DEPÓSITO LEGAL ZU2020000153
*Esta publicación científica en formato digital*
*es continuidad de la revista impresa*
**ISSN 0041-8811**
**E-ISSN 2665-0428**

# Revista de la Universidad del Zulia

**Fundada en 1947**
**por el Dr. Jesús Enrique Lossada**

# Ciencias de la Educación

**Año 12 N° 35**
**Noviembre - 2021**
**Tercera Época**
**Maracaibo-Venezuela**

**NÚMERO ESPECIAL**

DOI: http://dx.doi.org/10.46925//rdluz.35.09

# Cognitive-behavioral aspects in the effectiveness of foreign language training of students of a non-linguistic university

Larisa E. Deryagina*
Sergey N. Tikhomirov**
Igor B. Lebedev***
Darya V. Rusetskaya****
Yury V. Chumanov*****

ABSTRACT

The article analyzes the impact of the cognitive-behavioral characteristics of students from a non-linguistic university on the level of success in learning a foreign language. The purpose of this article is to identify the patterns of the cognitive-behavioral parameters of decision-making in the conditions of choosing between various alternative reactions and their relationship with the effectiveness of foreign language training of students from a non-linguistic university. To study behavior patterns, the method of parameterizing was used such as an important component of any activity, as decision-making by modeling situations under conditions of free, probabilistic and conditional choice. The study involved freshmen and sophomores from a medical university, who were studying foreign languages. The simulation of the follow-up of the stimulus presented revealed a low level of voluntary attention in the students with low performance, especially in a situation of imposed rhythm. Naturally, there is the hypothesis that in this group, their own cognitive style is dependent on environmental conditions, so this must be taken into account in the learning process. The results obtained indicate that the presence of universal differentiated cognitive-behavioral strategies are important in the case of successful / unsuccessful command of a foreign language.

KEY WORDS: behavior; cognitive activity; attitude; decision making; forecasting; voluntary attention.

*Professor of the Department of Psychology, Educational and Scientific Complex of Psychology of Service Activities, Moscow University of the Ministry of Internal Affairs of the Russian Federation named after V.Y. Kikot, Moscow, Russia, ORCID https://orcid.org/0000-0001-5522-5950. E-mail: lderyagina@mail.ru

**Candidate of Pedagogical Sciences, Professor of the Department of Pedagogy of the Educational and Scientific Complex of Psychology of Service Activities, Moscow University of the Ministry of Internal Affairs of the Russian Federation named after V.Y. Kikot, Moscow, Russia. ORCID https://orcid.org/0000-0001-8972-2808. E-mail: 5103720@gmail.com

***Professor of the Department of Psychology, Educational and Scientific Complex of Psychology of Service Activities, Moscow University of the Ministry of Internal Affairs of the Russian Federation named after V.Y. Kikot, Moscow, Russia. ORCID: https://orcid.org/0000-0002-8070-3843. E-mail: I_leb53@mail.ru

****Research associate of the educational and scientific complex of service psychology, Moscow University of the Ministry of Internal Affairs of the Russian Federation named after V.Y. Kikot, Moscow, Russia. ORCID: https://orcid.org/0000-0003-1256-1238. E-mail: dasha_rusik@mail.ru

*****Candidate of psychological Sciences, senior teacher-Methodist of faculty of training of scientific and pedagogical staff, Moscow University of the Ministry of Internal Affairs of the Russian Federation named after V.Y. Kikot, Moscow, Russia. ORCID: https://orcid.org/0000-0003-4705-4463. E-mail: yvc90@mail.ru

Recibido: 15/07/2021 Aceptado: 07/09/2021

DOI: http://dx.doi.org/10.46925//rdluz.35.09

# Aspectos cognitivo-conductuales de la eficacia de la formación en lenguas extranjeras de estudiantes de una universidad no lingüística

RESUMEN

El artículo analiza el impacto de las características cognitivo-conductuales de los estudiantes de una universidad no lingüística en el nivel de éxito en el aprendizaje de una lengua extranjera. El propósito de este artículo es identificar los patrones de los parámetros cognitivo-conductuales de la toma de decisiones en las condiciones de elegir entre varias reacciones alternativas y su relación con la efectividad de la formación en lenguas extranjeras de estudiantes de una universidad no lingüística. Para estudiar los patrones de comportamiento, utilizamos el método de parametrizar un componente tan importante de cualquier actividad como la toma de decisiones al modelar situaciones en condiciones de elección libre, probabilística y condicional. El estudio involucró a estudiantes de primer y segundo año de una universidad médica, que estudiaban idiomas extranjeros. La simulación del seguimiento de los estímulos presentados reveló un bajo nivel de atención voluntaria en los estudiantes con bajo rendimiento, especialmente en una situación de ritmo impuesto. Naturalmente, existe la hipótesis de que en este grupo, su propio estilo cognitivo es dependiente de las condiciones ambientales, por lo que esto debe tenerse en cuenta en el proceso de aprendizaje. Los resultados obtenidos indican que la presencia de estrategias cognitivo-conductuales diferenciadas universales son importantes en el caso de dominio exitoso / no exitoso de una lengua extranjera.

