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PROBLEMS OF FORMATION OF THE READING SKILL IN FIRST GRADERS FACING THE RISK OF EARLY DYSONTOGENESIS¹

Abstract. The paper is devoted to an urgent issue of analysis of the risk of reading problems in first graders. The sample includes 428 first graders of general education schools of Arkhangelsk. In the course of the experimental qualitative and quantitative observation, the authors have analyzed the risk factors of early dysontogenesis and the reading skills formation with the help of the questionnaires “Characteristics of early child development”, “Heredity and reading”, “Challenges of teaching reading”, “Typical features of reading skills in schoolchildren”. The article discusses the impact of the micro-social environment on the child’s reading skills. It demonstrates the relationship between the child’s reading problems and the similar problems of the mother, father, siblings or the traditions of family reading and the parents’ education. The analysis of reading problems in junior schoolchildren and the members of their families revealed the similarity of the problems caused by the immaturity of visual-spatial perception, phonetic-phonemic awareness and attention. The article confirms the negative impact of unfavorable factors of early ontogenesis (prematurity and artificial feeding of the baby from birth) on the child’s reading skills. The high rate of negative factors in the early ontogenesis of schoolchildren with problems of reading skills formation causes a saliently uneven development of certain functions significant for effective learning. The basic cognitive functions deficit during the pre-school period of development brings about various forms of school disadaptation, especially at an early stage of schooling. The children who have problems with reading need special support; therefore, timely identification of such schoolchildren will allow to assess their learn-

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ing potential and to design an individual trajectory of rehabilitation and development for each child.

Keywords: early child development; *inherited susceptibility*; risk factors; learning problems; reading problems; first graders; children's reading; reading skills; dysontogenesis.

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Introduction

Modern scientific literature provides detailed description of the issue of challenges of child education. A wide range of problems of emergence of difficulties is analyzed, including those of the reading skill formation: from inherited susceptibility to social deprivation. The study of the child's cognitive development is traditionally carried out in the context of developmental

risks. Nevertheless, the question about the causes and consequences of deviations still remains debatable. Many authors note the significant role of inherited factors and early development risks in the formation of the reading skill [2; 7; 13; 19; 22; 23; 24]. Thus, as far back as 1905, C. J. Thomas, observing several generations of one family, found 6 persons incapable of reading [3; 32]. The possibility of inher-

itance of reading disability is argued in the works by S. Stephenson, who posed a hypothesis about the responsibility of the recessive gene for the formation of ability to read on the basis of analysis of three generations of one family [31]. B. Hallgren studied 276 children with dyslexia and their relatives and found that 88% of the families had problems with reading. Having made up 106 genealogies, the author makes a supposition that the disorder is passed down in the autosomal dominant way with gender-modified degree of manifestation [20]. We can often observe preferential manifestation of specific reading disability in human males. Some authors note that the recessive gene, which is the main cause of inheritance of the given disorder in girls, does not fully explain inherited susceptibility to this disorder in boys [29]. The works analyzing genetic factors are also in the foreground of the modern investigations of the cognitive potential of man [3; 15; 17]. Nevertheless, inheritance of the reading ability does not exclude the impact of the environment on the development of the child's cognitive functions, and specifically on the development of the reading skill. The causes of disorders of functional systems regulating the process of reading may include pathology related to pregnancy and childbirth, chronic and long somatic illnesses, frequent infections in ear-

ly childhood, head traumas, etc. [9; 15; 21]. Thus, it has been discovered that infectious diseases may become both decisive factors in the emergence of reading and writing disorders (in 9 children with dyslexia out of 91 persons tested) and additional causes of development of previous brain lesions (in 12% of cases) [21]. The reading disability may form as a result of impaired metabolism, which may be attributed to specific biological factors [25]. Successful development of the reading skill is said to be connected with the general development of the child [13]. Observing children with reading disorders, researchers report deviations in their personal traits [10; 11; 16; 30]. Such children are characterized by personal immaturity, inadequate social adaptation, and unstable impulsive behavior. They are inadequately focused, absent-minded, can hardly concentrate their attention, and try to avoid psychological effort and difficulties in any kind of activity [33].

