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**PSYCHOLOGICAL AND SPEECH THERAPY INTERVENTIONS IN
LANGUAGE AND COMMUNICATION DISORDERS IN
PRESCHOOLERS**

Specialty 511.06 - Special Psychology

Summary of the PhD Thesis in Psychology

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CONCEPTUAL REFERENCES OF THE RESEARCH

The current subject. In the preschool period, in the opinion of the authors L. Vâgotski, M.Lisina, C.Păunescu, J.Racu, F.Golu [27,38,19,22,12], the language knows an intense development, it acquires specificity and it is outlined as a significant item in organizing the intellectual and psycho-behavioral functionality for the child. The language is continuously enriched, the phonological development is almost completed, the capacity for the logical-grammatical formulation is developed, and the communication encourages the child's interrelationship. The psychology of education and development, including the authors E.Verza, N.Bucun, I.Racu, V.Rusnac, D.Gînu, A.Ciobanu [25,2,21,23,11,9] shows, at this stage, a strong psychic development of the child, on multiple levels, in which the cognitive and linguistic development, as well as the communicative skills are supported and contribute to the psycho-affective development. But, also during this period of time, the language and communication disorders can be outlined, a fact that aroused the interest of many researchers, being analyzed from different angles: C. Paunescu, N. Bucun, M. Gutu, E. Verza, V. Olares, A. Cucer, C. Bodea Hațegan, D.V. Popovici, Stănică C., Vrăsmaș E. [19,3,13,25,14,15,20,24].

The description of the situation in the field of research and the identification of the research matter. The pronunciation disorder is a language disorder that is widespread among preschool children and requires a complex approach, because if not fixed in time, it intensifies and causes disorders of communication, socialization and the child's whole personality. The results of the modern studies plead for the inclusion of the language disorder (polymorphic dyslalia), parallel to dyslexia and dysgraphia in the category of learning difficulties or development disorders, these being considered on a continuous axis and being maintained by deficits at the level of the working memory, and its role is significant in learning and education, and is related to the child's ability to process information and to learn basic skills in oral and written language, mathematics and social interactions. The working memory, along with the phonological awareness, is a good predictor of the school success in children, J. Montgomery, N. Cowan, Visu-Petra, Cheie, D. Buganu [34,33,26,6,8].

From the perspective of the working memory training, the researchers' attention was focused, especially, on the school-age children, but most of these studies were conducted on children with a typical development. In preschool children, the literature attests to few investigations aimed at highlighting programs to improve the working memory capacity or acquisition memory strategies in 5-7 year old children - Sodian, Schneider, Visu-Petra, Cheie [37, 36,26,], such as verbal labeling, simple verbal repetition, verbal recoding, categorization of strongly related items, visual strategies. We consider that the studies on the relationship between pronunciation disorders and working memory in preschool, from the perspective of drawing up certain programs to support the development of oral communication skills and the remission of the pronunciation disorders are insufficient and reveal a field situated at the beginning of the exploration.

In this context, our research acquires a special practical and theoretical topicality, and the *elaboration of a systemic program of psycho-speech therapy* for senior preschoolers with polymorphic dyslalia becomes particularly current. The degree of research of the proposed problem and the premises of the research highlighted *the scientific problem*, determined by the dilemma between an insufficient investigation of the pronunciation disorders in relation to memory function in preschoolers with polymorphic dyslalia, and the need to develop a systemic intervention psycho-speech program which would streamline the development of the language and communication at these children. We formulated **the scientific matter** as follows: *What would be the alternative way to streamline the speech therapy intervention, in order to develop the language and the oral communication, by taking into account the relationship between the pronunciation disorder and the memory function?*

The aim of the research is to develop, implement and validate the efficiency of a systemic psycho-speech therapy intervention program to fix the language disorders, based on studying the peculiarities of the language development and the communication in relation to the memory function with senior preschoolers.

The goals of the research aim:

- 1.the study, interpretation and argumentation of the conceptual landmarks regarding the psychological particularities of the pronunciation disorders, related to the mnemonic working;
- 2.establishing the evaluation methodology, diagnosing the pronunciation disorders in preschoolers aged 5-6 and identifying the level of development of the language and communication, and memory, based on the presence of the pronunciation disorders;
- 3.identification of neuropsychic working in the context of the presence of the pronunciation disorders;
- 4.determining the significance of the relationship between mnemonic function and pronunciation disorders (polymorphic dyslalia) in senior preschoolers;
- 5.elaboration and implementation of a systemic psycho-speech therapy intervention program focused on the development of the language and communication, and of the mnemonic function;
- 6.experimental approval and assessment of the effects of the administered psycho-speech therapy program.

The theoretical support of the research is represented by the theories and conceptions about: *language and communication* (L.S. V ęotski, J. Racu, F. Golu, M.I. Lisina, M .E. Dobrescu, D. Bougnoux, A. Mehrabian, U. Őchiopu, C. Zamfir, L. Vlăsceanu, C. Cucos); *language disorders and phonological deficits* (E. Verza, C. Păunescu, M. Guțu, V. Preda, E. Boscaiu, G. Radu, N. Bucun, E. Vrăsmaș, V. Olărescu), *the development of the working memory* (A. Baddeley, G. Hitch, Archibald, Gathercole, Visu-Petra, J. Montgomery, Alloway); *the model of cognitive processing at the level of the language* (K. Patterson, C. Shewell, Schneider, Thorel, Benga); *language development level model* (Bloom, Lahey); *working memory model* (A. Baddeley, S. Tahir, Bull, Espy, Wiebe, N. Cowan).

The scientific research methodology: *theoretical methods* – the study of the specialty literature; *empirical methods* - tests, trials, speech therapy file, finding and control experiments, psychological interventions; *statistical methods* - calculation of *frequencies* (distribution of results), *average* (central trend of results), *the test for independent samples* (the significance of the difference between the means of two distinct samples), *the d Cohen indicator* (the magnitude of the effect or the magnitude of the relationship between two variables), *the F Levene test* (for assessing the homogeneity of samples), *the Pearson correlation test* (the power and the sense of correlations between research variables), the U Mann-Whitney test and the Wilcoxon test.

The scientific novelty and originality consist in:

- conducting the experimental comparative study of language and communication, and the mnemonic function at senior preschool children with pronunciation disorder (polymorphic dyslalia), and in children of the same age with typical development, in order to delimit and interpret the specific development of language and communication in relation to the mnesic function, against the background of the presence of the pronunciation disorders;

- establishing a methodology for evaluating and diagnosing the level of the language and communication development and the memory capacity in senior preschoolers;

- highlighting the particularities of the oral language in relation to the mnemonic capacity, in senior preschool children;

- application of a systemic psycho-speech therapy intervention program aimed at repairing the pronunciation disorders (polymorphic dyslalia) in senior preschoolers focused on the development of language, communication and memory function.

- elaboration of recommendations for specialists in the field of speech therapy and psychology.

The obtained results that contribute in solving the scientific matter consist in:

- *establishing* the theoretical-applied psychological foundations that are the basis for *identifying* an alternative way of developing language and oral communication in preschoolers of 5-6 years old, by *considering* the relationship between pronunciation and memory disorders;

- *assessing* the level of development of the language and oral communication and memory with *highlighting* the peculiarities depending on the category of preschoolers;

- *elaboration, implementation and approval* of a systemic psychological-intervention program *oriented towards* the remedy of pronunciation disorders (polymorphic dyslalia) focused on the development of language, communication and mnemonic function in senior preschool students.

Theoretical significance. The results of the investigation bring a contribution to the psychological and speech therapy science with new information related to the knowledge of the relationship between pronunciation disorders and memory function, in preschool age. The systemic program of psycho-speech therapy can serve as a methodological benchmark for specialists in organizing the intervention that aims

to correct pronunciation disorders in preschoolers and the influence on memory function (and other neuropsychic functions).

The applicative value of the paper consists in:

- the systemic program of psycho-speech therapy intervention elaborated, implemented and validated, which offers an alternative intervention model for overcoming pronunciation disorders in senior preschoolers, in terms of language development, communication and memory.

- the systemic psycho-speech therapy program is useful for practitioners in the field of speech therapy, who work in preschool educational institutions, but also for parents of the children with language disorders;

- the set of selected and proposed methods serve to identify dyslalic disorders, to assess the oral language and memory of the senior preschoolers with pronunciation disorders and contribute to elucidate the relationship between pronunciation disorders, oral language development and mnemonic function in senior preschoolers;

- the theoretical and practical results of the research can be included as fundamental landmarks in methodological works, to be made available and to be applied by specialists in the therapy of language and communication disorders, psychologists, pedagogues or parents of the children with disorders language, but also by other interested persons;

Main scientific results submitted for support

- The pronunciation disorders, especially the polymorphic dyslalia, is the most common form of language disorders in preschool age and in the psychological area, it is experienced by the child as an inability to express himself properly.

- The language disorder (polymorphic dyslalia), if not treated properly, can predispose to important disturbances of the regulatory function of communication, it affects all the components of the language, it exerts a lingering influence on the language structures, it creates impediments to development, it prevents the good organization of the mental life, including memory (auditory, visual, ability to associate word pairs, memory and learning) and other psychic functions (attention/executive functions, sensory-motor working, visual-spatial processing).

- Between preschoolers with TL and DT there are differences in the language development, the operating of the linguistic structures on the phonological, semantic, morpho-syntactic, pragmatic segment; at the level of the mnemonic information processing and the neuropsychic functionality.

