

FEATURES OF THE EMOTIONAL STATUS OF SCHOOLCHILDREN WITH DIFFERENT PROFILES OF LATERAL PHENOTYPE

Zachowania emocjonalne u dzieci w wieku szkolnym z różną lateralizacją mózgu

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A- przygotowanie projektu badania (study design), **B-** zbieranie danych (data collection), **C-** analiza statystyczna (statistical analysis), **D-** interpretacja danych (data interpretation), **E-** przygotowanie maszynopisu (manuscript preparation), **F-** opracowanie piśmiennictwa (literature search), **G-** pozyskanie funduszy (funds collection)

Summary

Background: Success of school education depends on many factors, including the most important mental function of a child, namely the type of hemispheric asymmetry of the brain that determines the characteristics of perception, memory, thinking strategy and the emotional sphere. Accounting the patterns of mental functions of a child constitutes the basis for the individualization of learning processes with the focus on maintaining the health of children and adolescents. The type of the hemispheric asymmetry is determined by the lateral phenotype of the subject, which is the set of peripheral motor-sensory asymmetries.

Aim of the study: To evaluate emotional and personal characteristics of pupils with different lateral phenotypes.

Material and methods: 227 schoolchildren (Caucasians) aged 7-15 years living in the city of Krasnoyarsk. The pupils were recognized clinically as healthy and they achieved the average physical and sexual development. Their lateral phenotype was assessed by the psychomotor tests for the guiding hand, the leading leg, eye and ear. The study aimed to explore the emotional personality traits, using child personality questionnaire G.U. Eysenck adapted to the childhood age and to estimate the level of intra - extraversion and neuroticisms in points.

Results: Among schoolchildren of Krasnoyarsk city, there were numerous groups of children with right lateral and mixed phenotypes in combination with extroverted personality type and emotional stability. Among the children with left lateral and symmetric phenotypes almost half of the subjects recorded introverted personality type combined with high levels of neuroticism.

Conclusions: The components of a child's personality such as introverted personality type combined with high levels of neuroticism reduce the body's adaptive capabilities of children and dictate the need for psycho-pedagogical correction. The results of the research can be used in psychology, age physiology and pedagogic.

Keywords: lateral phenotype, schoolchildren, personality type, level of neuroticism

Streszczenie

Wstęp: Sukces edukacyjny dziecka zależy od wielu czynników, z których najważniejszymi są jego funkcje umysłowe takie jak lateralizacja mózgu, która określa jego percepcję, pamięć i strategie myślenia jak również sferę emocjonalną każdego ucznia. Określenie funkcji umysłowych każdego ucznia stanowi podstawę indywidualizacji procesu nauczania z jednoczesnym zachowaniem prawidłowego rozwoju dzieci i nastolatków. Typ lateralizacji czynnościowej mózgu jest określany na podstawie fenotypu każdej jednostki i stanowi zespół cech ruchowo – sensorycznych.

Cel pracy: Zbadanie cech osobowościowych i emocjonalnych uczniów o różnych fenotypach asymetrii mózgu.

Materiał i metody: Badanie przeprowadzono na 227 uczniach pochodzenia kaukaskiego w wieku od 7-15 lat mieszkających w Krasnojarsku. W badaniu medycznym uczniów określono jako zdrowych i na średnim poziomie rozwoju fizyczno – seksualnego. Rodzaj lateralizacji mózgu został określony przy użyciu testów ruchowych i badających funkcjonowanie mózgu na występowanie dominacji ręki, nogi, ucha i oka. Badanie miało również na celu określenie cech emocjonalnych i osobowościowych na podstawie testu Hansa Eysencka dostosowanego do wieku dziecięcego, aby ocenić u uczniów ich poziom introwertyczności i ekstrawertyczności oraz psychotyczności i neurotyzmu w punktach.

Wyniki: Wśród dzieci z Krasnojarska wyodrębniono liczną grupę dzieci z dominującą prawą półkulą cechami ekstrawertyczności oraz stabilności emocjonalnej. Wśród dzieci z dominacją lewej lub symetrycznym fenotypem wyniki badań wskazały, że ponad połowa z nich charakteryzuje się introwertycznym typem osobowości z wysokim poziomem neurotyczności.

Wnioski: Introwertyczny typ osobowości u dzieci oraz wysoki poziom neurotyczności pomagają zmniejszać możliwości adaptacyjne u dzieci i tym samym mogą wymagać psychologiczno – pedagogicznego wsparcia. Wyniki badania mogą być użyte w psychologii, fizjologii rozwojowej oraz pedagogice.