PALABRAS CLAVE: comportamiento; actividad cognitiva; actitud; toma de decisiones; previsión; atención voluntaria.

## Introduction

The question of the success of mastering a foreign language is extremely relevant in the context of the globalization of the modern world. Today, a modern promising specialist in a particular field is obliged to know a foreign language (Prokopenko 2014). One of the key points is to solve a fundamental dilemma: which is more important - the universality of learning processes or dependence on the characteristics of a particular language (Mizen 2019) Behavioral aspects of educational activity are determined by the motivational orientation of the subject of learning, in which it is possible to distinguish content (internal) and dynamic (external) components. Our research has shown (Khokhlova, Deryagina, 2009) that the harmonious ratio of these components determines the success of educational

DOI: http://dx.doi.org/10.46925//rdluz.35.09

activities, in particular, the acquisition of a foreign language. The behavioral construct of any activity is inextricably linked with cognitive processes, in which the attitude has an important regulatory function (Bakhmat, 2016). According to D.N. Uznadze, the setting is a dynamic, integral state of a person's readiness to act in a given direction (Uznadze, 2001). The attitude characterizes the needs of the subject and the ratio of informative features and all conscious and unconscious stimuli acting on him at the moment. A significant quality of cognitive activity is the phenomenon of "static - mobility" of the forming attitudes, their ability to inhibit and activate new ones, more adequate to the changed situation (Kostandov, 1995).

For the organization of this study, domestic and foreign scientific literature was analyzed. In particular, the scientific provisions of behaviorism and the activity approach are analyzed. The research is also based on the theory of Uznadze's attitude, the main provisions of neurobiology, the theory of decision-making, the provisions of communicative-pragmatic and cognitive approaches.

The purpose of this study was to identify patterns of cognitive-behavioral parameters of decision-making in the context of a choice of several alternative reactions and their relationship with the effectiveness of foreign language training of students of a non-linguistic university.

## 1. Methodology, subject and object of research

An instrumental technique for studying decision making, subject to a choice of several alternative reactions, developed according to the theory of functional systems by P.K. Anokhina (Matveev, Nadezhdin, 1996) on the device "Binatest" (Russia) is applied in the proposed study.

The authors of the methodology proposed three experimental models of activity:

- Free choice of generating reactions is a behavior that does not depend on the patterns of appearance of stimuli on the panel of the device.
- Probabilistic choice of generating responses is a behavior in which the subject is asked to predict the pattern of emerging stimuli.
- Conditional choice is a behavior in which the subject's responses must exactly match the proposed pattern of emerging stimuli.

DOI: http://dx.doi.org/10.46925//rdluz.35.09

The data obtained in the course of the study were subjected to statistical processing using the software package "Statistic for Windows", version 7.0. Assessment of the distribution of signs for normality according to the Shapiro-Wilk criteria was carried out for each of the studied parameters. Also, Student's t-test was used for the normal distribution of indicators and the equality of variances of the studied trait, the arithmetic mean and standard deviation were used for descriptive statistics. The critical level of significance (p) when testing statistical hypotheses in the study was taken as ≤ 0.05.

The subject of the research is the cognitive-behavioral construct of decision-making in the experimentally created environment of "choice-tracking" the pattern of emerging stimuli. The object of the research was chosen patterns of decision-making depending on the success of educational activities in the field of learning foreign languages. The study involved 1st and 2nd year students of a medical university (n = 400) aged 17 to 19 of both sexes, studying English, German and French. The study did not include students who graduated from schools with in-depth study of a foreign language. All subjects were informed of their consent to the survey. As a result of oral and written responses during the first month of study, students with excellent academic performance were divided into groups of high and low performing.