- Setting the existing correlations between the studied variables it can adequately guide the design of effective psycho-speech therapy interventions in senior preschoolers with polymorphic dyslalia

- Psycho-speech therapy intervention through a systemic program will be performed on all levels/dimensions: Recovering the pronunciation disorders, Language development (linguistic aspects and oral communication); Valorization and optimization of the mnemonic (neuropsychic) function, thus

managing to recover the pronunciation disorders, directly and indirectly influencing the mnemonic function and the neuropsychic functions.

Implementation of scientific results. The resulting materials are used in the psycho-therapeutic process at the preschool level; in the process of the continuous and complementary training of psychologists and speech therapists; they are recommended for the courses in Special Psychology, Speech Therapy, Speech Therapy Assistance, for the training of students in Special Psycho Pedagogy and Master students in Speech Therapy in "Ion Creanga" UPSC.

Approval of the research results. The research results were approved during the meetings of the Department of Special Psycho Pedagogy of "Ion Creanga" UPS in Chisinau, capitalized in scientific conferences organized within "Ion Creangă" UPSC, "V.Alecsandri" UB and within seminars, workshops organized in the educational institutions: International Scientific Conference " Speech therapy assistance: current events and horizons", "Ion Creangă" UPSC, 22-23 November, 2018. *Language and Communication - Defining Elements of the Human Being*; The symposium with an international participation "School - the main means of preserving the freedom of the soul in the oppressed environment", "V.Alecsandri" UB, Bacău, 2018. *Memory - Means of Preserving the Linguistic-Experiential Acquisitions*; Conference of the PhD and Post PhD students at "Ion Creanga" State Pedagogical University of Chisinau, 16 May, 2019. *Phonological Processing as a Substrate for the Link Between the Working Memory and the Pronunciation Disorders with Children*; International Scientific Conference "Teacher - Promoter of Educational Policies", Chisinau, 11-12 October, 2019. IȘE, *The Indispensability Between Communication and Language - Theoretical-Scientific Vision*; The International Scientific Conference "Problems of socio-humanities and modernization of education", UPSC 8-9 October, 2020. *Reflections and Coordinates in the Diagnosis and Symptoms of Dysarthria*; International Scientific-Practical Conference "Current Matters of Orthopedagogy, Orthopedagogy and Rehabilitology", Kiev, Ukraine, 18 March, 2021, pp. 4-6, *Language and Communication Disorders in Preschool Children with Neuromotor Disabilities*;

Practical guide. *Methodology of the Systemic Program of Psycho-Speech Therapy*, Chisinau, 2020; Scientific-methodical work. Teaching strategies in speech therapy, Chisinau, 2020;

Scientific-practical journal "Psychology" from Chisinau, *Aspects of Mnemonic Capacity in Preschoolers with Dyslalia Polymorphism*, 2018, No 2-4 (33), pp.14-22; Journal of Innovation in Psychology, Education and Didactics, *Evolution and Intervention in the Linguistic Structures of the Children's Language*. 19.02.2021, Vol.25, No. 1/2021 (**online**); Journal of Innovation in Psychology, Education and Didactics, *Measuring the Level of Development of Neuropsychic Functions in the Fields of Language and Memory in Preschoolers*. 16.03.2021, Vol.25, No. 1/2021 (**online**); Journal Plus Education, *Incursion on Language and Communication Disorders to the Preschool Child*. 20.03.2021. (**online**).

Workshops: Șerban and Pană Association: "*Parents' Involvement in Speech Therapy and in the Children's Development*", 20.10.2018, Bacău (trainer); "*Creativity in the Speech Therapy*", 16.02.2018, Bucharest; "*Speech Therapy in Correcting Dyslalia*", 22 March, 2018, Bucharest; "*Speech Therapy Games and Tricks*", 9 November, 2018, Bucharest.

Important aspects of the investigation were presented and discussed in the International Educational Project "Optimal Communication Triangle: Children-Parents-Teachers", 2018-2019, Bacău (undersigned - project coordinator).

Publications on the topic of the thesis: 15 scientific papers: of which: 2 scientific-methodological papers; 4 items in international scientific journals, 9 articles in scientific conference materials.

The volume and structure of the thesis. The thesis includes annotations, the list of abbreviations, introduction, three chapters, general conclusions and recommendations, bibliography of 246 titles, 9 annexes, 134 pages of basic text, 34 figures and 79 tables.

Keywords: language development level, communication, pronunciation disorder, polymorphic dyslalia, mnemonic function, neuropsychic functions, phonological processing, systemic psycho-speech therapy program, sensory-motor running, visual-spatial processing.

THESIS CONTENT

The *Introduction* argues the topicality and importance of the research theme, the important scientific problem solved, the purpose and goals of the investigations are formulated, the scientific novelty and originality, the theoretical significance and the applicative value of the paper, the implementation of the research results and approval of the scientific results.

In Chapter 1, entitled *Theoretical-scientific interferences in the research of language and communication disorders in relation to mnemonic function in preschoolers*, the modern theories on the concepts of communication, language and memory, aspects of language and memory development, explanatory models of the language disorders and communication, as well as the memory are examined. In the running of the human brain, it is emphasized that [12,4,5,7], the verbal language has historically imposed itself as a new system of coding and transporting information, which integrates with the other two primary, biological systems (bioelectric system and configurational space system – the short-term memory support) and the biochemical system (combinations of DNA and RNA molecules - long-term memory support). For the development of higher psychic processes (formal-abstract thinking, logical memory, linguistic imagination, etc.), the verbal language, as a support for encoding-fixing-conveying-decoding information plays an essential role, it regulating and subordinating the primary coding systems. From a cognitive point of view, the verbal (oral) information processing can be interpreted taking into account the functional and the neurophysiologic aspects, by reference to the cognitive model of the verbal information processing or the logogenic model of the linguistic processing for a word, described by K. Patterson and C. Shewell in 1987 [35]. The linguistic analysis involves, in turn, *the phonological*

analysis, the input phonological lexicon, the access to the unit of meaning (the semantic system at the level of the central processor). From the perspective of the oral language, the auditory phonological analysis activates the mechanisms of sensory memory and short-term memory to analyze and group sounds into a unit. The input phonological lexicon is the one that activates the short-term memory or the working memory to recognize the word or to categorize it as a familiar word. The semantic system groups the central component of the word semantic processing in relation to its activated meanings at the level of the long-term memory.

In the specialty literature, the language disorders have been classified by taking into account the general explanatory framework, as well as the etiological and risk factors of the language and communication disorders, delimiting categories and subcategories of the language disorders coagulated on various criteria M. Guțu, C. Bodea-Hațegan, E. Verza, V. Olărescu, D. Buganu, E. Vărășmaș, [13,1,25,17,18,]. Obviously, many scientific studies have been devoted to language and communication from different angles, different in purpose, goals, methodological inventory. Our opinion is based on the fact that the brain and psychic processes represent a multifunctional and multistory system from which we delimit language and communication, which cannot be achieved independently, without the involvement of other psychic processes, such as memory, attention and executive functions, sensorimotor function, visual-spatial processing, etc. However, we believe that in the world of scientific research, in the digital age there is room for new and new innovative research. At present, we have not discovered research in which language disorders in senior preschoolers are addressed in terms of working memory and the neuropsychic functions. Through the present research we intend to study both the language disorder (polymorphic dyslalia) and the mnemonic processing, in order to develop a valid, effective and applicable systemic psycho-speech therapy intervention program in similar situations.

Chapter 2, entitled *Language, communication and memory assessment in senior preschoolers*, presents the goals, hypotheses, research methodology and presents the results of the finding experiment, which involved 150 children, of which we delimited a sample of 70 preschoolers with typical development (group N), as well as a sample of 80 preschoolers with polymorphic dyslalia (group D).

Purpose: to find the experiment: to determine the peculiarities of the development of the oral language in relation to the mnemonic function in preschoolers aged 5-6 years, against the background of the presence and lack of pronunciation disorders (polymorphic dyslalia).

Goals: Establishing the intellectual level and framing the subjects from both groups within the limits of normal intellectual development; Diagnosis classification of pronunciation disorders in the category of polymorphic dyslalia, in the case of subjects from group D and exclusion of subjects from group N from this diagnosis category; Determining the psychological age of the language development in preschoolers with typical development and in those with pronunciation disorders; Evaluation of the level of the language development on the phonological, semantic, morphological, syntactic, pragmatic

side, for the two categories of preschoolers; Evaluation of the mnemonic function in preschoolers with typical development and with pronunciation disorders; Evaluation of neuropsychic functions in the two categories of preschoolers (attention/ executive functions, sensory-motor running, visual-spatial processing); Establishing the significance of correlations between variables denoting linguistic structures (phonological, semantic, morpho-syntactic, pragmatic, language development, psychological age of the language) and pronunciation disorders, respectively mnemonic functions (auditory, visual, ability to associate word pairs, memory and learning), as well as neuropsychic functions (attention/executive functions, sensory-motor working, visual-spatial processing), in subjects from group D and group N.

