of two aspects:

- 4.1 The first aspect pertains to the relation between *someone - to someone (else)*, in other words, the relation *author - audience* where the message becomes the tool for exercising author's goal within the interaction. This focus on the interpersonal relationship between the participants in the communication is described by the first from the fundamental expression categories - *the operability of an expression*.
- 4.2 The second aspect pertains to the referential potential of the message - to express *something* by "projecting an image" of its meaning. The descriptor for this aspect is the second category - *the iconicism of an expression*.

The thesaurus methodologically places two fundamental categories across from each other creating the core of the whole expression system - *operability* (action) and *iconicism* (manner). Both communication dimensions are essential and in this relation equivalent, but operability still forms the base for the qualitatively correct communication while iconicism serves as its enriching component [11]. Further dynamics influencing the quality of the

operability and iconicism of an expression follow the following principles:

- 4.2 The dynamics of the manifestation of *the operability of an expression* occur in two directions which are determined by the inner dialectics behind these key communication subjects: **author (expedient) - audience (recipient)**
- 4.3 This signifies on which participant's perspective the communication relies more:
 - a) If the emphasis is on the author, it is his/her temperament, social status, and the current emotional state, which prevail in the message. In other words, the author's stylised self-expression in the form of *the subjectivity of an expression*.
 - b) A different operability of communication brings an emphasis on the audience suggesting to whom the message is intended. For this approach, it is the audience's emotional state, social status, and temperament, which are crucial, but in the perception of the author. In other words, the attitude of the author towards the audience manifests in the form of the *sociability of an expression*.
- 4.4 The exposing of *the iconicism of an expression* has emerged from the historical context, within which an essential element represents the evolution of languages allowing their users to convey messages about phenomena which happened or might happen in the future. These messages can, e.g. through their verbal performance, "convey even such images the participant of the communication has not experienced directly, that is, it allows to free oneself from the immediate situation the communication takes place in" [12].
 - a) From this phenomenon evolved the capacity of language to generalize, specify, extrapolate, confront, prove, etc. This in turn began the application of pragmatic characteristics of language in the use of terms especially in sciences represented by *the factuality of an expression*.

- b) On the other hand, *the sensuality of an expression* evolved in other spheres of language use which allows for a certain mostly visual subjective experience in the audience of especially artistic communication.

5. Conclusion - the simplified expression qualities system

The interrelationship of the three fundamental oppositions as explained within the (media) communication paradigm finally leads us to the schematic representation of our simplified model of the expression system (Fig. 3) from the one originally suggested by Prof. Miko. Please note, that the original stylistic organisation of the expression qualities is conceived as a “paradigmatic model of text from the stylistic point of view” [13] allowing a systematic, but especially pragmatic orientation for the reception analysis of the language modalities used mostly in artistic text to amplify

the effect of its message. However, our paper demonstrates that the simplified model is suitable for the reception analysis of any qualitatively correct media communication.

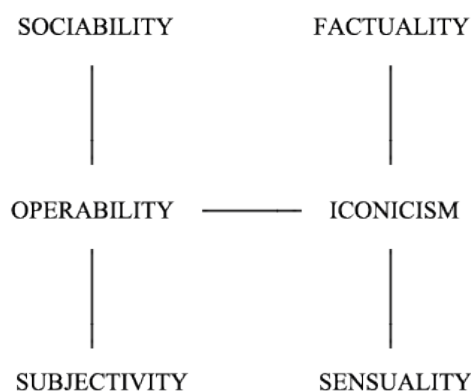


Fig. 3 Simplified expression qualities system [14]

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Jan Zavodny Pospisil - Lucie Sara Zavodna *

RISKS AND THREATS OF SOCIAL NETWORKS COMMUNICATION

This paper focuses on social networks as a source of information and a tool for its sharing. The first part of the paper defines the theoretical background while the second part is devoted to the evaluation of research which was conducted among university students in the Czech Republic. The main aim of this research is to get a deeper understanding of how students work with information obtained from social networks and to identify the main risks and threats connected with it.

Keywords: Social Networks, Analysis, Information value, Research, Internet, Media Use.

1. Introduction

"Almost imperceptibly we found ourselves in a new sociotechnical era - the Hybrid Age. In this new era people and technologies merge with each other which bring a lot of unprecedented consequences, opportunities, but also requirements for each individual" [1].

Social networking has become a current issue in last ten years. During this time, it significantly changed the patterns of human behavior and many fields of human activities. Sociologists point out the changes in the form and manner of human communication - from a personal communication to an on-line, non-personal communication. The changes can be observed also from the perspective of media communication.

In general, it is possible to characterize a social network as a system of social relations or a group of people who interact with each other. Each social entity has a tendency to look for a social network and/or to create its own [2]. Social networks are specific media for spreading mass communication. Virtual social networks are a phenomenon creation of which was possible due to the development of the Internet and the World Wide Web. In its environment, the social networking service allows registered members to create their personal (and corporate) public or semi-public profiles, interact with other entities, share various types of information and data, etc. The content of a social network in the web space is not static; it is generated and edited by its users [3].

Services such as Facebook, Twitter, LinkedIn, Google+, MySpace or YouTube are some of the most famous international virtual social networks used in the Czech Republic. We can also find local social networks which usually cover only the population of one country.

According to a recent research, classic media cease to be the main source of news and information [4]. The most obvious change can be observed in the decrease of traditional printed media - newspaper. There is a trend among young people of decreasing use of newspaper and TV news coverage as the source of information in exchange for the Internet. Therefore, the Internet is becoming major news media for them [5].

The goal of this article was formulated on the assumption that social networks are used for multiple reasons - not only to be a platform for interaction but also as a source of information that recipients use for forming their decisions. Social networks complement (and to some level they replace) traditional media [6]. The way of working with the information obtained from a social media may however be different from the way that information from a traditional media is handled. The main objective of this paper is to investigate how students treat the information from social networks and whether they trust such information.

2. Methodology

This paper was created using descriptive research. The research describes variables that are present in the field of social networking and what the relationships between the variables are. It also provides information about specific aspects of the issue. The research consisted of the following steps:

- Formulation of the research problem.
- Data collection and analysis of available resources.
- Analysis of the data. SWOT analysis.
- Interpretation and conclusion.

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Finding the answers for five elementary research questions used was necessary in order to reach the main goal of the article. These questions are:

- (A) What kind of respondents use social networks and how much time do they spend using them?
- (B) What are the connections of the respondents within a social network?
- (C) Are the social networks currently the primary source of information?
- (D) Do the respondents trust the information?
- (E) Do the respondents verify the information?

To answer these research questions, a quantitative research method - semi-structured questionnaire was used. This method was chosen with regard to the research as it was necessary to obtain individual respondents' answers.

Based on the research objectives, 12 questions were formulated forming a semi-structured questionnaire. The actual questionnaire was created in Google Docs environment and was distributed in electronic form through social networks and e-mails.

The sample of respondents was selected through typological choice, during which it is necessary to analyze a typical representative of a certain group of the population. In accordance with this, the respondents were picked among university students of the age from 19 to 30 years. The majority of respondents interviewed were 19-25 years old (74%). The questionnaire was submitted by 871 respondents. More than half of the respondents (68%) were female, and the rest (32%) were male. The research was conducted in the Czech Republic, at Tomas Bata University in Zlin and Palacky University in Olomouc. Responses were collected during February and March 2013.

3. Results

The questions in the questionnaire were designed to identify the behavior of respondents in the context of social networks. The first question (see Fig. 1) was finding which of the social networks the respondents use. Most respondents (96%) have an active account on Facebook. The remaining 4% of respondents use the

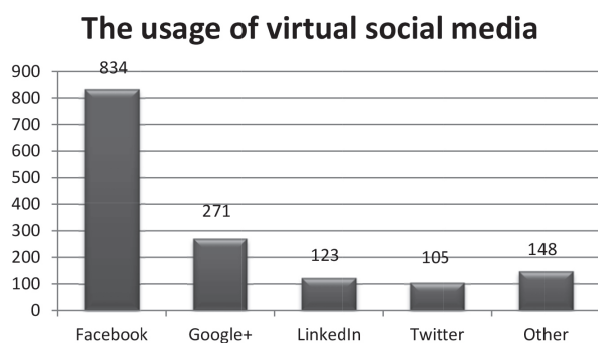


Fig. 1 Virtual social media shares among university students

social network Google+. Users of social network Facebook are in most cases (77%) at the same time also active users of other social networks, mostly (according to the rank) Google+, LinkedIn, Twitter and/or some other Czech local networks.

Regardless of the social networks used, most users (35%) spend less than an hour a day using their favorite social network (Fig. 2). Similarly large group of users (31%) spent 1-2 hours a day using the networks. The extensive use of social networks in the range of 2-4 hours was confessed by 23% of the respondents. The remaining 11% of the respondents spend 4 or more hours a day using a social network.

Time spent on the virtual social networks

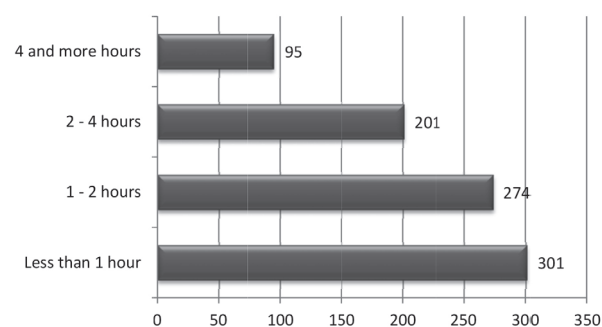


Fig. 2 Usual time spent using virtual social networks

The concern of further questioning was to uncover the connections of users within a social network and the way of making friends in the virtual network. Most respondents (61%) are associated only with users (friends) that they know personally. In addition to friends, they know personally, 38% of respondents are also involved in various discussions (focus groups) on personal and corporate websites. Only 1% of users are not associated with any of the real friends and connections are realized only with people and groups from the virtual environment.

The following question is connected with the above-mentioned issue. It examined whether users of social networks read also the content created by unknown (possibly unrelated) people. Most users (66%) read only posts from friends. The rest (34%) also read posts from people who are not from their circle of friends. These posts are usually from a well-known personalities, companies, etc.

An important question was the one that examined whether the respondents verify the information on social networks published by their friends - both real and virtual friends (see Fig. 3). Answers to this closed-ended question were practically equal. While 51% of respondents claimed that they verify the information, 49% of them do not bother to do so. It is very useful to notice the connection between a source of the information (from real or virtual "friend") and an attempt to verify the information. Information from real friends is being verified by a half of the respondents. In case that information is accessed through following content created by

people who are not respondents' real friends, such information is being verified by 54% of users.

Do you verify information obtained from virtual social media?

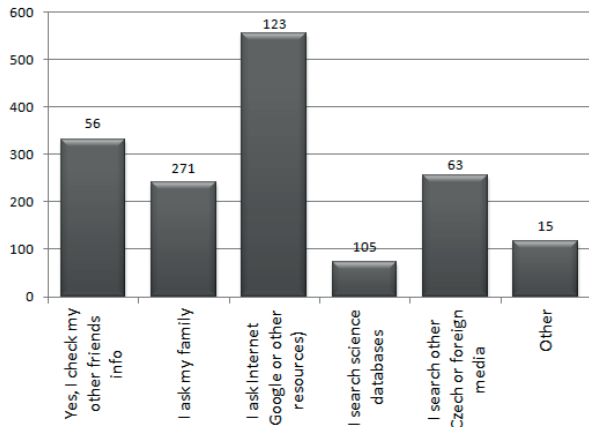


Fig. 3 Verification of information obtained from virtual social media

The following question was analyzing the personal opinion of respondents regarding a credibility of information they receive through social networks. Most respondents (79%) consider such information to be partially trusted. Other 14% of respondents do not trust information obtained through online social networks. Only 7% of respondents trust information on social networks without any conditions as shown in Fig. 4.

Is information from the social media trusted?

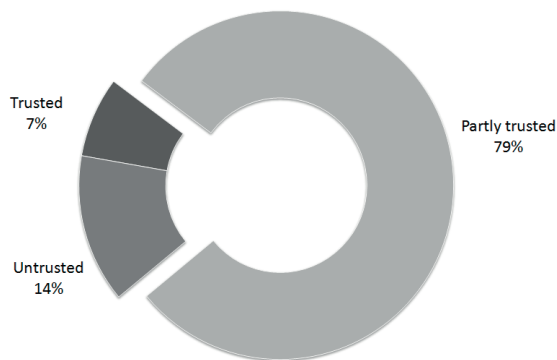


Fig. 4 Credibility of information obtained from virtual media

The research results point out the overall weaknesses of social networks. The main findings are summarized in the following chapter.

Discussion: Risk and Threats of Social Networks

The SWOT analysis of the social networks based on the research and previous findings of several authors is displayed in Table 1 below.

SWOT analysis of sharing information at social networks Table 1

Strengths	Weaknesses
Fast information	Can be false information
Quick overview of current situation	Only one side information
Information about close friends	No internal need to verify information
Different platforms for information, such as games, competitions, etc...	Blindness to other information
	Simplified information
Opportunities	Threats
Educate people about risks and threats	People start to believe that information
Educate people about social media	People will not verify information
Educate people about value of information	People will live according that information

This section will be dealing with threats of social networking as it is the overall focus of the paper. The biggest risks come to society from rapid dissemination of false or half-true information. And on top of that, if people attempt to verify the information through their other acquaintances or family members, this may distort the information even further. There is no need to go into details of what may cause incorrect information and how panic or hoax is created. It is not necessary since the research discovered that a large group of people do not verify the information they are given. Believing media is a general trend of a postmodern society. Once the message is released to the world, we will never find out who got it and how he/she used it.

4. Conclusion

While the virtual social networking is consistently more and more popular, new uses for the technology are frequently being observed. Emerging trends in social networking is the concept of "real-time web" and "location-based web". Real-time allows users to contribute content which is then broadcasted as it is being uploaded - the concept is similar to live radio and television broadcasts. Companies have begun to merge business technologies and solutions, such as cloud computing, with social networking concepts. Instead of connecting individuals based on social interest, companies are developing interactive communities that connect individuals based on shared business needs or experience.

These new trends usually result in ability to spread information faster. There are several possibilities how to control information through the internet but at the moment there are not many people responsible for doing it. If a wrong message is spread to the world, it may cause wrong understanding of real things and their interpretation. There are several solutions to this. The government

can introduce new laws, regulations or even departments for controlling information. But control is not what society wants.

As the social networks are most popular among young people, the main risks are in their wrong understanding of the role of social media. Therefore, the main focus should be on educating them about the credibility of social networks.

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Ludovit Tomanek - Anna Tomankova *

GROUPS WITH THE INFINITE NON-QUASICENTRAL NODAL SUBGROUP

We present some properties of the groups with the infinite non-quasicentral periodic nodal subgroup. Our main results are formulated in Theorem 1, 2 and Theorem 3, 4. 2000 Mathematics Subject Classification: 20F22, 20F25

Keywords: A group, a subgroup, a commutator of a group, a locally graded group, p -quasicyclic group, a direct and semi-direct product of groups, an extension of a group.

The description of groups defined by the systems of their subgroups was first described in the papers of Chernikov and Kurosh (RN - groups, [1]). Chernikov dealt with an extension of the direct product of the finite number of the quasicyclic groups by the finite abelian group (ν - groups, [2]), with the infinite non-abelian groups whose arbitrary infinite subgroup is the normal subgroup of the whole group (INH - groups, [2]). Subbotin studied the groups G in which every subgroup from commutator G' is a normal subgroup of G (KI-groups, [3]). Tomanek, L. studied the IAN and the IANA groups, Definition 1, (IAN groups, [4]). This definition was given to the author by Chernikov. In this paper we describe IAN and IANA groups with the infinite non-quasicentral periodic nodal subgroup.

We use standard designations of terminology where: $M \times N$ is the direct product of the groups M, N ; $\sum_{i \in I} X_i$ is the direct sum of the additive groups X_i for all $i \in I$; $M \rtimes N$ is the semi-direct product of the groups M, N ; $M.N = \{mn \mid m \in M, n \in N\}$ is the product of the groups M, N ; G/A is the factor group of G by A ; $|G:N|$ is the index of the subgroup N in a group G ; $\langle a \rangle$ is the cyclic group generated by the element a ; $\langle a, b, c \rangle$ is the group generated by the elements a, b, c ; $H \leq G$ where H is the subgroup of G ; $H \trianglelefteq G$, H is normal in G ; $[a, b] = a^{-1} b^{-1} a b$ is the commutator of the elements $a, b \in G$; $G' = [G, G]$ generated by all commutators of the elements $a, b \in G$ is the commutator of G ; $Z(p^\infty) = \{x \mid x^{p^n} = 1, n = 1, 2, \dots\}$ is the p -quasicyclic group; $C_G(A)$ is the centralizer of the subgroup A in G ; $C(G)$ is the centre of the group G ; $G \cong H$ where the groups G, H are isomorphic. The group G is the p -group if each of its elements has an order with a power of some fixed prime p [6]. The group G is a locally graded group if every finitely generated nontrivial

subgroup of G contains a proper subgroup of finite index ([2] p.236). The group G is the solvable group if it includes series: $G > G' > G^{(2)} > \dots > G^{(n)} = \langle e \rangle$. The subgroup A is a quasicentral of G if every subgroup of A is normal in G . The group G is the extension of the group H by a normal subgroup N of G if $G/N \cong H$. The extension of the finite direct product of the quasicyclic groups by the finite abelian group are ν - groups ([2]). The group G is an almost quasicyclic group if G is the extension of the quasicyclic group by the finite group. $Q_8 = \langle x, y \mid x^4 = y^4 = 1, x^2 = y^2, yx = x^{-1}y \rangle$ is the quaternion group.

Definition 1.

An infinite non-abelian G is said to be the IAN group if there exists a subgroup A of G so that every infinite subgroup of A and every infinite subgroup of G containing A is a normal subgroup of G . The group G is the IANA group if A is the abelian subgroup. The subgroup A is called the nodal subgroup.

Definition 2.

An infinite non-abelian G is the INH group if an arbitrary infinite subgroup of G is the normal subgroup of G .

Definition 3.

The group G is the Dedekind group if an arbitrary subgroup of G is the normal subgroup of G . Non-abelian Dedekind group G is called the Hamiltonian group.

Proposition 1. [[2], T. 6.10]

The infinite Hamiltonian groups and the non-abelian non-Hamiltonian groups that are the finite extensions of the quasicyclic

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subgroups by the finite abelian and the finite Hamiltonian groups form the class of the solvable INH groups.

Proposition 2. [[7], T.12.5.4]

The group G is the Hamiltonian group if and only if the group $G = Q_8 \times M \times N$ where Q_8 is the quaternion group, M is an elementary abelian 2- group, N is a periodic abelian group with no elements of the order 2.

Lemma 1.

Let G be the IAN group with a nodal subgroup A . If a nodal subgroup A contains the element of the infinite order, then A is the abelian quasicentral subgroup of group G .

Proof. If the group A contains the element x of the infinite order, then according to Definition 2, the group A is the INH group. According to Proposition 1 A is the abelian group. Let B be an arbitrary subgroup of the group A . We shall show that $B \trianglelefteq G$. If B is an infinite subgroup of G , B is admittedly a normal subgroup of G .

Let B be a finite subgroup of G . If A is the abelian group containing the element x of the infinite order, then $B \langle x \rangle \cong B \times \langle x \rangle$. Pursuant to Definition 1 $(B \times \langle x \rangle) \trianglelefteq G$ which implies $B \trianglelefteq G$. Thus A is the abelian quasicentral subgroup of the group G . ■

Lemma 2.

If G is the locally graded IAN group with the nodal subgroup A , there exists a subgroup of A that is not a normal subgroup of G . Then A is a finite group or A is the extension of the quasicyclic subgroup by the finite Dedekind group.

Proof. Let G be the IAN group with a nodal subgroup A and let $A_1 \triangleleft A$ where A_1 is not a normal subgroup of G . Admittedly, $A_1 \neq \langle e \rangle$ is a finite subgroup of G . In agreement with Lemma 1 A is a periodic group. If A is a finite group, then this lemma is valid. Let A be an infinite periodic subgroup of G . We consider two possible cases; A is not u - group, or A is u - group.

Case 1. Let A not be u - group. Then choose the subgroup A_2 of A where $A_2 = A_3 \times A_4$, $A_2 \cap A_1 = \langle e \rangle$, and where A_3, A_4 are the infinite cyclic groups of G . By Definition 1 $A_3 \trianglelefteq G$, $A_3 \times A_1 \triangleleft G$, $A_4 \trianglelefteq G$, $A_4 \times A_1 \trianglelefteq G$. Evidently $(A_3 \times A_1) \cap (A_4 \times A_1) = A_1$ and furthermore $A_1 \trianglelefteq G$, so it is a contradiction.

Case 2. Let A be u - group. Then put $A = R \cdot B$ where R is the direct product of the finite number of the quasicyclic groups, R is at the same time a divisible group, and B is the finite group where $B \neq \langle e \rangle$. Therefore, A_1 is not a normal subgroup of G ; there exists a cyclic subgroup $\langle a \rangle$ of A_1 that is not normal in G and where $R \cap \langle a \rangle = \langle t \rangle$. Since R is a divisible group, there exists a quasicyclic subgroup R_1 of R and furthermore R_1 contains the subgroup $\langle t \rangle$. Put $R = R_1 \times R_2$ where R_2 is an infinite subgroup of A or $R_2 = \langle e \rangle$. If R_2 is an infinite subgroup of A , then, by Definition 1

$R_2 \trianglelefteq G$, furthermore $(R_2 \times \langle a \rangle) \trianglelefteq G$, $R_1 \trianglelefteq G$, $(R_1 \times \langle a \rangle) \trianglelefteq G$. Evidently $(R_2 \times \langle a \rangle) \cap (R_1 \times \langle a \rangle) = \langle a \rangle$ and $\langle a \rangle \trianglelefteq G$. This is a contradiction.

Let $R_2 = \langle e \rangle$, then $R = R_1$ is a quasicyclic group and moreover $A/R \cong B$ where B is a finite Dedekind group. Thus A is the extension of the quasicyclic subgroup by the finite Dedekind group. ■

Theorem 1.

If G is a locally graded IAN group with a nodal subgroup A , then subgroup A belongs to one of the types:

1. A is a finite subgroup of G ;
2. A is an extension of the quasicyclic subgroup by a finite Dedekind group where G is an infinite group;
3. A is an infinite quasicentral periodic subgroup of G ;
4. A is a quasicentral non-periodic abelian subgroup of G .

Proof. If A is not a quasicentral subgroup of G , then, based on Lemma 2, the subgroup A belongs to one of types 1 or 2 of this theorem. If A is a quasicentral subgroup of G , then by Lemma 1 the subgroup A belongs to one of the types 3 or 4 of this theorem. ■

By Theorem 1 and according to the definition of IANA groups the next corollary follows.

Corollary 1.

If G is a locally graded IANA group with a nodal subgroup A , then subgroup A belongs to one of the types:

1. A is a finite abelian subgroup of G ;
2. $A = \mathbb{Z}(p^\infty) \times B$, where B is a finite group;
3. A is an infinite quasicentral periodic abelian subgroup of G ;
4. A is a quasicentral non-periodic abelian subgroup of G .

Lemma 3.

If G is the locally graded group with the infinite periodic nodal subgroup A , then the subgroup A satisfies one of the following conditions:

1. A is the infinite periodic Dedekind quasicentral subgroup of the group G where G/A is the abelian group;
2. A is the infinite periodic Dedekind quasicentral subgroup of the group G where G/A is the Hamiltonian group and G is a locally finite group;
3. A is not the quasicentral subgroup of G , A is an almost quasicyclic subgroup of G where G/A is the Dedekind group.

Proof. If G is the locally graded group with an infinite periodic nodal subgroup A , then, according to Theorem 1 A is the extension of the quasicyclic subgroup by the finite Dedekind group, or A is the quasicentral subgroup of the group G .

Let A be the extension of the quasicyclic subgroup B by the finite Dedekind group. If B is an infinite subgroup of G containing A , then $B \trianglelefteq G$ and furthermore every quotient subgroup

$B/A \trianglelefteq G/A$. Since G/A is the Dedekind group, A then satisfies the 3rd condition of this lemma.

If A is a quasicentral subgroup of group G , then, analogous to the paragraph above, we can prove that G/A is the Dedekind group. Admittedly, G/A is the abelian or the Hamiltonian group. If G/A is the abelian group, then A satisfies the 1st condition of this lemma.

Let G/A be the Hamiltonian group. By Proposition 2 G/A is a locally finite group. Thus an extension of a locally finite group by a locally finite group is a locally finite group, which implies that G is a locally finite group and hence A satisfies the 2nd condition of this lemma. ■

Lemma 4.

If G is the locally graded IAN group with the infinite nodal subgroup A non-quasicentral of G , then A is the extension of a quasicyclic group by the Dedekind group.

Proof. Let G be the locally graded IAN group with the infinite nodal subgroup A non-quasicentral of G . According to Theorem 1 A is a periodic group, by Lemma 3 A is the extension of a quasicyclic group by the Dedekind group. ■

Lemma 5.

If G is the group with a finite nodal subgroup A , then G/A is the abelian group, or the group.

Proof. If G/A is the abelian group, then this lemma is valid. Let G/A be a non-abelian group and B/A be an arbitrary infinite subgroup of G/A . There evidently exists $B \trianglelefteq G$ and furthermore $B/A \trianglelefteq G/A$. Thus G/A is the INH group. ■

Theorem 2.

Let G be the locally graded IAN group with a nodal subgroup A . The nodal subgroup A of G is a non-quasicentral of G if and only if it satisfies one of the following conditions:

1. *A is a finite non-quasicentral subgroup of G , the quotient group G/A is the INH group with the abelian commutator or G/A is the abelian group;*
2. *A is an almost quasicyclic group which contains the finite subgroups that are not normal in G , $|A : A \cap G| < \infty$, and G/A is the Dedekind group.*

Proof. Let G be the locally graded IAN group with the infinite nodal subgroup A . Admittedly, the subgroup A is a non-quasicentral of G . Referring to Lemma 2 A is a finite group, or A is an almost quasicyclic group.

If A is a finite group then, by Lemma 5, G/A is the abelian group or G/A is a solvable INH group. According to Proposition 1 the commutator of a solvable INH group is the abelian group. Thus the subgroup A satisfies the 1st condition of this theorem.

Let G/A be a solvable INH group. By the condition 3 of Lemma 3 G/A is the Dedekind group. Based on this fact A is an almost quasicyclic group and by Definition 1 A is a non-quasicentral of G . Suppose there exists a finite subgroup and A is normal in G . Therefore G/A is the Dedekind group, A is an almost quasicyclic group, thus G' is a subgroup of that almost quasicyclic subgroup A . Let G' be a finite group and put $A = G'$. Hence A satisfies either condition 1 or condition 2 of this theorem.

If G' is an infinite group, then $|A : G' \cap G'| < \infty$, $|A : A \cap G'| < \infty$, too. Admittedly, A satisfies the 2nd condition of this theorem.

Conversely. Suppose the nodal subgroup A satisfies either condition 1 or condition 2 of this theorem, then G is the IAN group with the non-quasicentral nodal subgroup A . ■

By Theorem 2 and the definition of IANA groups the next corollary follows.

Corollary 2.

Let G be a locally graded IANA group with a nodal subgroup A . The nodal subgroup A of G is a non-quasicentral of G if and only if it satisfies one of the following conditions:

1. *A is the finite abelian non-quasicentral subgroup of G , the quotient group G/A is the INH group with the abelian commutator or G/A is the abelian group,*
2. *$A = Z(p^\infty) \times D$ where D is the finite abelian subgroup of G , A contains finite subgroups that are not normal in G , and G/A is the Dedekind group.*

Lemma 6.

Let G be the IAN group with the infinite non-quasicentral Dedekind nodal subgroup A . Then $A = Z(p^\infty) \times D$ where D is a finite Dedekind group, $p \mid |D|$, and there exists the element $a \in A$ so that the subgroup $\langle a \rangle$ is not normal p -subgroup of G . For $p = 2$ is $D' = \langle e \rangle$.

Proof. Let G be the IAN group with the infinite non-quasicentral Dedekind nodal subgroup A . By Lemma 1 A is an almost quasicyclic group. Pursuant to Proposition 2 $A = Z(p^\infty) \times D$ where D is a finite Dedekind group, $p = 2$, and $D' = \langle e \rangle$. We shall prove that A does not contain a normal p -group $\langle a \rangle$ of G .

Obviously, if every cyclic subgroup of A is a normal subgroup of G , then A is a quasicentral subgroup of G . Thus there exists a cyclic subgroup $\langle x \rangle$ of A that is not normal in G , which implies that the $\langle a \rangle$ Sylow q -subgroup of the group $\langle x \rangle$ is not normal in G . This verifies that $q = p$.

Let $q \neq p$ and $Z(p^\infty) \cap \langle a \rangle = \langle e \rangle$. Then $Z(p^\infty) \langle a \rangle \cong Z(p^\infty) \times \langle a \rangle$ where $Z(p^\infty) \times \langle a \rangle$ is the normal subgroup of G . Evidently, $\langle a \rangle$ is the Sylow q -subgroup normal in $Z(p^\infty) \times \langle a \rangle$ and $\langle a \rangle$ is normal in G . This is a contradiction, thus $q = p$.

If $A = Z(p^\infty) \times D \cong Z(p^\infty) \langle a \rangle$, then $Z(p^\infty) \langle a \rangle = Z(p^\infty) \times \langle b \rangle$, $\langle b \rangle = D \cap Z(p^\infty) \times \langle a \rangle$. Because the subgroup $\langle a \rangle$ is the p -subgroup

normal in G and furthermore $Z(p^\infty) \cap \langle a \rangle < \langle a \rangle$, $|b| > 1$, $\langle b \rangle$ is a p -group, therefore $p \mid |D|$. ■

According to Lemma 6 and the Definition of IANA groups, the next corollary follows.

Corollary 3.

Let G be the IANA group with the infinite non-quasicentral nodal subgroup A . Then $A = Z(p^\infty) \times D$, where D is a finite group, $p \mid |D|$, the subgroup D contains an element $a \in A$ so that the $\langle a \rangle$ p -subgroup is not normal in G .

Theorem 3.