Słowa kluczowe: typ lateralizacji, dzieci wieku szkolnym, typ osobowości, poziom neurotyczności

Background

Democratization of school education sharply raised the intensification of educational processes. These processes in school education, in conjunction with progressive disadvantage of children's health, affect the ability of students to adapt to school and, in particular, to master curriculum [1,2]. The problem of the success and the effectiveness of training depend largely on the individually-oriented approach to students, which should be based on the implementation of physiologically appropriate teaching methods that take into account their personal characteristics as well as their emotional and cognitive functions [3].

The type of the hemispheric asymmetry is an important indicator of brain activity in children: originality reflects higher brain functions of a child; determines the specificity of emotional and personal qualities of a child, in particular, the temperament [4,5]. According to the model of lateral cerebral organization of the emotion-genic systems, the left hemisphere of the emotion-genic system (cortical and subcortical education) is associated with "giperstenic" emotions (euphoria, anxiety) and are characteristic for the extraverted personality type, while the right brain - with "asthenic" emotions (sadness, fear), which are characteristic for the predominantly introverted personality type [6,7].

It is found that dominance of one hemisphere in mnemonic functions is, to a certain extent, due to the peripheral asymmetries, namely the degree of dominance of the leading arm, leg, ear and eye. The type of hemispheric asymmetry is often determined by the lateral phenotype of the subject, which is the set of peripheral psychomotor asymmetries [8,9].

Purpose of the study

The purpose of this study was to evaluate the emotional and personal characteristics of students with different profiles of lateral phenotype.

Materials and Methods

227 schoolchildren, aged 7-15 and living in the city of Krasnoyarsk, were examined. The pupils were recognized clinically healthy and achieved average physical and sexual development. There were two research age groups formed: 7-11 years and 12-15 years. Sensomotor asymmetry was assessed using experimental tests proposed by N.N. Bragina with a co-author (1998).

Stage 1. Questionnaire. Tests written with the right or left hand revealed the dominant hand. Rating: 7 points indicates ambidexterity;

Stage 2. Samples to identify the dominant hand: dynamometers, interlocking fingers, crossed hands, applause;

Stage 3. Samples to identify the dominant leg: put the leg over the other, jumping on one leg, hitting the ball;

Stage 4. Samples to identify the dominant eye: wink, watch a telescope, Rosenbach probe;

Stage 5. Samples to identify the dominant ear: clock ticking, whispered speech, dichotic testing.

Ambidexterity Rating: sum of the left indicators was equal to the sum of the right indicators; mixed profile recorded at various combinations of left and right indicators [1].

Children surveyed were divided into groups according to the severity of symptoms of right lateralization. The first group consisted of children with the left one in three indicators. The second group included students with balanced performance and the third group - with various combinations of left and right indicators. The fourth group consisted of children with three right-wing figures.

The study of emotional personality traits was produced using child personality questionnaire G.Y. Eysenck [2] adapted for childhood age. Rating Scales (extra/introversion, neuroticism and emotional stability, scale lies) were calculated in points. Estimated level of intra – extraversion and neuroticism was calculated in points. Extrovert testified above 12-24 points. 4 points on a scale of lies was taken as critical, above which the results were considered unreliable.

Data analysis was performed using the statistical software package STATISTICA, ver. 6.0. (StatSoft Inc. USA). The analysis of the statistical significance of differences of qualitative features is performed using the criterion c adjusted Yeats, and for small samples - bilateral Fisher's exact test. The results of the study of qualitative features are presented as absolute (abs.) and relative (%) of frequency 95% confidence interval (CI) [10]. Changes were considered statistically significant at a significance level of $P < 0.05$.

Results

The most numerous, among the schoolchildren in Krasnoyarsk, was a group of students (group 4) with the right lateral profile sensomotor asymmetry 56.42% (Fig.1). Less numerous - a group of students with mixed indicators of lateral phenotype 30.71% (group 3). Pupils with symmetrical figures of lateral phenotype (group 2) were 11.5%, and the smallest recorded group of schoolchildren with the left lateral profile of sensomotor asymmetry (group 1). In groups 2, 3 and 4 the difference in age aspect has not been revealed. These findings are consistent with those of other authors, indicating a low incidence of left-handers in Russia [5,6].