General hypothesis: we assume that at the level of the language development, mnemonic and neuropsychic functions in the subjects involved in the finding experiment we shall assess/attest certain differences/discrepancies, estimated by the statistical processing

Working hypotheses of the ascertaining experiment. *We assume that:* **1.** There are no significant differences between the preschoolers in group N and the preschoolers in group D from the perspective of the intellectual development; **2.** At the level of the oral language of senior preschoolers with pronunciation disorders (in extended form) compared to preschoolers with typical development: a) there will be a mismatch between the psychological age of the language and the chronological age; b) inferior performances in the running of the linguistic structures at a phonological, semantic, morpho-syntactic, pragmatic level will be identified. **3.** The mnemonic processing of information and the neuropsychic functionality, in senior preschoolers with pronunciation disorders (in extended form), is different (slower) compared to preschoolers with a typical development; **4.** Between the studied variables, there are significant correlations in the two categories of investigated subjects, which can adequately guide the design of the effective psycho-speech therapy interventions in senior preschoolers with polymorphic dyslalia: a) in group D, between the presence of pronunciation disorders and: (at a phonological, semantic, morpho-syntactic, pragmatic level, language development, the psychological age of the language); memory functions (auditory, visual, ability to associate pairs of words, memory and learning); neuropsychic functions (attention/executive functions, sensory-motor functioning, visual-spatial processing): b) in both groups, D and N, between the psychological age of the language, on the one hand, and linguistic structures, mnemonic functions, neuropsychic functions, on the other hand; between linguistic structures and mnemonic functions, respectively between linguistic structures and neuropsychic functions.

Variables of the finding experiment: Independent variable: pronunciation disorder (polymorphic dyslalia); Dependent variables: (1) level of intellectual development; (2) language (psychological age of the language, linguistic structures at a phonological, semantic, morpho-syntactic, pragmatic level); (3)

memory functions (auditory, visual, memory and learning); (4) neuropsychic functions (attention/executive functions, sensory-motor running, visual-spatial processing).

Diagnostic tools used in the finding experiment. The selected instruments had a distinct destination and were applied individually: Raven Progressive Colored Matrices, parallel version, 2005; Pronunciation ability examination sheet; Alice Descoedress test; BLT-2 test; Language tests in the NEPSY battery; NEPSY battery memory and learning tests; Memory-learning ratio highlighting test (Oprea); Test to assess the capacity of the auditory-verbal memory; Visual memory capacity assessment test (proposed by D. A. Buganu); Tests to assess the level of development of some neuropsychic functions.

Results at the Raven Progressive Colored Matrices, parallel version, 2005.

Working hypothesis: There are no significant differences between preschoolers with TL (pronunciation disorders) and preschoolers with typical development, from the perspective of intellectual development, these falling within the limits of the normal intellectual development. The results of the Raven test (CPM Paralel, 2005) revealed a similar structure in terms of the distribution of IQ at the two groups, all subjects examined within the limits of the normal intellectual development, the average values of IQ being close to $M = 98.08$ for preschoolers TL and $M = 100.92$ for preschoolers with a typical development (Annex 2, tables 2.1. and 2.2). The difference between these mean values was checked using the *t test* for independent samples, which did not detect any significant difference between the means ($t = 1.869$; $p = 0.064$). The processing of the results obtained in the *t test* was based on groups with equal variances, the values of the F (Levene) test not being statistically significant ($f = 0.461$; $p = 0.498$), which confirms the hypothesis.

Results in the Pronunciation Ability Examination Sheet

Working hypothesis: we assume that only preschoolers with TL will commit imperfections in the pronunciation of sounds (consonants) of the Romanian language, tab 1.

Table 1. Decision ability examination sheet, batch D

	<i>Frequency</i>	<i>Percentage</i>
Dyslalia in the first joint region	15	18.75
Dyslalia in the second joint region	80	100
Dyslalia in the third joint region	17	21.25

The maximum score in this test was 40 points. The average gross scores of the subjects had the value of 10.20 points, and the variability of the scores around this average value was ± 3.38 points. Given these values, we consider that group D is sufficiently representative in terms of the presence of polymorphic dyslalia.

The results of Alice Descoedress Test, for determining the psychological age of the language development. *Working hypothesis:* There are significant differences between preschoolers with

pronunciation disorders and preschoolers with typical development in terms of the psychological age of the language development.

Performing an average of the performances on all 7 samples of the A. Descoedress test, we delimited the psychological age of the language, which we related to the average chronological age. The average values of the chronological age in relation to the psychological age in group N being 5.5 years (with $\delta = 0.336$) and 5.9 years, respectively (with $\delta = 0.230$); in group D being 5.59 years (with $\delta = 0.292$) and 5.27 years respectively (with $\delta = 0.295$). Hence, in the case of typical preschoolers, a psychological age of the language higher than the average chronological age, the advance being almost half a year in the language development. The value of the *t test* for independent samples at the level of the average chronological age was statistically *insignificant* ($t = -1.708$, at $p = 0.090$), while from the perspective of the psychological age of the language the value of the *t test* was *significant* ($t = 14.370$, at $p \leq 0.001$).

Results on the Bankson-2 Test for the Language Assessment (BLT-2). *Working hypothesis:* There are significant differences between preschoolers with TL and preschoolers with typical development in terms of the language development on the semantic, morphological, syntactic, pragmatic side.

The linguistic performances of TL preschoolers were clearly placed at lower levels, respectively most of them had performances of medium level (62.5%) or below average (20%), and few of them had better results, above average (11.2%) or higher (6.3%). On the other hand, it is observed that the language development was predominantly of higher level in the preschoolers with typical development (70%), but also of medium level (15.7%) or above average (14.3%), presented in fig. 1.

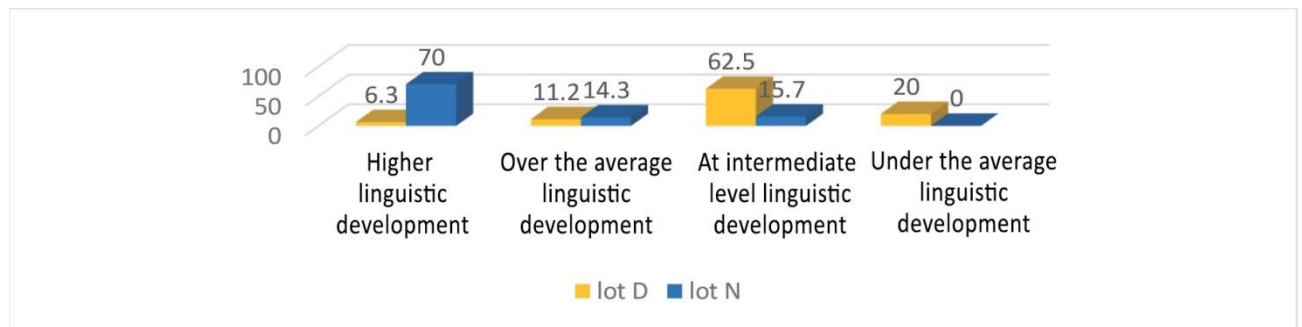


Fig.1. Distribution of subjects from groups D and N by levels of language development.

The statistical analysis of the data obtained in the BLT-2 test allowed the validation of the working hypothesis.

Results of the Memory-Learning Report for Preschoolers. *Working hypothesis:* There are significant differences between preschoolers with TL and preschoolers with typical development in terms of the ability to learn and update mechanical and logical associations.

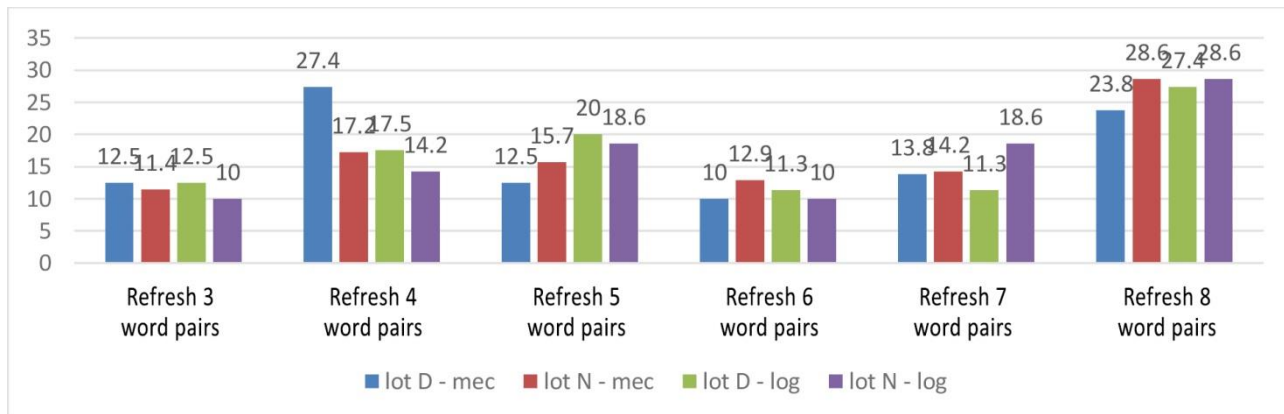


Fig.2. Results in the ability to mechanically and logically associate words.

From the perspective of the number of mechanical and logical associations of words, a similar distribution of the results obtained by the subjects from both groups is observed, with some small differences. In this test, the average gross values of performance were calculated, both in terms of the number of mechanical and logical associations updated by the subjects in the two groups (rendering list 2 and list 4), and in terms of time and number of repetitions required for memorization the word pairs.