The group G is the locally graded IAN group with the infinite non-quasicentral nodal subgroup A of G if and only if a quotient group G/A is the Dedekind group, $|A : A \cap G'| < \infty$ and the nodal subgroup A is of one of the types:

1. $A = Z(p^\infty) \times D$, where D is the finite Dedekind group, $p=2$, $D' = \langle e \rangle$, $p \mid |D|$, the subgroup A contains an element a such that $\langle a \rangle$ p -subgroup is not normal in G , and the quotient group $A/Z(p^\infty)$ is the quasicentral in $G/Z(p^\infty)$;
2. $A = Z(p^\infty) \rtimes D$, where D is the finite Dedekind subgroup, the group A does not contain the finite normal subgroup of G , and $A/Z(p^\infty)$ is the quasicentral in $G/Z(p^\infty)$;
3. $A = (Z(p^\infty).B) \times D$, where $Z(p^\infty).B$ is the non-abelian Sylow p -subgroup of G , D is the infinite Dedekind group, $p=2$, $D' = \langle e \rangle$, $Z(p^\infty) \leq C(G)$, the finite group B has a normal series: $Z(p^\infty) \cap B = B' = B_0 < B_1 < \dots < B_{i-1} < \dots < B_n$, $n \geq 1$, $B_i = B_{i+1} \rtimes \langle b_i \rangle$, for all $i \geq 1$, $|b_i| > 1$, and $A/Z(p^\infty)$ is the quasicentral in $G/Z(p^\infty)$;
4. $A = (Z(p^\infty).B) \rtimes Q_8 \times D$, where $Z(p^\infty).B.Q_8$ is the Sylow 2-subgroup of G , D is the finite abelian group, $Z(p^\infty) \leq C(G)$, the finite group B has a normal series: $Z(p^\infty) \cap B = \langle B', [B, Q_8] \rangle = B_0 < B_1 < \dots < B_{i-1} < \dots < B_n$, $n \geq 1$, $B_i = B_{i+1} \rtimes \langle b_i \rangle$, for all $i \geq 1$, $|b_i| = 2$, $|B_0| = 2$, and $A/Z(p^\infty)$ is the quasicentral in $G/Z(p^\infty)$;
5. $A = (Z(2^\infty).B) \rtimes \langle d \rangle \times D$, where $Z(2^\infty).B \rtimes \langle d \rangle$ is the Sylow 2-subgroup of G , D is the finite abelian group, $Z(2^\infty) \leq C(Z(2^\infty).B)$, for each $c \in Z(2^\infty)$, $d^4 c d = c^{-1}$, the finite group B has a normal series: $Z(2^\infty) \cap B = \langle B', [B, \langle d \rangle] \rangle = B_0 < B_1 < \dots < B_{i-1} < \dots < B_n$, $n \geq 1$, $B_i = B_{i+1} \rtimes \langle d \rangle$, for all $i \geq 1$, $(Z(p^\infty).B) \cap \langle d \rangle = Z(2^\infty) \cap \langle d \rangle \leq \langle c_1 \rangle$, $|c_1| = 2$, and $A/Z(p^\infty)$ is the quasicentral in $G/Z(p^\infty)$;
6. $A = (((Z(2^\infty).B) \rtimes \langle d \rangle) \rtimes Q_8) \times D$, where $Z(2^\infty).B \rtimes Q_8 \rtimes \langle d \rangle$ is the Sylow 2-subgroup of G , D is the finite abelian group, $Z(2^\infty) \leq C(Z(2^\infty).B.Q_8)$, for each $c \in Z(2^\infty)$, $d^4 c d = c^{-1}$, the finite group B has a normal series: $Z(2^\infty) \cap B = \langle B', [B, \langle d \rangle], [B, Q_8], [\langle d \rangle, Q_8] \rangle = B_0 < B_1 < \dots < B_{i-1} < \dots < B_n$, $n \geq 1$, $B_i = B_{i+1} \rtimes \langle b_i \rangle$, for all $i \geq 1$, $|b_i| = 2$, $|B_0| = 2$, $|d| = 4$, $(Z(p^\infty).B) \cap \langle d \rangle = Z(2^\infty) \cap \langle d \rangle$, and $A/Z(p^\infty)$ is the quasicentral in $G/Z(p^\infty)$;
7. $A = (((Z(2^\infty).B) \rtimes Q_8) \times D.B) \rtimes Q_8 \times D$, where $Z(2^\infty).B.Q_8$ is the Sylow 2-subgroup of G , D is the finite abelian group,

$Z(2^\infty) \leq C(Z(2^\infty).B)$, $[Z(2^\infty), Q_8] = Z(2^\infty)$, the finite group B has a normal series:

$Z(2^\infty).B = \langle B', [B, Q_8] \rangle = B_0 < B_1 < \dots < B_{i-1} < \dots < B_n$, $n \geq 1$, $B_i = B_{i+1} \rtimes \langle b_i \rangle$, for all $i \geq 1$, $|b_i| = 2$, $|B_0| = 2$ and $A/Z(p^\infty)$ is the quasicentral in $G/Z(p^\infty)$;

8. $A = ((Z(2^\infty).B) \rtimes H) \times D$, where $Z(2^\infty).B.H$ is the Sylow 2-subgroup of G , D is the finite abelian group, $Z(2^\infty) \leq C(Z(2^\infty).B)$, $[Z(2^\infty), H] = Z(2^\infty)$, $H = \langle a \rangle \rtimes \langle b \rangle$, $|a| = |b| = 4$, $[a, b] = a^2$, the finite group B has a normal series: $Z(2^\infty) \cap B = \langle B', [B, H] \rangle = B_0 < B_1 < \dots < B_{i-1} < \dots < B_n$, $n \geq 1$, $B_i = B_{i+1} \rtimes \langle b_i \rangle$, for all $i \geq 1$, $|b_i| = 2$, $|B_0| = 2$, $(Z(2^\infty).B) \cap H = Z(2^\infty) \cap H = \langle a^2, b^2 \rangle$, and $A/Z(p^\infty)$ is a quasicentral in $G/Z(p^\infty)$.

Proof. Let G be the locally graded IAN group with the infinite non-quasicentral nodal subgroup A of G . By Theorem 1 A is an almost quasicyclic group containing the finite subgroups that are not normal in G , $|A : A \cap G'| < \infty$, and G/A is the Dedekind group. The above mentioned implies that A contains a subgroup $Z(p^\infty)$ that is normal in G , $A/Z(p^\infty)$ is the finite Dedekind group and furthermore $Z(p^\infty) \leq B \leq A$. Pursuant to Definition 1 the group B is the infinite subgroup of G . Admittedly, B is normal in G and the factor group $A/Z(p^\infty)$ is the quasicentral subgroup of $G/Z(p^\infty)$. According to Theorem 3.1 [8] the subgroup A satisfies the conditions of this theorem. Evidently, A is the group of one of types 1 to 8 of this theorem.

If A is a group of the type 1 of Theorem 3.1 [8], then A is the Dedekind group, $A = Z(p^\infty) \times D$ where D is the finite Dedekind group, $p = 2$, and $D' = \langle e \rangle$. By Lemma 6 $p \mid |D|$, the subgroup A contains element a so that a subgroup $\langle a \rangle$ is not normal p -subgroup in G . Thus A is of the type 1 of this theorem.

If A is a group of one of the types 2 - 8 of Theorem 3.1 [8], then A is a subgroup of one of the types 2 - 8 of this theorem.

Conversely. If G is a group with the normal subgroup A of one of the types 1 - 8 of this theorem, then G/A is the Dedekind group. G is evidently the locally graded group. Because G/A is the Dedekind group and $A/Z(p^\infty)$ is the quasicentral subgroup of $G/Z(p^\infty)$, then any infinite subgroup contained in A and any subgroup which contains a subgroup A is normal in G . Thus G is the IAN group.

Let A be an infinite subgroup of G . If the subgroup A is of the type 1 of this theorem, then the subgroup A contains a subgroup $\langle a \rangle$ that is not normal in G . Thus the subgroup A is non-quasicentral subgroup of G .

Thus the quasicentral subgroups of the group G are the Dedekind groups, which implies A is a group of one of the types 2 - 8 of this theorem. Thus A is the non-Dedekind group, which implies that the subgroup A of one of the types 2 - 8 is a non-quasicentral subgroup of G . ■

Theorem 4.

The group G is the IANA group with an infinite non-quasicyclic nodal subgroup A , if and only if $A = Z(p^\infty) \times D$, where D is a finite group, $p \mid |D|$, the subgroup A contains an element a so that $\langle a \rangle$ p -subgroup is not normal of G , and $A/Z(p^\infty)$ is the quasicyclic in $G/Z(p^\infty)$.

Proof. Let G be the locally graded IANA group with the infinite non-quasicyclic nodal subgroup A of G , and $A' = \langle e \rangle$. Because G/A is the Dedekind group, $A = Z(p) \times D$, where D is the finite abelian group, A contains the finite subgroups that are not normal in G , and G/A is the Dedekind group. The group G is evidently the locally graded IANA group with the nodal subgroup A of the type 1 of Theorem 2, $p \mid |D|$, the subgroup A contains

an element a so that $\langle a \rangle$ p -subgroup is not normal in G , and $A/Z(p^\infty)$ is the quasicyclic in $G/Z(p^\infty)$.

Let G be a group, A is a subgroup A of G , and $A = Z(p^\infty) \times D$, where D is a finite group, $p \mid |D|$, the subgroup A contains an element a so that $\langle a \rangle$ p -subgroup is not normal in G , and $A/Z(p^\infty)$ is the quasicyclic in $G/Z(p^\infty)$.

Conversely. Suppose that $A \trianglelefteq G$ where A is an almost quasicyclic group. Since $A/Z(p^\infty)$ is a quasicyclic in $G/Z(p^\infty)$, then $B/Z(p^\infty) \trianglelefteq G/Z(p^\infty)$ for all $B/Z(p^\infty) < A/Z(p^\infty)$. Hence

$B \trianglelefteq G$, A is the abelian subgroup, every infinite subgroup of A and every infinite subgroup of G containing A is a normal subgroup of G . By Definition 1 the group G is the IANA group. Hence the subgroup A contains the subgroup that is not normal in G , then A is the non-quasicyclic in G . ■

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MONOMIAL CURVES IN AFFINE SPACE AND THEIR ASSOCIATED PRIME IDEALS WITH SIX GENERATORS AS SET-THEORETIC COMPLETE INTERSECTIONS

The paper deals with the problem of the expression of associated prime ideals of monomial curves in the affine space A^4 as set-theoretic complete intersections. We describe some associated prime ideals, a minimal generating set of which has six elements and we prove that these ideals are set-theoretic complete intersections. Corresponding monomial curves are intersections of three hypersurfaces and we find the equations of these hypersurfaces.

Keywords: A monomial curve, an associated prime ideal, a set-theoretic complete intersection.

1. Introduction

It is known that k -dimensional algebraic affine variety is intersection of not fewer than $n - k$ hypersurfaces in n -dimensional affine space A^n . There is the presumption, that a number of these hypersurfaces is exactly $n - k$. In this case we can say, that they are ideal-theoretic or set-theoretic complete intersections. This is also equivalent to the fact, that either the associated ideal I of this variety has generators (ideal-theoretic complete intersection) or the ideal I is radical of an ideal a , $a \subseteq I$, the ideal a has $n - k$ generators (set-theoretic complete intersection). The number $n - k$ is also height of the ideal I . The ideal is called a set-theoretic complete intersection (s.t.c.i., for short), if there are $s = \text{ht}(I)$ elements $g_1, g_2, g_3, \dots, g_s$, such that $\text{rad}(I) = \text{rad}(g_1, g_2, g_3, \dots, g_s)$.

Let K be an arbitrary field, $R = K[x_1, x_2, x_3, x_4]$ the polynomial ring in four variables over K . $C = C(n_1, n_2, n_3, n_4)$ a monomial curve in affine space A^4 over K having parameterization $x_i = t^{n_i}, i \in \{1, 2, 3, 4\}$, where n_1, n_2, n_3, n_4 be positive integers with g.c.d. equal 1 and n_1, n_2, n_3, n_4 is a minimal set of generators for the numerical semigroup $H = \langle n_1, n_2, n_3, n_4 \rangle$.

The ideal P of all polynomials $f(x_1, x_2, x_3, x_4) \in R$ such that $f(t^{n_1}, t^{n_2}, t^{n_3}, t^{n_4}) = 0$, t transcendental over K , is the associated prime ideal of ring R of the monomial curve C . P is the corresponding ideal with $\dim(P) = 1$ and height $\text{ht}(P) = 3$. In particular, associated prime ideal P of monomial curve C in A^4 is a s.t.c.i., if $P = \text{rad}(g_1, g_2, g_3)$ and also a monomial curve C is a s.t.c.i. (more information in [1]).

The general problem of whether all associated ideals of monomial curves (or monomial curves) are s.t.c.i. is still open.

There are nevertheless some partial results in this direction. E.Kunz [1] showed that every monomial curve in 3-dimensional affine space is a s.t.c.i.

In 4-dimensional affine space A^4 , H. Bresinsky proved that if numerical semigroup H is symmetric, then the monomial curve $C(n_1, n_2, n_3, n_4)$ and its associated prime ideals are s.t.c.i. (see [2]). D. Patil presented in [3], if $n - 1$ numbers among m_1, m_2, \dots, m_n form an arithmetic sequence, then $C = C(m_1, m_2, \dots, m_n)$ in A^n is s.t.c.i. S.Solcan dealt with monomial curves $C(p^2, p^2 + p, p^2 + p + 1, (p + 1)^2)$ in A^4 as s.t.c.i. for the positive characteristic of the field $K \text{ char } K = p \neq 0$ [4] and for $\text{char } K = 0$ [5]. W. Gastinger in [6] proved that associated prime ideals of monomial curves in A^4 are s.t.c.i. if minimal generating sets of these ideals have four generators. We showed that associated prime ideals of monomial curves whose minimal set of generators have five elements is s.t.c.i. [7].

2. The associated prime ideal P of the monomial curve C

Let a binomial term $\prod_{i=1}^4 x_i^{\gamma_i} - \prod_{i=1}^4 x_i^{\vartheta_i} \in P$, where $\gamma_i \vartheta_i = 0, i \in \{1, 2, 3, 4\}$. It is clear that $\sum_{i=1}^4 \gamma_i n_i = \sum_{i=1}^4 \vartheta_i n_i$.

We have basically two types of binomial terms of P .

$$x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\vartheta_k} x_l^{\vartheta_l}, \{i, j, k, l\} = \{1, 2, 3, 4\}, \gamma_i \gamma_j \gamma_k \gamma_l \neq 0$$

$$\text{or } x_i^{\gamma_i} - x_j^{\alpha_j} x_k^{\alpha_k} x_l^{\alpha_l}, \{i, j, k, l\} = \{1, 2, 3, 4\}, r_i \neq 0.$$

We denote the binomial term $x_i^{\gamma_i} - x_j^{\alpha_j} x_k^{\alpha_k} x_l^{\alpha_l}$ by $(x_i^{\gamma_i})$ if r_i is minimal and by $(x_i^{\gamma_i}, x_j^{\alpha_j})$ if $x_j^{\alpha_j} - x_i^{\alpha_i} x_k^{\alpha_k} x_l^{\alpha_l} \in P$ with r_j minimal and $\alpha_{ji} = r_i, \alpha_{jk} = \alpha_{jl} = 0$. Every generating set for

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P contains for each $i (i \in \{1, 2, 3, 4\})$ at least one polynomial $x_i^{r_i} - x_j^{\alpha_j} x_k^{\alpha_k} x_l^{\alpha_l}$ with r_i minimal. We also denote polynomial $x_i^{r_i} - x_j^{\alpha_j} x_k^{\alpha_k} x_l^{\alpha_l}$ by $(x_i^{r_i}(k, l))$ if r_i is minimal with respect to the condition either $\alpha_{ik} \neq 0$ or $\alpha_{il} \neq 0$. We defined as H. Bresinsky a set in three cases as follows:

- For binomials $(x_i^{r_i})$, $s = i, j, k, l, \{i, j, k, l\}$ with at least two exponents α_{sh} not zero, $h \in \{i, j, k, l\} - \{s\}$ let $B = \{(x_i^{r_i}), (x_j^{r_j}), (x_k^{r_k}), (x_l^{r_l})\}$
- Let $(x_i^{r_i}, x_j^{r_j}) \in P$ but $(x_k^{r_k}, x_l^{r_l}) \notin P$. Then either $B = \{(x_i^{r_i}, x_j^{r_j}), (x_k^{r_k}), (x_l^{r_l})\}$ or $B = \{(x_i^{r_i}, x_j^{r_j}), (x_k^{r_k}), (x_l^{r_l}(k, l))\}$,
- $B = \{(x_i^{r_i}, x_j^{r_j}), (x_k^{r_k}, x_l^{r_l})\} \cup C, C \subseteq \{(x_j^{r_j}(k, l)), (x_i^{r_i}(i, j))\}$.

We write $x_i^{\gamma_i} x_j^{\gamma_j} \not\prec x_i^{\gamma_2} x_j^{\gamma_2}$ if either $\gamma_{i1} > \gamma_{i2}$ and $\gamma_{j1} > \gamma_{j2}$ or the inequalities are reversed. For binomials we write $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \not\prec x_i^{\gamma_2} x_j^{\gamma_2} - x_k^{\gamma_2} x_l^{\gamma_2}$ if $\not\prec$ holds between the first and second monomials of this binomials, i.e. if $x_i^{\gamma_i} x_j^{\gamma_j} \not\prec x_i^{\gamma_2} x_j^{\gamma_2}$ and $x_k^{\gamma_k} x_l^{\gamma_l} \not\prec x_k^{\gamma_2} x_l^{\gamma_2}$.

We next define a set $D_{ij}, i \neq j, \{i, j\} \subset \{1, 2, 3, 4\}$, $D_{ij} = \{f = x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l}, \{k, l\} \subset \{1, 2, 3, 4\} - \{i, j\}, \gamma_h < r_h'$ for the polynomials $(x_h^{r_h}(k, l))$ if $h \in \{i, j\}$, for the polynomials $(x_h^{r_h}(i, j))$ if $h \in \{k, l\}$ and for each binomial term $f' = x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in P, f' \neq f$ is $f' \not\prec f\}$.

The definition of sets B, D_{ij} gives

Corollary 2.1

1. If $B = \{(x_1^{r_1}), (x_2^{r_2}), (x_3^{r_3}), (x_4^{r_4})\}$ and $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ij}, \{i, j, k, l\} = \{1, 2, 3, 4\}$, then $\gamma_h < r_h, h \in \{1, 2, 3, 4\}$.
2. Let $B = \{(x_i^{r_i}, x_j^{r_j}), (x_k^{r_k}), (x_l^{r_l})\}$. If $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ik}$, or $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{il}, \{i, j, k, l\} = \{1, 2, 3, 4\}$, then $\gamma_h < r_h, h \in \{i, j\}$. If $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ij}, \{i, j, k, l\} = \{1, 2, 3, 4\}$, then $\gamma_h < r_h, h \in \{k, l\}$.
3. Let $B = \{(x_i^{r_i}, x_j^{r_j}), (x_k^{r_k}), (x_l^{r_l}), (x_j^{r_j}(k, l))\}$. If $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ik}$, or $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{il}, \{i, j, k, l\} = \{1, 2, 3, 4\}$, then $\gamma_h < r_h, h \in \{i, j\}$. If $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ij}, \{i, j, k, l\} = \{1, 2, 3, 4\}$, then $\gamma_h < r_h, h \in \{k, l\}$.
4. Let $B = \{(x_i^{r_i}, x_j^{r_j}), (x_k^{r_k}, x_l^{r_l})\} \cup C, C \subseteq \{(x_j^{r_j}(k, l)), (x_i^{r_i}(i, j))\}$. If $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ik}$, or $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{il}, \{i, j, k, l\} = \{1, 2, 3, 4\}$, then $\gamma_h < r_h, h \in \{1, 2, 3, 4\}$. If $x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ij}, \{i, j, k, l\} = \{1, 2, 3, 4\}$, then $\gamma_h < r_h, h \in \{j, l\}$.

In [8], H. Bresinsky gives the following theorem.

Theorem 2.1

$M = B \cup D_{ij} \cup D_{ik} \cup D_{il}, \{i, j, k, l\} = \{1, 2, 3, 4\}$ is a minimal generating set for the associated prime ideal $P = P(n_1, n_2, n_3, n_4)$ of the monomial curve in A^4 .

We can find in [6], Lemma 7.1, the next property of minimal generating set for a prime ideal P .

Lemma 2.1 Let $g_j = \prod_{i=1}^4 x_i^{\gamma_i}, j = 1, \dots, t$ be a monomial term in R .

Let $M = \{x_1^{r_1} - g_1, x_2^{r_2} - g_2, g_3 - g_4, \dots, g_{t-1} - g_t\}$ be a minimal generating set for the associated prime ideal P of the monomial curve in A^4 . If $x_2 | g_1$ and $x_1 | g_2$, then there is an integer $k, 3 \leq k \leq t$ with $g_k = x_1^{\delta_1} x_2^{\delta_2}$.

Following theorems we proved in [7].

Theorem 2.2 Let $B = \{(x_1^{r_1}), (x_2^{r_2}), (x_3^{r_3}), (x_4^{r_4})\} \subseteq M$, where M is a minimal generating set for the associated prime ideal P of a monomial curve in A^4 . If $x_1^{r_1} - x_j^{\alpha_j} x_k^{\alpha_k} x_l^{\alpha_l} \in B$ and $\alpha_{ij} \neq 0, \{i, j, k, l\} = \{1, 2, 3, 4\}$, then $\alpha_{ji} < r_i$.

Theorem 2.3 Let $B = \{(x_i^{r_i}, x_j^{r_j}), (x_k^{r_k}), (x_l^{r_l}), (x_j^{r_j}(k, l))\}$ and $B \subseteq M, \{i, j, k, l\} = \{1, 2, 3, 4\}$ where M is a minimal generating set for the associated prime ideal P of a monomial curve in A^4 .

If $\alpha_{kl} \neq 0$, then $\alpha_{lk} < r_k$.

If $\alpha_{lk} \neq 0$, then $\alpha_{kl} < r_l$.

If $\alpha_{ju} \neq 0$, then $\alpha_{uj} < r'_j, u = k, l$.

If $\alpha_{ju} \neq 0$, then $\alpha_{ju} < r_u, u = k, l$.

Theorem 2.4 If $B = \{(x_i^{r_i}, x_j^{r_j}), (x_k^{r_k}, x_l^{r_l})\} \cup C \subseteq M, C \subseteq \{(x_j^{r_j}(k, l)) = x_j^{r_j} - x_i^{\alpha_i} x_k^{\alpha_k} x_l^{\alpha_l}, (x_i^{r_i}(i, j)) = x_i^{r_i} - x_j^{\alpha_j} x_k^{\alpha_k} x_l^{\alpha_l}\}, \{i, j, k, l\} = \{1, 2, 3, 4\}$ and M is a minimal generating set for the associated prime ideal P of a monomial curve in A^4 . Then $\alpha_{ji} < r_i$ and $\alpha_{lk} < r_k$.

Theorem 2.5 Let P be the associated prime ideal of a monomial curve in A^4 .

Let $B = \{(x_1^{r_1}), (x_2^{r_2}), (x_3^{r_3}), (x_4^{r_4})\}$ and

$M = B \cup D_{12} \cup D_{13} \cup D_{14}$ be a minimal generating set for the ideal $P, x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ij}, \{i, j, k, l\} = \{1, 2, 3, 4\}$. If $(x_s^{r_s}) \in B, s \in \{k, l\}, (x_s^{r_s}) = x_s^{r_s} - N_s$ and $N_s = x_i^{\alpha_i} x_j^{\alpha_j}$, then either $\alpha_{si} > \gamma_i \wedge \alpha_{sj} < \gamma_j$ or $\alpha_{si} < \gamma_i \wedge \alpha_{sj} > \gamma_j$.

When we use permutation of index $(i, j, k, l) \rightarrow (k, l, i, j)$ in Theorem 2.5 we receive following

Corollary 2.2 Let P be the associated prime ideal of a monomial curve in A^4 .

Let $B = \{(x_1^{r_1}), (x_2^{r_2}), (x_3^{r_3}), (x_4^{r_4})\}$ and

$M = B \cup D_{12} \cup D_{13} \cup D_{14}$ be a minimal generating set for the ideal $P, x_i^{\gamma_i} x_j^{\gamma_j} - x_k^{\gamma_k} x_l^{\gamma_l} \in D_{ij}, \{i, j, k, l\} = \{1, 2, 3, 4\}$. If $(x_s^{r_s}) \in B, s \in \{k, l\}, (x_s^{r_s}) = x_s^{r_s} - N_s$ and $N_s = x_k^{\alpha_k} x_l^{\alpha_l}$, then either $\alpha_{sk} > \gamma_k \wedge \alpha_{sl} < \gamma_l$ or $\alpha_{sk} < \gamma_k \wedge \alpha_{sl} > \gamma_l$.

3. The minimal generating set for a prime ideal P having six generators

The inducted propositions give necessary conditions on a minimal set of generators for an associated prime ideal P of a monomial curve in A^4 . When we use methods presented in [9]

- [11] and we also suppose that the minimal generating set M has six generators

$$M = \left\{ \begin{aligned} &x_i^{r_i} - x_j^{\alpha_{ij}} x_k^{\alpha_{ik}} x_l^{\alpha_{il}}, x_j^{r_j} - x_i^{\alpha_{ji}} x_k^{\alpha_{jk}} x_l^{\alpha_{jl}}, \\ &x_k^{r_k} - x_i^{\alpha_{ki}} x_j^{\alpha_{kj}} x_l^{\alpha_{kl}}, x_l^{r_l} - x_i^{\alpha_{li}} x_j^{\alpha_{lj}} x_k^{\alpha_{lk}} - x_j^{\omega_j} x_l^{\omega_l}, \\ &x_i^{\gamma_i} x_l^{\gamma_l} - x_j^{\gamma_j} x_k^{\gamma_k} \end{aligned} \right\}, \quad (1)$$

where $\{i, j, k, l\} = \{1, 2, 3, 4\}$, α_{ik} and α_{jk} are not equal to zero, we get that there is an $u \in N_0$ and all exponents must satisfy the following equations:

$$\begin{aligned} r_i &= \alpha_{ji} + \alpha_{ki} + (u + 1)\alpha_{li}, \\ r_j &= \alpha_{ij} + \alpha_{kj} + (u + 1)\alpha_{lj}, \\ r_k &= \alpha_{ik} + \alpha_{jk}, \\ r_l &= \omega_l + \alpha_{jl} = \gamma_l + \alpha_{il}, \\ (u + 1)r_l &= \alpha_{il} + \alpha_{jl} + \alpha_{kl}, \\ \omega_i &= \alpha_{li} + \alpha_{ji}, \omega_j = \alpha_{ij} + \alpha_{kl} + u\alpha_{lj}, \\ \omega_k &= \alpha_{jk}, \omega_l = \alpha_{il} + \alpha_{kl} - ur_l, \\ \gamma_i &= \alpha_{ji} + \alpha_{ki} + u\alpha_{li}, \gamma_j = \alpha_{ij} + \alpha_{kl}, \\ \gamma_k &= \alpha_{ik}, \gamma_l = \alpha_{jl} + \alpha_{kl} - ur_l. \end{aligned} \quad (2)$$

4. Set-theoretic complete intersection

In this section we will prove that each associated prime ideal P of the monomial curve C , whose minimal generating set M has description (1) is s.t.c.i. and the corresponding monomial curve C is also s.t.c.i. We show that C is an intersection of three hypersurfaces and we give the equations of these hypersurfaces.

Theorem 4.1 *Let P be the associated prime ideal of the monomial curve C in A^4 .*

If $M = \{x_i^{r_i} - x_j^{\alpha_{ij}} x_k^{\alpha_{ik}} x_l^{\alpha_{il}}, x_j^{r_j} - x_i^{\alpha_{ji}} x_k^{\alpha_{jk}} x_l^{\alpha_{jl}}, x_k^{r_k} - x_i^{\alpha_{ki}} x_j^{\alpha_{kj}} x_l^{\alpha_{kl}}, x_l^{r_l} - x_i^{\alpha_{li}} x_j^{\alpha_{lj}} x_k^{\alpha_{lk}} - x_j^{\omega_j} x_l^{\omega_l}, x_i^{\gamma_i} x_l^{\gamma_l} - x_j^{\gamma_j} x_k^{\gamma_k}\}$ is a minimal generating set for the prime ideal P , where $\{i, j, k, l\} = \{1, 2, 3, 4\}$, α_{ik} and α_{jk} are not equal to zero and exponents satisfy equations (2) for some $u \in N_0$, then this prime ideal P (monomial curve C) is a set-theoretic complete intersection.

Proof. To prove our claim we need to show that $P = \text{Rad}(g_1, g_2, g_3)$, $g_s \in P, s \in \{1, 2, 3\}$. We find expression of polynomials $g_s \in P, s \in \{1, 2, 3\}$.

Now we denote polynomials from the minimal generating set M as $g_2 = x_k^{r_k} - x_i^{\alpha_{ki}} x_j^{\alpha_{kj}} x_l^{\alpha_{kl}}, g_3 = x_l^{r_l} - x_i^{\alpha_{li}} x_j^{\alpha_{lj}} x_k^{\alpha_{lk}}, \{i, j, k, l\} = \{1, 2, 3, 4\}$. When we add a polynomial $g \in (g_2, g_3)$ to a polynomial $f \in R$ we denote it as \rightarrow . Let $F_1 = x_j^{r_j} - x_i^{\alpha_{ji}} x_k^{\alpha_{jk}} x_l^{\alpha_{jl}}$, then we have

$$F_1^{r_1 r_l} = (-1)^{r_1 r_l} \sum_{h=0}^{r_1 r_l} r_k r_l \binom{r_k r_l}{h} (-1)^h (x_i^{\alpha_{ji}} x_k^{\alpha_{jk}} x_l^{\alpha_{jl}})^{r_1 r_l - h} x_j^{r_j h}.$$

We denote $b_h = r_k r_l \binom{r_k r_l}{h} (-1)^{r_1 r_l + h}, h = 0, \dots, r_k r_l$.

$$F_1^{r_1 r_l} \rightarrow \sum_{h=0}^{\alpha_{jk} r_l} b_h x_i^{\alpha_{ji}(r_k r_l - h) + \alpha_{ik}(\alpha_{jk} r_l - h)} x_k^{\alpha_{jk} h} x_l^{\alpha_{il}(\alpha_{jk} r_l - h) + \alpha_{jl}(r_k r_l - h)} x_j^{r_j h + \alpha_{ij}(\alpha_{jk} r_l - h)}$$

$$+ \sum_{h=\alpha_{jk} r_l + 1}^{r_k r_l} b_h (x_i^{\alpha_{ji}} x_k^{\alpha_{jk}} x_l^{\alpha_{jl}})^{r_1 r_l - h} x_j^{r_j h}$$

[if $h \leq \alpha_{jk} r_l$, then $x_k^{\alpha_{jk}(r_k r_l - h)} \rightarrow x_k^{\alpha_{jk} h} (x_i^{\alpha_{ji}} x_j^{\alpha_{ij}} x_l^{\alpha_{il}})^{(\alpha_{jk} r_l - h)}$]

$$\rightarrow \sum_{h=0}^{\alpha_{jk} r_l} b_h (x_i^{\alpha_{ji}(r_k r_l - h) + \alpha_{ik}(\alpha_{jk} r_l - h) + \alpha_{il}(\alpha_{jk} r_l - h) + \alpha_{il}(\alpha_{jk} r_l - h) + u(\alpha_{jk} r_l - h)} x_k^{\alpha_{jk} h} \cdot x_l^{\gamma_l(\alpha_{jk} r_l - h)} x_j^{r_j h + \alpha_{ij}(\alpha_{jk} r_l - h) + \alpha_{ij}(\alpha_{jk} r_l - h) + u(\alpha_{jk} r_l - h)})$$

$$+ \sum_{h=\alpha_{jk} r_l + 1}^{r_k r_l} b_h (x_i^{\alpha_{ji}} x_k^{\alpha_{jk}} x_l^{\alpha_{jl}})^{r_1 r_l - h} x_j^{r_j h}$$

[if $h \leq \alpha_{jk} r_l$, then

$$x_l^{\alpha_{il}(\alpha_{jk} r_l - h) + \alpha_{il}(r_k r_l - h)} \rightarrow x_l^{\gamma_l(\alpha_{jk} r_l - h)} (x_i^{\alpha_{ji}} x_j^{\alpha_{ij}})^{\alpha_{ij}(\alpha_{jk} r_l - h)}$$

$$\rightarrow \sum_{h=0}^{\alpha_{jk} \gamma_l - 1} b_h (x_i^{\alpha_{ji}(r_k r_l - h) + \alpha_{ik}(\alpha_{jk} r_l - h) + \alpha_{il}(\alpha_{jk} r_l - h) + \alpha_{il}(\alpha_{jk} r_l - h) + u(\alpha_{jk} r_l - h) + \alpha_{jk} \gamma_l - h)} x_k^{\alpha_{jk} h} \cdot x_l^{\alpha_{il} h} x_j^{r_j h + \alpha_{ij}(\alpha_{jk} r_l - h) + \alpha_{ij}(\alpha_{jk} r_l - h) + u(\alpha_{jk} r_l - h) + \alpha_{jk} \gamma_l - h)})$$

$$+ \sum_{h=\alpha_{jk} \gamma_l}^{\alpha_{jk} r_l} b_h (x_i^{\alpha_{ji}(r_k r_l - h) + \alpha_{ik}(\alpha_{jk} r_l - h) + \alpha_{il}(\alpha_{jk} r_l - h) + u(\alpha_{jk} r_l - h)}) x_k^{\alpha_{jk} h} \cdot x_l^{\alpha_{il} h} x_j^{r_j h + \alpha_{ij}(\alpha_{jk} r_l - h) + \alpha_{ij}(\alpha_{jk} r_l - h) + u(\alpha_{jk} r_l - h) + \alpha_{jk} \gamma_l - h)})$$

[if $h < \alpha_{jk} \gamma_l$, then $x_l^{\gamma_l(\alpha_{jk} r_l - h)} \rightarrow x_l^{\alpha_{il} h} (x_i^{\alpha_{ji}} x_j^{\alpha_{ij}})^{\alpha_{ij}(\gamma_l - h)}$]

$$= x_j^{\alpha_{ij} \alpha_{jk} \alpha_{il} + \alpha_{ij} \alpha_{jk} r_l + \alpha_{ij} \alpha_{jk} r_l} \left(\sum_{h=0}^{\alpha_{jk} \gamma_l - 1} b_h (x_i^{\alpha_{ji}} x_j^{\alpha_{ij}} x_k^{\alpha_{jk}} x_l^{\alpha_{il}})^h \right)$$

$$\cdot x_i^{\alpha_{ji} r_k r_l + \alpha_{jk} r_l (\alpha_{ji} + u \alpha_{il}) + \alpha_{il} (\alpha_{jk} \gamma_l + \alpha_{ij} \alpha_{il}) - r_l h}$$

$$+ \sum_{h=\alpha_{jk} \gamma_l}^{\alpha_{jk} r_l} b_h x_i^{\alpha_{ji} r_k r_l + \alpha_{jk} r_l (\alpha_{ji} + u \alpha_{il}) + \alpha_{il} \alpha_{ij} \alpha_{il} - (r_l - \alpha_{il}) h} x_k^{\alpha_{jk} h} x_l^{\alpha_{il} h} x_j^{\gamma_l (\alpha_{jk} r_l - h)} x_j^{\alpha_{ij} h + \alpha_{ij} (h - \alpha_{jk} \gamma_l)}$$

$$+ \sum_{h=\alpha_{jk} r_l + 1}^{r_k r_l} b_h (x_i^{\alpha_{ji}} x_k^{\alpha_{jk}} x_l^{\alpha_{jl}})^{r_1 r_l - h} x_j^{\alpha_{ij} h + (\alpha_{ij} u + \alpha_{ij})(h - \alpha_{jk} r_l) + \alpha_{ij}(h - \alpha_{jk} \gamma_l - \alpha_{ij} \alpha_{il})}$$

$$= x_j^{\alpha_{ij} \alpha_{jk} \alpha_{il} + \alpha_{ij} \alpha_{jk} r_l + \alpha_{ij} \alpha_{jk} r_l} g_1.$$