## 2. Results

The analysis of the obtained results was carried out on the basis of a patent for an invention (Deryagina, et al., 2001), in which the author's interpretation of the obtained results of instrumental testing is given. Of particular interest is the free choice mode, when the subject is given multiple opportunities to make an arbitrary choice, which depends only on the subjective decision-making mechanisms. Factor analysis by the method of principal components revealed two groups of factors that characterize the totality of testing parameters in conditions of free choice. The first group of factors included structural indicators (preference for choice, which determines 42.37% of the total variance, the second group consisted of dynamic (speed) parameters of 13.53%. Thus, the structure of the behavioral construct turned out to be decisive in the selection process under conditions of free activity.

Evaluation of the test results in the free choice mode showed two groups: 1) students preferring "single choice" (67% of low-performing students) and 2) students who prefer the behavior of "repeated N times in a row choice" (77% well-performing). The preference for "single choice" may indicate the need to constantly search for solutions in the course of any activity. The search for solutions, accordingly, assumes a certain time. The mean time between reactions showed a statistically significant difference ($p = 0.001$) between the studied groups (Fig. 1), especially at the beginning of the first year of study. The leveling of differences by the end of the second year indicates adaptive processes in the dynamics of learning activity.

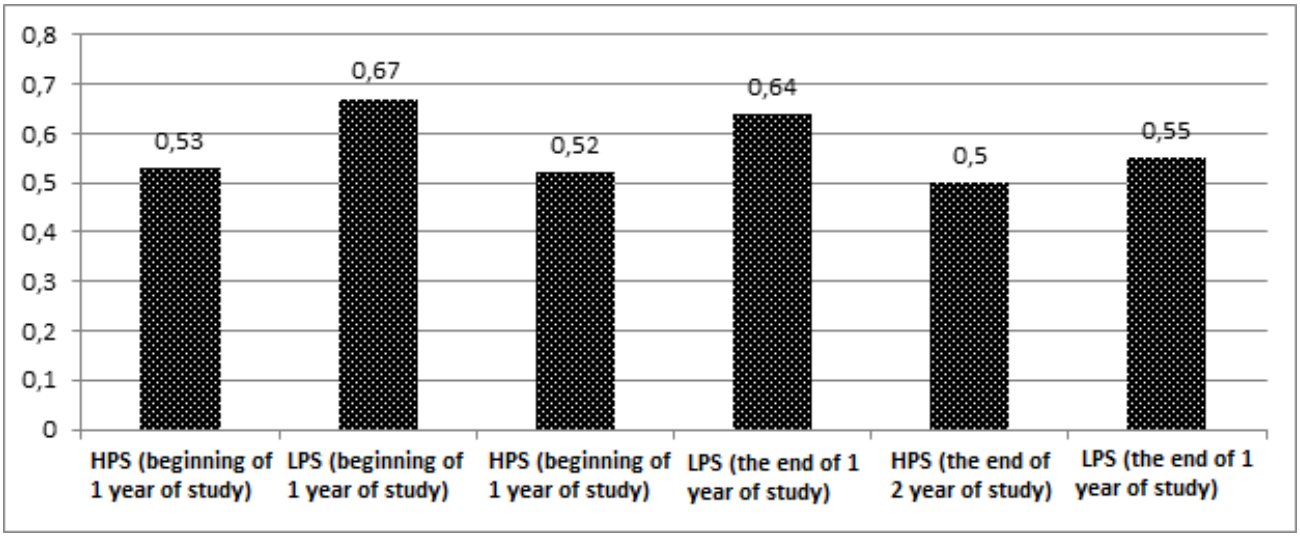


Fig. 1. Average time between reactions in the free choice mode (sec): HPS - high performing students, LPS- low-performing students.

The average time between reactions reflects the lability of the psychomotor reactions of the subject as a whole, while the differential indicators of the decision-making time during the repeated choice can be considered as the main components of the behavioral construct (Table 1): the average repeated choice time is the information component, the average reaction time is the motivational component, in particular search activity (Simonov, 1997). The level of the subject's awareness of the external environment (information component) correlates with environmental stimuli and determines the level of search activity (motivational component). Evaluation of differential indicators of decision-making time during repeated choice demonstrated a certain dominance (at the level of tendencies) of indicators of the information component among well-performing students, which, possibly,

determined more successful educational activities. Excessive indicators of search activity (motivational component) were observed in the group of low-performing students, which we regarded as an indicator of a high degree of uncertainty in the learning environment for this group of subjects.