Tab.2. Results in the learning / updating capacity of mechanical and logical associations

		No. of subjects	Gross average	Standard dev.
Mechanical associations (playlist 2)	<i>Lot N</i>	70	5.87	1.7850
	<i>Lot D</i>	80	5.56	1.8131
Logical associations (play list 4)	<i>Lot N</i>	70	5.98	1.7403
	<i>Lot D</i>	80	5.73	1.7913
Repetition of mechanical combinations (list1)	<i>Lot N</i>	70	3.51	1.2711
	<i>Lot D</i>	80	4.02	1.1471
Repetition of logical associations (list 3)	<i>Lot N</i>	70	3.32	1.3375
	<i>Lot D</i>	80	3.50	1.2222
Mechanical association time (list 1)	<i>Lot N</i>	70	5.16 min	1.33 min
	<i>Lot D</i>	80	6 min	1.23 min
Logical association time (list 3)	<i>Lot N</i>	70	4.43 min	1.34 min
	<i>Lot D</i>	80	4.56 min	1.21 min

Analysing the results obtained for the *t test* in this sample, a series of insignificant values were delimited: to the number of the mechanical associations ($t = 1.049$, $p = 0.296$), to the number of logical associations ($t = 0.858$, $p = 0.392$), to the number of repetitions necessary for the logical learning of word pairs ($t = -0.820$, $p = 0.413$), as well as the time necessary for memorizing word pairs through logical learning ($t = -0.901$, $p = 0.369$). On the other hand, some significant values of the *t test* were delimited: at the number of repetitions necessary for the mechanical learning of word pairs ($t = -2.586$, $p = 0.011$) and at the time necessary for memorizing word pairs by mechanical learning ($t = -3.067$, $p = 0.003$). The values of the *t test* were calculated for groups with homogeneous variances - the values of the F Levene test were insignificant, f having values between 0.185 and 3.130 (the values of the

significance thresholds being between 0.079 and 0.688). The working hypothesis is only partially confirmed in the sense that there are statistically significant differences between group D and group N only in terms of the number of repetitions required to memorize word pairs by machine learning, as well as the time required to mechanically memorize pairs of words. The working hypothesis is not confirmed from the perspective of the number of updated logical and mechanical associations, of the number of repetitions necessary for the logical memorization and of the time necessary for memorizing the pairs of words associated on a logical criterion.

Results in the Auditory-verbal memory capacity assessment test and in the visual memory capacity assessment test. *Working hypotheses:* There are significant differences between preschoolers with TL and preschoolers with typical development in terms of the ability to retain a series of auditory-verbal and visual elements.

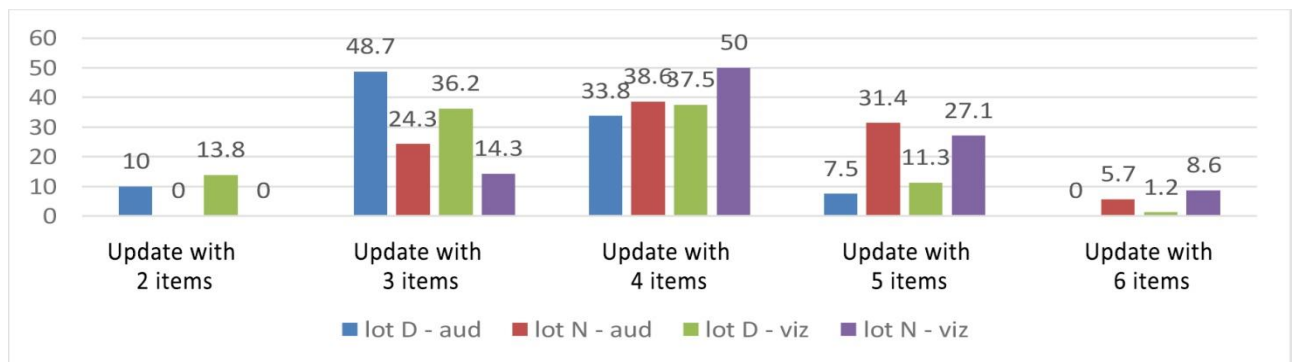


Fig.3. Distribution of results to *auditory and visual memory capacity*,

We present below the average performances obtained by the subjects of the two groups, both from the perspective of the *working memory capacity* as well as the *potential memory capacity* (random playback of the items presented in series), on the two modalities, auditory and visual.

Table 3. Average performances obtained at the *working memory capacity* and the *potential memory capacity*, lots D and N

		No. of subjects	Gross average	Standard dev.
Number memory (working, auditory)	Lot N	70	4.18	.8730
	Lot D	80	3.38	.7712
Number memory – at random	Lot N	70	4.58	.7321
	Lot D	80	3.73	.8228
Image memory (work, visual)	Lot N	70	4.30	.8227
	Lot D	80	3.50	.9140
Image memory – at random	Lot N	70	4.75	.6241
	Lot D	80	3.98	.8343

Summarizing the results of these two tests, the intergroup analysis revealed mnemonic performances (visual and auditory) inferior to TL preschoolers, compared to typical preschoolers. Intergroup analysis revealed a better visual memory capacity than the auditory memory capacity in both typical preschoolers and preschoolers with TL. By applying the *t test* for comparing the averages for

independent samples, from the perspective of the number/auditory memory and image/visual memory, a series of *significant differences* were delimited between the two groups of subjects. From the point of view of the memory capacity of the auditory and visual serial elements (number memory and image memory), *significant values* of the *t test* were obtained, both in the memory of numbers ($t = 5.946$; $p \leq 0.001$) and in the memory of images. ($t = 5.602$; $p \leq 0.001$). From the perspective of the potential mnemonic capacity, on auditory and visual typology (number-random memory and image-random memory), *significant values* were obtained: for the random rendering of the numbers $t = 6.629$ at $p \leq 0.001$, and for the random rendering of the images $t = 6.323$ at $p < 0.001$. The intergroup analysis revealed a capacity for retention of serial elements (auditory and visual) significantly more developed in typical preschoolers, compared to that of preschoolers who have polymorphic dyslalia. We can say that the deficits of the working memory are more accentuated at the phonological level and less at the imagistic level, in children with polymorphic dyslalia. Under these conditions, the working hypotheses were confirmed.

Results in evaluating the development of the neuropsychic functions within the NEPSY battery.

Working hypothesis: There are significant differences between preschoolers with TL and preschoolers with a typical development in terms of the level of development of the neuropsychic functions. The calculation of the average values of the performances, on the 5 development areas (basic subtests), by taking into account the sum of the standardized scores (composite scores) showed that the performances of the subjects from group N are superior to the subjects from group D, and the differences are statistically significant, the conclusion from the administration of the *t test* for independent samples.

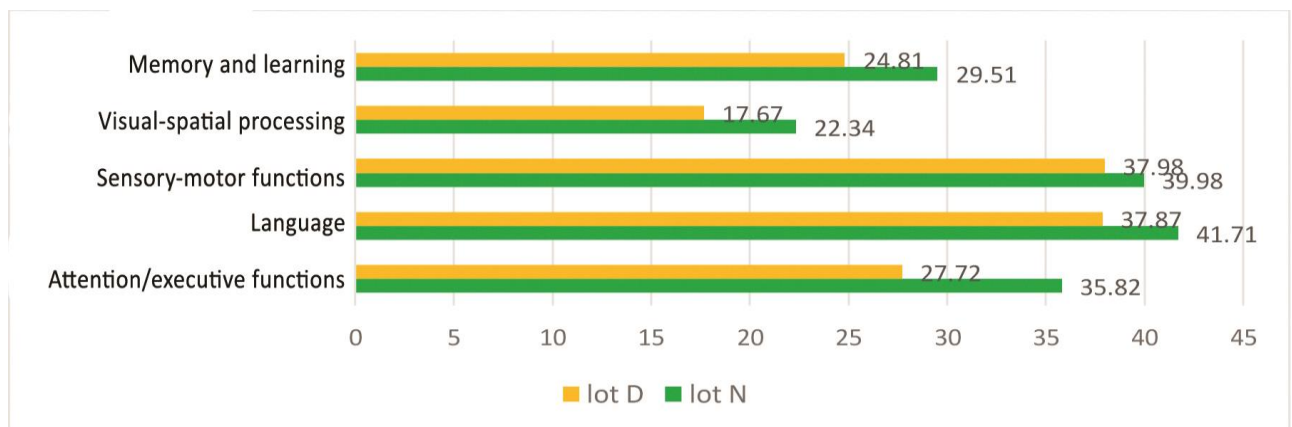


Fig.4. Mean values of the neuropsychic functions within the *NEPSY battery*

As we analysed the situation in each area of investigation of the neuropsychic functions, significant differences were observed between the performances of the two categories of children. The values of the *t test* for independent samples had statistically significant values, $p \leq 0.001$. The *t test* values were calculated for homogeneous groups - *Levene f test* having insignificant values (*f* had values between 1.296 and 3.062, at significance thresholds between 0.082 and 0.257). Based on the values of the *t test* for independent samples, we calculated the *d Cohen* indicator in all 5 areas of development, registering

statistically significant values; a very important standardized difference of the averages obtained at the levels of development of the neuropsychic functions, between the two groups. In conclusion, it is reconfirmed, once again, that there are significant differences between preschoolers with pronunciation disorders and preschoolers with typical development in neuropsychic functions: attention/executive functions, language, sensory-motor functions, visual-spatial processing, memory and learning. Another conclusion drawn by processing and interpreting the experimental data, suggests that for the studied age stage (5-6 years), the pronunciation disorder (polymorphic dyslalia) no longer falls within the physiological limits of evolution, highlighting the fact that it is related to mild disturbances of neurocognitive functions.