Let $F_2 = x_i^{r_i} - x_j^{\alpha_{ji}} x_k^{\alpha_{jk}} x_l^{\alpha_{jl}}$ be another generator of the ideal P . We know that $x_j^{(u+1)\alpha_{ij} + \alpha_{ij}} F_2 \equiv -x_k^{\alpha_{ik}} x_l^{\alpha_{il}} F_1 \text{ mod}(g_2, g_3)$

and it is easy to see that

$$x_j^{((u+1)\alpha_{ij} + \alpha_{ij}) r_l} F_2^{r_l} \equiv (-1)^{r_l r_l} (x_i^{\alpha_{ji}} x_j^{\alpha_{ij}})^{\alpha_{ij} r_l} (x_i^{\alpha_{il}} x_j^{\alpha_{il}})^{\alpha_{ij} r_l} F_1^{r_l} \text{ mod}(g_2, g_3).$$

and

$$F_1^{r_1 r_l} \equiv x_j^{\alpha_{ij} \alpha_{jk} \alpha_{il} + \alpha_{ij} \alpha_{jk} r_l + \alpha_{ij} \alpha_{jk} r_l} g_1 \text{ mod}(g_2, g_3). \quad (3)$$

We know that $R/(g_2, g_3)$ is a module over $K[x_r, x_j]$ and $\{g_2, g_3\}$ is a Grobner basis for (g_2, g_3) with respect to the lexicographic order, taking $x_r > x_j > x_k > x_l$. By [12], Chapter 1, § 3, Exercise 4 each element $\tilde{f} \in R/(g_2, g_3)$ is uniquely expressed $\tilde{f} = a_1 \cdot 1 + \dots + a_n \cdot x_k^{r_k - 1} + a_2 \cdot x_1 + \dots + a_2 \cdot x_1 x_k^{r_k - 1} + \dots + a_n \cdot x_l^{r_l - 1} + \dots + a_n \cdot x_l^{r_l - 1} x_k^{r_k - 1} + (g_2, g_3)$, $a_n^u \in K[x_i, x_j], n = 1, 2, \dots, r_l$. Clearly, the module $R/(g_2, g_3)$ has a linearly independent basis $\{\bar{1}, \dots, x_l^{r_l - 1} x_k^{r_k - 1}\}$ over $K[x_r, x_j]$, thus is free module over $K[x_r, x_j]$ and its rank is $r_l r_k$. Therefore

$$F_2^{r_1 r_l} \equiv (-1)^{r_1 r_l} x_j^{\alpha_{ij} \alpha_{jk} r_l + \alpha_{ij}(\alpha_{jk} r_l + \alpha_{il} \alpha_{il})} g_1 \text{ mod}(g_2, g_3). \quad (4)$$

We denote the generator $x_i^{\omega_i} x_k^{\omega_k} - x_j^{\omega_j} x_l^{\omega_l}$ of ideal P as F_3 . Moreover,

$$x_j^{\alpha_{ij}} F_3 \equiv -x_l^{\alpha_{il} + \alpha_{il} - u r_l} F_1 \text{ mod}(g_2, g_3), \text{ hence}$$

$$x_j^{\alpha_j r_i r_i} F_3^{r_i r_i} \equiv (-1)^{r_i r_i} (x_i^{\alpha_i} x_j^{\alpha_j})^{r_i(\alpha_i + \alpha_j - u r_i)} F_1^{r_i r_i} \pmod{(g_2, g_3)}.$$

We use the same properties as above and we have a consequence,

$$F_3^{r_i r_i} \equiv (-1)^{r_i r_i} x_i^{\alpha_i r_i(\alpha_i + \gamma_i - \alpha_i)} x_j^{\alpha_j r_i(\alpha_j + \alpha_j \alpha_i)} g_1 \pmod{(g_2, g_3)} \quad (5)$$

We denote the generator $x_i^{\gamma_i} x_j^{\gamma_j} - x_i^{\gamma_i} x_j^{\gamma_j}$ of ideal P as F_4 . We know that $x_j^{\alpha_j + u \alpha_j} F_4 \equiv -x_i^{\alpha_i} F_1 \pmod{(g_2, g_3)}$ and $x_j^{\alpha_j + u \alpha_j} F_4^{r_i r_i} \equiv (-1)^{r_i r_i} (x_i^{\alpha_i} x_j^{\alpha_j})^{r_i \alpha_i} (x_i^{\alpha_i} x_j^{\alpha_j})^{\alpha_i \alpha_i} F_1^{r_i r_i} \pmod{(g_2, g_3)}$

When we use the same method as above, we get

$$F_4^{r_i r_i} \equiv (-1)^{r_i r_i} x_i^{\alpha_i \alpha_i r_i + \alpha_i \alpha_i \alpha_i} x_j^{\alpha_j \gamma_i r_i} g_1 \pmod{(g_2, g_3)} \quad (6)$$

If P is the associated prime ideal of the monomial curve, then $P = \text{Rad}(P)$ and $g_1 \in P$. This implies that $(g_1, g_2, g_3) \subseteq P$ and this inclusion induces $\text{Rad}(g_1, g_2, g_3) \subseteq P = \text{Rad}(P)$. From (3), (4), (5), (6) then we can easily get $P \subseteq \text{Rad}(g_1, g_2, g_3)$. Then $P = \text{Rad}(g_1, g_2, g_3)$ and the proof is completed.

Example 4.1. We take the minimal generating set M_t for the associated prime ideals $P, t \in \{1, 2\}$ of the monomial curves $C_1(11, 15, 18, 35)$ and $C_2(20, 25, 39, 41)$ which is given by Computer algebra system Macaulay created by D.Bayer and M.Stillman.

$$M_1 = \{x_1^3 - x_2 x_3, x_2^5 - x_1^2 x_3 x_4, x_3^4 - x_1^2 x_2 x_4, x_4^2 - x_1^2 x_2^2 x_3, x_1 x_3^3 - x_2^2 x_4, x_1 x_2^4 - x_3^2 x_4\},$$

$$M_2 = \{x_1^4 - x_3 x_4, x_2^4 - x_1 x_3 x_4, x_3^4 - x_1^2 x_2^3 x_4, x_4^3 - x_1 x_2 x_3^2, x_1^2 x_3^3 - x_2^3 x_2^2, x_2 x_3^3 - x_1^3 x_4^2\}.$$

The ideals $P, t \in \{1, 2\}$ generating by these sets belongs to the case of Theorem 4.1 for $(i, j, k, l) = (2, 3, 4, 1)$, $u = 1$ and $(i, j, k, l) = (3, 4, 2, 1)$, $u = 0$.

Hence ideals $P, t \in \{1, 2\}$ is s.t.c.i.

$$P_1 = \text{Rad}(g_1, x_1^3 - x_2 x_3, x_4^2 - x_1^2 x_2^2 x_3), \text{ where } g_1 = x_2^{18} - 6x_1^2 x_2^8 x_3 x_4 + 15x_1^4 x_2^8 x_3^2 - 20x_2^5 x_3^5 x_4^3 + \sum_{h=4}^6 (-1)^{6+h} \binom{6}{h} x_3^{4h-9} (x_1^2 x_2 x_4)^{6-h} \text{ and}$$

$$P_2 = \text{Rad}(g_2, x_1^4 - x_3 x_4, x_2^4 - x_1 x_3 x_4), \text{ where } g_2 = x_3^{41} - 16x_1^2 x_2^3 x_3^{37} x_4 + 120x_1^5 x_2^2 x_3^{34} x_4^3 - 560x_1^4 x_2 x_3^{321} x_4^6 + \sum_{h=4}^{16} (-1)^{16+h} \binom{16}{h} x_4^{3h-9} (x_1 x_2 x_3^2)^{16-h}.$$

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Maria Kudelcikova *

EXISTENCE OF POSITIVE SOLUTIONS OF A NONLINEAR DIFFERENTIAL EQUATION WITH n DELAYS

The equation $\dot{y}(t) = -(a + b(t)) \prod_{i=1}^n y^{\alpha_i}(t - \tau_i)$ is considered where n is a positive integer, a, τ_i and $\alpha_i, i = 1, 2, \dots, n$ are positive constants and conditions on function b are formulated such that the considered equation has positive solutions when $t \rightarrow \infty$. The equation is studied under assumptions

$$a < 1 / \left(e^{\sum_{i=1}^n \alpha_i \tau_i} \right), \sum_{i=1}^n \alpha_i = 1.$$

Estimation of positive solutions is given as well. The proof is based on the retract technique.

Keywords: Nonlinear differential equation with delays, positive solutions, transcendental equation, asymptotic behavior.

1. Preliminaries

New mathematical models which involve differential equations with delay continue to arise with increasing frequency in the modeling of diverse phenomena in physics, biology, ecology, and physiology. Often such equations describe various processes appearing in practice more realistic than differential equations without delays. Let us consider a motivation example:

Example (Mixing of liquids) [1]

Consider a tank containing l liters of sugar water solution. Fresh water flows in at the top of the tank at a rate of m liters per minute. The water solution in the tank is continually stirred, and the mixed solution flows out through a hole at the bottom, also at the rate of m liters per minute [Fig. 1]. Determine the amount of sugar in the water solution in the tank at time t .

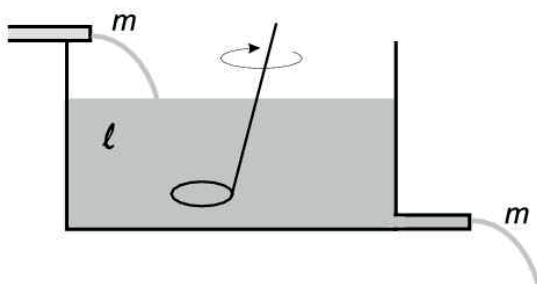


Fig 1 Mixing of liquids

Solution. Let $y(t)$ be the amount (in kilograms) of sugar in the solution in the tank at time t . If we assume continual, instantaneous, perfect mixing throughout the tank, then the solution leaving the tank contains $y(t)/l$ kilograms of sugar per liter, and hence the rate of change of the amount of sugar in the solution at time t is proportional to $my(t)/l$. Therefore we can compose an ordinary differential equation describing the change of the amount of the sugar in the water solution in the tank at the time t :

$$y'(t) = -\frac{m}{l}y(t) \quad (1)$$

and

$$y(t_0) = y_0$$

where y_0 is the amount (in kilograms) of sugar in the solution in the tank at the initial time t_0 . It is easy to see that the solution of (1) is given by the formula

$$y(t) = y_0 \exp\left[-\frac{m}{l}(t - t_0)\right].$$

A disadvantage of the given model is following. As mixing cannot occur instantaneously throughout the tank it is more realistic to assume that the concentration of the sugar water solution leaving the tank at time t equals the average concentration

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at some earlier instant, say $t - \tau$. We shall assume that τ is a positive constant (often called a time lag or a time delay). Then the differential equation for becomes a delay differential equation

$$y'(t) = -\frac{m}{l}y(t - \tau). \tag{2}$$

Moreover, the speed of mixing can depend also on the time and then instead of the equation (2) one can consider the following mathematical model:

$$y'(t) = -\frac{m}{l}y(t - \tau(t)) \tag{3}$$

with a positive bounded function $\tau(t)$.

Models (2) or (3) should give a better description of the decrement process of amount of sugar in the tank than the model (1) without delay. Since in all models (1) - (3) it is assumed (and it is expected) $y(t) > 0$ if $t \geq t_0$ we can classify all of them as problems on existence of a positive solution on interval $[t_0, \infty)$. In the following part of the paper the problem on existence of positive solutions is discussed for a class of nonlinear equations.

2. Introduction

Let us consider the following nonlinear first order differential equation with n delays, more complicated than (3),

$$\dot{y}(t) = -(a + b(t)) \prod_{i=1}^n y^{\alpha_i}(t - \tau_i) \tag{4}$$

where a, τ , and $\alpha_i, i = 1, 2, \dots, n$ are positive constants,

$$a < 1 / \left(e^{\sum_{i=1}^n \alpha_i \tau_i} \right), \sum_{i=1}^n \alpha_i = 1, \tag{5}$$

$b: [t_0 - \tau, \infty) \rightarrow \mathbb{R}^+ = (0, \infty)$ is a continuous function, $t_0 \in \mathbb{R}$ and $\tau = \max_i \tau_i$. We prove that positive solutions of (4) exist if relations in (5) hold and b satisfies some additional assumptions. The main role in investigation performed below is played by the transcendental equation

$$\lambda = a \exp\left(\lambda \sum_{i=1}^n \alpha_i \tau_i\right). \tag{6}$$

We show that the transcendental equation (6) has two real roots and give its properties. The existence of a positive solution $y=y(t)$ of (4) is proved by utilization of a result on existence of solutions lying between two auxiliary functions. One of such functions is in the form of an exponential function constructed using a real root of (6). The paper is organized as follows. In subsection 2.1 essential auxiliary result on asymptotic behavior of solutions of general nonlinear system is cited for the reader's convenience (Theorem 1 below). Subsection 2.2 is devoted to the investigation of the properties of real roots of the transcendental equation (6). Then in section 3 auxiliary results are applied to

the equation (4). For further results on the existence of positive solutions and also oscillating solutions to delayed differential equations we refer, e.g., to monographs [2] - [5], papers [1], [6] - [14] and to the references therein.

2.1 A result based on the retract method

Let $C([a, b], \mathbb{R}^n)$ where $a, b \in \mathbb{R}, a < b$, be the Banach space of the continuous mappings from the interval $[a, b]$ into \mathbb{R}^n equipped with the supreme norm

$$\|\phi\|_c = \sup_{\theta \in [a, b]} \|\phi(\theta)\|, \phi \in C([a, b], \mathbb{R}^n)$$

where $\|\cdot\|$ is the maximum norm in \mathbb{R}^n . In the case of $a = -\tau$ and $b = 0$, we shall denote this space as C_τ^n , that is,

$$C_\tau^n := C([- \tau, 0], \mathbb{R}^n).$$

If $\sigma \in \mathbb{R}, A \geq 0$, and $y \in C([\sigma - \tau, \sigma + A], \mathbb{R}^n)$, then, for each $t \in [\sigma, \sigma + A]$, we define $y_t \in C_\tau^n$ by $y_t(\theta) = y(t + \theta), \theta \in [-\tau, 0]$.

We consider a system of retarded functional differential equations

$$\dot{y}(t) = F(t, y_t) \tag{7}$$

where $F: \Omega^* \mapsto \mathbb{R}^n, F = (F_1, \dots, F_n)$ is a continuous quasi-bounded functional which satisfies a local Lipschitz condition with respect to the second argument and Ω^* is an open subset in $\mathbb{R} \times C_\tau^n$. We recall that the functional F is quasi-bounded if F is bounded on every set of the form $[t_1, t_2] \times C_{tL}^n \subset \Omega^*$, where $t_1 < t_2, C_{tL}^n := C([- \tau, 0], L)$ and L is a closed bounded subset of \mathbb{R}^n (compare [4, p. 305]). In accordance with [5] a function $y(t)$ is said to be a solution of system (7) on $[\sigma - \tau, \sigma + A]$ if there are $\sigma \in \mathbb{R}$ and $A > 0$ such that $y \in C([\sigma - \tau, \sigma + A], \mathbb{R}^n), (t, y_t) \in \Omega^*$ and $y(t)$ satisfies the system (7) for $t \in [\sigma, \sigma + A]$. For given $(\sigma, \varphi) \in \Omega^*$, we say $y(\sigma, \varphi)$ is a solution of the system (7) through (σ, φ) if there is an $A > 0$ such that $y(\sigma, \varphi)$ is a solution of the system (7) on $[\sigma - \tau, \sigma + A]$ and $y_\sigma(\sigma, \varphi) = \varphi$. In view of above conditions each element $(\sigma, \varphi) \in \Omega^*$ determines a unique solution $y(\sigma, \varphi)$ of the system (7) through $(\sigma, \varphi) \in \Omega^*$ on its maximal interval of existence $I_{(\sigma, \varphi)} = [\sigma, a), \sigma < a \leq \infty$ which depends continuously on initial data ([5]). A solution $y(\sigma, \varphi)$ of the system (7) is said to be *positive* if

$$y(\sigma, \varphi) > 0 \tag{8}$$

on $[\sigma - \tau, \sigma] \cup I_{(\sigma, \varphi)}$ for each $i = 1, 2, \dots, n$. If $I_{(\sigma, \varphi)} = [\sigma, \infty)$, then a nontrivial solution $y(\sigma, \varphi)$ of the system (7) is said to be oscillatory if (8) does not hold on any subinterval $[\sigma_1, \infty) \subset [\sigma, \infty), \sigma_1 \geq \sigma$.

For continuous vector functions

$$\rho = (\rho_1, \rho_2, \dots, \rho_n), \delta = (\delta_1, \delta_2, \dots, \delta_n) : [t_0 - \tau, \infty) \rightarrow \mathbb{R}^n,$$

with $\rho(t) \ll \delta(t)$ for $t \in [t_0 - \tau, \infty)$ (the symbol \ll here and below means: $\rho_i(t) < \delta_i(t)$ for all $i = 1, 2, \dots, n$), continuously differentiable on $[t_0, \infty)$, we define the set $\omega := \{(t, y) : t \in [t_0, \infty), \rho(t) \ll y \ll \delta(t)\}$.

In the sequel, we employ the following result being a particular case of [6, Theorem 1].

Theorem 1. Assume that if $t \geq t_0, \phi \in C_\tau^n$ and $(t + \theta, \phi(\theta)) \in \omega$ for any $\theta \in [-\tau, 0)$, then

$$\delta_i'(t) < F_i(t, \phi) \text{ when } \phi_i(0) = \delta_i(t), \tag{9}$$

$$\rho_i'(t) < F_i(t, \phi) \text{ when } \phi_i(0) = \rho_i(t) \tag{10}$$

for any $i = 1, 2, \dots, n$. Then there exists an uncountable set \mathcal{Y} of solutions of (7) on $[t_0 - \tau, \infty)$ such that each $y \in \mathcal{Y}$ satisfies

$$\rho(t) \ll y(t) \ll \delta(t), t \in [t_0 - \tau, \infty). \tag{11}$$

The original Theorem 1 is in [6] proved using the retract technique combined with Razumikhin's type ideas, known in theory of stability of retarded functional differential equations.

2.2 Real roots of a transcendental equation

Let us consider the auxiliary transcendental equation (6). In the following lemma we prove some properties of its real solutions.

Lemma 1. Let a, τ_1 and $\alpha_i, i = 1, 2, \dots, n$ be positive constants, and inequality (5) holds. Then there exist just two real different positive roots λ_1, λ_2 of (6) such that $\lambda_1 < \lambda_2$.

Moreover,

a) $\lambda_1 \sum_{i=1}^n \alpha_i \tau_i < 1$

b) $\lambda_2 \sum_{i=1}^n \alpha_i \tau_i > 1$

Proof. Let us define the auxiliary function

$$f(\lambda) := \lambda - a \exp\left(\lambda \sum_{i=1}^n \alpha_i \tau_i\right).$$

Looking for its extremal points, we compute its first derivative:

$$f'(\lambda) := 1 - a \sum_{i=1}^n \alpha_i \tau_i e^{\lambda \sum_{i=1}^n \alpha_i \tau_i}.$$

Equation $f'(\lambda) = 0$ has a root

$$\lambda = \lambda_\epsilon = -\frac{1}{\sum_{i=1}^n \alpha_i \tau_i} \ln\left(a \sum_{i=1}^n \alpha_i \tau_i\right).$$

Since the second derivative $f''(\lambda)$ is a negative function, it is obvious that at λ_ϵ the auxiliary function $f(\lambda)$ reaches its maximum. We compute it and conclude

$$f(\lambda_\epsilon) = -\frac{1}{\sum_{i=1}^n \alpha_i \tau_i} \left[\ln\left(a \sum_{i=1}^n \alpha_i \tau_i\right) + 1 \right] > 0$$

if inequality (5) holds. Since $f(0) = -a < 0$ and $f(+\infty) = -\infty$, the equation (6) has just two different positive roots λ_1, λ_2 satisfying $\lambda_1 < \lambda_\epsilon < \lambda_2$. To prove the part a) we consider:

$$\begin{aligned} \lambda_1 &= a \exp\left(\lambda_1 \sum_{i=1}^n \alpha_i \tau_i\right) < a \exp\left(\lambda_\epsilon \sum_{i=1}^n \alpha_i \tau_i\right) \\ &= a \exp\left(-\frac{1}{\sum_{i=1}^n \alpha_i \tau_i} \ln\left(a \sum_{i=1}^n \alpha_i \tau_i\right) \sum_{i=1}^n \alpha_i \tau_i\right) \\ &= a \left(\frac{1}{a \sum_{i=1}^n \alpha_i \tau_i}\right) = \frac{1}{\sum_{i=1}^n \alpha_i \tau_i}. \end{aligned}$$

From this we have $\lambda_1 \sum_{i=1}^n \alpha_i \tau_i < 1$. Since $\lambda_2 > \lambda_\epsilon$, part b) holds by the similar arguments. The lemma is proved.

In the proof of the main result we will need estimation of the expression

$$g(\mathcal{E}) := \lambda_2 \left(\mathcal{E} - \frac{a}{\lambda_2} \left(\frac{\lambda_2}{a}\right)^\mathcal{E} \right) - b(t) \left(\frac{\lambda_2}{a}\right)^\mathcal{E} \tag{12}$$

where \mathcal{E} is a constant. The following Lemma gives us a condition under that expression (12) is positive.

Lemma 2. If for function inequality

$$b(t) < a \left(\ln \frac{\lambda_2}{a} - \ln \left(\ln \frac{\lambda_2}{a} - 1 \right) \right), t \in [t_0, \infty) \tag{13}$$

holds, then $g(\mathcal{E}) > 0$.

Proof. Let us define the auxiliary function

$$f(\mathcal{E}) = \mathcal{E} - \frac{a}{\lambda_2} \left(\frac{\lambda_2}{a}\right)^\mathcal{E}, \tag{14}$$

looking for its extremal point we compute its first derivative

$$f'(\mathcal{E}) = 1 - \frac{a}{\lambda_2} \left(\frac{\lambda_2}{a}\right)^\mathcal{E} \ln \frac{\lambda_2}{a}.$$

Since the second derivative $f''(\mathcal{E})$ is negative, function $f(\mathcal{E})$ reaches in its extremal point \mathcal{E}^* maximum. To find \mathcal{E}^* we have to solve equation $f'(\mathcal{E}) = 0$. We get

$$\left(\frac{\lambda_2}{a}\right)^\mathcal{E} = \frac{\lambda_2}{a} \frac{1}{\ln \frac{\lambda_2}{a}} \tag{15}$$

and after necessary computations we have

$$\mathcal{E}^* = 1 - \frac{\ln\left(\ln \frac{\lambda_2}{a}\right)}{\ln \frac{\lambda_2}{a}}. \tag{16}$$

For clarity of next computations we use the substitution

$$\ln \frac{\lambda_2}{a} = s, \text{ i.e., } \frac{\lambda_2}{a} = e^s. \tag{17}$$

From (6) and property b) in Lemma 1 it is visible that $s > 1$. Now substituting \mathcal{E}^* to (12) and using (15) and (17) we get

$$g(\mathcal{E}^*) = g\left(1 - \frac{\ln s}{s}\right) = \lambda_2 \left(1 - \frac{\ln s}{s} - \frac{1}{s}\right) - b(t) \frac{e^s}{s}.$$

For the positivity of previous expression function $b(t)$ must fulfill the following inequality

$$b(t) < e^{-s} \lambda_2 (s - \ln s - 1).$$

Using (17) we have (13). The lemma is proved

3. Main result

In this section we prove the existence of positive solutions to equation (4) and give its estimation from above.

Theorem 2. Let $b: [t_0, \infty) \rightarrow \mathbb{R}, |b(t)| < a, t \in [t_0, \infty)$ and for (13) be fulfilled. Then equation (4) admits an uncountable set \mathcal{Y} of positive solutions defined on $[t_0 - \tau, \infty)$ such that each $y = y(t) \in \mathcal{Y}$ satisfies inequalities

$$0 < y(t) < e^{-\lambda_2 t \mathcal{E}^*} \tag{18}$$

where \mathcal{E}^* is defined in Lemma 1 and is defined by (16).

Proof. To prove the theorem, we employ Theorem 1 with $n = 1$,

$$F(t, y_i) := -(a + b(t)) \prod_{i=1}^n y^{\alpha_i}(t - \tau_i),$$

$$\rho(t) := 0, \delta(t) := e^{\lambda_2 t \mathcal{E}^*}.$$

Hence the set is defined as

$$\omega = \{(t, y): t \in [t_0 - \tau, \infty), 0 < y(t) < e^{\lambda_2 t \mathcal{E}^*}\}.$$

Now, we have to verify the inequalities (9) and (10). In our case (for $t \geq t_0$)

$$\begin{aligned} F(t, \phi) - \delta'(t) &= -(a + b(t)) \prod_{i=1}^n y^{\alpha_i}(t - \tau_i) - \delta'(t) \\ &= -(a + b(t)) \prod_{i=1}^n y^{\alpha_i}(t - \tau_i) + \lambda_2 \mathcal{E}^* e^{-\lambda_2 t \mathcal{E}^*} \\ &> -(a + b(t)) \prod_{i=1}^n \delta^{\alpha_i}(t - \tau_i) + \lambda_2 \mathcal{E}^* e^{-\lambda_2 t \mathcal{E}^*} \\ &= -(a + b(t)) \exp\left(-\lambda_2 \mathcal{E}^* \sum_{i=1}^n \alpha_i (t - \tau_i)\right) + \lambda_2 \mathcal{E}^* e^{-\lambda_2 t \mathcal{E}^*} \\ &= e^{-\lambda_2 t \mathcal{E}^*} \left[\lambda_2 \mathcal{E}^* - (a + b(t)) \exp\left(\lambda_2 \mathcal{E}^* \sum_{i=1}^n \alpha_i \tau_i\right) \right] \\ &= \left(\text{using } \exp\left(\lambda_2 \mathcal{E}^* \sum_{i=1}^n \alpha_i \tau_i\right) = \left(\frac{\lambda_2}{a}\right)^{\mathcal{E}^*} \right) \\ &= e^{-\lambda_2 t \mathcal{E}^*} \left[\lambda_2 \mathcal{E}^* - a^{1-\mathcal{E}^*} \lambda_2^{\mathcal{E}^*} - b(t) \left(\frac{\lambda_2}{a}\right)^{\mathcal{E}^*} \right] \\ &= e^{-\lambda_2 t \mathcal{E}^*} \left[\lambda_2 \left(\mathcal{E}^* - \frac{a}{\lambda_2} \left(\frac{\lambda_2}{a}\right)^{\mathcal{E}^*}\right) - b(t) \left(\frac{\lambda_2}{a}\right)^{\mathcal{E}^*} \right] \\ &> 0 \quad (\text{due to Lemma 2}). \end{aligned}$$

Hence the inequality (9) holds for $t \in [t_0, \infty)$. To verify the inequality (10) we have

$$\begin{aligned} F(t, \phi) - \rho'(t) &= -(a + b(t)) \prod_{i=1}^n y^{\alpha_i}(t - \tau_i) - \rho'(t) \\ &= -(a + b(t)) \prod_{i=1}^n y^{\alpha_i}(t - \tau_i) < 0. \end{aligned}$$

Since both inequalities are fulfilled and all assumptions of Theorem 1 are satisfied, the conclusion of the theorem is straightforward of the inequalities (11).

Corollary 1. If $y=y(t)$ is a solution to eq. (4) then also $y=C(t)$, where C is a constant, is a solution to eq. (4).

Remark. For positive solutions satisfying (18) it holds: $\lim_{t \rightarrow \infty} y(t) = 0$ This follows from that number \mathcal{E}^* defined by (16) is positive due to the property b) in Lemma 1.

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Lydia Kontrova *

MIND MAPPING AS EFFICIENT TOOLS IN MATHEMATICS EDUCATION

There are many possibilities how to improve mathematical education and enable students to participate in the process of the cognition of new knowledge. In this paper we present mind mapping as one of graphical representation of mathematical networks which may become another efficient tool for improving mathematical achievement. A pedagogical experiment, whose results are stated in this article, was realised during the academic year 2013/2014 when Mathematics 1 was taught on the Faculty of Civil Engineering, University of Zilina. It consisted in the inclusion of mind maps in mathematics teaching, observation of their influence on the teaching process efficiency.

Keywords: Mental maps, effectiveness of the teaching process, learning strategies, pedagogical experiment.

1. The theoretical background

The experience of mathematical structure may be supported by representing mathematical knowledge graphically in the form of networks. Knowledge maps are means to show ideas and concepts connected with a topic, in a well-structured form. Their special fitting as a pedagogical tool for mathematics education is pointed out, especially with regard to building of the mathematical structures. It turns out that knowledge maps, like mind maps and concept maps, may be efficient tools for building structure in mathematics.

The method of mind mapping takes into account that the two halves of the human brain are performing different tasks. While the left side is mainly responsible for logic, words, arithmetic, linearity, sequences, analysis, lists, the right side of the brain mainly performs tasks like multidimensionality, imagination, emotion, colour, rhythm, shapes, geometry, and synthesis. Mind mapping uses both sides of the brain, [1] letting them work together and thus increases productivity and memory retention. This is accomplished by representing logical structures using an artistic spatial image that the individual creates. Thus mind mapping connects imagination with structure and pictures with logic [2].

Mind mapping is a method of learning and knowledge testing and detecting whose essence lies in acquiring interconnections among terms. It is also a way how to formulate and regulate metacognitive learning strategies of students.

The mind mapping saves time, improves efficiency, presents information in an organized and easy to follow format on one page, which is simple for others to read and add their own ideas, develops organization skills. This flexible tool can be adapted to

almost any task. The structure of a mind map improves memory and makes easier for anybody to remember more.

In spite of its well-structured and ordered contents a mind mapping has some limitations.

The essence of our pedagogical experiment realized in the academic year 2013/2014 (when teaching a subject Mathematics 1 on the Faculty of Civil Engineering, University of Zilina in Zilina) was to include mind maps in the contents of lectures from the stated subject. The priority functions of the mind maps were the following ones:

The function of the “connecting bridge“; the aim of the mind map was to remind students of the facts and knowledge from the secondary school. This knowledge is necessary for the topic understanding (a phase reflect),

Cognitive maps mediated a recapitulation overview of the curriculum (a phase review).

With the help of the implemented mind maps students were pertinently “navigated and guided” in their own learning process.

2. Mind mapping in mathematical education

The beginnings of *Mind mapping* are connected with the name of Tony Buzan who in the late 70s of 20 century proposed mind maps as a technique of note taking. According to Fisher, it is an indication of “all procedures denoting thinking by the means of some projection”[3]. It is a visual denotation, which consists of words, concepts, ideas, symbols, pictures and essential junctions expressing interrelations between them. It is an effective tool for capturing ideas, notes and information, identification of key terms, projection of facts into the overall and meaningful

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structure, an aid for creating associations which could otherwise get lost. Like a cartographic map it is a good way how to make thinking visible.

In fact the idea of the mind maps creation is much older. Also a great philosopher René Descartes in his *Discourse on the Method for Reasoning Well and for Seeking Truth in the Sciences* states the following rules of the so called Cartesian method: *the rule of analytical procedure* - to decompose complicated things into the simplest ones; *the rule of synthesis* - to proceed in the correct order from the simplest to the most difficult, to sum up relations and dependences from the simple ones up to the learning of the most complicated phenomena; and *the rule of control* - when solving the problem, pay attention to its different connections and aspects.

Mathematical knowledge has a character of the net. Mathematical terms, definitions, theorems, algorithms and rules are interconnected both between themselves and with the world outside. If we want our students to understand mathematics and make progress in it, we have to present it in relations (mathematical terms among themselves, mathematical terms ↔ real world).

From the stated facts it is evident that the visual depiction of cognitive structures can be very useful. Application of mind maps can significantly deepen individual understanding of the problem and make the whole learning process more valuable.