The aim of the given research is to analyze the risk factors of the reading skill formation caused by inherited susceptibility and peculiarities of early development of first graders.

1. Research Methods

428 first graders of Arkhangelsk have been observed in the course of the experiment. A complex of various procedures has been used to study the risk factors of early

dysontogenesis, the peculiarities of characteristics (table 1).
the reading skill acquisition and its

Table 1. Methods of research of risk factors of early dysontogenesis, acquisition of reading skills and the reading skill characteristics

Method	Characteristics
<i>Detection of risk factors of early dysontogenesis</i>	
Questionnaire "Characteristics of early child development"	Block 1 — peculiarities of the course of pregnancy and childbirth of the mother, presence of inherited risk factors, psycho-physiological development of the infant up to the age of 1 year
	Block 2 — morphofunctional and cognitive development of the child 1-3 years old
	Block 3 — morphofunctional and cognitive development of the child 3-6 years old
<i>Detection of risk factors of acquisition of reading skills</i>	
Questionnaire "Heredity and reading"	Problems with the reading skill formation in the family members; the nature of reading difficulties in the pupils under study
Questionnaire "Challenges of teaching reading"	
<i>Study of the reading skill</i>	
Questionnaire "Typical features of reading skills in schoolchildren"	Reading speed, reading errors, reading comprehension, skill dynamics

To conduct a comparative analysis, we have formed groups of first graders with different level of acquisition of the reading skill: 96 children with reading problems (Group 1) and 106 pupils with successful acquisition of the skill (Group 2).

The procession of empirical data involved both quantitative and qualitative analysis using a pack of computer programs SPSS Statistics 22.00 for Windows. The statistical procession of results included as-

essment of distribution of qualities with reference to normality using the Shapiro–Wilk test. The comparison of two independent samples with non-normal distribution presupposed the application of the nonparametric Mann–Whitney U test. The structure of relations between the variables under study was investigated with the help of correlation analysis involving calculation of the Spearman's rank correlation coefficient r .

2. Results and Discussion

Our analysis of the questionnaires “Heredity and reading” and “Challenges of teaching reading” aimed at detection of the possibility of inheritance of reading disorders in the pupils revealed 32.0 ± 4.03 % of families in which reading problems were discovered in representatives of the first and second generations. According to the parents under observation, some problems of teaching reading are similar to those of the children and are mostly brought about by poor visual memory, low concentration of attention and inadequacy of visual-spatial and phonetical-phonemic perception. But the question “What are the main causes of the reading problems in your child?” was more frequently answered in the following way: 10.0 ± 2.1 % of the respondents believe that the problems are caused by poor health; 10.0 ± 2.1 % – by the methods of teaching; 37.0 ± 3.38 % – by inadequate support on the part of the parents. The respondents look for the causes of reading problems in the conditions of the social environment, underestimating the biological factors. None of the parents has made any reference to their own difficulties with learning to read in their childhood and the chance of their inheritance. In its turn, the comparison of the results of questionnaires of families with “inherited susceptibility” and without it demonstrated significant differences in the presence of

problems of the reading skill formation in the mother ($p = 0.0001$), father ($p = 0.0001$), and the other children in the family ($p = 0.007$).

Scientific treatises quite often corroborate the impact of environmental causes on the formation of intellectual abilities [4]. Thus, the parents’ attitude towards education changes the variability of the reading ability indicators by 10% [17]. Inadequate social and pedagogical conditions of the child’s development lead to the accumulation of the non-specific negative influence on the development of brain structures and, as a result, to the emergence of general underdevelopment of the system of higher psychological functions and the violation of the processes of formation of school skills and behavior [14]. Our research has found direct ties between the conditions of microsocial environment and the child’s reading problems. The correlation analysis has demonstrated the following dependencies: mother’s reading problems – child’s reading problems: $r = 0.38$; father’s reading problems – child’s reading problems: $r = 0.37$; reading problems of the sisters or brothers – child’s reading problems: $r = 0.38$; family traditions of reading – child’s reading problems: $r = -0.22$; higher education of the parents – child’s reading problems: $r = -0.27$ ($p < 0.05$) (Figure 1).