Correlational study between research variables. *Working hypotheses:* There are significant correlations between the variables studied in the two categories of subjects investigated. I applied the *Pearson correlation test*. A series of positive correlations were established, of which the most important are those between the variables representing the linguistic abilities (*Psychological age of the Language, Language, Semantic Knowledge, Morpho-syntactic Rules, Pragmatic Language*) and between the variables representing mnemonic functions (*Memory and Learning, Mechanical Word Association, Auditory Memory, Visual Memory*). We also identified the indirect correlations between pronunciation disorders and language skills, respectively memory functions, which can guide us in developing the training program. Overall, the finding is that through the development of the language and the communication, respectively of the mnemonic function, we will indirectly influence the pronunciation disorders, in the sense and we shall increase the psychological age of the language in preschools.

Conclusions in Chapter 2. **1.** The existence of statistically significant differences between group D and group N were revealed, from the perspective of the investigated psychic levels, respectively language, memory and some neuropsychic functions; **2.** Significant differences were delimited at the level of the psychological age of the language through A. Descoeudress test; **3.** The presence of the pronunciation disorder (polymorphic dyslalia) imprints an inferior development of the linguistic structures from a semantic, morphological, syntactic or pragmatic point of view; with reference to the level of the phonological processing and to the receptive and expressive language skills, there are statistically significant differences between the categories of the children; **4.** There are statistically significant differences between the groups of preschoolers in the field of memory and learning, respectively in memory and visual-verbal learning and narrative memory (mnemonic functions); **5.** This finding tells us about the impact of the group dyslalic disorder (in extended form) on the evolutionary path of mnemonic functioning; **6.** The working of auditory memory in preschoolers with polymorphic dyslalia is lower than the limits reached by the typical preschoolers; **7.** The method of evaluating the visual memory, elaborated and applied in analogy with the method of evaluating the auditory-verbal memory, allowed the highlighting of superior performances in the visual mnemonic functioning

compared to the auditory mnemonic functioning, in the two categories of subjects; **8.** In terms of learning and updating of group mechanical and logical associations, statistically significant differences were identified between the categories of children, only from the perspective of the mechanical word associations, more precisely from the perspective of the number of repetitions necessary to memorize word pairs, by mechanical learning, as well as the necessary time of the mechanical memorization; **9.** The results of the ascertaining experiment showed that the pronunciation disorder (polymorphic dyslalia) is related to slight disturbances of the neurocognitive functions. From the perspective of the fields of attention/executive functions, sensorimotor functions and visual-spatial processing, the obtained data attest to slight deviations in development, and the differences from the performances of the typical preschoolers are statistically significant, given the presence of the polymorphic dyslalia. **10.** By applying the Pearson correlation test, a series of positive correlations were established, between the language skills and the memory functions. **11.** Indirect correlations were also identified between the pronunciation disorders and the language skills, respectively mnemonic functions, which can guide us in developing the training program.

Overall, the finding is that by developing language and communication, respectively mnemonic function we will indirectly influence pronunciation disorders, in the sense of reducing them and increase the psychological age of the language in preschoolers.

In chapter 3, entitled “*Valorisation of the systemic program of psycho-speech therapy for senior preschoolers with language disorder in relation to the mnemonic function*”, the general characteristic of the formative experiment is presented; the efficiency of the systemic psycho-speech therapy program developed and implemented is discussed. *The aim* is to develop, implement and validate the effectiveness of a systemic program of psycho-speech therapy designed to remedy the language disorders in relation to the memory function in senior school preschoolers. We started from the *Hypothesis*, that the systematic and systemic application of the psycho-speech therapy intervention program will intensify the process of repairing the pronunciation disorders, linguistic structures and communication; it will optimize the mnemonic functions (but also the global neuropsychic functions) in preschoolers with a polymorphic dyslalia. **The goals** of the formative approach are: a) Elaboration and implementation of the psycho-speech therapy intervention program for preschoolers; b) Assessment of the effects and validation of the administered psycho-speech therapy program.

Detected/distinguished **variables**: *Independent* variable: systemic psychological intervention program. *Dependent* variables: **1.** language disorder (polymorphic dyslalia); **2.** language (psychological age of the language, linguistic structures of semantic, morpho-syntactic, pragmatic level); **3.** mnemonic functions (auditory/visual memory, the ability to mechanically associate words, memory and learning) and the neuropsychic functions (attention/executive functions, visual-spatial, sensorimotor processing/orientation).

The logistics of developing and implementing the psycho-speech therapy intervention program for children with pronunciation disorders was guided by a set of principles.

The structure of the systemic psycho-speech therapy program includes several strategies that have decided us to reflect on the development of the dimensions and component areas: *Remediation of pronunciation disorders, Language development (linguistic aspects and oral communication); Valorisation and optimization of mnemonic (neuropsychic) function.* The psycho-speech therapy activities selected and included in these three dimensions were adapted to the age of preschoolers and administered according to the area of the next development, but also having as a benchmark the potential abilities of the children [7,16]. 24 preschoolers (12 in GE and GC) with polymorphic dyslalia participated. With GE, 2 speech therapy and psychological sessions were performed, lasting 30-35 minutes, for a period of 6 months. The efficiency of the systemic program of the psycho-speech therapy was evaluated by performing the control experiment (retesting), using the *following tools*: Pronunciation capacity examination sheet; Alice Descoedress test; Bankson - 2 test; Language tests in the NEPSY battery; NEPSY battery memory and learning tests; Evidence test of the memory-learning relationship - mechanical associations section (Vrăsmaş E., Oprea V.); Test to assess the capacity of the auditory-verbal memory; Visual memory capacity assessment test (proposed by D A. Buganu).

Descriptive statistics were performed on the data obtained, during the administration of the above-mentioned instruments, from the GE/GC group. We used nonparametric statistical methods to compare the groups: the Wilcoxon statistical test, to delimit the statistically significant differences obtained by the subjects of the experimental and control group, in testing and retesting; U -Mann Whitney statistical test to calculate the statistical differences obtained by GE/GC in retesting. The homogeneity of the groups of preschoolers selected for the formative experiment was confirmed from a statistical point of view, by applying the U-Mann Whitney test. In order to delimit the central tendency of the data obtained in the training experiment, although the median was calculated for each distribution, it was observed that there are differences in the ranks between GE/GC, even if the medians are equal and in this case we opted to calculate and highlighting the average, which is a more sensitive indicator from this point of view.

The purpose of the stage of verifying the efficiency of the applied intervention, followed the evaluation of the impact of the systemic psycho-speech therapy intervention program administered in the case of the senior preschoolers with pronunciation disorder (polymorphic dyslalia). The hypothesis of the control experiment advanced the presumption that between the results of the experimental group and those of the control group there will be statistically significant differences in all aspects subject to intervention: the recovery of the pronunciation disorders; remediation of the pronunciation disorders; language development and oral communication; development of the memory function.

Results in the Pronunciation Ability Examination Sheet

The test-retest results obtained in the *Pronunciation ability examination sheet* revealed a decrease in the average score in both groups, being more pronounced in GE.

Table 4. Mean values with *Wilcoxon* test/ GE/GC test-retest

	M1 Test	M2 Retest	Z	P
GE	10.41	3.91	- 3.078	.002
GC	9.91	7.83	- 3.114	.002

The *U-Mann Whitney test* revealed ($U = 35,000$; $p = 0.031$), a statistically significant difference at the retest stage between the two groups.

The results of Alice Descoedress Test, for determining the psychological age of the language development. Working hypothesis: The psychological age of the language will advance substantially in GE subjects compared to GC, due to systemic psycho-speech therapy intervention.

The data obtained in the test-retest stages, showed the increase of the average values of the language indicators at each test sample, in both groups, at the retest stage the average values being more or less significant.

Table 5. Average performance values and *Wilcoxon* test, GE/GC test-retest, at *Alice Descoedress test, to determine the psychological age of the language*

	GE				GC			
	Test M1	Retest M2	Z	P	Test M1	Retest M2	Z	P
Test contrary with subjects	5.08	5.83	- 2.460	.014	5.00	5.33	- 1,265	.206
Gap test	4.58	5.75	- 3.276	-.001	4.75	5.08	- 2.000	.046
Test series digits	4.33	5.50	- 3.276	.001	4.50	4.75	- 1.732	.083
Test matter	3.83	4.08	- 1.732	.083	4.00	4.16	- 1.414	.157
Proof of Contradictions without support	4.83	5.08	- 1.732	.083	4.91	5.25	2.000	-.046
colour test	5.33	6.33	- 2.972	.003	5.50	6.25	- 2.714	.007
Verb test	5.00	5.91	- 2.428	.015	4.75	5.16	- 2.236	.025
The psychological age of language	4.41	5.58	- 3.276	.001	4.66	4.91	- 1.334	.180
Chronological age	5.35	5.84	- 3.276	.001	5.42	5.90	- 3.276	.001

Only in the experimental group, the *Wilcoxon test* showed a statistically significant difference ($Z = -3.276$; $p = 0.001$), and in the control group ($Z = -1.342$; $p = 0.180$) the changes are insignificant. At the retest stage between the progress of the psychological age of the language in the experimental group

and the control group there was a statistically significant difference ($U = 31,000$; $p = 0.007$). In conclusion, we state that the increase of the psychological age of the language in GE preschoolers is due to the involvement in the psycho-speech therapy system, which had a positive influence on its development. The test results, as a whole, confirm the working hypothesis.