Advantages of mind mapping:

- **for a student - it makes easier**
 - curriculum understanding,
 - its recoding to a more memorable form,
 - distinguishing its nature and internal structures,
 - its remembering,
 - its restoring,
 - its reconstructing if new pieces of knowledge add up, and
 - creating “mental models“ of the world.
- **for a teacher**
 - application when a teaching process is planned, when the curriculum is explained and summarised,

- it is a suitable tool for entrance diagnosis as well as diagnosis during or at the end of the educational process.

A mathematical world is a net of interconnected facts and terms and knowledge of all correlations among them is necessary for entering this wonderful world of mathematics. Mind maps will enable students to orientate themselves in the web of mathematical terms and they are also:

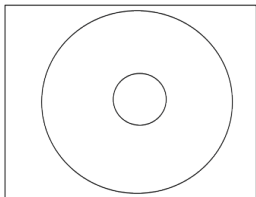
- an aid when identifying key terms, relations among them, creating a meaningful structure and making necessary links and relations understandable,
- they enable to implement new information in a broader context,
- combinations of words and a picture integrate both brain hemispheres in the learning process and make the learning of mathematics more effective,
- they help cognitive skills development, ability of analysis, classification and synthesis of terms,
- they enable and stimulate convergent, divergent, critical, strategic and complex mathematical thinking,
- they are an effective mnemotechnical aid (memory aid); the shape, colours, structure of a map will enable better remembering of information,
- they develop holistic and complex understanding of mathematical terms and characteristics, and
- they support the development of metacognitive skills - learn to learn and think about knowledge.

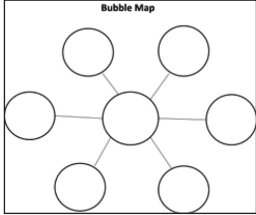
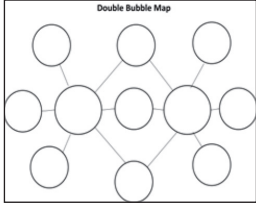
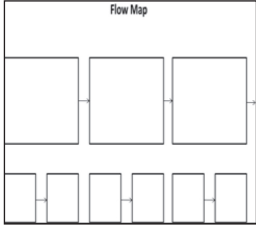
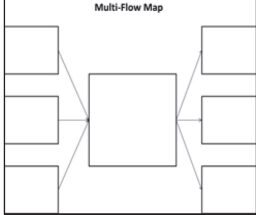
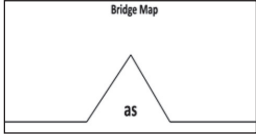
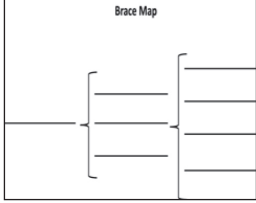
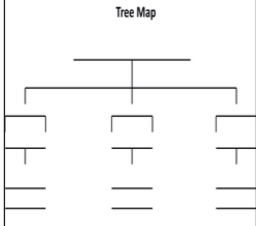
Functions of mind maps:

- **Auto diagnostic** (for a student) - a mind map enables a student to know explicitly his/her own realizing and cognitive arrangement of the discussed topic. It also offers a possibility to monitor his/her own learning procedure - it develops metacognitive abilities of a student.
- **Diagnostic** (for a teacher) - a mind map is a tool of identification the situations for making decisions about the character of pedagogic intervention. It is also a diagnostic tool of identification on which level of understanding a student accepts new concepts.

Basic types of the mind maps

Table 1

QUESTIONS FROM TEXTS, TEACHERS AND TESTS	THINKING PROCESSES	THINKING MAPS AS TOOLS
<p>How are you defining this thing or idea? What is the context? What is your frame of reference?</p>	<p>CIRCLE MAP DEFINING IN CONTEXT</p>	<p style="text-align: center;">Circle Map</p> 

QUESTIONS FROM TEXTS, TEACHERS AND TESTS	THINKING PROCESSES	THINKING MAPS AS TOOLS
How are you describing this thing? Which adjectives would best describe this thing?	BUBBLE MAP DESCRIBING QUALITIES	
What are the similar and different qualities of these things? Which qualities do you value most? Why?	DOUBLE BUBBLE MAP COMPARING AND CONTRASTING	
What happened? What is the sequence of events? What are the sub stages?	FLOW MAP SEQUENCING	
What are the causes and effects of these events? What might happen next?	MULTI - FLOW MAP CAUSE AND EFFECT	
What is the analogy being used? What is the guiding metaphor?	BRIDGE MAP SEEING ANALOGIES	
What are the component parts and subparts of this whole physical object?	BRACE MAP PART - WHOLE	
What are the main ideas, supporting ideas, and details in this information?	TREE MAP CLASSIFYING	

- **Intervention** – a mind map becomes a content-organised pillar of the learning procedure which guarantees a meaningful integration of new pieces of knowledge into already existing cognitive structures.

The stated functions of mind maps clearly indicate their important role in the formation of metacognitive learning strategies of students. Let us deal with some concrete examples of the mind maps that were used during our teaching experiment. In Table 1 we present some interesting types of the mind maps [4], which we used to create the specific models for teaching Mathematics 1.

3. Pedagogical experiment

The essence of our pedagogical experiment realized in the academic year 2013/2014 (when teaching a subject Mathematics 1 on the Faculty of Civil Engineering, University of Zilina in Zilina) was to include mind maps in the contents of lectures from the stated subject. The priority functions of the mind maps were the following ones:

1. The function of the “connecting bridge”, the aim of the mind map was to remind students of the facts and knowledge from the secondary school. This knowledge is necessary for the topic understanding (a phase reflect),
2. Cognitive maps mediated a recapitulation overview of the curriculum (a phase review).

With the help of the implemented mind maps students were pertinently “navigated and guided” in their own learning process.

We present in Figs. 1 and 2 two mind maps which were used during our experiment.

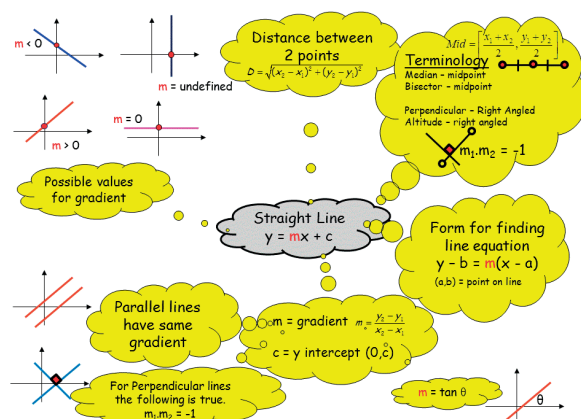


Fig. 1 Bubble map - Straight line

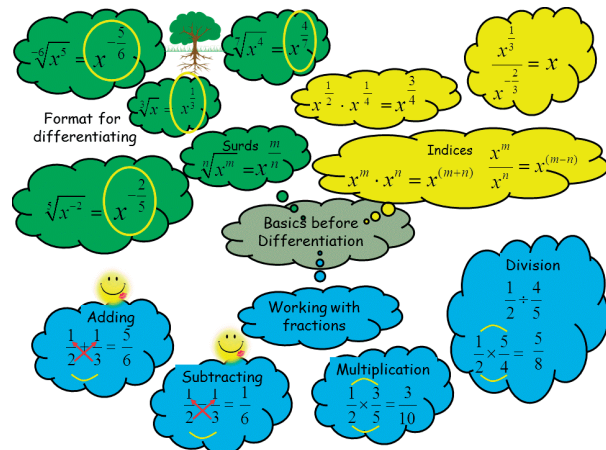


Fig. 2 Bubble map - Basics before Differentiation

After creating and implementing several mathematical mind maps in the teaching process of the subject Mathematics 1 we approached carrying out a pedagogical experiment whose aim was to find out if this implementation would have a positive influence on the study results of students. On the basis of formulation of the pedagogical experiment’s aim the following hypothesis was set: H_1 : Students educated with the support of mind and conceptual maps will obtain at the end of an experimental teaching process at least an equal standard of knowledge in comparison with students educated without mind mapping use.

When choosing experimental subjects we tried to find two groups which would be equivalent as much as possible. Finally we decided for a random sample of the first year students of the Faculty of Civil Engineering, University of Zilina in Zilina. During the winter term of the academic year 2013/2014 they passed the exam from the subject Mathematics 1 whose content is: basics of linear algebra, analytical geometry and differential calculus of real-valued functions of one variable.

When selecting control and experimental groups the agreement in the teacher competence was crucial (in both groups three-hour seminar and lectures were conducted by the same teacher), agreement in the content and range of curriculum and in teaching plans. The number of respondents in both groups was identical - 28. For an experimental group the work with mind maps was included in the teaching process every week. A control group attended traditional mathematics classes organised in the form of seminars.

After curriculum completion both groups solved an equivalent knowledge test which contained 10 tasks. The maximum number of the received points in the test was 30. Doing the experiment to verify the hypothesis H_1 was conducted according to an experimental plan without a pre-test. The following Table 2 presents the percentage success rate of a post-test in individual groups.

Basic statistic characteristics of files Table 2

	n	%	\bar{x}	s_x^2
Experimental group	28	69.1%	23.5	26.8
Control group	28	60.1%	20.4	23.7

To verify the hypothesis H_1 , we selected a significance level $\alpha = 0.05$. The outcome of an experimental method (obtained results when teaching mathematics with the support of mind mapping) we considered to be a random sample from a normal distribution $N(\mu_1, \sigma_1^2)$. The outcome of the second method (tests results when teaching mathematics traditionally) we considered to be a random sample from a normal distribution $N(\mu_2, \sigma_2^2)$ where $\mu_1, \sigma_1^2, \mu_2, \sigma_2^2$ are unknown parameters. We had two independent files $n = 28, m = 28$. We calculated sample characteristics and by using an F -test we found out that the difference between their distributions is not statistically significant. For this reason we tested the difference between the two groups by a two-sample location *Student's t-test* with equal distribution.

We tested the hypothesis concerning the fact whether the effects of both teaching methods are the same:

$$H_0: \mu_1 = \mu_2 \quad \text{versus} \quad H_1: \mu_1 \neq \mu_2.$$

The value of test statistics is $T = 2.276$ and $p = 0.01313$.

When comparing it with the critical values of a *t-test* we obtained:

$$T = 2.276 > t_{0.05}(54) = 2.0048.$$

H_0 hypothesis was rejected. Selective average on the selected significance level differs from the value of the average of the basic file.

When using the stated teaching methods different study results were obtained. If we apply the one-sided hypothesis

$$H_0: \mu_1 = \mu_2 \quad \text{versus} \quad H_1: \mu_1 > \mu_2,$$

then H_0 is rejected on the significance level α if $T > t_{2\alpha}(n + m - 2)$. This was confirmed in our case as it is true that

$$2.276 > t_{2\alpha}(n + m - 2) = t_{0.1}(54) = 1.676.$$

The one-sided hypothesis was rejected and the difference between mean values for the stated selective file was considered statistically significant. With the help of statistical methods it was confirmed that students educated by an innovative teaching method with the use of mind maps achieved better study results than the students educated by a traditional method.

4. Conclusion

The described pedagogical experiment convinced us about the positive influence of implementing mind maps in the process of teaching mathematics. Students perceived positively especially the fact that mind maps enabled them to bring a system into the amount of information, facts and terms and receive a detached view of the studied topic. Mind maps enabled them also to observe, revise, control and guide their learning process and thus develop their metacognitive learning strategies.

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Darina Stachova *

NON-LINEAR MAPPINGS AND THEIR APPLICATIONS

In this contribution we discuss selected geometrical mappings that, although uncommon in practice, are important and irreplaceable in some areas of engineering, architecture and art (scenography, embossing, panoramic cinematography).

Keywords: Linear mapping, cylindrical and conical perspective, distance radius.

1. Introduction

Attempting to capture the surrounding world and preserve it in unchanged form has been a focus of interest of humans since the beginning of time [1]. One of the basic problems of this endeavor has been the problem of transforming the three-dimensional world into a two-dimensional medium (paper, photography, or more recently also computer screen). To this end one uses a particular mathematical transformation called projection. It defines how particular points of the mapped 3D body (space) are mapped into a 2D surface (plane). There are many ways to perform this operation and there are consequently many known types of such mappings (projections).

A mapping is called *linear* if it maps each line onto a line, i.e. any three different collinear points into three distinct collinear points (points are collinear if they belong to one line).

A linear mapping in E_2 with a Cartesian coordinate system (O, x, y) can be expressed using the equations:

$$\begin{aligned}x' &= a_1x + a_2y + a_3 \\ y' &= b_1x + b_2y + b_3,\end{aligned}\quad (1)$$

where the coordinates of a point A are $[x, y]$ and the coordinates of a point A' are $[x', y']$. The point A' is the image of the point A .

Mappings in the three-dimensional space are defined analogously to those in the plane. A *linear mapping* in E_3 with Cartesian coordinates (O, x, y, z) is defined as follows:

$$\begin{aligned}x' &= a_1x + a_2y + a_3z + a_4 \\ y' &= b_1x + b_2y + b_3z + b_4 \\ z' &= c_1x + c_2y + c_3z + c_4\end{aligned}\quad (2)$$

with point $A = [x; y; z]$ and its image point $A = [x'; y'; z']$.

Nonlinear mappings are mapping that do not preserve lines, and thus deform their image. Such mapping can be defined by equations:

$$\begin{aligned}x' &= f(x, y, z) \\ y' &= g(x, y, z) \\ z' &= h(x, y, z)\end{aligned}\quad (3)$$

where $f(x, y, z)$, $g(x, y, z)$, $h(x, y, z)$, are nonlinear functions with variables x, y and z .

2. Applications of nonlinear mappings

Nonlinear mappings have applications in various areas such as in computer graphics where they, for instance, form the underlying basis of visual deformations and graphical special effects (Fig. 1).



Fig. 1 Deformed image

Cylindrical and conical perspectives are examples of nonlinear mappings. These mappings are the basis of cartographic projections onto cylindrical and conical surfaces which have already been in use since the ancient Greece, to construct maps of the world and the stars. For illustration, an early example of a cylindrical mapping is the so-called Marinus projection - from around the first century BC (Fig. 2) and an example of an early conical mapping is the Ptolemaic projection - from around 150 BC (Fig. 3) [2].

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Fig. 2 Marinus projection currently



Fig. 3 Ptolemaic projection currently

As far as applications in engineering and technology, we find cylindrical perspective in panoramic cinemas where the image is projected onto a wide screen curved into the shape of a cylindrical surface.

In art, especially in the 19th century, painters often captured significant historical events in panoramic paintings (of which only 33 are known to have survived until this day). Such event was, for example, the battle of Lipany. The author of this panoramic painting is Luděk Marold (1865-1898). Another painting using a cylindrical perspective is the Battle of Borodino (Fig. 4) by the

Russian painter Franz Alekseevitch Roubaud (1856-1928) who created it in 1912. The painting is 15 meters high, and when unwound, it is 115 meters wide. It is located in a panoramic museum in central Moscow [1].

3. Fundamentals of cylindrical perspective

In a cylindrical perspective an image is projected onto a cylindrical surface. Ordinarily it is more common to project onto a plane. So why introduce something like a cylindrical perspective and invent a complicated process of projecting an object on a cylinder and then transfer it onto the plane? The reason is simple - using a cylindrical perspective we can cover up to 360 degrees viewing angle. This cannot be achieved with a planar projection. Another advantage is that if we want to capture a very large object, for example, a street or a cityscape, we must either be at a great distance, thus losing precision and detail, or be closer but not able to capture everything we want. Cylindrical perspective allows us to map a wide object from a much smaller distance than what would be needed using other methods. Some detail is lost, but not as much as if we were far away from the object. So how does a cylindrical perspective work?

Let us have a cylindrical surface Φ with axis of rotation o , radius r (the distance radius) and a point S , which lies on the o axis. Let \overline{E}_3 denote E_3 augmented with points at infinity, and let G be a rotational conical area bounded by conical surface Ψ , axis-aligned with the surface Φ , with the point S as its peak point and apex angle of 90° . Under cylindrical perspective the image of a point $A \in \overline{E}_3 - G$ is the intersection of the ray \overline{SA} with the cylindrical surface Φ , i.e. $A_s = \overline{SA} \cap \Phi$ (Fig. 5).

Cylindrical perspective of objects is in descriptive geometry constructed by unwinding the cylindrical surface Φ . The



Fig. 4 F. A. Roubaud: Battle of Borodino

intersection of the surface Φ with the plane through the center S and orthogonal to the o axis is the circle h (horizon). By unwinding the horizon we obtain the line segment h_0 , whose

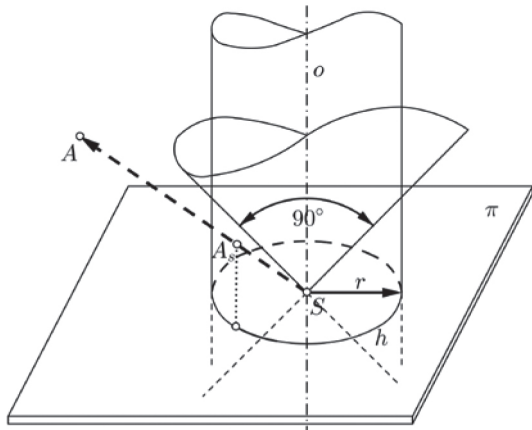


Fig. 5 The projection of the point

length is $2\pi r$. The images of points in the unwound cylindrical perspective are located within the rectangle whose middle segment is h_0 and whose height is $2r$ (Fig. 6).

Consider a point $A = [{}^A x; {}^A y; {}^A z]$ in the Cartesian coordinate system (S, x, y, z) . In the plane of the unwound cylindrical surface Φ consider a Cartesian coordinate system (O, x', y') where the point $O = h \cap x$ and $x' \equiv h_0$.

Let A_s be the image of the point A in the cylindrical perspective, and let ${}^A x', {}^A y'$ be its coordinates in the unwinding of the cylindrical surface Φ .

The coordinate ${}^A x'$ of the point A_{s0} is equal to the length of the arc of the horizontal circle h bounded by the point O and the intersection of the horizon with the vertical (generating) line of the cylindrical surface passing through the point A_s . If t is the magnitude (in radians) of the angle spanned by this arc, then the coordinate satisfies ${}^A x' = r \cdot t$. The coordinate ${}^A y'$ is equal to the distance of the point A_s from the aforementioned intersection. Consequently the mapping equations of the cylindrical perspective can be formulated as follows:

$${}^A x' = r \cdot \arcsin \frac{{}^A y}{\sqrt{{}^A x^2 + {}^A y^2}}, \quad {}^A y' = r \frac{{}^A z}{\sqrt{{}^A x^2 + {}^A y^2}}.$$

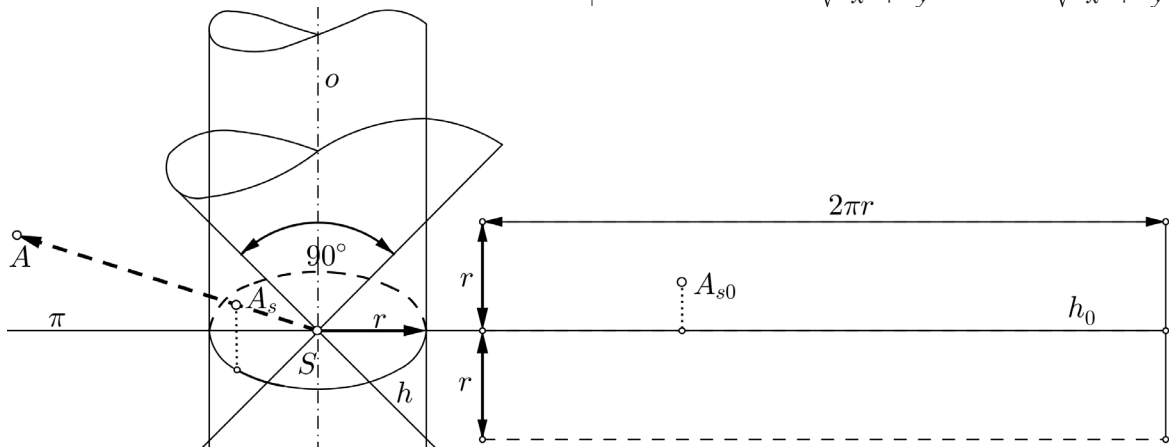


Fig. 6 Image point after unwinding area

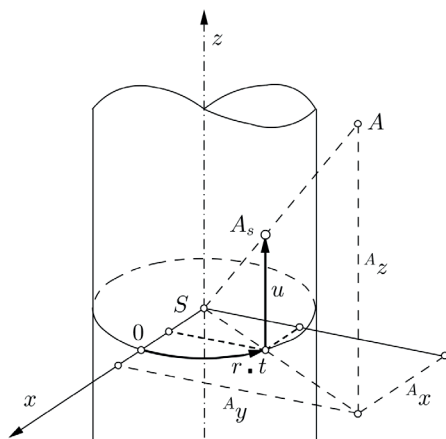


Fig. 7 Cartesian and cylindrical coordinates

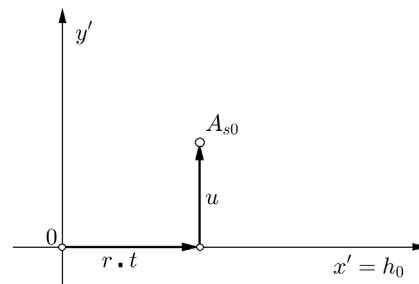


Fig. 8 Coordinates in the plane unwinding

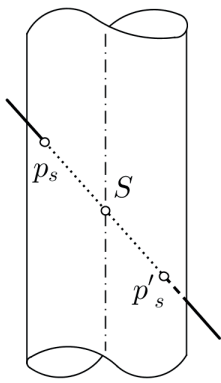


Fig. 9 $S \in p$

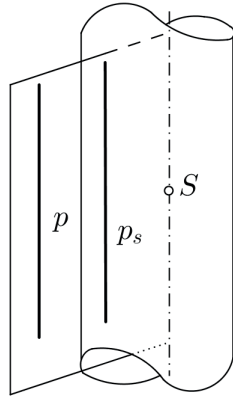


Fig. 10 $p \parallel o$

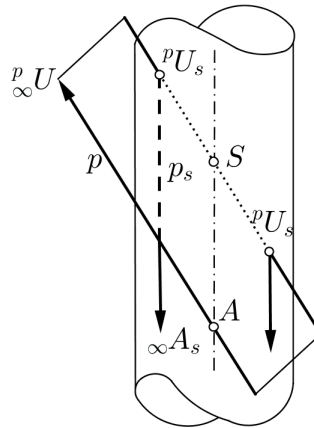


Fig. 11 $p \cap o = \{A\}$

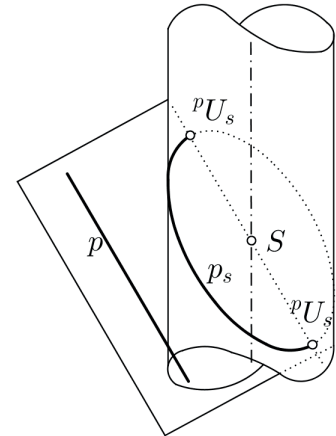


Fig. 12 Skew lines o, p

Let (S, x, y, z) be a given Cartesian coordinate system and let $A = [^Ax; ^Ay; ^Az]$ be a given point. Let Φ be a given cylindrical surface. Since $A_s = \vec{S}A \cap \Phi$, we can derive, from the Cartesian coordinates of the point A_s , the cylindrical coordinates: $x = r \cdot \cos t$, $y = r \cdot \sin t$, $z = u$ (Fig. 7). After unwinding the cylindrical surface Φ into a plane, in this plane we can define a new Cartesian coordinate system (O, x', y') in which $^Ax' = r \cdot t$ and $^Ay' = u$ (Fig. 8).

To find an image of a line in the cylindrical perspective it is important to determine what its relative position with respect to the center of projection S is and also with respect to the o axis of the cylindrical surface Φ .

Theorem 1: For a cylindrical perspective of a line p ($p \neq o$) the following holds [3]:

- a) If $S \in p$, then the image of p are two points p_s and p'_s , namely the points of intersection of the line p with the cylindrical surface Φ (Fig. 9).
- b) If p and o are parallel, then the image of p is the generating line p_s of the cylindrical surface Φ (Fig. 10).
- c) If p and o are intersecting, then the image of p is formed by two rays located at generating lines of the cylindrical surface Φ (Fig. 11).
- d) If none of the conditions a) - c) holds, then the image of p is a semi-ellipse or a semi-circle (Fig. 12).

Theorem 2: Unwinding an ellipse lying on a cylindrical surface Φ yields a part of the sinusoid [4].

Proof: The parametric equations of points on a rotational cylindrical surface Φ around the axis z with radius r are as follows: $x = r \cdot \cos t$, $y = r \cdot \sin t$, $z = u$, $t \in \langle 0, 2\pi \rangle$, $u \in R$. Consider

a plane α containing the x -axis forming an angle φ ($\tan \varphi = \frac{b'}{r}$) with the plane (x, y) (Fig. 13). Then the analytical expression of

the points on the plane α is: $z = \frac{b'}{r} \cdot y$. Substituting $y = r \cdot \sin t$,

we obtain the expression for the z -coordinates of the points of the cut k (the intersection of Φ and α):

$$z = \frac{b'}{r} \cdot y = \frac{b'}{r} \cdot r \cdot \sin t = b' \cdot \sin t.$$

If $b' \neq 0$, then the intersection of Φ with the plane α is the ellipse k . The coordinates of the points of the ellipse after unwinding the surface are: $x' = r \cdot t$, $y' = z = b' \cdot \sin t$, thus the unwound ellipse forms a part of a sinusoid which can be expressed in the form of the function: $y' = b' \cdot \sin \frac{x'}{r}$.

Theorem 3: Let $\alpha \cap \alpha' = p$, where p is the diameter of the circle h . Then unwinding the ellipses k and k' produces sinusoids where one is an affine projection of the other, with the axis of the affinity being h_0 and the direction perpendicular to the axis.

Fig. 13 $\alpha \cap \Phi = k$

Proof: Using the proof of Theorem 2, let $\alpha \cap \alpha' = x$ and let the angle of the plane α' with $\pi = (x, y)$ be ϕ' , i.e. $\tan \phi' = \frac{b'}{r}$ (Fig. 14). For the coordinates of the points on the ellipse k' after unwinding the surface, we have: $x' = r \cdot t$ and $y' = z = b' \cdot \sin t$. From both expressions for y' , it follows that the affinity with axis $x' \equiv h_0$, with the direction perpendicular to the axis, and with characteristic $\frac{b'}{b}$, maps the sinusoid k_0 to the sinusoid k'_0 (Fig. 15).

When unwinding the curve that is cut on the surface by the plane, we assume that its starting point either lies on the positive part of the x -axis, or lies on a line parallel to the x -axis with a positive x -coordinate.

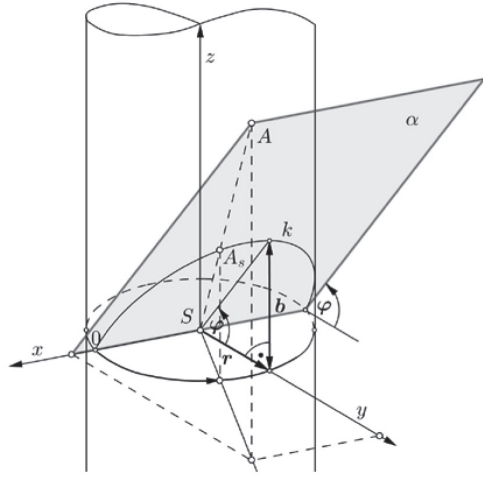


Fig. 13 $a \cap \phi = k$

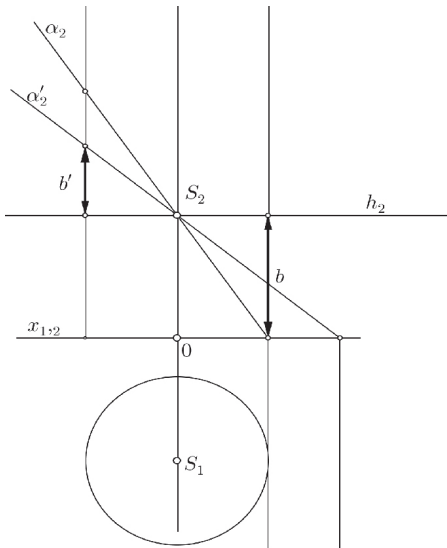


Fig. 14 Cuts on the cylinder

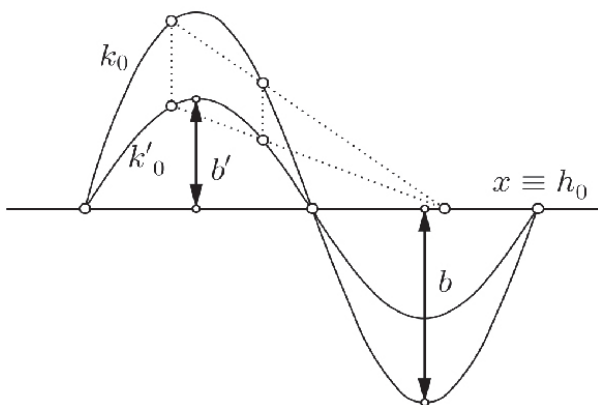


Fig. 15 Affine relationship of ellipses

4. Fundamentals of conical perspective

In this section, we discuss the conical perspective, i.e. a mapping onto a rotational conical surface Ψ from a point S (center of projection) of its axis (the point S is distinct from the peak point V of this conical surface). The field of view of the conical perspective, i.e. a restricted part P'_3 of the space $P_3 = \bar{E}_3$, can be determined similarly as for the cylindrical perspective.

Consider a rotational conical surface Ψ with axis o and point S which lies on the o axis.

Then, a conical perspective of a point $A \in P'_3$ is the point of the intersection of the ray \overrightarrow{SA} with the conical surface Ψ , i.e. $A_s = \overrightarrow{SA} \cap \Psi$ (Fig. 16).

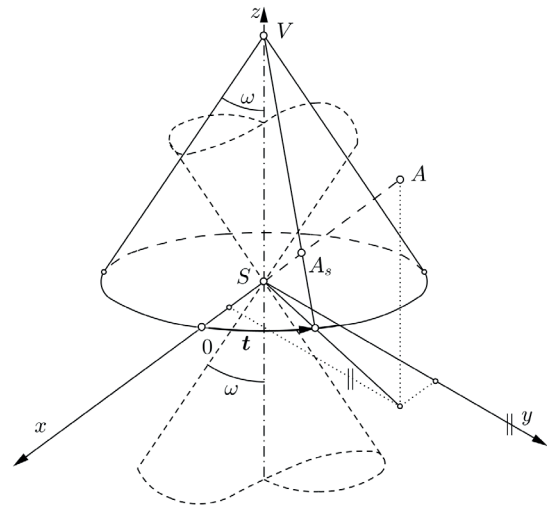


Fig. 16 Conical perspective of a point

If there are two intersection points of the ray \overrightarrow{SA} with the conical surface Ψ , the conical perspective of A is defined to be the point that is closer to the point S [4].

Let us fix a coordinate system (S, x, y, z) in P'_3 and consider a conical surface Ψ with axis z , where ω is the angle of the generating line with the axis. In a conical perspective with center S onto the surface Ψ with radius r of the horizon, the image of $A_s = [^A s x; ^A s y; ^A s z]$ of a point $A = [^A x; ^A y; ^A z]$ satisfies the following equations:

$$^A s x = \frac{r \ ^A x^2}{^A y^A z t g \omega + ^A x \sqrt{^A x^2 + ^A y^2}},$$

$$^A s y = \frac{r \ ^A y^2}{^A y^A z t g \omega + ^A x \sqrt{^A x^2 + ^A y^2}},$$

$$^A s z = \frac{r \ ^A y^A z}{^A y^A z t g \omega + ^A x \sqrt{^A x^2 + ^A y^2}}.$$

The first step in the construction of the image of a point in the conical perspective is to construct the point $A_s = \overrightarrow{SA} \cap \Psi$ (Fig. 17) which we usually perform using orthographic (Monge) projection. The next step is to unwind the conical

surface Ψ into the plane. This allows us to obtain the angle $\alpha^\circ = 360^\circ \cdot \sin\omega$, or $\alpha = 2\pi \cdot \sin\omega$ (in radians) where the angle of generating lines with the axis is ω .