Table 1. Free choice testing parameters(M ± SD)

| Time (sec) | HPS | LPS | P - value | | |
|---|---|---|---|---|---|
| | 1 year of study(1)(n=200) | 2 year of study (2)(n=200) | 1 year of study(3)(n=200) | 2 year of study(4)(n=200) | |
| Average reselection time | 0,48±0,04 | 0,50±0,04 | 0,44±0,03 | 0,45±0,03 | (2-4) 0,004 |
| Average reaction time | 0,45±0,03 | 0,48±0,03 | 0,64±0,05 | 0,66±0,05 | (1-3) 0,000 |

According, to Leont'ev, (1975), activity is "the process of interaction of a subject with an object, provided that its direction as a whole (its subject) always coincides with the motive (motive), in which the need is concretized and defined". Also, his further postulates about activity as internal, and the subject as a subjective characteristic of a person confirms our concept of cognitive-behavioral activity of students. If we concretize the activity as educational, it is appropriate to recall the approach of L.S. Vygotsky, who believed that "the need, task, motives, actions and operations are distinguished in the structure of educational activity" (Fedorova, 2010). Considering the above, it should be noted that stable scenarios of human behavior under standard conditions are an ordered sequence of reactions occurring in time and space. In our study, we observed structural and functional differences in operational processes in conditions of free activity among students with high and low academic performance.

Any activity, including educational, contains elements of uncertainty, which requires the inclusion of mechanisms for predicting future events. A person can "use imagination as a powerful tool that helps people to reveal themselves as individuals and enter into a deeper, living and responsible relationship with reality" (Donati, 2019). A study by Potts R. et al. shows that preliminary guessing of translations of foreign words leads to an intensification of the learning process (Potts, Davies, Shanks, 2018). Much attention is paid to forecasting in psycholinguistics, especially to probabilistic forecasting of spoken speech. From a

psychological point of view, probabilistic forecasting is a consequence of the body's readiness to be exposed to one or another auditory stimulus (Matveeva, 2015). However, the perceptual processes of speech include not only auditory perception, but also visual perception. We conducted an instrumental analysis of the subjects' ability to anticipate the appearance of a visual stimulus signal in the form of lighting one of the two windows of the device. The advantage of this method of testing lies in the indifference of the stimulus material in relation to gender, age, race and available knowledge.

Activity in the form of prediction (probabilistic choice) was assessed by us on the basis of the success of the choice of the subject, which determined his ability to perceive the internal interconnection of the sequence and, on this basis, to predict the next stimulus. The most significant of the 16 parameters proposed by the developers of the device turned out to be three: the average reaction time (30), the probability of repeated selection of the left and right buttons against the background of success (25) and failure (26).

Repetition on the background of success was statistically significantly higher in the group of well-performing students, both in the first and second year. This result is quite natural, which is consistent with our data on the prevalence of the motive for achieving success among more successful students (Khokhlova, Deryagina, 2009). Moreover, the vector of increasing this parameter upward was identical in both groups. Repetition against the background of an erroneous decision had no statistically significant intergroup differences, increasing by the second year also in all surveyed students.

Table 2. Testing parameters in terms of probabilistic choice(M ± SD)

| Parameters | HPS | LPS | P - value | | |
|---|---|---|---|---|---|
| | 1 year of study(1)(n=200) | 2 year of study(2)(n=200) | 1 year of study (3)(n=200) | 2 year of study(4)(n=200) | |
| 25 (%) | 66,90 ±0,75 | 74,7 ±7,5 | 61,43 ±7,1 | 65,13 ±0,77 | (1-2) 0,030<br>(1-3) 0,020<br>(2-4) 0,020 |
| 26 (%) | 25,12 ±0,51 | 29,84 ±0,54 | 27,25 ±0,63 | 32,93 ±0,76 | (1-2) 0,030<br>(3-4) 0,020 |
| 30 (сек) | 0,81 ±0,18 | 1,51 ±0,19 | 0,73 ±0,15 | 1,06 ±0,18 | (1-2) 0,040<br>(2-4) 0,050 |

The average speed of reactions in the mode of probabilistic choice in the first course differed almost 2 times. The differences were not so great by the second year. The reaction rate increased in all students, which, however, led to an increase in repetitions against the background of failure ($r = -0.72$; $p = 0.05$).

It should be noted that correct and erroneous prediction revealed a relationship with the development of linguistic guesswork, which is necessary for the correct perception of foreign language information by ear and the functioning of the functional speech system. When translating 20 words with a phonetic coincidence with the Russian language, low-performing students gave fewer correct answers (12 words) compared to the group of high - performing students (19 words, respectively). At the same time, an incorrect translation of one word entailed a chain of mistakes, which required 2-3 attempts for low- performing students to correct. Students with a good level of foreign language proficiency made mistakes less often and were corrected immediately after an unsuccessful answer.