It has been found out that the parents and elder adult children of only 50% of the families are keen on reading and read to the younger children. Unfortunately, the tradition of family reading has been practically lost. Nevertheless, informal communication during the discussion of the books read may

facilitate the formation of common interests, emotional unity and family comfort. According to I. A. Zetkina and E. A. Nikolaeva, such reading facilitates the formation of learning cognitive interests, raises the social status and enhances all-round development of the child's personality [6].

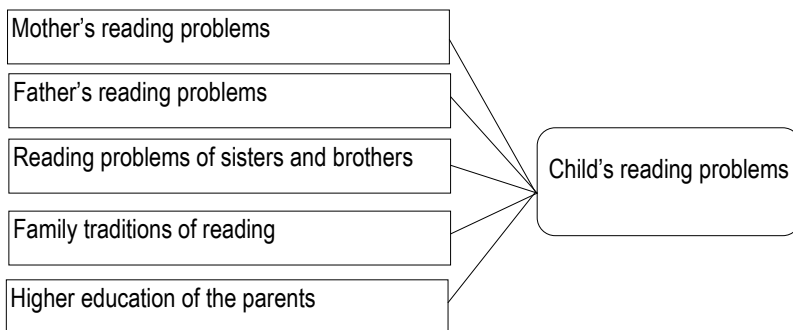


Figure 1. Correlation between the reading problems of the child and the microsocial environment factors.

Legend: thin line — significance at $p < 0.05$ (according to Spearman's rank correlation coefficient).

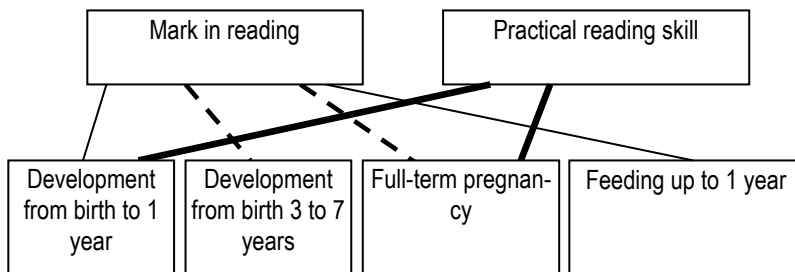


Figure 2. Correlation between the indicators of early ontogenesis and the reading skill development in the first graders under study

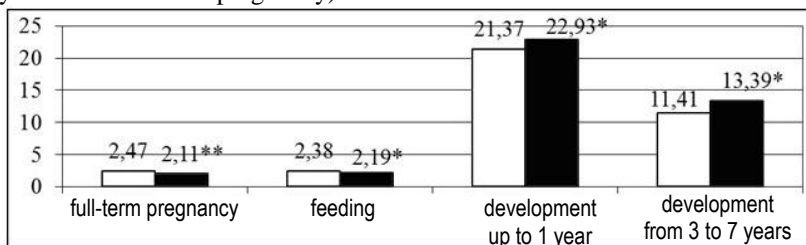
Legend: bold line – very close ties ($p < 0.001$), broken line – moderately close ties ($p < 0.01$), thin line – loose ties ($p < 0.05$).

The issue of delayed consequences of the impact of negative factors in early ontogenesis of children is gaining ever growing scientific and social interest. The results of correlation analysis corroborate the impact of unfavorable early development factors upon the individual reading characteristics of the first grade pupils under observation. We have discovered direct associations between the reading skill indicators and the peculiarities of early ontogenesis (Figure 2).

Full-term pregnancy and proper development of the infant from birth to 1 year have close ties with the quantitative characteristics of the skill – practical reading skill (speed and accuracy). We have discovered positive correlations between the indicators of early ontogenesis (the specificity of development up to 1 year and from 3 to 7 years of age, type of feeding up to 1 year and full-term pregnancy) and

the mark in reading. Researchers have often noted that premature babies are characterized by immaturity of brain structures [27], sensory-motor underdevelopment [12], underdevelopment of speech [18] and visual-spatial perception [28], and poor reading comprehension in the pupil [13]. The children formula-fed from birth are distinguished by intellectual underdevelopment [5], less progress in speech formation during school years [8], and, in general, by cognitive development deficiency [26]. This testifies to the significance of the perinatal period of ontogenesis for the holistic development of the cognitive activity of the child, and specifically the process of reading.