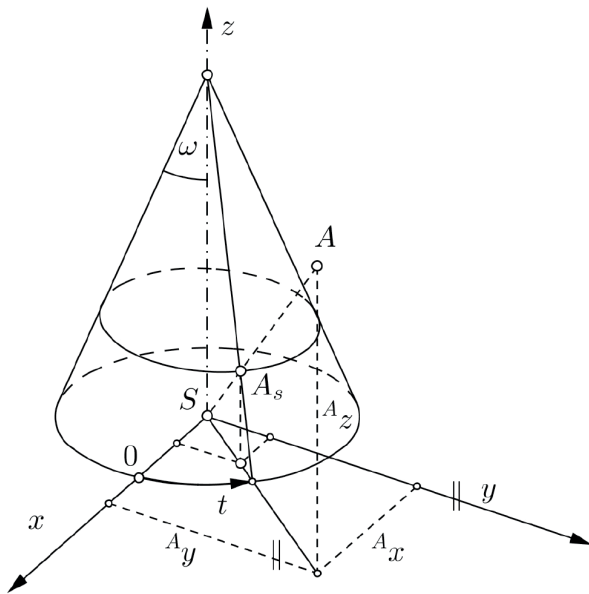


Fig. 17 Construction of image point

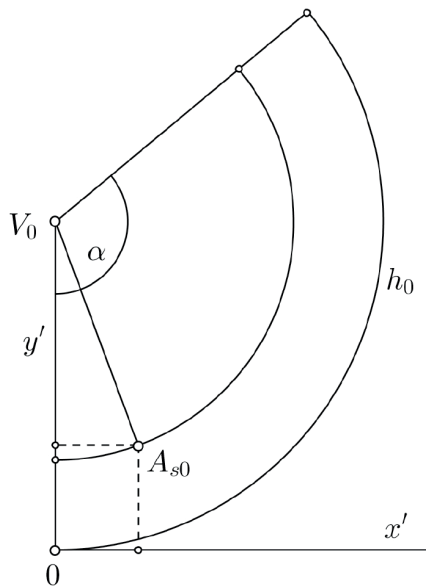


Fig. 18 Unwound surface

Generating lines of the conical surface are unwound into a pencil of lines with center V_0 and parallel circles map onto arcs of concentric circles whose center is again V_0 (Fig. 18).

Let A_{s0} be the location of the point A_s after unwinding the surface Ψ where $A_{s0} = [x'; y']$ are the coordinates of A_{s0} in the Cartesian coordinate system (O, x', y') . The coordinate x' is equal

to the unwound position of the generating line of the conical surface that lies in the plane (x, z) (Fig. 18). Then the mapping equations of the unwound position are as follows:

$$x' = \frac{r\sqrt{{}^A x^4 (\text{tg}^2 \omega + 1) + {}^A x^2 ({}^A x^2 + {}^A y^2 \text{tg} \omega)}}{\text{tg} \omega ({}^A y^4 \text{tg} \omega + {}^A x \sqrt{{}^A x^2 + {}^A y^2})}$$

$$\sin \left[\arcsin \left(\frac{{}^A y}{\sqrt{{}^A x^2 + {}^A y^2}} \right) \sin \omega \right],$$

$$y' = \frac{r}{\sin \omega} - \frac{r\sqrt{{}^A x^4 (\text{tg}^2 \omega + 1) + {}^A x^2 ({}^A x^2 + {}^A y^2 \text{tg} \omega)}}{\text{tg} \omega ({}^A y^4 \text{tg} \omega + {}^A x \sqrt{{}^A x^2 + {}^A y^2})}$$

$$\cos \left[\arccos \left(\frac{{}^A y}{\sqrt{{}^A x^2 + {}^A y^2}} \right) \sin \omega \right].$$

For the image of a line in a conical perspective (just like with cylindrical perspective) it is important to determine what its position with respect to the center of projection S is and also with respect to the o axis of the conical surface Ψ .

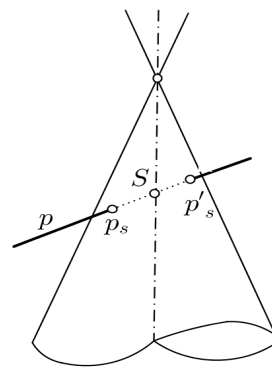


Fig. 19 $S \in p$

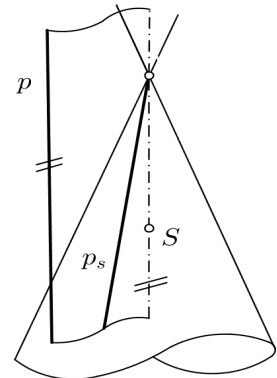


Fig. 20 $p \parallel o$

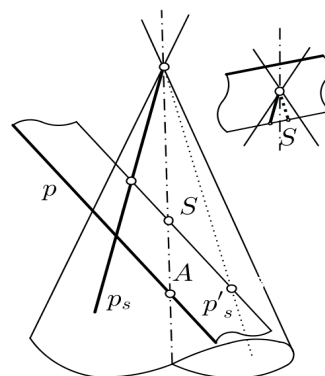


Fig. 21 $p \cap o = [A]$

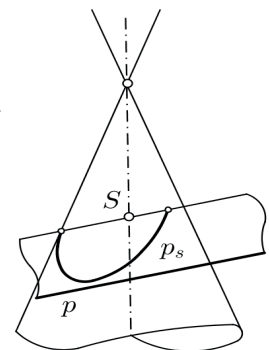


Fig. 22 Skew lines o, p

Theorem 4: If we consider also lines which are located outside the field of view, then for a conical perspective of a line p ($p \neq o$) the following holds [3]:

- a) If $S \in p$, then its image are two points p_s, p'_s , namely the points of intersection of the line p with the conical surface Ψ (Fig. 19).

- b) If p is parallel to o , then its image is p_s - a part of a generating line of the conical surface Ψ starting at the peak point (Fig. 20).
- c) If p intersects o , then its image is formed by two rays (or segments) lying on generating lines of the conical surface Ψ (Fig. 21).
- d) If none of the conditions a) - c) holds, then the image of p is part of a conic section (Fig. 22).

An image of a conic section lying in one plane with the x axis is, after unwinding the conic surface, a curve with parametric equations as follows:

$$x = \cos(t \sin \omega) \sqrt{\left[\frac{r \cos t}{1 + \operatorname{tg} \omega \operatorname{tg} \phi \sin t} \right]^2 + \left[\frac{r \sin t}{1 + \operatorname{tg} \omega \operatorname{tg} \phi \sin t} \right]^2} + \left[\frac{r}{\operatorname{tg} \omega} - \frac{r \operatorname{tg} \phi \sin t}{1 + \operatorname{tg} \omega \operatorname{tg} \phi \sin t} \right]$$

$$y = \sin(t \sin \omega) \sqrt{\left[\frac{r \cos t}{1 + \operatorname{tg} \omega \operatorname{tg} \phi \sin t} \right]^2 + \left[\frac{r \sin t}{1 + \operatorname{tg} \omega \operatorname{tg} \phi \sin t} \right]^2} + \left[\frac{r}{\operatorname{tg} \omega} - \frac{r \operatorname{tg} \phi \sin t}{1 + \operatorname{tg} \omega \operatorname{tg} \phi \sin t} \right]$$

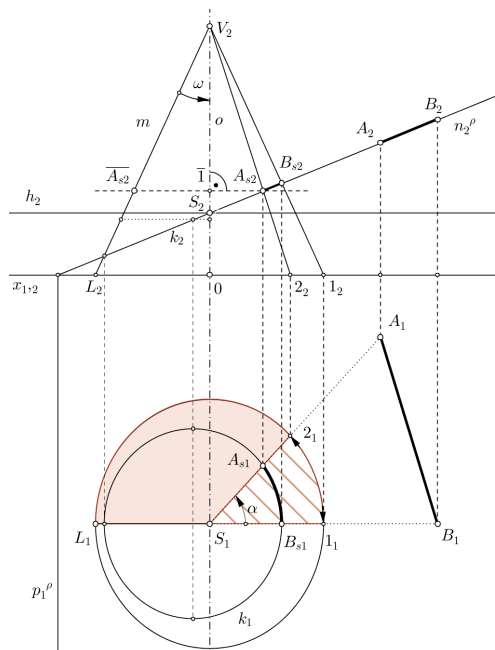


Fig. 23 The segment before unwinding the surface

where ω is the angle of generating lines of the conical surface Ψ with axis of rotation z , and ϕ is the angle of the projection plane with the plane of the horizon; t is a parameter.

5. Instead of final words

Exercise: Construct an image of the segment AB in conical perspective, if $SAB \perp v$ and $o \perp \pi$.

Construction: The first step is to construct a design cut k_1 conical surface Ψ of plane SAB ($A_{s1}, B_{s1} \in k_1$) in Monge's projection (Fig. 23). The next step is to unwinding the conical surface Ψ together with a cut k and with the points A_s, B_s into the plane (Fig. 24).

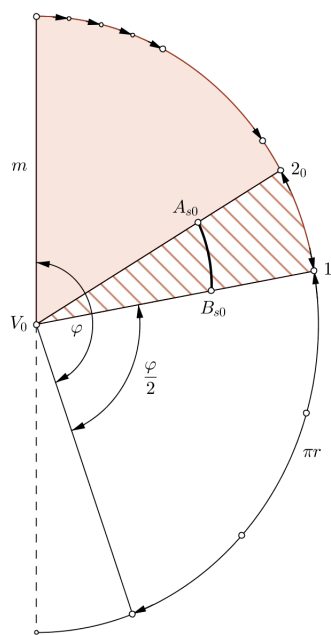


Fig. 24 Segment after unwinding

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Alzbeta Kucharcikova *

THE IMPORTANCE OF IDENTIFICATION AND ANALYSIS OF EDUCATIONAL NEEDS FOR INVESTMENT IN HUMAN CAPITAL

Human capital has currently represented significant production input for economies and companies as well. The need for investment is more intense in connection with the massive introduction of science and technology achievement into life and the need for constant innovation. Investments in human capital are made of the funds being invested in education, training, safety and security, health and etc. However, it is mostly the investment in education. Whether the subject of investment is a state, an individual or company, for the investment to be effective, it is necessary to place the identification and analysis of educational needs first. The purpose of this paper is to point out the importance of identification of the educational needs in company conditions, the methods of effective implementation, the accompanying problems and measures to prevent them.

Keywords: Investment in human capital, company education, identification and analysis of educational needs.

1. Introduction

The growth of technology intensity of production, opening of markets and continuing growth of competition require that companies are interested in technological improving of their production processes, improving quality of production and services, introduction of information technology and innovation. "The rapid and steady changes in a field of information and communication technologies have increased demand for high qualified specialists not only in a field of cybernetics and applied informatics, but also in related fields such as economy and management" [1]. It is important that advanced technology should be operated by people technically, knowledgeably, but also physically fit, able to respond flexibly to these changes, creative people, capable to innovate. Currently, companies are looking for optimal ways of organizing work, which would contribute to their effective functioning. "Equally also universities nowadays must behave responsibly and creatively competitively - in their activities they must create such future career opportunities for their future students/graduates, which enable them to hold an excellent starting position on the labor market, and at the same time help them to train their skills and competences, to direct their personal potential so that these students/graduates/employees permanently manage to cope with all work challenges. To achieve this level it means a very precise, demanding, and systematic work of the entire university and all its employees (pedagogic and other ones as well)" [2]. There is the essential

ability of teamwork, appropriately lead and positively motivate subordinates and also the ability to communicate and collaborate with customers successfully. The facts given form the pressure on companies to understand that it is necessary to invest in the human capital of their workers and develop their competencies.

2. Education in the company

Education and training representing an important part of the activities of personnel management company contribute to the development of the necessary competencies of company staff. It is a means of reconciling the changing demands on work activities, qualification and behavior of workers in order to effectively achieve the objectives set by company strategy. At the same time it is a means to achieve a higher degree of satisfaction of workers in the course of their activities (competence, achievement of performance promotion). Company investments in education and development of their people are a tool to attract and stabilize human capital and also become a tool for achieving a better return on these investments. Education may also be one, but not the only solution to the problems that prevent companies in effective achievement of the objectives [3].

Education and development of working skills can be considered as a lifelong process of continuous enhancement and enrichment of the current labor and life knowledge. Systematic education and staff development represent a process of goal-

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directed and balanced development of the human potential of the company, i.e. deepening professional and personal skills and competencies, and increasing employee’s motivation and management [4].

Company education is not a short-term issue, but the education effectively realized represents a long-term process, which consists of 4 phases. It is: 1. identification and analysis of educational needs, 2. planning education, 3. implementation of the educational process, 4. evaluation of education outcomes [5].

3. Identification and analysis of educational needs

Companies, which support the development and personal growth of workers, contribute to improving the quality of production, increasing efficiency of internal processes and development of the company as a whole. In this way, company education also becomes a decisive factor in increasing the competitiveness of companies in today’s markets.

The preparation of workers must always focus to increase performance, achieve specific objectives, as the main result of education is to achieve the highest company objectives [6]. It is often not possible to improve company performance only through education; there are also problems that cannot be resolved by education. At the beginning of the process of improving the quality of staff through educational programs, it is necessary to make identification and analysis of educational needs. Then, based on them, the entire educational program is planned and implemented and finally evaluated. The process of education and development of workers is based on the vision, mission, objectives, philosophy and culture of the company, its strategy and policy management and development of human potential. All these aspects must be taken into account when identifying the educational needs of company.

Analyzing the needs there are identified current gaps in skills together with other factors that affect the performance of workers

in achieving the objectives required. Therefore, it is necessary to deal with questions such as:

- Is the performance of these skills and knowledge really so important?
 - How is a worker stimulated to use these skills?
 - Doesn’t management by its behavior, in fact, discourage its people who have these skills?
 - What other obstacles to achieve the performance still exist?
- When it is clear that education will help to resolve some problems in the company, then it is necessary:
- To agree the objectives of education with the management, which agree with the priorities of the business.
 - To decide which skills or qualifications we want to improve by education.

However, the analysis must deal with the problems that are organizational or procedural nature and they are not solvable in education and point out their relationship to problems in achieving company objectives [7] - [12]. There are many authors who address the issue of the implementation of identification and analysis of training needs process [7] - [12].

The analysis of education needs basically resides in gathering information on the current state of knowledge, skills and abilities of workers, the performance of individuals, teams and company and comparing the data collected with the level required. Identification gives an answer to questions such as:

- Is performance in skills in question actually necessary?
- Is an employee actually paid for managing these skills?
- Does management actually support the behavior required?
- What other performance barriers still exist?

When identifying education needs, it is necessary to compare two levels of performance, i.e. standard (required, optimal, planned) performance V_p and current (existing, real) performance V_s . The difference between the two levels is a **performance gap**. Then, the result of the analysis is to identify gaps of performance that need to be eliminated, with a focus on those that can be

Different behavior in a stable and dynamic environment [12]

Table 1

STABLE ENVIRONMENT	DYNAMIC ENVIRONMENT
Relevant information and their distribution are concentrated at the top of the company.	Relevant information must be available wherever operational decisions are taken, hence the lowest levels.
Manager is responsible for the work and performance of subordinates.	Manager is also responsible for the involvement of subordinates in decision-making and responsibility.
Manager is responsible for fulfilling the tasks and compliance with procedures.	Managers are co-creators of the plan, implement it and where necessary they change it together with procedures.
Managers are responsible only for their department.	Managers are also responsible for how their department affects the operation of the other parts of the company.
Managers monitor the relevant information.	Managers search for information from new resources.
Managers implement the plan.	Managers search for alternatives for implementation and new opportunities in changing environment.
Managers make decisions.	Managers empower others to take decisions and encourage them.

completed with education and the design of proper education program.

When analyzing the development needs, demands of the business environment on the behavior of managers should be taken into account. Other behavior is required in a relatively stable environment and others in a dynamic environment, as shown in Table 1. In the event that there is a shift from the requirements in the left-hand column to the right in the business environment, it is necessary to change the behavior of managers. It is not easy, and for this reason an appropriate analysis of the situation is essential.

The main objective of educational activities in the company is to increase the performance, individual as well as the department and the entire company. The performance can be assessed when a certain comparative level - standard is available, when there are educational and performance standards. Competence, which a worker receives during the process of company education, is *educational standard*. *Performance standard* provides information about what a worker can perform during normal - standard working conditions [6].

When calculating the current performance, we begin with the collection of information that can describe the performance and determine its size. Without providing the required level of performance there is no starting base. Then, we compare the detected level of performance with this standard. When assessing the current level of competence of performance there may be used standards of other companies (benchmarking with excellent companies) or organizations within the group of companies or national standards (representing acknowledged level in a particular activity).

Current needs can be determined by comparing actual existing performance with standard to be achieved in a short time. Otherwise, if the changes appear in the company, it is possible that it will be necessary to carry out education in parallel with the ongoing change. Future needs are linked to ideas about the future, with connection to the company's development strategy and its long-term objectives. Then, the purpose of education is to simply help to overcome current imperfections of performance and prepare workers to new situations and opportunities that await them.

Analyzing needs should be clearly defined and distinguished company performance, team performance, individual behavior, individual performance and competence of the individual. This clarification early in the process can prevent possible misunderstandings.

4. Analysis of performance problems

There are learning and development activities that should meet the needs of the organization. We can conceive the need either as an existing problem (error, customer complaints...) or

a new situation where the organization or department get in (new information system, new staff, new situations, new objectives ...). There is always the need of learning in the new situation. Education will be in place regardless of the mentality and must be focused on the positive, effective and fast educational process. However, education must not always involve solution of emerging problems.

Once you have identified the problem, then you need to find its key causes and not to correct symptoms, as happens so often. In practice, it does not make sense to try to correct the symptoms (which are usually on the surface), as this will not get rid of the problem.

New situations automatically deliver learning needs, however, many new situations appear unexpectedly, resulting in the fact that companies have little time to plan and implement an appropriate response in the form of education. Therefore, it is appropriate to point out some indicators that help to predict learning needs. Since they are indicators associated with the company, at the same time they can help to ensure that the process of company education will be linked to the requirements of the company management.

The useful indicators of future educational needs include:

- Strategic company plans, particularly plans for expansion, diversification, increase customer value, which will have increased demands on education.
- Restructuring and the resulting reduction in the workforce and changing stratification will lead to changes in job specifications, and thus the performance requirements.
- Changes in the competitive environment.
- New technologies and systems, e.g. installation of new information systems put demands on those who will operate them, but also those who will use their output in their work.
- Changes in management and performance, such as reduction in productivity will lead to finding possible causes. These causes can point out differences in performance of various departments in the company. These causes often lead to the realization of the need of education.

5. Stages of identification of educational needs

The process of the identification of educational needs is carried out in *three stages*. It is the analysis of company objectives, task analysis, knowledge and skills of workers and analysis of people.

In the first stage, the analysis of company objectives is implemented. Having the education successful and effective, it is necessary to monitor the overall company strategy and objectives (BSC is a good starting point). This also acquires support even from management. It is important to ensure that all workers are aware of the strategy of the company and identify them with it. The task of analysis is to identify the differences between required

and achieved performance and define whether and how it is possible to reduce this performance gap using education. This level is of particular importance in relation to the education needs, organizational systems, programs increasing the performance and company strategy. The process of analysis of the objectives that lead to the identification of educational needs, it is important to take into account the company culture, which reflects the value system - the philosophy of the organization. Provided that education is provided by external organization, it is appropriate to realize the analysis of company culture first. Considering the company performance, the point is that education needs should be expressed so that the required changes in the level of company performance should be clear.

In the second stage, the analysis of tasks, abilities, knowledge, and skills of workers is taking place. Data for analysis can be obtained from descriptions, specifications and qualifying characteristics of working places. Data thus obtained are compared with the actual competence of workers, figuring the leadership style of managers at all levels, culture of working relations, etc. The result is information about the potential need for education. The changes required in individual behavior and performance, especially for executives, may have, in general, technical character, or they approach to leadership and working with people, which is more often. A manager affects the performance by what his individual performance is, but especially how he can lead and motivate their colleagues to improve their personal performance. Individual level of the analysis is starting. Each employee has unique and individual needs of education due to his specific job position, level of education, experience, cultural background and his personality. The emphasis on assessing the individual needs enables to prepare the education "tailored", to adapt it really to the needs of the individual and monitor the objectives which the individual feels responsible for. When analyzing the needs of education, it is necessary to examine the needs of the team, as some managers' needs are unique and others are common for team, managers do not work only as isolated individuals, but often in teams. Thus the needs come to the fore, which cannot be defined, if we dealt with each individual separately.

The third stage focuses on the analysis of individuals when the individual characteristics of workers are compared with the requirements of the company. Data can be obtained from the records of evaluation of workers, his education, qualifications, completing educational programs, trainings and so on [13].

There can be applied the following *procedure* at each of the three phases. First, collect the necessary data and then analyze all the data. When collecting and analyzing, it is possible to use different methods of implementation. In order to ensure the greatest possible objectivity, it is important to get the largest amount of data and combine more kinds of methods.

Data collection

The process of identification of educational needs begins with collecting information when comparing the current level of performance, but also the skills, abilities and knowledge of workers with the standard. Information about the substance of job position activities and achieving the level of performance can be obtained using different *methods* such as structured interview, group discussion, questionnaire, and participation and observation. It is a simple and easy-to-use method.

Structured interview is based on a pre-prepared list of questions (open or closed), solving the problem. The purpose is to find out why individuals or groups do not perform satisfying performance, get opinions, perceptions and attitudes of key personnel representatives. The advantage of the structured interview is the possibility of more detailed examination of the situation and flexibility. The disadvantages are that they are often time consuming and the person who conducts the interview must be sufficiently qualified. "This should be done in a form of bilateral communication. Managers and experts from organization should realize that this type of interview will enable them to recognize the complex potential of applicants and compare these personal competence complexes to the requirements of the position being offered to the applicant" [14].

Observation represents an intentional observing an individual or group of persons of employment in a given environment. An observer can compare different styles and skills of individuals who perform work and compare them with the job description, standards and procedures. The advantage is to obtain a clear picture of the task performance in terms of organization. The disadvantage may be that if a worker is surprised, then he can get resistance to the observation and behave untypically.

Questionnaire represents targeted aggregate structure of different types of questions. The purpose used in this case is to obtain data on the roles and attitudes of employee on different aspects of his work. The advantage of using is low cost, disadvantage may be that the respondent does not understand the right questions, open questions are difficult to assess and question scale may not cover all aspects of the work.

Participation represents the time section, during which the researcher takes on the roles and responsibility of the worker. The purpose is to gain a closer understanding of the work when it is difficult to explain, or the procedures in the company are new and there is no one able to competently assess these approaches. The advantage is a deeper understanding of the conditions of work; the disadvantage is that in some cases where it is necessary to have special skills, an examiner cannot be involved in the work.

Job description written by an employee is a product of the analysis conducted by the employee himself. The purpose is to develop a complete job description which, from the perspective of an employee, describes the levels of importance and difficulty of the main tasks and duties which his work is composed of. The advantage may be speed and may reflect the experience of

the employee if he had several jobs. Employees may sometimes find that it is difficult to describe their work, information may be incomplete, it is necessary to verify them and it is difficult to standardize this process. It happens that employees overestimate or undervalue the importance and difficulty of their work.

Group discussion represents concentration and discussion the difficulties of individuals who are somehow connected with the job. The purpose of this working meeting is to gather relevant information and specific aspects of the work and gain perspectives on how it should be implemented. It is particularly important in those cases where the work includes changes in the content or methodology. The advantage is the relatively rapid acquisition of various perspectives on the job. The disadvantage can be time-consuming; the need of skilled and qualified moderator, there may appear barriers of workers to speak out, especially if they are in different functional status.

After getting the information using some of these methods, the data are analyzed to identify problems in performance and determining the causes of the problems identified. The priority in problem areas will be set and the educational and other measures that help to solve the problems will be identified. Based on the findings there will be developed the program of education in accordance with company strategy and objectives.

In view of the success of the process of identification of educational needs, the amount and relevance of information ability of the company, its activities and people are important. In addition to those methods, in order to obtain the data there is also used the study and treatment of internal documents of the company, SWOT analysis, workshops with management and selected workers, monitoring of work performance, ability tests, but also the performance evaluation and self-evaluation. In practice, it is necessary to use a combination of best techniques to the situation in the company. It is risky to make decisions solely based on a single technique. Strategy, company objectives, organizational structure, financial plans and reports, job descriptions, indicators of fluctuation and accidents, performance standards, marketing plans and staff evaluation system can be used as *sources* for processing the necessary information. These sources allow getting technical, economic and personal data and information on existing relationships and company culture. The obtained data should be interpreted and assessed in relation to the extent to which they present opportunities to enhance the performance of workers and entire company.

Analysis of data

When evaluating and measuring data obtained from the first phase of company education there are usually used two approaches - comparative and absolute. *Comparative approach* involves techniques of order determination (from best to worst), forced division (dividing into groups, intervals, scoring at a fixed number of points in a given group of employees) or paired

comparisons (each is compared with each and determine if the specified criterion is better or worse).

Where absolute approach there is used a written description of the evaluator, numerical rating (to a certain extent of possible points), descriptive scale (use of adjectives for the evaluation of skills), graphic rating scale (usually involves several aspects and combined with a numerical or descriptive scale), performance scale (where direct performance indicator) or forced choice (choice of usually five descriptions of behavior in every part, it is a favorable and unfavorable evaluation).

Considering data collection there is obtained a large number of information from various sources. When processing it is necessary to maintain objectivity, allowing the application of certain principles:

- consider those factors that affect mainly problem in the performance of an individual or an entire company,
- focus on obtaining a comprehensive view of the problem, allowing consultation of all responsible workers,
- use perspective approach in which to give an objective view of the worker and the problem from the perspective of another worker based on his attitudes, ideas and information. It is a certain paraphrase of problem.

In practice, it is possible to use, for example, a combination of mathematical and statistical techniques, too [15].

Applying those principles, or combinations thereof, it is important, in terms of objectivity, to obtain a large amount of information, which to the subsequent processing, are summarized, and classified and where interdependencies between them are explored.

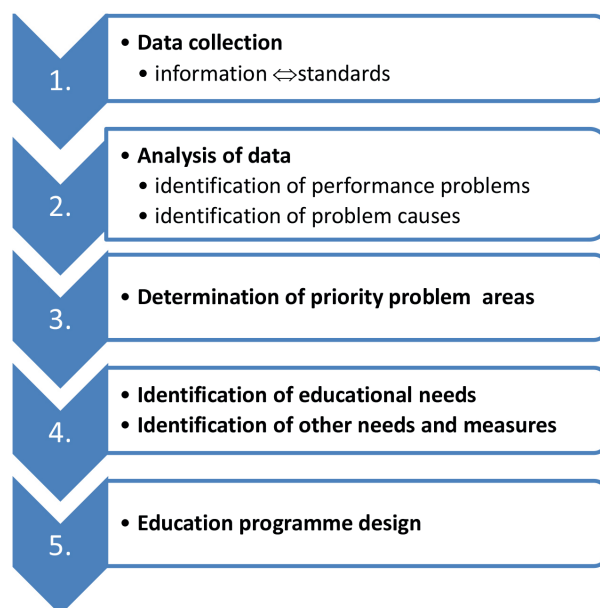


Fig. 1 The process of identification and analysis of educational needs
Source: [own design according to 12]

The aim of the process of data analysis is to identify problems in performance through the symptoms they demonstrate themselves and identify their causes. The performance of the company and the individual is determined by internal environment of the company, its environment, motivation and behavior of workers. Therefore, the cause of changes in performance can be the change in these factors. It is necessary to detect and specify such changes in performance in the process of data analysis.

The result of the process of analysis and identification of educational needs is a list of educational and other needs of workers and the design of educational program, or other designs to resolve other problems and needs identified (Fig. 1). It is essentially a determination of who and why needs education [12]. We recommend that the efficiencies training program accepted knowledge of learning styles and education styles [16].

In terms of effective implementation of identification of analysis of educational needs, it is essential that the company workers were informed in advance about what is happening and why it matters for the company. Unless there is sufficient information, there appear concerns about the impact of ongoing activities and consider them a threat to its own person. This could reduce the motivation of workers to learn in future educational activities. Omrod [17] in his article discusses the topic motivation in learning.

6. Conclusion

Continuous development of competition and increasing pressure in developing market lead managers to introduce new, progressive forms in management of companies. "The current labor market effects also the university education to a large

extent requiring a graduate of interdisciplinary knowledge and with the skills to find the solutions to both technological and economic issues" [18]. Determinants of the success of companies in these conditions can affect the intensity of the introduction of advanced approaches and methods of analysis, planning and control, innovation of organizational structures and information systems [19]. One of the possibilities of increasing the competitiveness of companies is to focus on increasing the value of human capital of their employees using company education, which is aimed at increasing job skills, abilities and knowledge. Identification and analysis of educational needs enables companies and educational institutions to set objectives of educational programs properly so that they are in accordance with company objectives and help to solve problems in achieving performance in the company. Evaluation of data obtained during the process of identification and analysis of educational needs analysis of the actual and required knowledge, skills and abilities provides not only information on the educational needs, but it is also possible to detect other problem areas and their causes, such as organizational areas or introducing changes. Experience shows that a well-prepared and carried out identification and analysis of educational needs allows better investment in the development of human potential and effectively supports increasing the performance of individuals, teams and the company.

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Josef Vodak - Jakub Soviar - Viliam Lendel *

IDENTIFICATION OF THE MAIN ASPECTS OF COOPERATION MANAGEMENT AND THE PROBLEMS ARISING FROM THEIR MISUNDERSTANDING

Goal of the article is to identify main aspects of cooperation management, using detailed analysis of available scientific literature together with outcomes of performed empirical research. With the identified main aspects, we were able to identify problematic areas related to the use of cooperation management and to propose a number of recommendations in order to correct these issues. The article thus brings to managers a handy tool in a form of a set of recommendations (instructions) that are meant to support problem-free use of cooperation management within a company.

Keywords: Cooperation management, project management, strategic management, change management, process management, management of human resources.

1. Introduction

The hurdle of building cooperation management within a company is a real challenge that managers of companies often face. The process of building cooperation management involves a number of factors, ranging from theoretical concepts all the way to practical applications. At present, companies often strive to manage their cooperation initiatives intuitively. There are several unsuccessful activities in the area of implementation of cooperation management that can be identified among real-life companies. The reason for these failures can be chiefly attributed to missing clear plan of activities, division of competencies for implementation and, last but not least, company strategy oriented towards creation and development of cooperation. Errors are also made by managers, mainly due to misunderstanding of the term cooperation management and underutilization of cooperation potential of a company.

Company management represents the main link on the connecting line between the company and its partners. It has multiple tools at its disposal and its managers can use these tools for implementing cooperation management in the company. For this reason it is important that the company possesses knowledge about the main aspects of cooperation management and using suitable managerial approaches ensures durability of relations between the partners within cooperation [1, 2 and 3].

2. Objective and methodology

The main goal of the article is to collect novel information and knowledge in the area of cooperation management, specifically focusing on defining cooperation management within the area of management, and to highlight managerial tools and techniques available for use in cooperation management in a company. Identification of the main aspects of cooperation management could significantly help with the search for problematic areas related to cooperation management. These areas require additional attention of the company and represent room for further development and improvement. Subsequent recommendations are meant as practical tools in a toolkit of company managers, ready to be used during implementation of cooperation management of the company.

In order to address the points in question, as set by this article, it was necessary to use several methods, depending on and fitting to the character of the individual parts of the solution. In order to accumulate necessary data, we used the method of document analysis (for analysis of current as well as historical data about the topic), a questionnaire method and a method of semi-structured interview (gathering data in an empirical research) and a method of observation (used during visits of selected companies).

For processing the data, we mainly used a method of quantitative evaluation (statistical methods and tools were applied) and a method of comparison (for comparing data

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gathered by empirical research and data from the analysis of secondary information sources).

The performed research focused on medium and large enterprises active in the Slovak Republic. The respondents were company managers on the mid to top management level within the managerial hierarchy of companies. In total, 221 respondents took part in the research focused on diagnostics of the level of use of cooperation management.

Research included companies active in multiple sectors of the Slovak economy. Companies included were categorized by the Statistical Office of the Slovak Republic as medium or large enterprises. The respondents were company managers on the mid to top management level within the managerial hierarchy of companies. Size of the sample was 345 respondents, with the required 95% interval of reliability and the maximum allowable error of 5%. Since 221 respondents actually took part in the research, the maximum allowable error reached 6.37%. Data was gathered exclusively via personal interview.

The following methods were used for approaching and solving the research goals: induction, deduction, synthesis (identification of the main aspects of the cooperation management, formulating recommendations for minimal chance of problems), abstraction and model building.

3. The current state of dealing with the issue

We identified an ongoing scientific discussion regarding the term cooperation management, its definition and the scope of use. Several definitions of cooperation management can be found in the scientific literature, however, these typically address only a subset of the whole task of cooperation management. High variability in interpretation of the term can be supported by the following examples. Lafleur (2005) understands cooperation management as a way of managing and developing collaboration in a competitive environment [4]. According to Ray (2002), cooperation management represents a term for integrated management of company networks [5]. Staatz (1983) sees cooperation management as cooperative decision making within heterogeneous preferences [6]. He highlights the need for a model of cooperation based on a defined group choice.