Results on the Bankson-2 Language Assessment Test (BLT-2). Working hypothesis: the development of the linguistic structures (morphological, syntactic, pragmatic semantics), following the systemic psycho-speech therapy intervention in GE subjects will evolve more than the GC subjects.

Table 6. Average values, test – retest GE/GC, at *Bankson Test – 2*

	GE				GC			
	Test M1	Retes t M2	Z	P	Test M1	Retes t M2	Z	P
Semantic knowledge	26.91	33.16	-3.169	.002	27.33	27.66	-2.000	.046
Morpho-syntactic rules	41.58	46.33	-3.089	.002	41.66	41.91	-1.732	.083
Pragmatic language	4.41	4.66	-1.732	.083	4.16	4.33	-1.414	.157

The *Wilcoxon test* revealed statistically significant progress only in GE subjects: to the *Semantic Knowledge* and the *Morpho-Syntactic Rules*; in GC subjects the progress was insignificant. At the level of the *Pragmatic language*, there were no significant differences in both groups. At the testing stage, the differences found in the BLT-2 test subsections between GE and GC were statistically insignificant, the GE and GC groups being homogeneous; at the retest stage the application of the *U-Mann Whitney test* indicated significant differences between GE and GC, only at the *Semantic Knowledge* ($U = 35,000$; $p = 0.032$) and the *Morpho-syntactic Rules* ($U = 29,500$; $p = 0.014$); at the level of the *Pragmatic language* the differences were not significant ($U = 57,000$; $p = 0.371$). In conclusion, we mention that the *Pragmatic Language* requires more activities, carried out in micro groups of children, a longer period of intervention, especially when it comes to children with a language disorder. The results of the BLT-2 test partially confirm the working hypothesis.

Results in NEPSY battery language tests. *Hypothesis:* we assume that the level of the phonological processing, receptive and expressive language skills will be more developed in GE subjects than in GC subjects and there will be statistically significant differences. The analysis of the test-retest results in the language field within the NEPSY battery indicated a *slight advance* in the GC subjects, the cumulative average of the standard scores for the three language tests being $M1 = 33.58$; $M2 = 34.00$; *the Wilcoxon test* shows $Z = -2,236$; $p = 0.025$. In GE subjects, the qualitative leap occurred *more significantly*, the cumulative average of the standard scores on the language field being $M1 = 33.50$; $M2 = 35.33$. *The Wilcoxon test* indicates $Z = -2,911$; $p = 0.004$).

Table 7. Mean values and *Wilcoxon test*, GE/GC test-retest, at the (NEPSY) *Language tests*

	Test M1	Retest M2	Z	P
GE	33.50	35.33	- 2.911	.004
GC	33.58	34.00	- 2.236	.025

At the retest stage between GE and GC there are statistically significant differences, the values of the *U-Mann-Whitney test* being $U = 31,500$; $p = 0.016$). This allows us to conclude that the impact of the systemic psycho-speech therapy program on GE children was profound, meaning a better ability to phonologically process, understand verbal instructions of increasing complexity, or quickly name familiar words.

Results of Memory and Learning Tests and Attention Tests / Executive Functions, within the NEPSY battery. *Hypotheses:* we assume that the development of the memory function and the level of development of attention/executive functions at GE will be more developed than at GC, positive changes due to psychological and speech therapy intervention.

At the testing stage, the differences found in the memory and learning tests, as well as the attention/executive functions between GE and GC were statistically insignificant; The results obtained at the test-retest demonstrate a progress in development only at the level of the *Mnemonic Functions*, at *Attention/executive functions* the size of the advancement being close in value to both groups.

Table 8. Average performance values and *Wilcoxon test*, GE/GC test-retest, at *Memory and learning and Attention/Executive functions* within the NEPSY battery

	GE				GC			
	Test M1	Retest M2	Z	P	Test M1	Retest M2	Z	P
Memory and learning	24.83	26.25	- 3.153	.002	24.58	24.75	- 1.414	.157
Attention/executive functions	27.66	28.00	- 2,000	.046	27.20	27.50	- 1,732	.083

The application of the *Wilcoxon test* revealed a significant test/retest progress only in GE preschoolers and only in the field of Memory and learning: $M1 = 24.83$; $M2 = 26.25$; $Z = - 3.153$; $p = 0.002$; In the field of *Attention/executive functions*, the dynamics was reduced in both samples, the statistical values being insignificant. The *U-Mann Whitney test* did not indicate significant differences between GE/GC in the test stage, only at the retest stage from the perspective of the development of the *Mnemonic Function* in GE subjects ($U = 32,500$; $p = 0.020$). We mention that there has been a change, a positive leap in *Memory functions (memory and learning)* between GE and GC subjects, the result of systemic psychological intervention - with content focused on the memory development, but also speech

therapy intervention with visual-verbal content, updating a text freely or based on clues. The fact that the preschoolers in GC received speech therapy assistance throughout the experiment also contributed to the development.

For the field of *Attention/executive functions*, the psycho-speech therapy program did not produce important neuropsychic changes, however, the fact that there are positive effects on the attention due to the systemic intervention program, the leaps produced in memory also speak.

The results in the Auditory-verbal memory capacity assessment test and in the visual memory capacity assessment test. Working hypotheses: the ability to memorize a series of auditory-verbal and visual elements will be improved/optimized following the psycho-speech therapy intervention. At the testing stage, the differences found in the two samples were statistically insignificant. The results obtained in these two tests at the test-retest stages attest to positive qualitative changes in the capacity of auditory and visual memory, under the influence of the psycho-speech therapy program, in the experimental group.

Table 9. Mean values and *Wilcoxon test*, for *auditory-verbal memory and visual memory*

	GE				GC			
	Test M1	Retest M2	Z	P	Test M1	Retest M2	Z	P
Number memory (auditory)	3.58	4.66	- 3.357	.001	3.66	3.83	- 1.000	.317
Image memory (visual)	3.66	5.33	- 3.176	.001	3.75	3.91	- 1.414	.157

The *U-Mann Whitney test* values are statistically significant in the retest stage, both from the perspective of the *Number Memory* ($U = 24,000$; $p = 0.002$) and from the perspective of the *Image Memory* ($U = 8,500$; $p \leq 0,001$). The obtained data allow the validation of the working hypothesis, due to the systemic intervention program, which confirms its correct and logical structuring.

The Results of the Memory-Learning Report for Preschoolers. Hypothesis: the ability to memorize and learn word pairs by mechanical association, will have higher results in GE than GC; between them we shall record significant differences. In this test, the ability to associate words on logical criteria was not investigated, as the results obtained at the testing stage, from the perspective of preschoolers with polymorphic dyslalia, were similar to those of preschoolers with typical development, while at the ability of the mechanical association of the word pairs the results were different. The analysis of the test-retest data recorded at the *Mechanical Association of Words*, by GE and GC indicated a development progress in GE subjects only in terms of *the number of pairs rendered* in the word list ($Z = -3.071$; $p = 0.002$), (table 11), not from the perspective of *the number of repetitions* necessary to learn the word list or *the memorization time* of the mechanically associated word pairs.

Table.10. Average performance values and *Wilcoxon* test, at the *Memory-learning ratio highlighting test, mechanical associations, GE/GC, at the test-retest*

	GE				GC			
	Test M1	Retest M2	Z	P	Test M1	Retest M2	Z	P
Mechanical associations (playlist 2)	4.00	5.58	- 3.071	.002	4.08	4.33	- 1.732	.083
Mechanical association repetitions (list 1)	4.75	4.58	- 1.414	.157	4.58	4.50	- .577	.564
Mechanical association time (list 1)	5.58 min (358 s)	5.53 min (353 s)	- 1.867	.062	6.02 min (362 s)	6 min (360 s)	- 1.841	.066

The application of the *U-Mann Whitney test* at the retest stage showed that the difference between GE and GC subjects is statistically significant in terms of the mechanical learning of word pairs ($U = 28.5000$; $p = 0.010$). In this case, the working hypothesis is partially confirmed, only from the perspective of the average number of mechanical word associations, between GE and GC, there are significant differences in terms of memory/ learning capacity of some word pairs, through the influence of the program of the psycho-speech therapy intervention.

Conclusions in chapter 3. 1. At the formative stage, the homogeneous groups GE and GC were formed. With GE, the intervention had a psycho-speech therapy character; with GC the intervention was mainly speech therapy. **2.** At GE, after the application of the systemic psycho-speech therapy program, the data indicated an important positive leap in fixing pronunciation disorders. At GC the data showed improvements in the pronunciation capacity, with few total recoveries, more with changes in framing diagnoses within the limits of a milder symptomatology (monomorphic dyslalia). **3.** On the dimension of the language Development, we found that the psychological age of the language, at the retest stage, registered a higher advance in GE, compared to GC. **4.** At the semantic and morpho-syntactic levels of the language, the GE's performance consisted in a better capacity of phonological processing, of understanding some verbal instructions of increasing complexity or of quick naming of some familiar words. In the development of the pragmatic language, the data were not significant enough. **5.** Regarding the updating capacity (of the number of word pairs rendered) of some mechanical associations, the statistical analysis of the test-retest data indicated a significant progress in the subjects from GE, signifying a better efficiency of the mechanical learning in these subjects, thus strengthening the value of the applied psycho - speech therapy program. **6.** In the case of the auditory-verbal memory and the visual memory, it was found that the statistical results obtained reveal important qualitative changes in

the ability to retain a series of auditory and visual elements. **7.** When developing a mnemonic function (memorization and visual-verbal learning, updating a text, free or based on clues), the differences are significant at the level of GE subjects, compared to GC subjects. **8.** Statistical results attest to the efficiency of the strategies used in the psycho-speech therapy intervention program, respectively the finding that by engaging all the language structures and memory training focused on the development of auditory-verbal and visual working memory, on learning simple memorization techniques, the learning process is improved and significantly increases the level of performance in verbal tasks, together with the improvement and even overcoming the pronunciation disorders with the senior preschoolers.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

Through the present research, the theoretical-applied psychological foundations have been established, which are the basis for identifying an alternative way of developing the language and oral the communication in preschoolers aged 5-6, by considering the relationship between pronunciation and memory disorders, and has been developed, implemented and approved a systemic psycho-speech therapy intervention program aimed at recovering the pronunciation disorders (polymorphic dyslalia) in preschoolers focused on language development, communication in relation to/and the memory function.