The comparative analysis of the two groups of children differing in reading proficiency has revealed a number of significant differences (Figure 3).



□ poor readers; ■ good readers

Figure 3. Average values of early development score-based indicators of first graders with different level of development of the reading skill

Legend: ** — at $p < 0.01$, * — at $p < 0.05$ (according to the Mann–Whitney U test).

We have discovered significant differences in manifestation of the risk factors during the perinatal period of development – in Group 1, there were more premature babies: $40.4 \pm 5.06\%$ in comparison to $24.0 \pm 4.18\%$ in Group 2. The average score of Group 1 in this parameter was 2.1 ± 0.09 in comparison to 2.47 ± 0.08 of Group 2. The pupils of Group 2 have better scores for feeding during the first year of life: 2.38 ± 0.06 in contrast to the pupils of Group 1 – 2.19 ± 0.07 ($p = 0.05$). This fact suggests a greater number of formula-fed babies in Group 1: $18.1 \pm 3.97\%$ in contrast to $7.6 \pm 2.58\%$ in Group 2.

The comparison of development indicators of the children up to one year and from 3 to 7 years of age in the presence of risk factors revealed higher values in Group 1: the average score was 22.9 ± 0.57 and 13.39 ± 0.29 correspondingly in comparison to 21.3 ± 0.49 and 11.41 ± 0.22 in Group 2 ($p < 0.05$). It should be noted that in both groups, there was a large percentage of children with a high risk of developmental deviations during the first year of life: in Group 2 – $47.6 \pm 4.90\%$, in Group 1 – $48.9 \pm 5.15\%$. Nevertheless, at preschool ages (3-6), the number of such children in Group 2 radically decreases and makes up $22.3 \pm 4.1\%$ in comparison to $42.6 \pm 5.1\%$ in Group 1.

The period from birth to 3 years is marked in the ontogenesis of man

as the most significant time for the development of neuropsychological functions. At this stage of the nervous system development, we observe intensive increase of brain mass and emergence and differentiation of interneuron ties. Active interaction between the child and the environment, which is more efficient only with the help of the adults, plays an important role in the formation of inter- and intramodal neuron ties. It is a period of “primary education”, when “neural ensembles” as a basis for the formation of more complex and versatile kinds of cognitive education are formed [1]. The presence of the necessary and considerable environmental interventions and their timely inclusion favorably tell on the child’s nervous system development, stimulate a certain function and thus facilitate successful adaptation to the ever changing requirements and conditions of the external environment. During the period of early childhood, from 1 to 3 years of age, the role of socio-psychological factors, and first and foremost situation in the family, radically increases. Neutralization of negatively affecting factors in the group of good readers might be attributed to the abovementioned arguments: favorable socio-psychological situation, loving and caring attitude of the parents and developing training facilitate the

formation of the child's psychological functions.

3. Conclusion

The results of our study agree with the supposition that both genetic and environmental causes may become risk factors of reading difficulties. The study of the specificity of early ontogenesis of the first graders under observation demonstrated their significance for successful formation and development of the reading skill. The works of specialists in various fields show that the beginning of schooling presenting new complicated requirements to the child's cognitive sphere may serve as an indicator of its inefficiency leading to various forms of school disadaptation. The cognitive functions basis deficit, developing during the first seven years of life, may turn out to be the cause of learning problems, especially at the initial stage of schooling. High frequency of "damaging" factors in the early ontogenesis of the children under study aged 7-8 years with problems of the reading skill formation causes saliently irregular development of the significant learning functions leading to certain manifestations of disadaptation. In view of what has been said, early assessment and analysis of the anamnestic data for timely diagnostics of the child's potential and design of rehabilitation-educational measures become especially urgent.

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