Similar view is held by Watzlawick, whose idea of cooperation management is that of a complex decision making process, ongoing on three levels of the managerial pyramid, whose goal is to reach suitable balance between company success within cooperation as a business unit and as a social institution. Mendoza sees cooperation management as an effective use of resources within cooperation as a business organization, focused on satisfying needs of its members, according to the accepted cooperation principles. Zhang (2011) believes that cooperation management represents a basis for solving all managerial problems [7]. According to him, cooperation management provides conditions

for creating a system of cooperation based on effective use of resources and technologies. Veerakumaran (2006) summarized the most important characteristics of cooperation management into the following points [8]:

- Cooperation management is a complex decision making process and the decisions are made on all managerial levels.
- Primary goal of cooperation management is to satisfy the needs of the members of cooperation.
- All activities need to occur according to the agreed principles of management and cooperation.
- Suitable balance needs to be established between the efforts for commercial success and maintaining goals of the cooperating parties.
- Management focused on reaching a goal via effective use of resources.

A more detailed definition of the term cooperation management requires that the management as such is first defined, both as a science and as a practical activity. Consequently, a large number of possible definitions are available. Let us list three definitions that suitably capture the meaning of management.

Coulter and Robbins define management as “a process of coordinating work activities of people in such a way that the activities are performed efficiently” [9]. Here, the “process” represents the main managerial functions: planning, organizing, leadership and control. “Coordination” represents the attribute that differentiates managerial positions from the non-managerial ones, i.e. the position in the hierarchy of power. “Efficiency” means to conceptually achieve better (larger, richer) outputs that inputs. Efficiency in this sense is to be closely connected with effectiveness and the meaning to achieve the set goals.

Authors of US background Koontz and Weihrich offer the following definition: “management is a process of creating and maintaining certain environment, in which individuals work in groups and effectively/efficiently achieve the set goals” [10].

From the local environment, we selected the following complex definition: “management is a process where managerial employees use scientific knowledge as well as practical recommendations and are able to perform elementary managerial activities in the process of appraising disposable resources, with the goal to determine and achieve company business goals.” [11].

The listed definitions define the main role of management within an organization. No organization exists just by itself, isolated. Every organization is a part of a broader system. Parts of these systems influence each other to a higher or lower degree, and their mutual influence and impact determines their survival on the market. Logically, role of management needs to be focused on the market success of a commercial organization, or more generally, success of an organization in its environment.

Relationships exist between companies, customers, suppliers, elements of distribution networks etc., that represent separate corporate units, exist and it is necessary to manage them. Managing relationships in social organizational units, or between

them, is always based on the use of management. Managing relationships between separate organizations could be labeled as cooperation management. Based on that, we are able to supply a more precise definition:

Cooperation management is effective and efficient management of relationships in a cooperation between separate and relatively independent organizations or individuals, with the goal of improving their competitiveness [12 and 13].

4. Situation in Slovak enterprises – results of the empirical research

Between September 2012 and February 2013 we conducted a research, with the primary goal to gather and interpret information about the level of use of cooperation in the environment of Slovak enterprises. The main goal of the research was to identify the key aspects of efficient management and functioning of cooperation, related issues, degree of satisfaction of companies within cooperation and the opportunities for improvement of already functioning cooperation. Data that was gathered provided complete picture about readiness of Slovak enterprises to use (implement) cooperation management. In total, 273 managers of small, medium and large enterprises took part in the research, from companies active in the Slovak Republic. Data from the respondents was gathered via personal interviews.

Currently, Slovak enterprises have developed cooperation mainly in the form of supplier relationships (68.13%), purchasing relationships (52.38%), technical cooperation (44.32%), education (35.16%), advertising and promotion (24.18%). On the contrary, Slovak companies cooperate least in the areas of media (9.52%), financial consulting (10.99%), ecology (10.99%), management (11.36%) and investments (11.72%).

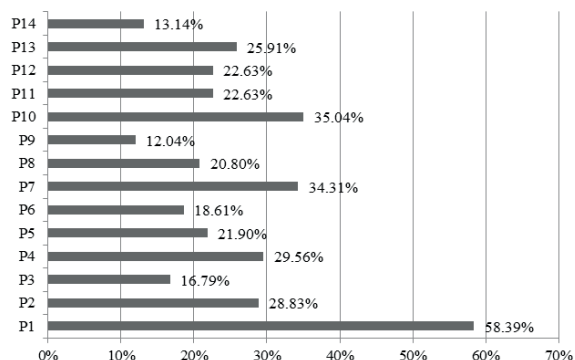
It could be considered positive that almost half of the respondents (47.62%) plans in the near future (within one year) to establish a more intense cooperation with a company or an organization. Less than 17.22% of the companies represented in the research do not plan to establish any cooperation in the near future and 35.16% of respondents were unable to respond.

Some of the most preferred areas of interest for a more intense cooperation in the near future were the following:

- Purchasing of products and services (59.23%),
- Supplying of products and services (57.69%),
- Technical cooperation (43.08%),
- Technical consulting (25.38%),
- Advertising, promotion (23.08%).

The main challenges and problems that were listed by respondents to occur in the process of cooperating with companies and organizations were mainly insufficient adherence to the agreed contractual terms (58.39%), financially demanding (35.04%), distortion of information (34.41%), low effectiveness of cooperation (29.56%), unwillingness to provide internal

information by a cooperating company, i.e. concerns about providing internal information to a company (28.83%) (Fig. 1).



Legend:

- P1 Insufficient adherence to the contractual terms of the cooperation
- P2 Unwillingness to provide internal information (concerns to provide internal information)
- P3 Unwillingness to cooperate of the cooperating company (partner)
- P4 Low effectiveness of the cooperation, i.e. costs are always larger than the resulting outcomes
- P5 Insufficient harmonization and interconnectedness of the partners' IT systems
- P6 Unwillingness to communicate with the partner
- P7 Distortion of information (incorrect, insufficient etc.)
- P8 Limited willingness of employees to maintain and develop cooperation (negative attitude to cooperation)
- P9 Limited willingness of management to cooperate
- P10 Financially demanding
- P11 Lack of time availability of management
- P12 Questionable quality of cooperation (uncertain added value)
- P13 Results do not correspond to the effort put into cooperation
- P14 Lack of trust towards the cooperating company

*Fig. 1 Problems arising during cooperation with companies and organizations
Source: Own research*

Using the realized research we also identified the main advantages of cooperation of the included companies with their partners (other companies, organizations etc.). Based on the number of responses we constructed the following order of the most advantageous impacts of cooperation, as perceived by the companies (1 - the most frequently seen and mentioned advantage of cooperation):

1. *Supplier-purchaser relationships* – perceived advantage in a form of better, safer and more reliable mutual cooperation, service options, infrastructure and specialized legal services, expansion of the portfolio of clients, time flexibility, regular and timely supplies, responsibility, trust, adherence to

- contractual terms, speed of dealing with complaints, good logistical relationships;
2. *Communication* – perceived advantage in a form of information about new products, consulting services, willingness to deal with problematic situations, willingness to take part on meetings, supply information via information system of a company, high degree of openness in internal communication within the organization;
 3. *Finance* – perceived advantage in a form of lower costs, improved bottom line, higher profits, opportunity to offer products for better prices, increased turnover and sales, increased number of resources and improved payment abilities of the companies;
 4. *Competitive advantage* – perceived advantage in a form of marketing, brand building, name and image, improved position on the market, improved technical capabilities, use of innovations and novel technologies, expansion of product portfolio, improved access to products, sharing of know-how, improved efficiency of manufacturing, improved quality of products and the value for customers;
 5. *Education* – perceived advantage in a form of available information and knowledge about cooperation, experience, supplying of results, teaching of graduates, securing qualified workforce, continuous education of employees and students in new areas, higher degree of expertise;
 6. *Internal environment* – perceived advantage in a form of employee motivation, development of the company, location of company branches, office interior, possibility to shorten the hiring process;
 7. *Projects* – perceived advantage in a form of collaboration on preparing, submitting and performing projects, expanded portfolio of projects, securing higher number of larger contracts and orders.

5. Identification of the main aspects of cooperation management

Management represents the main element on the connecting line between a company and its partners. In order to work, management requires information from the IT system, mainly information accumulated by the departments involved in the cooperation. It has at its disposal multiple tools that ensure speed of communication between partners and removal of unnecessary contacting of departments in order to obtain basic information. Thus it supports satisfaction of the partners, makes their work more effective and saves time for all people involved.

A mutual connection exists between management and cooperation management. Cooperation management offers immediate overview about the overall development of the key areas of the business as well as a perspective on individual cooperation activities performed by employees. Management

manifests within cooperation management mainly through the following elements (Fig. 2):

- strategic management,
- change management,
- project management,
- process management,
- management of human resources.

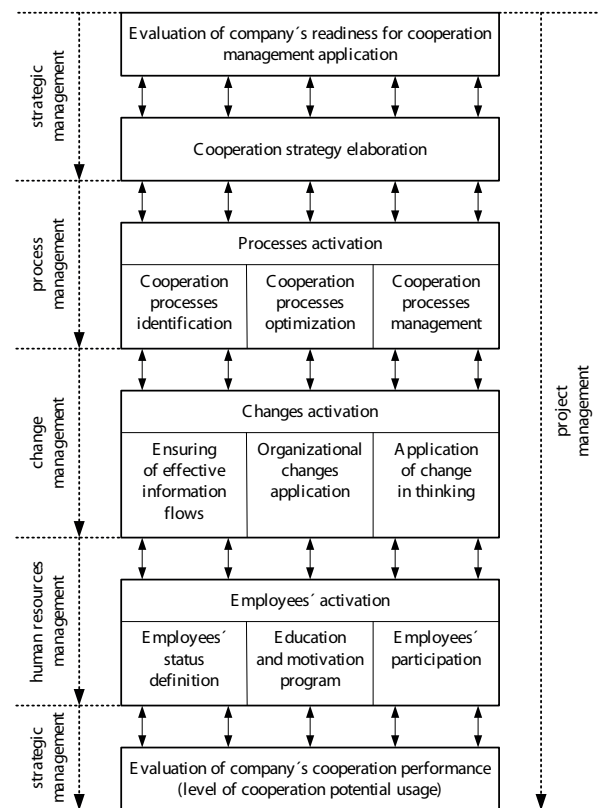


Fig. 2 Identification of the main aspects of cooperation management
Source: Own elaboration

Strategic management and cooperation management

Strategic management is used in the area of cooperation management mainly for formulating cooperation strategy which is preceded by a detailed analysis of current situation within the company. Process of establishing cooperation strategy according to Child et al. (2005) involves effort of the company to realize its goals using cooperation with other organizations [14]. The concept of strategy in relation to cooperation was well grasped by Faulkner (1995). His definition highlights the essence of cooperation relationships [15]. According to him, cooperation strategy represents a process of searching for reasons to establish cooperation, selection of suitable partners whose goals are compatible with the goals of the company, and a process of integration of partner cultures and systems.

Phoocharoon et al. (2001) emphasize that the role of cooperation management is not to create a company strategy [16]. Quite the contrary, it is about understanding that is needed in order to create a suitable cooperation strategy. Similarly, the company should suggest how this strategy should develop over time. It is important that the cooperation strategy is linked to and supports the company strategy. The latter stems from the mission and the purpose of the company. It helps company management to correctly direct the business and to prepare for unavoidable changes and risks of various character [17]. In the process of creating cooperation strategy, it is important to define the method of solving conflicts, to align strategic goals of partners and to establish strategic cooperation connection based on integration of the used cooperation channels. He also considers cooperation strategy to be a method for improving performance of the involved parties, with the goal of achieving strategic competitiveness. In order for this to happen, it is needed to bring in strategic thinking, characterized by continuous analysis of the environment, readiness for change, integration, concentration of cooperation resources and continuous learning. Multiple methods of strategic management are used for performing the analysis of current situation within as well as outside of the company (e.g. in regional environment [18], etc.).

Change management and cooperation management

Change management is used in cooperation management mainly after evaluating readiness of a company to enter into cooperation and after making a decision to move to either new or expanded cooperation initiatives. In such situation it is good for the company to approach key cooperation processes in a structured and integrated manner. Most frequently, the involved initiatives are as follows:

- Higher effectiveness in using human resources,
- Support of new innovation projects, research and development,
- Joint realization of marketing activities,
- Improved quality of mutual communication, networking.

Once the company defines each of the key cooperation processes, such as development of cooperation strategy, establishing strategic connection, integration of communication channels, management of information and performance evaluation, it needs to consider consequences of making changes in any of the processes. In order to implement extensive and complex cooperation initiatives, the company will need to undergo organizational and cultural changes. The decisive aspect in all this will, therefore, be the use of effective change management in the company.

Change management is primarily concerned by people, systems and organizational changes. The 7-S model developed by strategic consultants McKinsey & Company offers a strong tool for planning initiatives within change management in relation to cooperation management. The model consists of seven basic

elements: Strategy, Structure, Systems of management, Style of management, Staff, Skills and Shared values. Apart from the traditional aspects of changes such as strategy, structure and systems of management, the model emphasizes that companies should consider also additional four elements, i.e. style of management, staff, skills and shared values, in order to be successful in their change management initiatives [19]. This model can aid companies to efficiently manage changes by carefully managing and organizing relevant components of each element. This means that cooperation strategy needs to be embraced by employees with certain skills, shared values within the organizational culture, systems, style of management and organizational structures.

Changes needed as a result of implementing cooperation management in a company are clearly important. A number of potential barriers exist that may prevent such change, e.g. deeply rooted interest to maintain status quo. Therefore, in order to succeed in implementing cooperation management, it is essential to understand and act based on the requirements of change management.

Project management and cooperation management

Importance of project management increases as the cooperation initiatives gets larger and more complex. Projects are a specific set of activities that were designed in such a way that they need to achieve set goals within a certain time interval. Successful cooperation projects are based on cooperation goals that are derived from the company goals. They should also support and complement the overall company strategy. Efficient company management plays a crucial role in implementing cooperation management in a company. History tells us that projects that exceeded budget as well as the set time interval can result in considerable losses.

It is important that top management and heads of cooperation projects understand the role of information technologies in realization of cooperation management. There are several reasons for using information technologies to manage cooperation: ensuring efficiency of information flows, reduction of costs, improved communication with partners and ensuring coordination of individual cooperation activities. In case a proposed investment into information technologies that would be used to manage cooperation is valid and justified, it is reasonable to review it properly in this context.

Payne (2005) emphasizes that project management uses not only methods focused on controlling time and resources but also uses and improves a number of usual methods typically used in general management, e.g. teamwork, orientation process and leadership [20]. Currently, the field of project management has been expanded by sophisticated methods of management and control of time, costs, resources, quality and performance.

Process management and cooperation management

Basis for functioning of any company are its processes. Process management is established on the principle of activity integration into comprehensive processes. The process approach is based on the assumption that the causes of unacceptable economic results are poorly set cooperation processes. For this reason it is necessary to make all cooperation processes more efficient and to eliminate those that do not bring the desired outcomes.

The main goal of process management in relation to cooperation management in a company is the effectiveness of cooperation processes. Process management takes a comprehensive view of all company activities and integrates them into individual processes. Information exists and is available for each activity, e.g. who is realizing the activity how is the realization going, in what way, what are the limitations for realization, what is the input for the activity, what are the outputs, relationship of the internal customers, spread of overhead costs to individual activities within the process. Every activity has a defined metric of performance. Another strong point for process management is implementation of any changes resulting from realization of cooperation initiatives in the process of managing a company.

Key requirement for successful use of cooperation management in a company is thorough mapping of current company processes. Attention should be specifically paid particularly to cooperation processes. It is necessary that they are identified and consequently optimized.

Management of human resources and cooperation management

A key role in cooperation management is definitely played by people, the employees of the company. The success of cooperation initiatives will depend on their performance and attitude. Unqualified employees may disrupt interests of the company within the established cooperation. According to Blaskova (2003), people within the company and their potential represent an effective and strategic competitive advantage [21]. People and their motivation, knowledge, skills, capabilities, creativity and flexibility become the most important strategic resource for successful realization of cooperation initiatives in a company. Employees prepare analysis of the situation, together with the management they set cooperation goals, formulate cooperation strategy, action plans as well as a system for control of effectiveness and efficiency of cooperation initiatives. In short, employees play a crucial role in using cooperation management in a company. By using a suitable motivation program, ensuring possibility for further education and establishing suitable work environment can company achieve smooth implementation and use of cooperation management and eventually successful realization of cooperation initiatives.

6. Discussion

Use of cooperation management in a company is a complex process that requires thorough understanding of the company environment. Company managers should be aware that implementation of cooperation management also brings certain risks. Otherwise would this initiative be doomed to failure. In order to succeed in this area, it is a key to identify risk areas early and to take corresponding measures in order to increase probability of success of implementing cooperation management in a company.

In the next part we identify possible risks together with recommendations that are meant to help to reduce these risks. A necessary requirement for successful functioning of cooperation management in a company is also prevention.

The most frequent issue is *underutilization of cooperation potential of a company*. The company either is not aware of its cooperation potential or the suitable conditions for its development and use are not present. Manifestations of this issue differ. Chiefly they are represented by arising misunderstanding, costs, realization of inefficient cooperation processes (often repeated multiple times).

Managers of a company should dedicate their time to thorough analysis of cooperation capacity of the company. Company needs to possess suitable overview about its knowledge, experience, resources, assets and managerial skills and capabilities that are available and could be fully used in order to create and manage cooperation. However, this requires that the top management of a company had a clear idea about building and managing cooperation. This needs to be reflected in company strategy, supported by corresponding human and financial resources. Managers need to actively communicate with potential partners as well as own employees and to engage them in establishing of cooperation. It could also be recommended to the top management team that a motivation program is created, with the aim to stimulate employees to engage into cooperation processes. Employees represent a key aspect for success of cooperation management.

Another risk area is the *absence of information system* that would support efficient exchange of information between partners within cooperation. Information from the partners is often not registered in a form in which it could later be used or is not accessible to all relevant persons. This leads to situations when managers and employees do not react sufficiently to information responses in cooperation.

Managers of a company should also consider creating corresponding databases interconnected with company information systems. Every person in a company should know how to react in case of a relevant impulse. This can be enabled only by effective work with information as part of the cooperation. Information system needs to reflect the requirements

and current situation in the area of information technologies of the cooperating partners.

Another serious issue is *missing necessary environment that would support establishing of cooperation - suitable culture*. Managers of a company should consider focusing on establishing a company culture based on communication and collaboration. In addition to the already mentioned recommendations, implementation of which could improve quality of the cooperation environment, it is necessary to focus even further on employees of the company. Top management of the company should strive to stimulate employee activities by creating suitable environment that would ensure open communication, discussion about cooperation opportunities and work in teams. Managers need to transfer their engagement to their team members and they consequently bring the engagement into the development of new cooperation.

Poorly prepared cooperation program represents a frequent issue for implementing cooperation management in a company. Company managers tend to focus only on the technology side of cooperation and forget the other dimensions. Company needs to have at its disposal sufficient amount of information about cooperation processes, cooperation abilities and cooperation resources. In case the company does not dedicate necessary attention to this area and begins to implement cooperation management based on an insufficient documentation, it is highly probable that such implementation effort is doomed to fail. Company managers should consider the following measures:

- Realize detailed analysis of current situation in a company,
- Correctly understand the role played by technology in implementation of cooperation management,
- Perform complex mapping of the potential for cooperation and specify the requirements placed on the cooperation,
- Correctly set a system for evaluating cooperation performance of a company, including its rules.

Problems can arise also in the process of *defining cooperation goals* that company aims to reach in relation to the planned cooperation. Frequently it is not clear in what way the cooperation will be implemented and the realization of which activities will be necessary. In such situation it is needed that the company understands the goals of its cooperation options and to reflect these into its strategic goals. Company managers should consider the following measures:

- Correctly understand the principles of cooperation (good knowledge of the topic, achieved by studying of the literature and other professional education),
- Clarify the situation where the company aims to get by using cooperation management,
- Understand the expected outcomes of cooperation and the ways that can lead to their achievement,
- Prepare common vision together with its partners.

An important problem is to *exclude the human factor* in the process of using cooperation management. Employees that do not participate in creating necessary documentation about the

future cooperation, in the process of identification of cooperation potential and in setting the requirements of cooperation, would not have sufficient information about the goals of cooperation management. This can result in a situation where they perform certain activities without interest and passively, since they are not involved and informed about the company goals in this area. Managers could therefore consider the following in order to minimize this issue:

- Ensure regular communication with employees with the goal to create an environment suitable for building of future cooperation,
- Enable employees to take part in the development of cooperation program and consequently in using cooperation management in a company,
- Listen to and to consider ideas of employees about creating the cooperation program,
- Clarify to employees the meaning of cooperation for future direction of the company,
- Supply sufficient information to employees about every step in implementation of cooperation management in a company,
- Lead by example.

While securing cooperation processes there is a risk of *automating the previously poorly set (wrong) processes*. In order to minimize creation of this situation, managers could consider the following:

- Identify and regularly update cooperation processes,
- Place emphasis on the processes that are directly connected to work in the area of cooperation,
- Dedicate attention to analysis of current state of cooperation process,
- Create a separate process model of a realized cooperation.

Use of cooperation management in a company can be successful only in case the company accepts the initial conditions that include certain limitations. In case of *ignoring the initial conditions* a number of serious issues arise. Managers could consider the following in order to prevent this from occurring:

- Define key indicators for use of cooperation management in a company,
- Define control points within the use of cooperation management in a company,
- Take into account limitations (degree of use of cooperation management, risk of failure, level of cooperation capacity etc.).

Only if measurable goals are defined the company management can consider and evaluate outcomes of cooperation. A frequent issue in the process of using cooperation management is the *absence of feedback* that is meant for those managing this process. It is necessary that the whole process of cooperation management (from the analysis all the way to realization) was monitored and evaluated.

Company management could therefore consider securing intermediate evaluation of use of cooperation management in

a company. This requires that the goals of using cooperation management are clearly defined, based on measurable indicators. Company managers should clearly outline and set the metrics so that they could quickly and effectively manage company areas related to cooperation using well defined measurable goals. However it is necessary that the group of metrics be defined on the main priorities for managing cooperation activities of the company.

7. Conclusions

Managing of cooperation initiatives is closely related to management. Cooperation management provides valuable information that represents an input for strategic decision making. Cooperation management represents mainly a process that includes complete transformation of the company culture and its values. For this, it is necessary to apply principles of strategic management. Success in this area will depend on the company management and correct understanding of the real importance of cooperation management for the company. As long as the cooperation management is understood only as a technology and not as a behavior of the company towards its partners within the cooperation, then the whole project would be doomed to fail.

It is necessary to emphasize that people represent the single most important element of cooperation management.

Use of suitable motivation tools, creating of suitable conditions and ensuring open communication between company top management and its employees will result not only in smooth course of individual cooperation activities but also in their continuous use in the future.

When using cooperation management, the area of process management definitely should not be underestimated. All cooperation processes within the company should be analyzed. Top management needs to see itself as the owner of all of the main processes and needs to be responsible for their quality and performance.

Important role in the process of using cooperation management in a company is represented by the top management. Specifically this includes pushing forward effective approaches, securing sufficient resources for all cooperation initiatives, finding valid arguments for change and establishing company rules that would ensure use of cooperation management within the company. This is an organizational change that needs to be managed in order to result in success. Therefore, change management and cooperation initiatives need to be closely interconnected.

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USE OF ACTIVE AND PASSIVE VERB FORMS IN PAPERS FROM THE FIELD OF CHEMICAL ENGINEERING

The paper deals with use of active and passive verb forms in journal articles from the field of chemical engineering with focus on heavy metal ions removal from water. Three hypotheses about use of passive and active voice were formed and tested on six scientific journal papers in the above mentioned field – three experimental and three theoretical. The data were gathered using a comparative analysis of active and passive verb forms with a share of statistical analyses. Hypothesis 1 “In scientific papers from the field of chemical engineering passive voice is more frequent than the active voice.” is not valid as the active verb forms outnumber the passive verb forms though not significantly. Hypothesis 2 “Passive voice is much more common in Methods and Discussion sections than in the Introduction or Results sections.” can only be applied to experimental papers and is valid as the passive verb forms outnumber the active ones in the particular sections. Hypothesis 3 “There is no difference in usage of passive and active voice in theoretical and experimental scientific papers.” is not valid as in experimental papers the passive verb forms outnumber the active ones, on the other hand, in theoretical papers this statement does not apply.

Keywords: Active voice, passive voice, chemical engineering, comparative analysis.

1. Introduction

One of very specific use of spoken and/or written language is its use in science. Worldwide, though many of them written in a local language of the country where the research is conducted, the greatest number of scientific publications is written in the English language. English is also the required international language of communications, information technology, business, aviation, entertainment, radio and diplomacy.

It is generally accepted that the language used in science is different from “general English”. The main difference is considered to be especially the more frequent use of passive. A passive construction is regarded as impersonal and distant. It also supports the idea of research without emotions and a strong emphasis on factuality, fidelity, intelligibility, and clarity.

The purpose of the paper is to outline the use of English language in scientific articles in the field of chemical engineering with focus on heavy metal ions removal from water with a special interest in active and passive voice. The correct application of active and passive in journal articles is one of the basic tools for mastering the theory and practice of paper-writing. For a non-native speaker of English mastering the fragile balance between the two antinomies is vital but not that simple.

1.1 Scientific writings

Goldbort [1] defines scientific or technical English as a number of things – a tool for communication, a culture of writing, and a way of writing that is straight-lined and austere with strategies and uses of language of a very specific order – allowing the scientific community to conduct all the professional affairs. To be able to master the specificity of the language scientists depend on narrowly restricted uses of words. The advantage of this specific way of communicating has been explained by the linguist Leonard Bloomfield [2] as “The use of language in science is specialized and peculiar. In a brief speech the scientist manages to say things which in ordinary language would require a vast amount of talk. His hearers respond with great accuracy and uniformity. The range and exactitude of scientific prediction exceed any cleverness of everyday life: the scientist’s use of language is strangely effective and powerful. Along with systematic observation, it is this peculiar use of language which distinguishes science from non-scientific behaviour.”

Further on, “technical,” “technological,” “scholarly,” “academic,” “research” or “scholastic” English/writing/paper is referred to as “scientific” English/writing/paper due to the necessity of unifying these terms for the purpose of the paper

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as different authors refer to the same subject under different denominations.

Scientists, according to Glass [3], in their profession publish at least five distinct pledges. In order to achieve the purposes of the writings effectively Goldbort [1] identifies six basic kinds of purposes that researchers have when they write particular documents for particular readers: recording and archiving, professional exposition or dissemination of research results, teaching, job duties, seeking financial resources, and informing citizens. In scientific activity itself, the most immediately important uses of language occur in making a reliable and permanent record or archive of research methods, outcomes, and conclusions.

Hill et al. [4] define scientific paper as a published or unpublished paper. The central purpose is to present the results of an experiment or ex post study. Published scientific papers appear in scholarly journals in most applied, hard, and social sciences. Unpublished scientific papers include theses, dissertations, term papers written for classes, and papers delivered at professional conferences and symposia. Although the style and content of scientific papers vary greatly from field to field and audience to audience, scientific papers share a common rhetorical organisation.

1.2 Organisation of scientific writings

In scientific papers, Hill et al. [4] identify three organisational structures: the beginning - called the introduction; the middle - called the procedure including methods and methodology and results; and the ending - called the discussion. What separates the introduction, procedure, and discussion sections from each other are their functions within the scientific paper. The introduction provides a transition from the larger academic field to the particular experiment. The procedure section describes the particular experiment. The discussion, like the introduction, is a transition too, but its purpose is to guide the reader from the particular experiment back to the larger academic area. The overall organisation is from general to particular and back to general.

1.3 Passive voice in scientific writings

In general verbs denote all kinds of actions, processes or events; sometimes they can even express states [5]. Being part of the denotation, a process or a state, therefore, belongs to the semantics of a verb. In particular, stativity is a purely semantic notion.

Passive verbs are much more common in science and engineering textbooks than in humanities textbooks [6]. It has long been accepted that one of the most salient grammatical

features of scientific English, as compared to "general English", is its relatively frequent use of the passive form of the verb [7]. Frequency counts of verb tense and aspect performed on corpora of data which combine texts from a variety of scientific and technical fields do seem to show that, overall, the passive voice is used extensively in scientific English.

Passive voice allows for the subject of a sentence to be deleted, and thereby deemphasized in terms of its semantic role [8]. Passive voice can involve the deletion of the original subject. The effect is usually regarded as impersonal prose, precisely because the agent is deleted. Chafe and Danielwicz [9] characterise sentences in passive voice as detached and impersonal, as compared to those in active voice, since passives background or omit mentioning the agent of the action. Such agentless actions serve to distance the writer or speaker from the text, permitting opinions to be presented and generalized without overt attribution. In some instances the subject is deleted because the object is the topic of discussion, so that the "recorded results" are the focus, not the "recorder" [10]. Agentless passive can also be employed to front thematic information or remove the agent from the prominent sentence position [11]. In fact, scientific 'passive' [12] is closely associated with the conventionalized rhetorical constructs specific to Anglo-American academic writing.

Voice choices can indeed contribute to revealing a stance [13 and 14]. The passive voice is useful in this regard as by allowing for the aforementioned shift of focus, there is the potential for the author's personal emphasis to be seen. Therefore, it is this potential to emphasize one sentential argument over another that is the suggested means by which passive voice can contribute to a writer's stance.

The dense use of passive verbs in academic prose is interesting because it is used merely to sound objective and to distance the practice of science from human agents [6]. While it is conventional to use passives to report research findings in many fields, there are also functional factors that affect the choice of passive.

In many cases where passives are used, the subject of an active voice verb would just be a vague group of researchers [6].

Fahy [15] opposes frequent use of passive in scientific papers, especially in the field of nursing. "In scientific writing 'active' rather than 'passive voice' is generally preferred." Using the active voice the subject names the agent of the action. Many scientific sentences have more than one possible subject and more than one verb. The writer must be clear about which noun in any given sentence is the "real" subject of the sentence. The subject should appear early in the sentence. Putting the subject early in each sentence assists to write sentences simple, active, and brief.

While the active voice is preferred in most writing the passive voice is often indispensable when the object or receiver of the action of the verb is more important than the doer, as often happens in the Materials and Methods section of scientific articles [16]. In this case, the active subject is usually self-evident,

or unimportant, but sometimes, this construction is overused and sounds maladroit and complicated.

Using the passive voice appropriately, however, appears to be complex because of its contextual, lexical, and semantic constraints [17].

2. Objectives

We undertook to examine in more detail the frequency of occurrence of the active and passive forms of the verbs, i.e. active and passive voice in six journal papers in the field of chemical engineering. Considering that the degree of uniformity of textual structures in scientific texts depends on the discipline to which those texts belong [18 and 19], we did not select our sources from a wide range of disciplines, but gathered the papers belonging to one discipline.

We investigated, in particular, the rhetorical function of the passive in these texts. The six papers chosen for investigation were published in Applied Geochemistry, Separation Science and Technology, Water Research, and Hydrometallurgy, and focus on heavy metal ions removal from water.

Three are of theoretical character (review papers) whilst three papers are experimental scientific papers.

Based on the review in chapter 1.3 we made the following hypotheses:

Hypothesis 1: *In scientific papers from the field of chemical engineering passive voice is more frequent than active voice.*

Hypothesis 2: *Passive voice is much more common in methods and discussion sections than in the introduction or results section.*

Hypothesis 3: *There is no difference in usage of passive and active voice in theoretical and experimental scientific papers.*

For hypothesis 1 we decided in spite of the implication given by Fahy [15] and Espinoza [16].

3. Methodology

We did an initial survey of journal papers in the field of chemical engineering with focus on heavy metal ions removal from water and selected the six above mentioned articles based on publisher, country of origin of the authors, and type of article. The former two mentioned are not of the interest of the paper; nevertheless, the fact that the author(s) is/are non-native speaker(s) may have certain influence on the choice of verb forms.

3.1 Comparative analysis of active and passive verb forms

In our count and analysis, we counted finite verb phrases. We did not include bare past participles. Nor did we count verbs in footnotes, titles, data on receipt and acceptance, nomenclature, key words, tables and figures captions, acknowledgements or references. We did not count the symbol “=” as a verb, though at times it functioned as a verb. We did not count “is” as a verb in nomenclature included in the text.

We counted as passive all verbs which appeared in the “subject + be + past participle” form. In case of coordinating clauses whose verb phrases are conjoined and one of the verb phrases is active and the other one is passive, we counted one active verb and one passive verb. In case of coordinating clauses whose verb phrases are conjoined and both the verb phrases are either active or passive we counted only one verb, either active or passive. In case of coordinating clauses whose two or more sentences are conjoined we counted both the verbs irrespective of the voice.

In addition to counting all active verb forms, we counted a subcategory of first person plural active verb forms, which represent a clear contrast to the use of passive.

We formulated hypotheses as to the apparent rhetorical function of choices between active verbs and passive verbs. The first author of the paper, who is an expert in the field of chemical engineering with a special interest in heavy metal ions removal from water using a hybrid method of adsorption and microfiltration and has a 10-year experience in the research, provided the interpretation of the text and outlined the overall rhetorical structure of these papers.