The decision-making mechanism and the probabilistic forecasting that constitutes its basis are, therefore, necessary conditions for effective and adequate perception of foreign language speech. Its rate is much higher than the rate of the native language (French speech - 310 syllables per minute, English - 250, German - 220, Russian - 197 (Bukhvalova, 2012; Cutler, Mehler, 2002), and, consequently, the load on the neuronal systems that process dynamic properties of foreign language hearing information.

An obligatory component of the success of educational activities is the level of attention and the effectiveness of the restructuring of choice strategies. These functions were tested in the form of tracking the presented spatio-temporal pattern of stimuli (controlled choice) at the limiting (intrinsic - UV0) and imposed tempo (with an interstimulus interval of 400 ms - UV400). The response time (RT) and error rate (ERR) were recorded. The acceptable level was taken as 15%.

The level of attention in one's own response rate (inversely to the number of erroneous answers) was statistically significantly higher among well-performing students, both in the first and second years. By the second year, the number of errors was halved for all students, regardless of their academic performance. At the same time, the reaction time in the group of high performing students was lower at the tendency level in the first year and statistically significant in the second. Thus, the necessary components of effective tracking of visual stimuli in the group of well-performing students were initially present. Accordingly, the

number of erroneous responses and reaction times differed statistically significantly among these students in the mode with the imposed tracking rate (Table 3).

Table 3. Guided Selection Test Parameters (M±SD)

| Parameters | 1 year of study | 2 year of study | P - value | | |
|---|---|---|---|---|---|
| | HPS (1) (n=200) | LPS (2) (n=200) | HPS(3) (n=200) | LPS (4) (n=200) | |
| ERR (UV0) % | 4,4±0,03 | 11,6±0,01 | 2,0±0,02 | 6,7±0,01 | (1-2) 0,02 (3-4) 0,03 |
| ERR(UV400) % | 12,1±0,04 | 20,3±0,01 | 9,7±0,01 | 18,3±0,04 | (1-2) 0,006 (3-4) 0,03 |
| RT (UV0) c | 0,42±0,03 | 0,49±0,03 | 0,43±0,03 | 0,52±0,02 | (3-4) 0,03 |
| RT (UV400) c | 0,40±0,02 | 0,47±0,01 | 0,37±0,01 | 0,44±0,03 | (1-2) 0,04 (3-4) 0,04 |

## Conclusion

The cognitive paradigm in the field of linguistic research has been actively developing and establishing itself since the end of the 20th century. The language system is derived from the "ecological context" in which the language exists (Solodilova 2010). One of the components of the ecological context for language is the human cognitive system, which is interdependent with a complex behavioral construct. The fundamental aspect of behavior was studied in our work - the problem of choice, both free and determined by the conditions of the external environment, which was considered through the prism of the successful acquisition of a foreign language by students of a non-linguistic university. Making a decision in an uncertain situation, i.e. choice associated with strong involvement of cognitive processes. The speed with which the subject receives and transmits information in this case is mediated by his activity, aimed at building activity in the prevailing objective conditions. The preference for a single choice with a relatively low reaction rate in a free environment by students with low grades indicates the limitedness of "ready-made" neural programs, which requires a clear determination of educational activity, the formation of a social attitude as a

DOI: http://dx.doi.org/10.46925//rdluz.35.09

mechanism of communication between the operations of analysis, selection, selection of information and the environment (Devyatkin, 2009). A direct connection between the speed of perception of a foreign language and the success of consolidating the acquired knowledge was revealed in (Zerr et al., 2018), which is indirectly consistent with data on lower speed characteristics in all testing modes among unsuccessful students.

Almost any behavioral act is impossible without predictive elements, be it a conscious or unconscious level. Learning activity can be divided into many quanta of behavior, each of which contains the foresight of the future result. Instrumental testing in a probabilistic selection mode has shown that successful students are more responsive to positive reinforcement, choosing repetition against the background of success. No intergroup differences were found in response to negative reinforcement. This fact confirms the opinion that it is necessary to maintain a reasonable readiness in students not to be afraid of mistakes when learning a foreign language (Egorova, 2013). The nervous system has the ability to assess not only the probability of the appearance of certain stimuli, but also the probability with which reinforcement will follow, and the prediction of high-probability reinforcement is associated with the functions of the frontal cortex. It can be assumed that intergroup differences are associated with morphofunctional features of the brain organization.