The important scientific experiences of the research are stipulated in the general conclusions:

1. Language is a complex communication process, which requires a systemic, multidimensional approach, both in assessment and intervention.
2. Language disorders have a lasting influence on the language structures. In senior preschoolers with polymorphic dyslalia all the components of the language are affected, the psychological age of the language relative to the chronological age is slightly retained in development, even if it falls within the limits of the normal running and ultimately creates impediments to development.
3. Language disorder (polymorphic dyslalia), is related to deficits in the memory function, with slight disturbances of neurocognitive functions (areas of attention/ executive functions, sensory-motor functions and visual-spatial processing) - the differences being significant between the two groups (D and N), although the performances delimited in preschoolers with polymorphic dyslalia, fall within the limits of the normal running (with a tendency towards the lower limit).
4. Between the variables of the ascertaining research certain statistical correlations were established: important positive correlations between the variables representing linguistic abilities (Psychological age of the language, Language, Semantic knowledge, Morpho-syntactic rules, Pragmatic language) and the variables representing mnemonic functions (Memory and learning, Mechanical association of words, Auditory memory, Visual memory), as well as significant indirect correlations between pronunciation disorders and language skills, respectively mnemonic/neurocognitive functions. The idea derived from the correlational study is a bipolar one; by developing language and oral

communication in relation to the mnemonic function (working memory) we shall indirectly influence the pronunciation disorders, in the sense of accelerating their diminution and remediation in senior preschoolers.

5. The finding of the interrelation between TL (polymorphic dyslalia) and the mnemonic/neurocognitive function, is an imperative for specialists (psychologists /speech therapists), when establishing a work schedule with preschoolers with language disorders. Neglecting the systemic intervention, the link/interdependence between TL and ML can have far-reaching consequences at the beginning of the school and the period of early schooling. In the specialized literature we have not attested complex researches that should focus on the amelioration and overcoming of pronunciation disorders in an extended form, in relation to the mnemonic function (ML) in senior preschoolers. As a result, we developed and implemented a systemic program of psycho-speech therapy. The implementation and validation of the systemic psycho-speech therapy program was possible by involving two groups of preschoolers (GE and GC), the homogeneity of the groups being statistically established.

6. The proposed innovative methodology is focused on principles, goals and didactic strategies interposed psychologically and speech therapy, aiming a) Fixing the pronunciation disorders, b) Development of the language and oral communication and c) Valorisation and optimization of the memory functions (neurocognitive). For each child in GE, individualized goals were set, in accordance with their developmental needs in terms of language and communication, and memory working.

7. The retest data indicated in the experimental group an important positive leap in: recovery of the polymorphic dyslalia, highlighted mainly by the existence of cases in which the speech therapy diagnosis was reviewed in simple dyslalia or it was excluded; the increase of the psychological age of the language, the progress in the phonological processing, the evolution at the level of the semantic and morph-syntactic linguistic structures.

8. The administration of the methods and the techniques, exercises and psychological games of capitalization and development of mnemonic/neuropsychic functions have determined qualitative changes, statistically significant in the capacity of memorization and visual-verbal learning, in updating a text, memorizing pairs of words in mechanical learning tasks, respectively at the level of the ability to memorize a series of auditory and visual elements (working memory).

9. Overall, the training/ engagement of all language structures and mnemonic training focused on developing the auditory-verbal and visual ML capacity, as well as on learning simple memorization strategies, improves the learning process and significantly increases the level of performance in verbal tasks, along with the remission and even overcoming the pronunciation disorders (polymorphic dyslalia) in the senior preschoolers.

Recommendations for implementation:

The comparative research can also be performed on other samples of children, of other ages, with other language disorders and with other types (forms) of disabilities.

The language disorders may also be different, as well as their relationship with the child's physical development, other mental functions/processes (cognitive, socio-emotional, behavioural). Interesting would be both cross-sectional and longitudinal studies. We consider that the results of this research genre would be very innovative.

The theoretical and empirical information contained in this paper may be included in methodological guides, good practice guides, intended for practitioners in the field, or may be used in continuing education or specialization courses for psychologists, speech therapists, itinerant/support teachers, etc.

The set of the psychological and speech therapy methods applied in assessment/ investigation can be taken over by specialists in the diagnosis of the language problems and neuropsychic functioning. The set of the methods selected and applied by us can be used in express-diagnosis and by the Multidisciplinary Commissions for the children's assessment, obviously, and by each speech therapist or psychologist separately at any stage of assessment.

The systemic psycho-speech therapy intervention program offers a series of methodological guidelines for specialists, which can be implemented in the current practice of the psychological and speech therapy offices or in various educational centres, to improve the activities of specialists in the field. The program represents a set of methods, techniques, exercises, games that can be taken over, adapted, modified depending on the objective advanced by the specialist, guided by certain principles (principle of individualized and complex approach, principle of participation to the process (child/parent and the legal representative of the child, confidentiality), taking into account the age of the child, the specific features of the child's personality, the features of the chronological age and the individual features of the child's development, the environment in which the child grows and is educated.

Suggestions for future researches. Starting from the experimental results of this paper, new research can be organized to investigate: - pronunciation disorders in relation to mnemonic function in subjects from other age categories, such as those aged 6-7 years, 7-8 years; - pronunciation disorders in relation to dyslexia-dysgraphia and mnemonic function in students in primary school; - language disorders in relation to other psychic processes; - language disorders in relation to (different) mental processes in people with different disabilities; - existing tangents in preschoolers with language disorders (group of pronunciation disorders: dyslalia, dysarthria, rhinolalia) and mnemonic/neuropsychic functions.

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ADNOTARE

Buganu Diana Alina. Intervenții psihologice și logopedice în tulburări de limbaj și comunicare la preșcolari. Teză de doctor în Psihologie. Chișinău 2021.

Structura tezei: Teza este constituită din: adnotări, lista abrevierilor, introducere, trei capitole, concluzii generale și recomandări, bibliografie din 246 titluri, 9 anexe, 134 pagini de text de bază, 34 figuri și 79 tabele. Rezultatele obținute sunt publicate în 15 lucrări științifice.

Cuvinte-cheie: nivel de dezvoltare a limbajului, comunicare, tulburare de pronunție, dislalie polimorfă, funcție mnezică, funcții neuropsihice, procesare fonologică, program sistemic de intervenție psiho-logopedică, funcționare senzorio-motorie, procesare vizuo-spațială.

Domeniu de studiu: Psihologia comunicării și tulburărilor de limbaj.

Scopul cercetării: elaborarea, implementarea și validarea eficienței unui program sistemic de intervenție psiho-logopedică, destinat remedierii tulburărilor de limbaj și comunicării, în baza studierii/evaluării particularităților dezvoltării limbajului și comunicării în relație cu funcția mnezică, la preșcolarii mari.

Obiectivele cercetării: diagnosticul tulburărilor de pronunție, identificarea nivelului de dezvoltare a limbajului oral, memoriei și funcționării neuropsihice în contextul prezenței tulburărilor de pronunție, determinarea semnificației relației dintre tulburările de pronunție și funcționarea mnezică, la preșcolarii de 5-6 ani; elaborarea și implementarea unui program sistemic de intervenție psiho-logopedică axat pe dezvoltarea limbajului și comunicării, și a funcției mnezice la preșcolarii mari, în vederea remedierii tulburărilor de pronunție, evaluarea și aprobarea efectelor programului psiho-logopedic administrat.

Rezultatele obținute care contribuie la soluționarea problemei științifice importante constau în: *stabilirea* fundamentelor teoretico-aplicative psihologice care stau la baza *identificării* unei modalități alternative de dezvoltare a limbajului și comunicării la preșcolarii de 5-6 ani, prin *considerarea* relației dintre tulburările de pronunție și memorie; *evaluarea* nivelului de dezvoltare a limbajului și comunicării orale și a memoriei cu *evidențierea* particularităților în dependență de categoria de preșcolari; *elaborarea, implementarea și aprobarea* unui program sistemic de intervenție psiho-logopedic *orientat spre* remedierea tulburărilor de pronunție (dislalie polimorfă) la preșcolarii mari axat pe dezvoltarea limbajului și comunicării în raport cu funcția mnezică.