3.2 Statistical analysis

We can summarise and describe data using different numerical indicators. Central tendency, variability, and proportional representation (the sample mean, variance, and percentiles, respectively) are the most common ones. It is important that any characteristic of interest in a sample can be represented by a number [20 and 21].

4. Results

In comparing the frequency of the passive and active voices occurring in two astrophysics journal papers, the passive seems to be used when the authors simply follow established or standard procedures; when the authors refer to their own proposed future work; and describe the works of others (unless that work is mentioned in contrast to the author’s) [7].

4.1 Experimental papers

The studied experimental papers completely match the scheme of three organisational structures [4] also described in chapter 1.2.

4.1.1 General overview

The papers comprise an Introduction chapter that gives the overall theoretical background for the study based on the previously published works from the same field.

The middle section of the papers is represented by a description of each experiment conducted and discussed in the paper. The titles of the chapters, though, are different. These differences may not only be caused by the choice of the author(s) but also be determined by the publishers [22 and 23].

The Discussion sections of the papers give the results of the experiments drawn in the middle section which are discussed in a wider meaning of the knowledge in the scientific field.

Only in one paper out of the three studied, active verb forms outnumber passive verb forms, as shown in Table 1. If we look only at the incidence of active “we” verb forms as opposed to passive, we find that the authors do not favour this subcategory of verb forms. Only one “we” verb form out of 243 active verbs and of 517 verbs (active + passive) is found in the three studied experimental papers.

The overall tendency for all the three papers is to prefer the passive to the active. In scientific *experimental* journal papers in the field of chemical engineering, the passive verb form occurs more frequently than the active, and the first person plural we verb form is rare.

4.1.2 Comparative analysis

In the paper by Bunker et al. [24] passive verb forms outnumber active verb forms only in the Abstract section. In the

Introduction and Methodology sections the number of active and passive verb forms is equal and in the Results, Discussion and Conclusion sections the number of passive verb forms is below the number of active verb forms. The mean percentage of the passive verb forms occurrence is 41.69% and the standard deviation is 17.03%.

In the paper by Mizera et al. [25] passive verb forms outnumber active verb forms in the Experimental and Conclusion sections, yet there is no active verb form in the Experimental section.

In the remaining Abstract, Introduction and Results and Discussion sections the number of passive verb forms is below the number of active verb forms, though in the Abstract and Results and Discussion sections the difference is only 1 and 2 verbs, respectively. The mean percentage of the passive verb forms occurrence is 59.17 and the standard deviation is 25.17.

In the paper by Tran and Roddic [26] passive verb forms outnumber active verb forms in the Abstract, Introduction, Materials and Methods and Results and Discussion section. In the remaining Conclusion section the number of passive verb forms is below the number of active verb forms, though the difference is only 1 verb. The mean percentage of the passive verb forms occurrence is 65.40 and the standard deviation is 13.29.

Further we compared the frequency of occurrence of the active and passive forms of the verbs in particular sections crucial for the analysis, i.e. Introduction, Methods and Results and Discussion sections of all the three experimental papers. According to these results the ratio of the active to passive verb forms is greater in Methods sections than in Introduction and Results and Discussion sections thus passive voice is preferred in the Methods sections.

4.2 Theoretical papers

As Tarone et al. [7] underline an important fact sometimes forgotten in the field of scientific English – “not all scientific journal papers consist of reports of experimental studies,” – this

Frequency of Active and Passive Verbs in Experimental Papers

Table 1

Author(s)	Bunker et al. [24]			Mizera et al. [25]			Tran and Roddic [26]		
	Count	%	%	Count	%	%	Count	%	%
*	1	2	3	1	2	3	1	2	3
Total number of words	3164	100.00		3237	100.00		3939	100.00	
Total number of verbs	198	6.26	100.00	145	4.48	100.00	174	3.66	100.00
Active verbs	116	3.67	58.59	62	1.92	42.76	65	1.35	36.81
Passive verbs	82	2.59	41.41	83	2.56	57.24	109	2.31	63.19
Active “we” verbs	0	0.00	0.00	1	0.03	0.69	0	0.00	0.00

* 1 - total absolute number in the whole article; 2 - percentage from the total number of words in the whole article; 3 - percentage from the total number of verbs in the whole article.

Frequency of Active and Passive Verbs in Theoretical Papers

Table 2

Author(s)	Dambies [28]			Davis et al. [29]			Volesky [27]		
	Count	%	%	Count	%	%	Count	%	%
*	1	2	3	1	2	3	1	2	3
Total number of words	6 211	100.00		9 176	100.00		5 165	100.00	
Total number of verbs	435	7.00	100.00	605	6.59	100.00	334	6.47	100.00
Active verbs	282	4.54	64.83	376	4.10	62.15	243	4.70	72.75
Passive verbs	153	2.46	35.17	229	2.50	37.85	91	1.76	27.25
Active "we" verbs	2	0.03	0.46	9	0.10	1.49	0	0.00	0.00

* 1 - total absolute number in the whole article; 2 - percentage from the total number of words in the whole article; 3 - percentage from the total number of verbs in the whole article.

consideration also applies to papers in the field of chemical engineering.

4.2.1 General overview

In astrophysics, journal papers do not consist of experimental studies for a very simple reason: the subject matter does not lend itself to experimentation. One cannot experiment on a star or a galaxy in the way in which one can experiment on a chemical compound or a bean plant. The field of astrophysics therefore publishes papers describing logical arguments rather than experiments. Journal papers in astrophysics consist of logical arguments which cite observations and draw conclusions based on logic, citations of established procedures, and proposals for new choices and procedures, all involving the use of mathematical equations.

The situation in the field of the papers from the field of chemical engineering is not the same. Though scientists in this field can perform and successfully do experiments mostly on a chemical background, theoretical papers are often brought to summarize the growing number of experimental results in the same field of study, compare results of different authors on the same topic, or get together same experiments performed by different methods.

In all the three theoretical papers, active verb forms greatly outnumber passive verb forms, as shown in Table 2. If we look only at the incidence of active "we" verb forms as opposed to passive, we find that the authors do not favour this subcategory of verb forms that is in accordance to the finding concerning experimental papers. Though eleven "we" verb forms out of 901 active verbs and of 1 374 verbs (active + passive) are found in the three studied theoretical papers, namely as follows, it represents only 1.22 per cent of all the used active verbs. Based on the list above and Table 2, there is no "we" verb form in the paper by Volesky [27].

While there does seem to be some individual variation in the frequency of active verb forms and passive verb forms, the

overall tendency for all the three papers is to prefer the active to the passive. Thus, if these three papers are representatives of the writing style in this field and kind of paper, it seems that in scientific *theoretical* journal papers in the field of chemical engineering, the passive verb form occurs less frequently than the active, and that the first person plural we verb form occurs much less often as other active or the passive verb forms.

4.2.2 Comparative analysis

As it is not possible to apply the organisational structure of papers presented in chapter 1.2, we counted the verbs in particular chapters that we could unanimously identify and divided them into sections: Abstract, Introduction, "Main text," and Conclusion.

Further on we compared the frequency of active verb forms and passive verb forms in particular chapters as defined above.

In the paper by Dambies [28] active verb forms outnumber passive verb forms in the Introduction, Main text and Conclusion sections. The mean percentage of the passive verb forms occurrence is 57.54 and the standard deviation is 34.03.

In the paper by Davis et al. [29] active verb forms outnumber passive verb forms in all the sections. The mean percentage of the passive verb forms occurrence is 69.18 and the standard deviation is 8.76.

In the paper by Volesky [27] active verb forms outnumber passive verb forms also in all the sections. The mean percentage of the passive verb forms occurrence is 75.73 and the standard deviation is 2.91.

5. Discussion

The overall rhetorical structure of a professional journal paper in the field of chemical engineering takes the shape of a logical argument in which the author attempts to solve a problem by choosing that combination, from among various

accepted procedures and equations, which will best solve the problem.

Hypothesis 1 *In scientific papers from the field of chemical engineering passive voice is more frequent than active voice.* Based on the analysis introduced in chapter 4 this hypothesis is not valid for the studied papers and thus for the papers published in the field of chemical engineering with focus on heavy metal ions removal from water as a whole. The overall mean percentage of the active verb forms occurrence is 56.03% and of the passive is 43.97% although the difference is almost negligible. However, this hypothesis is only valid for all the 6 studied papers and cannot be evaluated in the same way if we take the criterion of the kind of papers, which will be further discussed in the assessment of Hypothesis 3.

Hypothesis 2 *Passive voice is much more common in methods and discussion sections than in the introduction or results section.* This hypothesis is not applicable for theoretical papers considering it is not possible to differentiate the Methods, Discussion and Results sections since they do not exist. The structure of theoretical papers is different from the structure of a scientific paper described in chapter 1.2 which is also discussed in chapter 4.2.2. Experimental papers, as introduced in chapter 4.1.2, comply with the structure of scientific papers described in chapter 1.2, but only in the paper published by Bunker et al. [24] all the four above mentioned sections, i.e. introduction, methods, discussion, and results, can be differentiated. In the remaining two papers published by Mizera et al. [25] and Tran and Roddic [26] the Results sections are immersed into the Discussion sections so we excluded the coupled Results and Discussion sections from the statistical analysis for these cases. Considering the above mentioned, this hypothesis is valid for the studied experimental papers i.e. for the experimental papers published in the field of chemical engineering with focus on heavy metal ions removal from water. The ratio of the active verb forms to the passive ones in the Methods and Discussion sections of all the three experimental papers is approximately 12:10 whilst this ratio in the Introduction and Results sections of all the three experimental papers is 10:11.

Hypothesis 3 *There is no difference in usage of passive and active voice in theoretical and experimental scientific papers.* Based on the presented results and conclusions from hypotheses 1 and 2 this

hypothesis is not valid for the studied papers i.e. for the papers published in the field of chemical engineering with focus on heavy metal ions removal from water. In case of experimental papers the passive verb forms outnumber the active ones. The overall mean percentage of the passive verb forms occurrence is, though not significantly, higher than that of active ones, i.e. 55.42% and 44.58% respectively. In case of theoretical papers the active verb forms greatly outnumber the passive ones. The ratio of the active verb forms to the passive ones is approximately 2:1, i.e. 67.49% compared to 32.51%, respectively.

6. Conclusion

The generalisations made in the paper concerning the occurrence of active and passive verb forms were based on six scientific articles appearing in prestigious journals on heavy metal ions removal from water, which is a subdiscipline of chemical engineering. Passive voice has an important role in writing papers. Placing the object of the sentence in the subject position is the basic function of passive voice; from a rhetorical point of view this gives one sentential element prominence over another. Textual cohesion, not personal emphasis, is very often an important factor to take into consideration, as well as placement within the topicality hierarchy.

Three hypotheses were formulated on usage of active and passive voice in scientific papers. For the papers published in the field of chemical engineering it is possible to generalise that passive voice is not more frequent than the active one. But this statement is only valid if both theoretical and experimental papers are considered. If the criterion of the type of papers is considered, there is a significant difference. In experimental papers passive voice is preferred unlike in theoretical papers, for which active voice is dominant. Concerning the structure of the papers theoretical papers are organised in a different way as experimental ones. As theoretical papers are not reports on experiments but summaries of other experimental papers from the same field, they do not consist of the Methods, Discussion and Results sections. For the experimental papers that do follow the three organisational structures it can be concluded that passive voice is more common in Methods and Discussion sections than in the Introduction and/or Results sections.

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PUBLIC INTERACTION OF WEB SELF-PRESENTATION

The article is focused on a specific area of copywriting - self-presentation of companies on the websites. It analyzes 190 webpages of smaller companies and 190 webpages of larger companies, compares their presentations and points out differences. The adaptation of the text to the search engine optimization and to the target audience and other aspects which create the specificity of copywriting are discussed.

Keywords: Copywriting, self-presentation, web, public.

1. Introduction

A significant qualitative shift has been recently observed in advertising and promotional texts. Promotion of products is associated with the very beginning of the exchange of goods. The way of communication with a customer has significantly changed thanks to electronic communication.

The primary objective of this article is to discuss the form of corporate web presentation focused on a customer. For this purpose, the qualitative analysis of the sample copywriting text has been conducted.

2. Copywriting texts on the Internet

The study discusses copywriting as a specific component of advertising, but also of the information in the Internet environment. It begins with a definition of this term, as the public are often confused by the expressions “copywriting” and “copyright” (these words are taken from English and they are pronounced in a similar way). There is no generally applicable definition in Slovakia; it can be most often found on blogs or websites of companies that offer such services. Abroad, there are a number of available valid materials, tutorials which were consulted during the process of the research. Selected resources on copywriting include A. Maslen [1]; J. Surgaman [2]; Manual of MoreNiche [3] D. Graham and J. Graham [4]; M. Stribbe [5]; M. Prokop [6]. Selected resources from the corporate communication and presentation on the web include: I. Pollach [7] and R. Fox [8]. “*Copywriting* is the act of writing words to sell a product, service, person, or idea. It uses persuasive language to set the voice and tone of a brand in the hope that people will identify with and buy into it” [9]. From a historical perspective, copywriters have worked for large agencies or for public-relations

firms, pairing with Art Directors to write advertising copy that wins approval from the buying public. “Starting in the late ’90s, the nature of copywriting began to change. The way in which people began consuming content changed the roles and responsibilities of copy, demanding both persuasive and contextually appropriate language that fit with a brand’s style and aesthetic across different channels” [9]. This type of the copy/text can be also found in the Internet environment. In the article we discuss just the part of the copywriting text (form of corporate web presentation focused on a customer). The search engines create an integral component of the Internet space. In the SEO¹ copywriting, there are texts which are not optimized for a potential customer or user, but for the search engines. As a result of this, various differences come into existence. An appropriate choice and placing of keywords in articles can “help in searching.” This process is performed by making use of search engines (search engines, by complex indexing based on certain algorithms assign the order of search results for the keywords that are entered). The selection of appropriate keywords in the text is just one of many factors that are used with the aim to increase searchability. There is a significant interaction with the target audience for whom the text is intended. The interaction is related to the thinking process of a group, to the searching of the product or a service. Finally, it is related to the terms that are entered into the search engine. Answers to such questions could provide answers at the stage of an optimal drafting of the text.

2.1 The reception of the public and of recipients

The author of message should take into consideration not only the product or brand that is promoted, but also the target audience (often at the expense of opinion, aesthetic preferences,

¹ SEO - abbreviation of: Search Engine Optimization

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or artistic ambitions). The creator adapts the advertising communication to the customer (or to the potential recipient). To a large extent, the creator is limited by taste or purpose of the contractor who can also greatly affect the final outcome. Finally, the author of the advertisement has to incorporate into the advertising communication the particular product or service in order to highlight its qualities. If aesthetic criteria are preferred at the expense of actual information about the company, product or brand, there may be misunderstandings with regards to the communication with the recipient and as a consequence, it makes the advertisement ineffective. The creator of the message (either author or the group of artists) must find a symbiosis between information and advertising aesthetic component. Banyar also highlights the importance of traditions in the creation of the message. Tradition can be used as a source of inspiration for the author and, on the other hand, it assists in the process of decoding and in the interpretation of messages [10].

From this information, it can be deduced that the informational aspect in this case is in direct relation with the creative aspect. The creative component is used to provide notice to the user – together with graphics and the design component. These aspects act on the recipient at the same value scale as the aforementioned information aspect. The social aspect of the psychology of advertising communication is described by T. Deptova [11]. In order to approach the selected target audience, the author uses advertising information and the respective communication method. It may be associated with the choice of vocabulary (which the recipient understands and is familiar with), environment (which the recipient knows), or with the communicative situation and advertising ideas (those which impress the recipient). This is a form of simulation of private communication that is supported by elements of the corporate identity of the company. This form of communication is also supported by the choice of color, font, actors, music, and other factors pertaining to the selected target audience. Thus, even in advertising communication products penetrate into the vocabulary, which sometimes crosses the border between literary language and slang, or it moves the axis of the colloquial style of language, which is closer to the chosen market segment, is understandable and easily decodable. The advertising information (consistent with the familiar model AIDA² or ADAM³) should attract the attention of the target audience if the message that is sent is to be accepted and correctly decoded by the target audience, e.g., words, phrases or sentences of particular importance, the choice of font type and size, image, color, plot and various forms of processing of audiovisual advertising. In many cases, however, we are faced with assembling and linking of these elements – as a result, there is an ambiguity in marketing communication. *On the contrary*, Rankov [12] refers to the fact

² AIDA - abbreviation of: attention, interest, desire or decision, action

³ ADAM - abbreviation of: attention, desire or decision, action, memory

that from the perspective of advertising communication (where on the one hand, there is often a professional institution involved in the production of advertising campaigns – advertising agency, or a specialized person and, on the other hand, there is a recipient, i.e., a potential customer), advertising is a highly professional (i.e. institutionalized) method of communication.

In general, it can be stated that the creative industries can be creative only to the extent that the customer or the receiver of the message is capable to face. With regards to the field of copywriting, there are developing strategies and recommendations for those who implement such type of communication and typical features for different categories of the offered reports and information content. The collective awareness of the problem, however, is often more intuitive or it is oriented to popular science. The scientific part of this process is not given much attention in Slovakia. In the process of the creation of texts for web, the interactions lie at the level of the originator (the originator is represented not only by the person of initiator but also by the executor), the message, the medium (by which the message is distributed) and the actual recipient (target audience). The interconnection of these components is inseparable, but the distribution of the individual components and the subsequent synthesis of generating characteristics help make the ongoing communication successful.

A more detailed insight into the issue of copywriting can be provided by its specification. One of the best-known Czech copywriters M. Prokop divides copywriting into four basic types according to the purpose of advertising: the first type is represented by direct sales of goods and services, the second type is concerned with generating interest and demand; the third type is associated with building awareness of goods and services, and finally, the fourth type is represented by corporate brand building [6]. The most extensive information contents are used in direct sales where a text should contain large amounts of information, and also specific technical details, examples of uses, independent assessments of other users or experts, answers to frequently asked questions, etc. In order to create interest and demand in concordance with the AIDA and ADAM models (both are discussed above), those who carry out the advertisement communication attempt to attract the attention of recipients (e.g., with different creative elements, the original text, etc.). The building of awareness of goods and services is applied in situations in which the goods cannot be sold at distance. In these cases, the general awareness of the product and service is reinforced. On the basis of this, a prospect can get interested in the product, and the product or service can be bought in retail. In these three cases, the language may vary to a significant degree – it ranges from a highly cultivated literary language through language containing a number of professional, technical terms taken over from English to specific language of particular community which is full of neologisms and slang words. In order to attract interest and demand in the product or in the company,

the main priority is attracting the public attention. This process is usually implemented through interactive presentations, mobile ads (such as flashes, banners), attractive images that are almost always accompanied by texts, which are often short and concise, but also through texts that are shocking and inducing emotions (with suitably chosen words).

3. Methodology

With regards to the scope of copywriting, we will focus on a very specific area, namely on the presentation of companies on their websites.

We carried out the qualitative research, one of whose aims was partially to draw attention to the evaluation of the submitted information content to the public. Thirty-eight students of library and information studies (master's degree) were involved in this research in the academic year 2013/2014. They accounted for potential recipients of promotional communication products. Before the start of the process of qualitative research, the students had been familiarized with the specific features of copywriting texts which the advertiser should fulfill. One of their tasks was the observation and analysis - with the aim to determine whether the submitted copywriting texts of individual companies and their webpages met the appropriate features. Another aim was to determine how the webpages with copywriting texts appealed to them (this factor was investigated through an anonymous survey with open-type responses). This research method was evaluated as the most appropriate for the purposes of the research. Each student analyzed two websites of companies or organizations that were represented in two categories. Students completed the questionnaire according to the established criteria at the value scale - in the value from one to five + in each category had also open-type responses (into formal and content aspect). The formal content covers subcategories (colorfulness, creative component, readability, font size, structure). The content aspect covers subcategories (such as persuasive power of presented information, creative component, without orthography errors and mistakes, ability to capture and hold recipient attention).

The research sample consisted of copywriting webpage texts of companies and organizations that promote themselves, their services and products on the Internet. The selection of the research sample was conducted with regards to the relevance to the selected category. In general, it can be stated that the analysis focused on company websites with the orientation on a wide range of products, services. The focus was also placed on the websites of a non-profit sector. There were included companies whose main activity involved the presentation of mobile operators, insurance companies, consultation and finance companies, car producers, software products, electronics, food products (that included, e.g., mineral water, food vitamin supplements), voluntary organizations, companies focusing on cosmetic products, fashion

clothes, sports clubs, and accommodation facilities. The websites were divided into two categories. The first category consisted of websites companies/organizations based in Slovakia, particularly with a regional scope. The main activity of the aforementioned companies and organizations focused primarily on the domestic market. Generally, their webpages were not much segmented and were primarily aimed at a narrower area of products/services. The second category consisted of websites of larger, international companies, firms or organizations whose main activities focus on the foreign market, but they also operate in Slovakia. Their webpages were mostly quite segmented and contained a large amount of information.

The study analyzes and discusses 190 sub-pages/webpages of smaller companies and 190 sub-pages/webpages of larger companies. It also compares various ways of presenting information to the user and points out the differences which are present in copywriting texts of this type. The study also presents mutual interlink between creative aspect and other phenomena of copywriting texts (such as the information environment, the process of adaptation of the text to the terms set by SEO, adaptation to the target audience). The informational aspect is a natural part of these texts as well.

Each analysis includes home page and four other sub-pages/webpages of a company. We chose only subpages that contain at least 200 words on a given webpage/subpage. In both analytic procedures, this included the analysis of the content of 38 websites (a set of pages).

4. Results

The students evaluated the copywriting texts verbally.

On the basis of their description, texts were subsequently classified into three levels. The first category, evaluated as the category of the lowest quality, consists of texts of poor quality, with many mistakes. Furthermore, the texts were not properly organized and they were not adapted to readers and were written in an elaborate style, etc.

The second category consists of texts of an average standard. Within this category, the texts were adapted to customers, but they also obtained errors that impeded proper recipients' understanding. Moreover, the texts did not seem to be sufficiently organized, there was a problem with the orientation on a page, etc.

The last category consists of texts on a professional level which were positively evaluated by recipients with regards to their content and formal aspects.

We noticed a significant difference between the level of copywriting texts of smaller companies and of larger companies. The results can be seen in the graph (Fig. 1):

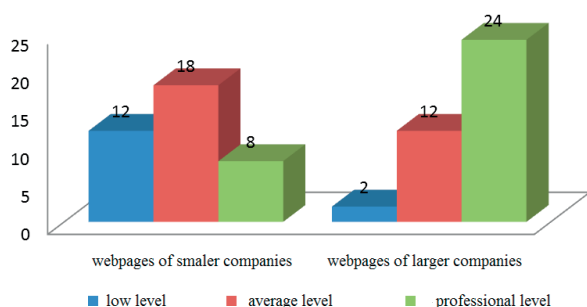


Fig. 1 Levels of copywriting texts based on respondents' evaluation

The graph shows significant differences in respondents' evaluation of webpages (copywriting texts, information content, visual impression) between smaller and larger companies. With smaller companies, we recorded a high number of evaluations at a low level - 12 (32%) compared to larger companies where only 2 (5%) of respondents rated the level of the analyzed site as low. The average level was achieved in most of smaller companies' webpages - 18 (47%) and a high, professional level with a positive response from the respondents amounted to only 8 (21%) of webpages. In comparison with these results, 24 (63%) of respondents rated the level of webpages of larger companies as very high and positive, and 12 (32%) of respondents assigned them the average level.

Students, being representatives of ordinary recipients or of potential customers reported an improper processing of information content with regards to the formal and content aspect as the most common reasons related to the reduction of the level of the webpage. In some cases, the information content was not adapted to the recipient (with regards to formulation, to the length of sentences or poorly chosen font and font size which caused problems with the readability of texts). Respondents positively evaluated those cases in which the information content was properly adapted to the offered product or service. They also positively evaluated cases in which the information was given clearly, convincingly and creatively. The creative component was seen as a major positive which enabled to distinguish particular company from other companies and enabled to catch the attention of respondents. The creative component did not include only the information content, but it also included the graphic design and the use of interactive elements. The visual impact was rated as equally important element as the information contents. From the obtained responses, we observed perception of respondents' appellative components. Information and rational appeals were used and they depended on the nature of the offered products and services. Together with emotional appeals which were seen as added values, they created a whole with a synergistic effect (when appeals were appropriately used). This issue is *highlighted* by Vopalenska who underlines the fact that emotions themselves remain in memory for a longer period of time than arguments.

Thus, if we intend to anchor certain information, we should use tools that evoke emotions.

The main role of appeals is to influence opinions, attitudes and values. As a consequence, the brand, product, service or procedure can become the object of recipient's attention, interest, desire or action. Furthermore, the result of this action will be fixed in his/her mind [13].

In the analyzed type of information content and information environment (more specifically, that of copywriting texts and of webpages where these texts are located), it is essential to take into account research and studies conducted in the area of information behavior of ICT users.

In addition to the above mentioned aspects, it is context that plays an important role in the process of searching and processing of the information. Context is generally considered to be not only specific discipline or area of activity - it also stands for the type of solving social and organizational framework, status and function of a person in a team or organization, time, project finance, resource availability, interdisciplinarity theme, etc. Context can be divided into external (it includes social and cultural aspects of information behavior) and internal (it includes sensorimotor, cognitive, affective component of information behavior) [14]. These individual components contribute to better understanding of user's information behavior.

5. Conclusion

In the field of advertising communication, the interconnection between information and creative industries can be observed. A proper adaptation of particular components increases the effectiveness of communication. The aspects of informational interaction and creative aspects of social perception are irreplaceable, as the recipient is a human. A person interacting with the environment that surrounds them is the subject of many scientific studies. The acquired knowledge will be applied in many areas due to its considerable interdisciplinary character. Message, as a part of information and creative industries can have a variety of forms. In this paper, we focused on copywriting texts in the online environment. Their perception depends on selected content and form and on the particular focus of interest of a recipient in the given area as well.

The qualitative research suggests differences in the quality of submitted webpages of smaller and larger companies towards the public. As it is assumed, the level of form and content of larger companies is directly proportional to the amount of money and professional activity involved in the production. Overall, the respondents identified the following as the most serious shortcomings: unprocessed information contents (a number of errors or a lack of clarity) together with optical - visual shortcomings.

The specificity of copywriting texts enhances their advertising message. Their attraction and creativity are often reduced due to a number of errors of different nature. It is the consistency of the content and of the form that plays an important role in the success of commercial texts.

The relevance of our scientific study lies in the fact that it highlights the individual aspects that affect copywriting. These are grounded in the information interaction and in the advancement of knowledge in the area that deserves scientific attention.

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SELECTED ASPECTS OF ANALYSES OF FAILURE RATES OF ACTIVE SAFETY SYSTEMS IN BUSES

The article outlines the methodology of statistical analysis of failure rate of active safety systems in buses. The theoretical discussion is illustrated with calculations carried out on the basis of empirical data covering a four-year period of operation of selected models of buses at the Motor Transport Company „Wschod“ plc in Lublin (Poland). It was found that the distribution of distances travelled by the analyzed vehicles between successive repairs can be approximated by an exponential distribution.

Keywords: Motor transport, failure rate, active safety systems.

1. Introduction

Buses, as means of motor transport which use public roads and are intended for transporting people, must meet stringent technical requirements specified by the relevant legal provisions. These regulations set out, among others, the requirements for the equipment of such vehicles and their systems designed to ensure safety (active and passive) of passengers and other road users (In Poland, these issues are governed by regulations of the Minister of Transport and Maritime Economy [1].) The concept of the car's active safety represents all activities the purpose of which is to reduce to a minimum the likelihood of a collision or accident while driving [2]. This concept also includes mechanisms and devices enabling the driver to actively counteract and prevent the occurrence of a traffic collision involving the vehicle he or she is driving. In addition to the skills, experience and the psychophysical state of the driver, a key factor deciding the level of active safety is the technical condition of the vehicle [3]. The efficiency of a vehicle's safety systems should be maintained throughout its operating life, under all weather conditions and in all traffic situations.

Basically, active safety of the car is affected by the technical condition of all structural systems that make up its structure: powertrain, chassis, steering, braking system, electrical system, suspension, etc. However, from the point of view of the essential purpose of a system, the so-called automotive active safety systems primarily include the braking, steering and suspension systems [4] and [5]. The braking system dissipates excess mechanical energy obtained by the vehicle as a result of acceleration or climbing

a hill. The steering system, in addition to its primary function of allowing the driver to change the path of travel, must enable safe execution of these manoeuvres also at high speeds. The suspension system, in addition to improving the comfort of the driver and passengers, is also responsible for safe manoeuvring. Any defects of component parts of the systems listed above result in dispatching the vehicle for repair. This article discusses selected aspects of analyses of the failure rate of active safety systems in buses. The discussion is illustrated with calculations carried out for selected makes of buses operated in the years 2008–2012 at the Motor Transport Company “Wschod” plc. (PKS “Wschod”) based in Lublin (Poland).

2. Characteristics of common failures of active safety systems in buses

A bus is a motor vehicle used for the transport of persons which has a seating capacity of at least 10 (including the driver's seat). In addition to seats, buses (especially public buses) may also offer standing room for passengers. The seating and standing capacity is strictly defined for each bus type produced and it must not be exceeded for safety reasons. The total seating and standing capacity is limited by the vehicle's gross mass and its dimensions [6]. Contemporarily manufactured buses are divided according to their gross mass and dimensions into vans, minibuses, midibuses, maxibuses and megabuses. An estimated relationship between the class of a bus and the maximum number of passengers it can carry is shown in Table 1.

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Number of passengers on buses of particular classes [7] Table 1

Class of buses	Number of passengers [-]	Gross vehicle mass [t]	Bus length [m]
MICRO	9-16	below 3.5	below 6
MINI	17-49	6-9	6-8
MIDI	up to 75	12-15	9-10
MAXI	up to 120	16-19	11-12
MEGA	above 120	24-28	13-18

Types of failures occurring in active safety systems of buses (braking, steering and suspension systems) depend both on the design solutions applied, as well as the operating conditions of those vehicles (state of road infrastructure, traffic, number of stops on the route, etc.). General analyses show that in braking systems, wear affects friction elements (pads, discs, shoes and brake drums) as well as actuators and safety valves. Also registered are failures of wear sensors of friction elements as well as components of electronic circuits of anti-lock systems and power booster systems [8]. Steering systems of buses are prone to failures of kinematic pairs in the connections of lever elements (rods and the steering column) as well as components of power steering systems. The suspension systems and the chassis are mainly affected by wear to shock-absorbing elements as well as kinematic pairs of lever elements, which operate under friction. Due to the large gross vehicle mass and the need for frequent stopping at bus stops, wear of friction elements in braking systems should be the dominant type of wear in public transport buses operating in cities and districts.

3. Outline of research methodology

Failure rate is a physical parameter used in the theory of reliability, where it is defined as the number of object (system) failures per unit of time. Failure rate is a function of operating time. Its value is estimated by calculating the ratio of the number of failures occurring during a time interval to the length of this interval. In the case of failure rates of automotive components and assemblies, operating time can be expressed in two ways. It can either be measured in calendar units (number of days, months, years, etc.) or mileage, i.e. the number of kilometres travelled by the vehicle as registered by the odometer installed in it as standard equipment. This is so because the theory of reliability uses the concept of "generalized time".

The basic (empirically confirmed) qualitative model of changes in the failure rate of a population of engineering objects as a function of operating time is the so-called "bathtub" curve [9]. This curve consists of three periods: an initial decrease in failure rate associated with the break-in of components followed by a period of constant failure rate during the object's useful life, and concluding with a wear-out period with increasing failure rate. The lengths of these periods and failure rates recorded at

particular moments in time depend on the types of objects or systems studied and the conditions in which they are used.

It is difficult, for economic and organizational reasons, to collect information about car failures occurring at longer time intervals. In principle, it is impossible to collect a sufficient number of data to perform statistical analyses using the planned experiment method. This is because such analyses require homogeneous populations of large numbers of objects. A practicable solution is to use databases created by large economic entities that deal with automotive diagnostics or have inspection stations designed for servicing their own fleets of vehicles [10].

In the case of inspection stations that provide services exclusively to external clients, it is impossible to monitor the performance of the vehicles diagnosed and repaired at the station over time (except when the diagnostic specialist has regular customers). Research material obtained from such entities is very comprehensive, yet very incomplete. The situation is different when an inspection station belongs to a transportation company and chiefly provides diagnostic services to its own fleet of vehicles. The information collected in maintenance databases of such companies is more accurate, though it usually covers a smaller number of diagnosed objects.