Simulation of tracking presented stimuli revealed a low level of voluntary attention in low - performing students, especially in a situation of imposed pace. A hypothesis arises that their own cognitive style in this group is dependent on environmental conditions (Nozari, Siamian, 2014), so this must be taken into account in the learning process.

Thus, the results obtained indicate the presence of universal differentiated cognitive-behavioral strategies in the case of successful / unsuccessful mastering of a foreign language, in which the way of making decisions in conditions of free activity, predicting the future result of activity and the level of voluntary attention are important. The obtained statistically significant differences in the dynamics of learning between 1 and 2 years of education indicate the plasticity of the attitudes that are formed in the learning process.

## References

Bakhmat E.M. (2016). The relationship between image and attitude in the system of mental regulation of activity. Scientific works of the Republican Institute of Higher Education. No. 16-2. Pp. 25-30.

Bukhvalova E.G. (2012). On the rhythm of English and German speech. Philological sciences. Questions of theory and practice. No. 2. Pp. 43-44.

Cutler A., Mehler J. (2002). The syllable's differing role in the segmentation of French and English. Psycholinguistics. Vol.1. Pp. 115–135.

Devyatkin A.A. (2009). The phenomenon of social attitude in the psychology of the twentieth century: monograph. Kaliningrad: Kaliningrad State University, 385 p.

Deryagina L.E., Sidorov P.I., Soloviev A.G. (2001). A method for assessing a behavioral response for professional selection and in screening studies. Patent for invention RUS 2208388 07.16.

Donati M. (2019). From active imagination to active life: at the roots of Jungian social activism. J Anal Psychol. Apr;64(2):225-243. Doi: 10.1111/1468-5922.12480.

Egorova N.V. (2013). The importance of the psychological aspect in the study of foreign languages. An innovative context for the development of methods of teaching foreign languages, philology and intercultural communication materials of a scientific and practical conference with international participation. Editorial Board: V.A. Mayevskaya (editor-in-chief). Pp. 251-256.

Fedorova M.A. (2010). Didactic characteristics of the relationship between the concepts of "activity", "educational activity", "educational independent activity". New in psychological and pedagogical research.No. 1 (17). Pp. 136-151.

Kostandov E.A. (2006). The value of the context of cognitive activity in the formation of unconscious visual attitudes. Russian physiological journal named after I.M. Sechenov. Vol. 92. No. 2. Pp. 164-178.

Khokhlova L.A. (2014). Psychophysiological connections in the structure of foreign language speech abilities. St. Petersburg, 7 STUDIO RIK. 255 p.

Khokhlova L.A., Deryagina L.E. (2009). Features of motivational behavior of students of the left and right hemisphere type in the process of learning foreign languages. Human Ecology, No. 5. Pp. 25-29.

Leontiev A.N. (1975). Activity. Consciousness. Personality. Moscow: Politizdat.304 p.

Matveeva L.Yu. (2015). Probabilistic prediction of sounding speech: to the problem statement. Saratov Journal of Medical Scientific Research. Vol. 11.No. 2. Pp. 216-220.

Mizen S. (2017). Preliminary thoughts on the neurobiology of innate unconscious structures and the psychodynamics of language acquisition. J Anal Psychol. Nov;62(5):756-770. Doi: 10.1111/1468-5922.12362.

Prokopenko Yu.A. (2014). The need for the study of foreign languages as a result of globalization processes. Eurasian Union of Scientists. No. 5-4 (5). Pp. 58-60.

Potts R., Davies G., Shanks D.R. (2018). The benefit of generating errors during learning: What is the locus of the effect? J Exp Psychol Learn Mem Cogn. Jul 19. doi: 10.1037/xlm0000637

Solodilova I.A. (2010). Communicative-pragmatic and cognitive approaches: unity and struggle of opposites. Social and Humanitarian Bulletin of the South of Russia. Krasnodar. Pp. 123 - 135.

Uznadze D.N. (2012). Psychology of installation. Psychology-classic. St. Petersburg: Peter, 2001. 416 p. Available at: http://www.psyworld.in.ua/.Accessed: 01.04.2012.

Zerr C.L., Berg J.J., Nelson S.M., Fishell A.K., Savalia N.K., McDermott K.B. (2018). Learning Efficiency: Identifying Individual Differences in Learning Rate and Retention in Healthy Adults. Psychol Sci. Sep;29(9):1436-1450. Doi: 10.1177/0956797618772540.