Noutatea și originalitatea științifică. Pentru prima dată la nivel național s-a realizat studiul comparativ experimental al limbajului oral și comunicării, a funcției mnezice la copiii de vârstă preșcolară mare cu tulburări de pronunție (dislalie polimorfă) și la copii, de aceeași vârstă, cu dezvoltare tipică, în vederea delimitării și interpretării specificului dezvoltării limbajului și comunicării în relație cu funcția mnezică, pe fondul prezenței tulburărilor de pronunție; s-a stabilit o metodologie de evaluare și diagnoză a nivelului de dezvoltare a limbajului și funcției mnezice; s-a aplicat un program sistemic de intervenție psiho-logopedică de dezvoltare a limbajului și comunicării, și funcției mnezice, în vederea remedierii tulburărilor de pronunție (dislalie polimorfă) la preșcolarii mari; au fost elaborate recomandări pentru specialiștii interesați de terapia dislaliei polimorfe.

Semnificația teoretică. Rezultatele investigației aduc un aport științei psihologice și logopedice cu noi informații raportate la cunoașterea relației dintre tulburările de pronunție și funcția mnezică la vârsta preșcolară mare; programul sistemic de intervenție psiho-logopedic poate servi drept reper metodologic în organizarea intervenției ce are în vedere remedierea tulburărilor de pronunție la preșcolarii mari.

Valoarea aplicativă a lucrării: constă în programul sistemic de intervenție psiho-logopedică elaborat, implementat și verificat, util practicienilor, oferind un model alternativ de remediere, dezvoltare a limbajului și comunicării cu reper pe funcția mnezică (memorie); setul de metode selectate și propuse servesc la evaluarea limbajului oral și memoriei preșcolarilor cu tulburări de pronunție.

Implementarea rezultatelor științifice. Materialele rezultate sunt utilizate în procesul psiho-logoterapeutic la nivel preșcolar; în procesul de formare continuă și complementară a psihologilor și logopezilor; sunt recomandate la cursurile Psihologie specială, Logopedie, Asistență logopedică, pentru pregătirea studenților în psihopedagogia specială și masteranzilor în logopedie UPSC "Ion Creangă"

АННОТАЦИЯ

Бугану Диана Алина. Психологические и логопедические вмешательства при расстройствах речи и общения у дошкольников. Докторская диссертация по психологии. Кишинев 2021.

Структура диссертации: Диссертация состоит из: аннотаций, списка сокращений, введения, трех глав, общих выводов и рекомендаций, библиографии из 246 наименований, 9 приложений, 134 страниц основного текста, 34 рисунков и 79 таблиц. Результаты исследования опубликованы в 15 научных трудах.

Ключевые слова: уровень развития языка, общение, нарушение произношения, полиморфная дислалия, мнемоническая функция, нервно-психические функции, фонологическая обработка, системная программа психолого-речевой терапии, сенсомоторное функционирование, зрительно-пространственная обработка.

Область исследования: Психология речевых расстройств и общения.

Цель научной работы: разработка, внедрение и проверка эффективности системной программы психо-логопедического вмешательства, предназначенной для улучшения/преодоления речевых и коммуникативных расстройств, основанной на оценивание особенностей речевого развития и общения во взаимоотношении с мнемонической функцией у старших дошкольников.

Задачи работы: диагностика нарушений произношения, выявление уровня развития устной речи, памяти и нервно-психического функционирования в контексте наличия нарушений произношения, определение значимости взаимосвязи нарушений произношения и функции памяти у дошкольников 5-6 летнего возраста; разработка и реализация системной программы психолого-логопедического вмешательства, направленной на развитие речи и общения, а также функции памяти у старших дошкольников, преодолевая нарушения произношения, оценивание эффективности психо-логопедической системной программы.

Полученные результаты способствующие решению важной научной проблемы. состоят в: *установлении* теоретико-прикладных психологических основ, *определения* альтернативных способов развития речи и общения у дошкольников 5-6 лет *с учетом* взаимосвязи между нарушениями произношения и памяти; *оценивания* уровня развития речи и памяти с *выделением* их особенностей, в зависимости от категории дошкольников; *разработка, реализация и утверждение* системной программы психо-логопедического вмешательства, *направленную* на улучшение/преодоление произносительных нарушениях (полиморфной дислалии) у старших дошкольников путём развития речи и общения в соотношении с функцией памяти.

Научная новизна и оригинальность. Впервые на национальном уровне проведено экспериментальное сравнительное исследование устной речи и общения, мнемонической функции у детей старшего дошкольного возраста с нарушениями произношения (полиморфная дислалия) и у детей того же возраста с нормо-типичным развитием, для разграничения и интерпретации особенностей/специфики развития речи и общения в соотношении с функцией памяти, на фоне наличия нарушений произношения; разработана методика оценивания и диагностики уровня развития речи и функции памяти; была внедрена системная программа психо-логопедического вмешательства для развития речи и общения, а также мнемонической функции; разработаны рекомендации для специалистов, интересующихся терапией полиморфной дислалии.

Теоретическая значимость. Результаты исследования вносят вклад в психологическую и логопедическую науку с новой информацией, связанной с пониманием взаимосвязи между нарушениями произношения и мнемонической функцией в старшем дошкольном возрасте; системная программа психо-логопедического вмешательства может служить методологическим ориентиром и пособием при организации вмешательства, направленного на улучшение/преодоление речевых нарушений произношения у старших дошкольников.

Практическая значимость работы состоит в системной программе психо-логопедического вмешательства, разработанной, внедренной и проверенной, полезной для практикующих психологов и логопедов, предлагающей альтернативную модель преодоления и развития речи и общения со ссылкой на функцию памяти; комплекс выбранных и предложенных методов служит для оценивания устной речи и памяти дошкольников с нарушениями произношения.

Внедрение научных результатов. Полученные материалы используются в психолого-логопедическом /терапевтическом процессе на дошкольном уровне; в процессе непрерывного и дополнительного обучения психологов и логопедов; рекомендуются на курсах по специальной психологии, логопедии, логопедическое сопровождение, для обучения студентов специальности психопедагогики и магистров логопедии в КГПУ «Ион Крянгэ»

ANNOTATION

Buganu Diana Alina. Psychological and speech therapy interventions in language and communication disorders in preschoolers. PhD thesis in Psychology. Chisinau 2021.

Thesis structure: The thesis consists of: annotations, list of abbreviations, introduction, three chapters, general conclusions and recommendations, bibliography of 246 titles, 9 annexes, 134 pages of basic text, 34 figures and 79 tables. The obtained results are published in 15 scientific papers.

Keywords: language development level, communication, pronunciation disorder, polymorphic dyslalia, mnemonic function, neuropsychic functions, phonological processing, systemic psycho-speech therapy program, sensory-motor functioning, visual-spatial processing.

Field of study: Psychology of language disorders and communication

The purpose of the research: consist in elaboration, implementation and validation of the efficiency of a systemic psycho-speech therapy program intended to remedy language disorders, based on the study / evaluation of the peculiarities of language development and communication in relation to the mnemonic function, in high preschoolers. **Research objectives:** diagnosis of pronunciation disorders, identification of the level of development of oral language, memory and neuropsychic functioning in the context of the presence of pronunciation disorders, determination of the significance of the relationship between pronunciation disorders and memory function in preschoolers aged 5-6 years; elaboration and implementation of a systemic program of psycho-speech therapy interventions, focused on the language and communication development, and the mnemonic function in high preschoolers in order to improve / overcome pronunciation disorders, evaluation and approval of the effects of the systemic psycho-speech therapy program administered.

The results obtained that contribute to solving the important scientific problem consists in: *establishing* the theoretical-applied psychological foundations that underlie the *identification* of an alternative way of language and communication development in preschoolers aged 5-6, by *considering* the relationship between pronunciation and memory disorders; *evaluating* the level of development of language and communication and memory with *highlighting* the peculiarities depending on the category of preschoolers; *elaboration, implementation and approval* of a systemic psycho-speech therapy intervention program *aimed at* remedying pronunciation disorders (polymorphic dyslalia) in high preschoolers *focused* on language and communication development in relation to memory function.

Scientific novelty and originality. For the first time at the national level, the experimental comparative study of oral language and communication, of mnemonic function was performed in preschoolers with pronunciation disorders (polymorphic dyslalia) and in children of the same age, with typical development, in order to delimit and interpretation of the specifics of language development and communication in relation to the mnemonic function, against the background of the presence of pronunciation disorders; a methodology for assessing and diagnosing the level of language development and memory function was established; a systemic program of psycho-speech therapy intervention for the development of language and communication, and mnemonic function, was applied in order to remedy pronunciation disorders (polymorphic dyslalia) in high preschoolers; recommendations were developed for specialists interested in the therapy of polymorphic dyslalia.

Theoretical significance. The results of the investigation bring a contribution to psychological and speech therapy science with new information related to knowing the relationship between pronunciation disorders and memory function in high preschoolers; the systemic psycho-speech therapy intervention program can serve as a methodological benchmark in organizing the intervention that aims in remediations of pronunciation disorders in preschoolers.

The applicative value of the paper: consists in the systemic program of psycho-speech therapy developed, implemented and verified, useful to practitioners, offering an alternative model of remediation, development of language and communication with reference on the memory function (memory); the set of selected and proposed methods are used to assess the oral language and memory of preschoolers with pronunciation disorders.

Implementation of scientific results. The resulting materials are used in the psycho-speech-therapeutic process at preschool level; in the process of continuous and complementary training of psychologists and speech therapists; are recommended on the courses Special Psychology, Speech Therapy, Speech Assistance, for the training of students in special psychopedagogy and master students in speech therapy of "Ion Creanga" State Pedagogical University .

BUGANU DIANA ALINA

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