In Polish conditions, reliable bus failure data can be obtained from major passenger transport companies such as urban transport operators or road transport companies. However, each company records these data in an individual manner, tailored to their own needs. The differences are often so significant that it is impossible to compare the results of reliability analyses of transport systems of different companies with similar business activities. From the point of view of the methodology of failure rate research, it is also important that data collected by companies typically relate to repairs and can therefore cover cases of preventive replacement of non-failed components and delays of some repairs (when the failure is not detected at the time of occurrence). These types of events give the impression of accumulation of failures. However, considering the fact that the issues discussed here concern the safety of many people and as such are subject to sanctions for non-compliance, it can be assumed that repairs of failures of bus active safety systems are carried out immediately after they have occurred. Thus, the failure rates of the components of such systems can be estimated on the basis of the length of time intervals between consecutive repairs. In the present article, this parameter is referred to as *distance between repairs*.

The lengths of the time intervals between consecutive repairs of the failures of a test bus are characterized by random variation with an unknown probability distribution. This distribution can be identified using statistical tests which assess the goodness of fit of the empirical distribution to typical theoretical probability distributions and allow one to choose the best among them. The procedure for testing the goodness of fit of a given empirical distribution of distance between repairs of safety systems of

an urban or an intercity public transport bus should start from checking its fit to the normal distribution. A normal distribution can be a mathematical model of the variation in distance between repairs when failures are varied and there is no noticeable dominant factor.

Currently, the most powerful statistical test for testing goodness of fit to the normal distribution is the Shapiro-Wilk test. If the hypothesis of goodness of fit to the normal distribution is rejected, the empirical distribution should be tested for goodness of fit to an exponential distribution. The Chi-Square (χ^2) or the Kolmogorov goodness of fit tests can be used for this purpose [11]. An exponential distribution is justifiably used when the failures have the character of a breakdown, i.e. when they appear as a result of the action of external causes which occur randomly and at a constant rate. In the case of a breakdown of bus active safety systems, this would entail the existence of a dominant type of failure. Rejection of the hypothesis of the goodness of fit of the empirical distribution to normal and exponential distributions paves the way for further comparisons with theoretical distributions, in which failure rate is not a constant function. In such cases, empirical data should be compared with selected probability distributions of the gamma distribution family.

4. Sample analyses of the distributions of distance between successive repairs

To illustrate the problem discussed, a statistical analysis of failure rates of safety system components was carried out for selected buses operated by the Motor Transport Company

“Wschod” plc. (PKS “Wschod”). PKS “Wschod” was established by consolidation of five state-owned enterprises in accordance with the decree of the governor of Lublin of 28 December 2006. It included motor transport companies with offices in five cities of the province of Lublin: Hrubieszow, Tomaszow Lubelski, Krasnystaw, Wlodawa and Lublin. The services provided by PKS “Wschod” include, among others, coach hire, maintenance and repair of motor vehicles and roadside assistance. Its major domain of activity is transport of passengers between districts (at distances of 50–60 km) and the provision of intercity and international bus services.

Data on bus failures were kindly provided by the company’s management. For the purposes of the test, we analyzed failures of three Scania Irizar CENTURY buses operated in the Lublin branch in the period from July 2008 to October 2012. Scania Irizar CENTURY is a maxi class coach with a length of 12 meters, gross vehicle weight of 18 tonnes, and a seating capacity of 51. During the period discussed the buses ran on intercity lines. Table 2 shows identification data for the individual vehicles.

In the analyzed period, the buses travelled distances of 400,000 km (Table 2), which means that they were operated with a similar intensity. In all cases, similar numbers of repairs were recorded, resulting in similar mean failure rates for each bus. Years of manufacture of the buses and odometer readings for July 2008 show that the period for which the failure data were collected does not include mechanical run-in of the vehicles.

Table 3 shows basic descriptive statistics related to the distance between repairs of faults in the safety systems of the analyzed buses. In the cases considered, the empirical coefficient of variation (standard deviation of the sample divided by the arithmetic mean) oscillates around the value of 1.

Basic data on the Scania Irizar CENTURY buses (data obtained from: PKS “Wschod” plc.)

Table 2

Buses	Year of manufacture	Odometer reading July 2008 [km]	Odometer reading October 2012 [km]	Bus’s mileage [km]	Documented number of repairs [-]
Bus I	2001	765928	1152895	386967	20
Bus II	2002	725220	1154467	429247	18
Bus III	2005	384422	842441	458019	19

Descriptive statistics for the distance between successive repairs of safety system faults in Scania Irizar CENTURY coaches operated by PKS “Wschod” plc. in Lublin from July 2008 to October 2012 (Source: Authors’ compilation of maintenance data provided by PKS “Wschod”)

Table 3

Buses	Number of repairs [-]	Mean value [km]	Minimum value [km]	Maximum value [km]	Standard deviation [km]
Bus I	20	19348	600	49092	16497
Bus II	18	23847	1450	110470	26338
Bus III	19	24106	1528	84483	20140
Buses I-III	57	22355	600	110470	20935

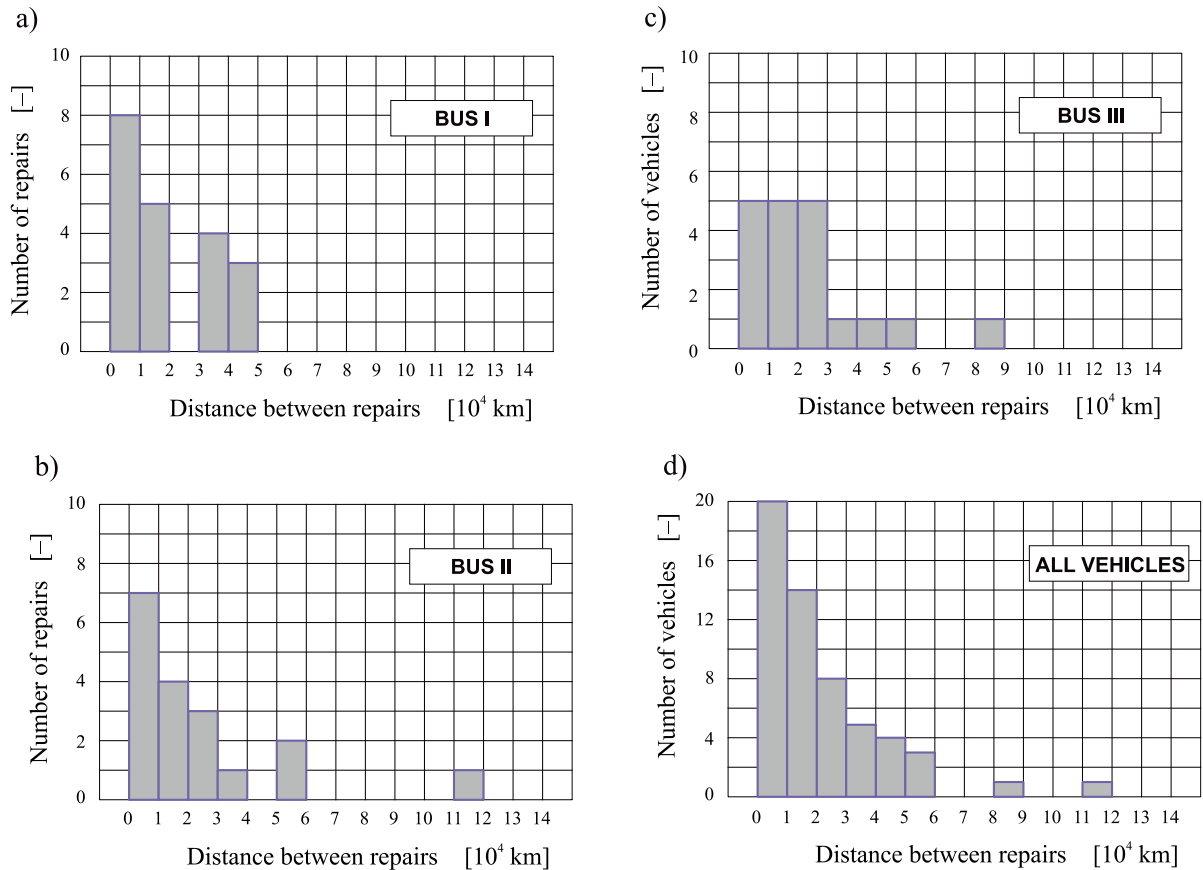


Fig. 1 Histograms of empirical distributions of distances between repairs of safety systems of Scania Irizar CENTURY buses operated by PKS “Wschod” plc. in Lublin in the period from July 2008 to October 2012; a) bus I, b) bus II, c) bus III, d) buses I-III (Source: Authors’ compilation of maintenance data provided by PKS “Wschod”)

Figure 1 shows histograms of empirical distributions of distances between repairs of safety systems of the analyzed buses. For easy comparison of sample sizes, the same widths of class intervals were used in all cases (both for the individual buses and the three buses analyzed together).

According to the procedure described in section 3 of this article, tests were carried out for goodness of fit of empirical distributions to the normal distribution. The results of the Shapiro-Wilk test are shown in Table 4. They unequivocally show that at the level of significance $\alpha = 0.05$, the hypotheses of

The results of the Shapiro-Wilk test for goodness of fit to the normal distribution of empirical distributions of distance between repairs of Scania Irizar CENTURY buses operated by PKS “Wschod” in the period from July 2008 to October 2012

(Source: Authors’ compilation of maintenance data provided by PKS “Wschod”)

Table 4

Buses	Sample size N [-]	Level of significance α [-]	Value of Shapiro-Wilk statistic [-]	p-value [-]	Goodness of fit to the normal distribution
Bus I	20	0.05	0.877	0.016	NO
Bus II	18	0.05	0.740	0.000	NO
Bus III	19	0.05	0.825	0.003	NO
Buses I-III	57	0.05	0.827	0.000	NO

The results of the χ^2 test for goodness of fit to the exponential distribution of empirical distributions of distance between repairs of Scania Irizar CENTURY buses operated by PKS "Wschod" in the period from July 2008 to October 2012 (Source: Authors' compilation of maintenance data provided by PKS "Wschod")

Table 5

Buses	Sample size N [-]	Scale parameter λ [10^{-4} km^{-1}]	Level of significance α [-]	Value of χ^2 statistic [-]	p -value [-]	Goodness of fit to the exponential distribution
Bus I	20	0.517	005	0.733	0.392	YES
Bus II	18	0.419	005	0.368	0.544	YES
Bus III	19	0.415	005	1.933	0.164	YES
Buses I-III	57	0.447	005	0.192	0.979	YES

goodness of fit of distributions of the distance between repairs of the buses to the normal distribution must be rejected in all cases considered.

Considering the fact that the analyzed bus failure data did not include data from the break-in period, the empirical distributions of distance between repairs were tested for goodness of fit to the exponential distribution. Pearson's χ^2 goodness of fit test was used to compare empirical distribution functions with exponential distribution functions whose location parameters were zero and scale parameters λ were the reciprocals of respective arithmetic means of the sample. The results of the tests are shown in Table 5.

Results of the χ^2 test show that at the level of significance $\alpha=0.05$ there is no reason to reject the null hypothesis of goodness of fit of empirical distributions to exponential distributions with the respective scale parameters: 0.517, 0.419, 0.415, 0.447 (10^{-4} km^{-1}). Because the analyzed results were obtained for the same model of Scania Irizar buses, it can be assumed that in reality the parameters λ had the same value. To test this hypothesis, a comparison of the empirical distributions of intervals between successive repairs of buses I, II and III was made using the Kruskal-Wallis test. The calculated value of the test statistic 0.845 corresponds to a p -value of 0.655. This indicates that, at the adopted level of significance $\alpha=0.05$, the hypothesis that the tested empirical distributions of intervals between successive repairs of buses I, II and III come from the same general population cannot be rejected.

5. Conclusions

The considerations presented above have a preliminary character. Still, they indicate the direction of further research on

failure rates in bus active safety systems. Because the statistical analysis of data from a typical population has shown that exponential distribution can be used to describe the random nature of the distance between successive repairs of safety system failures, future studies should undertake to verify this result. For this purpose, the registered failures should be divided into classes. Also a larger number of buses operating in specific transport systems should be included in the studies and more advanced statistical analyses should be carried out.

The problem of determining the distribution of failures occurring during the operation of a means of transport (which is a subject of interest to the theory of reliability) is closely related to issues of economic efficiency of the operation of transportation systems. An analysis of probability distributions of costs of repairs is carried out in an analogous manner. The financial outlays for maintenance and repair of means of transport are an important parameter in transportation systems [12] and [13]. An analysis of the costs of repairs is a basis for taking decision regarding the disposal of a means of transport, acquisition of a new one, fixing the shipping fee, route assignment, etc. The costs of repairs and maintenance are the basic parameters in stochastic models in operations research, which describe the operating efficiency of transportation systems. Developing such a model dedicated to the assessment of the economic efficiency of public transport systems is the main objective of further research conducted by the Authors of the present article.

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LOGO CREATION ALGORITHM

This article is dedicated to corporate design and its impact on online users. It contains definitions of basic concepts and terms of corporate identity. Particular attention is then paid to corporate design and its features – name of the company, slogan, logo, corporate colors, typography, mascot and signature tune. In the main part of article we present the algorithm which should help small and starting online companies to create their own logo without help of professional designers.

Keywords: Logo, corporate identity, logo creation algorithm.

1. Introduction

Every day, we come across hundreds of different signs of companies' activities. It is not only products that meet customer needs. Companies have to differentiate and identify themselves. Even bakeries use specific signs on the breads to ensure customers that they will get the quality and the taste they have expected. Sum of all the phenomena that distinguish the company from its competitors is called *corporate identity*. According to the most widely used definition, we can identify three parts of corporate identity [1]:

- corporate behavior,
- corporate communication,
- corporate design.

Some authors present the fourth part of corporate identity – *corporate product* [2]. Although product is one of the core stones of the marketing, we also consider it as a part of corporate identity. There are dozens of examples that prove that corporate product should be considered as a part of corporate identity. Therefore we decided to use the definition of corporate identity that consists of four parts and besides corporate culture, corporate communication, and corporate design it contains corporate product as well.

2. Corporate behavior

Corporate behavior is better known as organizational culture. Employees of the company form it and it consists of the values and norms that they share. It also contains standards of the behavior. How the doorman greets you, how the secretary answers your phone, all of this is considered as a part of *corporate culture*

[3]. Basically we can define two types of corporate culture – strong and weak one. Company with a *strong culture* has better position on the market because employees believe in the values of the company and are willing to follow its mission and vision. Company with *weak corporate culture* has problems to keep the alignment with organizational values. In such cases employees are not dedicated to the company and control must be secured with red tape.

3. Corporate communication

Corporate communication is the set of tools and methods used by company. It enables smooth flow of information. Communication can be internal or external. Both types of communication are crucial for successful operation of the company. Without effective communication there is lack of understanding between different stakeholders. Employees do not know and do not understand where the company is heading, managers do not know where the plugs in production are; customers do not know what the company is offering. Therefore corporate communication cannot be neglected.

Internal communication refers to communication within the company. There are three possible directions of information flow: Up, down or horizontal. First type directs information from lower levels of the organizational structure upward. Second type directs information flow opposite way, from the top to the bottom of the organizational structure. Last type, horizontal communication enables fellow workers on the same organizational level to share their knowledge and experiences.

External communication refers to communication outside the company. It includes communication with investors, government, institutions (such as insurance company), suppliers,

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intermediaries, public and customers. Therefore, for example, marketing communication is considered as a part of external communication. The same is with public relation [4].

4. Corporate product

Product is anything that can be offered to the market to satisfy customer's needs and wants. It can be tangible or intangible. Therefore service such as insurance is considered to be product as well. Corporate product is what customers are looking for. Therefore it is the best way how to prove that certain company is the best choice for them. Customers make their decision according to their individual expectations. If the product brings them higher value than they have expected, they are happy, and vice versa. We can define four levels of product:

- *generic product* - is the core product. It is the most basic form of the product. On this level products from different producers are generally the same. Customers expect more than just generic product;
- *expected product* - consists of the core product and other features, which together satisfy customers expectations. In other words, expected product is what customers buy to fulfill their needs and wants;
- *augmented product* - consists of the expected product and extra features, which overcome customer expectations. This is the level that enables companies to differentiate the product by offering something extra. Today, expected product is enough level for differentiation. Customers actually look for additional benefits;
- *potential product* - represents all possible extensions which can be offered to customers. Augmented product consists of real and working attributes while potential product is the promise to the future [5].

Customers perceive product levels differently. What is an expected product for one person is an augmented product for another. The bigger customer expectations, the more difficult for the company to meet them.

5. Corporate design

Corporate design consists of all elements that create unified presentation of the company. It includes graphical, textual but also other elements [6]. We can define these:

- *name of the company* is a very important element of corporate design. It is also the name under which the company is registered in a trade or professional register.
- *slogan* - The Americans use the term tagline or tag, while in UK it is more often to say endlines or straplines. All the time it refers to few words or a sentence which complement company name. It can also be connected with a certain

product or commercial campaign. When the slogan is good, customers automatically connect it with the company.

- *color* is the visible spectrum of *electromagnetic radiation* with wavelengths around 400-700 nm. Just as this definition, the whole science around the use of colors as a part of corporate design is very extensive. Color is an excellent way how to differentiate company.
- *typography* - Word typography has its origin in Greek. It is a combination of two words: *typos* (τύπος) that means form and *graphe* (γραφή) that means writing. Therefore typography deals with the *form of writing*.
- *mascot* is used to create positive attitude towards the company.
- *signature tune* is not that widely used because not all companies need it. But when it is done in such a great way as Nokia did with its ringtone, it is heard about 20 000 times per second worldwide. And this makes significant contribution to differentiation of the company.
- *logo* is very often mistakenly confused with the trademark. However, we have to realize they are not synonyms. Logo is the graphic representation of the company name. It does not necessarily have to contain the name but it should refer to it. When it contains only a picture, it is called *pictogram*. When it contains only graphic transcription of the name, it is called *logotype*. Pictogram together with logotype creates *logo*.

6. Aim and methodology

Dozens of different corporate designs bombard us every day. We cannot avoid it. These designs carry hidden messages whether we see it or not. Our subconsciousness feels more than is visible with the naked eye. Colors, shapes and even fonts affect our perception of the logo as a part of corporate design.

We have many examples of good and also bad logos, of different colors, shapes and fonts. How they affect us and in what way they should be used. Of course every logo has to be tailor made according to the company. However, sometimes it is not done very well. Companies like Amazon or Martinus have the capital to hire professional designers or even announce contest for the best logo. But there are many small companies which have just started to do the business and cannot afford it. They have to create the logo on their own. Unfortunately they usually create the logo according to their preferences. If they like black color they simply use it no matter that they are running a toyshop. Wrong font can also cause misunderstanding of logo. And using wrong shape can cause real disaster.

However the **main goal of this article is to help small and starting companies to clarify basic principles how to create their logo**. Using our created methodology can help them to orient themselves in the process of logo creation. We hope that this logo creation algorithm will be helpful for commercial and also other purposes.

7. Results - logo creation algorithm

To make it even easier for companies, we created algorithm that includes different situations that may arise, how they can be resolved and what procedures should be followed.

We divided the algorithm into **six different parts** that are also differentiated by color. The most important is the beginning and the end of the algorithm, which are represented by *red ellipses*. Prerequisite for the algorithm application is the decision to create logo. When this decision is made, we can proceed to the process of logo creation.

First, we have to have the *company name*. This part of algorithm is differentiated by *grey color* (Fig. 1). If the company has its name, we can proceed to the second part. If not, the company name has to be created. This is especially true in the case of starting companies that are not running their businesses yet.

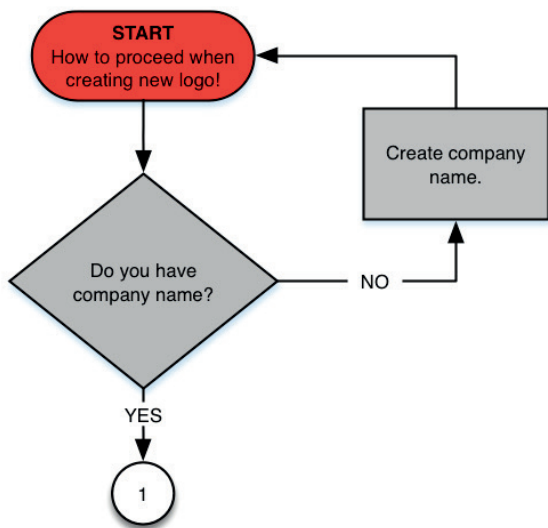


Fig. 1 Logo creation algorithm - first part
(Source: Authors)

Second part of algorithm is *green* (Fig. 2). It describes the process of *picture or symbol* implementation into the logo. At the beginning we have to identify the core business. If we can define such an area we have to find a picture that represents it. If there is no picture that represents the *core business*, we have to find the picture that represents *company name*. The same is also done in the case we cannot define core business. If there is no possibility to find a picture that is connected with the core business or company name, our last chance is to look for the motive in *mission or vision* of the company or anything else that is connected with the company. If none of this is possible, we should use the solution without picture - *logotype*. As we have already mentioned, logotype is type of logo where no picture or symbol

is used. It is the logo purely designed from the company name. But there are still great and significant logotypes that are engraved in minds of customers. Just think of Coca Cola or Google [7]. No need to implement picture. And still very well spoken. If we have identified some picture or symbol connected with the core business, company name or its mission or vision, we have to decide whether it is possible to implement it into the name. Sometimes there is opportunity to *replace one character* from the company name by the picture. This has to be considered very carefully and the picture has to fully replace the missing character. The name has to be easily readable after this change.

If there is no chance to replace the character by the picture or we decide not to use this opportunity, we have to find the best *place for the picture* next to the company name. Of course, in this part we are not limited and we can create more samples of logo. For example, with different picture placement. This part of algorithm is done when samples of logo or logotype are created.

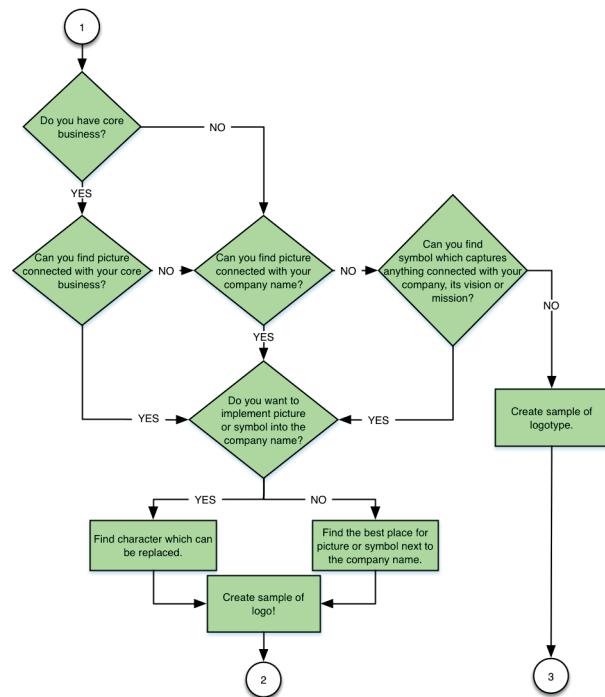


Fig. 2 Logo creation algorithm - second part
(Source: Authors)

Another part is differentiated by *orange* color and is dedicated to *fonts* (Fig. 3). Font is integral part of logo and corporate identity as well. Chosen font should be used not only as a part of the corporate design, but also as a part of overall identity - letterhead paper, newsletters and other documents as well. And, of course, we cannot omit websites. At the beginning of this part of algorithm we have to try different fonts and choose few that go well with our logo samples. The number of fonts does not limit us.

However the more fonts the longer it takes to analyze them. When we have chosen the right fonts we have to analyze them. First, we have to identify to which *group* they belong. Whether they are from geometric, humanist, old style, transitional, modern or slab serifs group. If we do not know to which group they belong we have to find out. After this is done we have to explore the *hidden meaning* of the fonts. Try to go deeper, associate font with your company. Each group contains dozens, even hundreds of different fonts and they carry their special message as well.

When we are done with hidden meaning analyzing, we should *eliminate* fonts that do not meet our requirements. Of course, if we are not satisfied with the results, we can go back at the beginning of this part of algorithm and try to use different fonts.

At the end of this part we should have samples of logo with chosen fonts. Of course, it does not have to be necessary one font. We can proceed with samples that contain different fonts and different pictures as well (or only different fonts in the case of logotype).

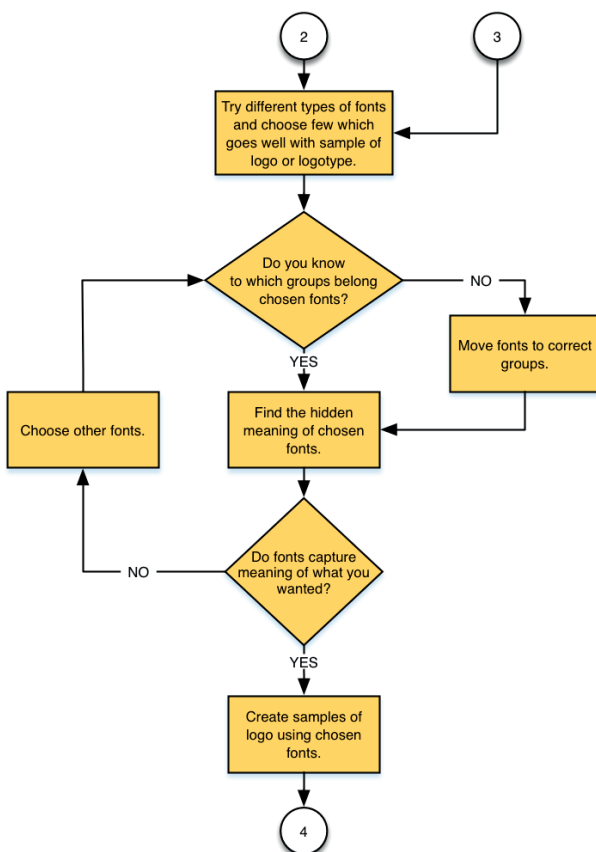


Fig. 3 Logo creation algorithm - third part
(Source: Authors)

Blue part of the algorithm is dedicated to *colors* (Fig. 4). Colors have significant impact on our subconsciousness. How strong? Well, think about the angry bull when it sees a red scarf.

Of course, this is an example from animal life, however red color has impact on human blood pressure as well. And other colors have impacts too, just in a different way [8]. Therefore, we have to think very carefully with which colors we connect our company. Process of colors selection is similar to font selection. At the beginning we have to try different *color combinations* on different logo samples. In every step of the algorithm we can eliminate the sample that just does not seem to be the right one. When we are done with choosing different colors, we have to reveal their *hidden meaning*.

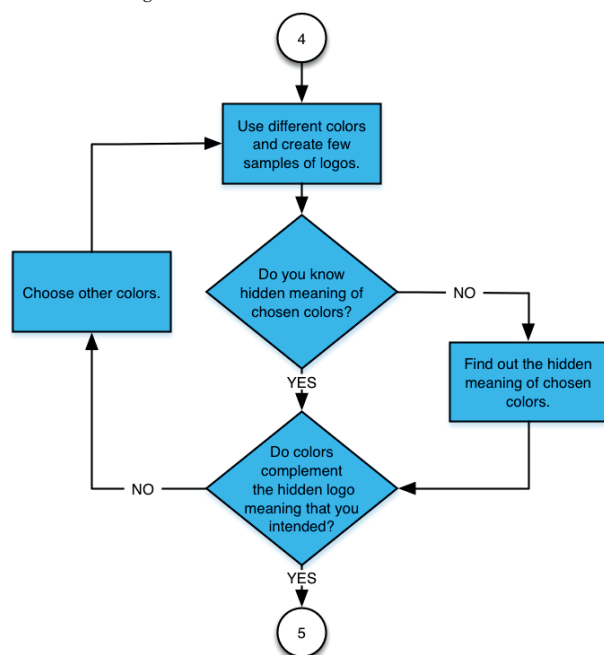


Fig. 4 Logo creation algorithm - fourth part
(Source: Author)

Once again, colors that do not complement the overall meaning of logo that we have intended should be eliminated. Only colors that go well with our samples of logo should proceed to the next part of algorithm.

Next part of algorithm is *sample testing* and it is differentiated by *violet color* (Fig. 5).

Our logo samples, which consist of company name, picture or symbol and chosen colors (in the case of logotype without pictures) have to be tested. So far we have done all the work. Now it is time to involve other people in this process as well. We should choose the samples that fulfill our requirement best. These *samples* should be introduced to our *potential customers*. In the business plan we have to identify who our potential customers should be, therefore, we know whom to ask. We can find them via social media or other online tools. If we know them directly we can even ask them personally. There are also different websites that are supported by *designers*. We can ask them about their *professional opinion* as well. There are no limitations in this part

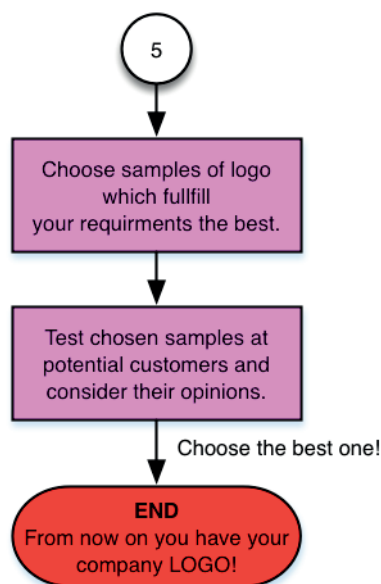


Fig. 5 Logo creation algorithm - fifth part
(Source: Authors)

of algorithm, we can try as many different ways as possible and gather all the different opinions and attitudes. By analyzing them we can decide which logo represents our company best. The one that is interpreted by customers the way we intended.

When all of this is done, we are at the *end of the algorithm* - red ellipse that signalizes that we have created our new logo!

8. Conclusions

Design and creation of the logo is a very important process. In this article we tried to compose the universal algorithm that will help small and medium companies with this problem. We hope that this proposed logo creation algorithm would be helpful for commercial and also other purposes.

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Job Advertisement for ERA Chair Holder Position

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- **Demonstrate critical judgment in the identification and execution of research activities;**
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- **Recognize the broader implications and applications of his/her research;**
- **Have a proven record in securing significant research funding / budgets / resources;**
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- **Tenure track with initial appointment for 4.5 years;**

-
- **Internationally competitive salary commensurate with the candidate's qualifications and experience in conformity with section 7a) of the Act No.553/2003 Coll.;**
 - **Budget for establishing ERA Chair Team (5 full-time and 5 part-time members);**
 - **Start-up package for instrumentation;**
 - **Consumables;**
 - **Office space for the ERA Chair research team;**
 - **Access to existing state-of-the-art research infrastructure;**
 - **Extra bonus package depending on negotiations.**

Applications should include Curriculum Vitae with a special focus on high-impact publications and research funding management, a statement of research interest, three professional references and motivation letter.

Applications should be sent by e-mail to erachair@uniza.sk or alternatively mailed to:

ERA Chair, University of Zilina; Univerzitna 8215/1, 010 26 Zilina, Slovakia.

Applications should be submitted by **31st August, 2014.**

Review of applications will commence immediately after the deadline. Short-listed candidates complying with the mentioned requirements will be invited to Zilina, Slovakia for an interview and public presentation within one month of the application deadline. The selected candidate is obliged to demonstrate his/her blamelessness before signing the employment contract with the University of Zilina. Expected start date of working in-situ is November 2014.

Information and updates regarding the ERA Chair Holder position are available at:

<http://www.erachair.uniza.sk/>

**COMMUNICATIONS – Scientific Letters of the University of Zilina
Writer's Guidelines**

1. Submitted papers must be unpublished and must not be currently under review for any other publication.
2. Submitted manuscripts should not exceed 8 pages including figures and graphs (in Microsoft WORD – format A4, Times Roman size 12, page margins 2.5 cm).
3. Manuscripts written in good English must include abstract and keywords also written in English. The abstract should not exceed 10 lines.
4. Submission should be sent: By e-mail – as an attachment – to one of the following addresses: komunikacie@uniza.sk or holesa@uniza.sk (or on CD to the following address: Zilinska univerzita, OVaV – Komunikacie, Univerzitna 1, SK-10 26 Zilina, Slovakia).
5. Uncommon abbreviations must be defined the first time they are used in the text.
6. Figures, graphs and diagrams, if not processed in Microsoft WORD, must be sent in electronic form (as JPG, GIF, TIF, TTF or BMP files) or drawn in high contrast on white paper. Photographs for publication must be either contrastive or on a slide.
7. The numbered reference citation within text should be enclosed in square brackets. The reference list should appear at the end of the article (in compliance with ISO 690).
8. The numbered references (in square brackets), figures, tables and graphs must be also included in text – in numerical order.
9. The author's exact mailing address, full names, E-mail address, telephone or fax number, the name and address of the organization and workplace (also written in English) must be enclosed.
10. The editorial board will assess the submitted paper in its following session. If the manuscript is accepted for publication, it will be sent to peer review and language correction. After reviewing and incorporating the editor's comments, the final draft (before printing) will be sent to authors for final review and minor adjustments
11. Submission deadlines are: September 30, December 31, March 31 and June 30.

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