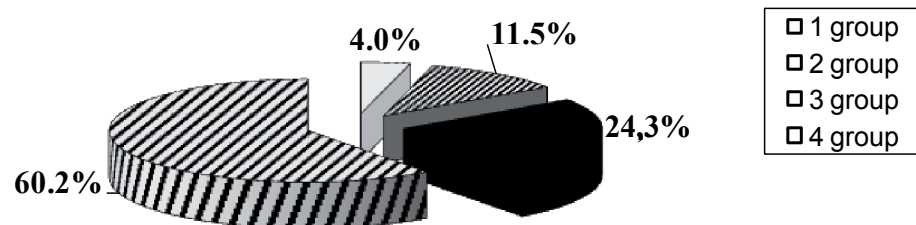


Figure 1. The distribution of lateral phenotype among the schoolchildren of Krasnoyarsk.

Notation for Figures 1, 2, 3: group 1 – schoolchildren with left lateral profile, group 2 - schoolchildren with symmetric profile; 3 - schoolchildren with a mixed profile; 4 - schoolchildren with right lateral profile.

The originality of psycho-physiological features in children with different profile lateral phenotype can be manifested in the character of emotional reactions and behavior. In this context, we analyzed the state of

the emotional status of students depending on the profile of lateral phenotype determining its scale G.Y. Eysenck "intra - extraversion." Results of the survey are presented in Figure 2.

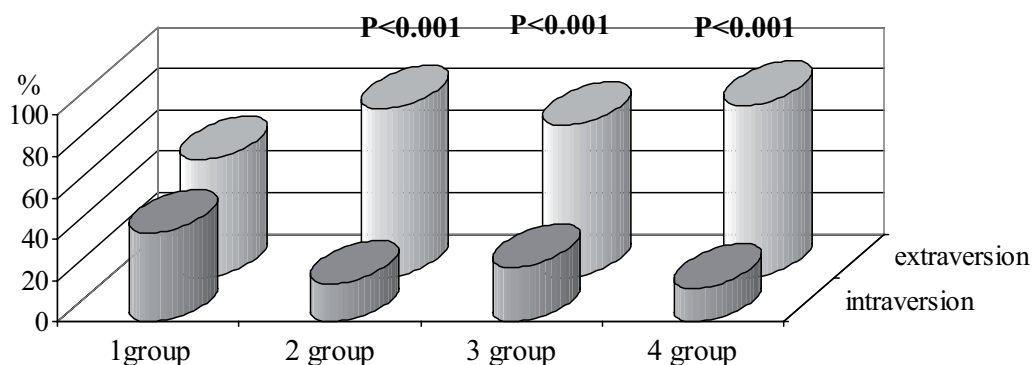


Figure 2. Characteristics of the emotional status of schoolchildren from Krasnoyarsk with different lateral phenotype on a scale of "extra-intraverse".

Note: statistical significance of differences among children with different types of emotional status

The extrovert personality type was predominant in all groups of children and reached statistical significance among schoolchildren with symmetric (group 2), mixed (group 3) and right lateral (group 4) profiles of sensorimotor asymmetry ($P < 0.001$). The exceptions were the students with left sensorimotor profile asymmetry (group 1), among which the extroverted personality type was recorded on average in half of the cases (57%). Extravert level in all subjects groups of children was on a scale G.Y. Eysenck extraversion moderate range (14-15 points). They are characterized by such features as a combination of personality and sociability pin with increased excitability and impulsiveness.

The introvert personality type of Krasnoyarsk students regardless of lateral phenotype was seen in 25% of subjects.

The degree of introversion was 9-10 points (moderate introversion). Introverts have prevailed in the

emotional-volitional sphere restraint, isolation and anxiety [4]. Depending on the lateral phenotype was different distribution pattern introvert personality type among schoolchildren. It was found that with the growth of left lateral signs increased the incidence of the introvert personality type. The greatest number of children were among the introverted students with left lateral profile (43%, group 1).

Another factor, that characterizes the property of an individual and is dependent on the functional activity of the central parts of the regulation of the ANS (reticular formation), is an indicator of emotional instability, as measured by G.Y. Eysenck's scale "neuroticism and emotional stability."

Data analysis showed that children with different profiles of hemispheric asymmetry detected differences in the frequency of occurrence of personal anxiety (Table 1).

Table 1. The distribution of the indicator of emotional instability among Krasnoyarsk schoolchildren taking into account the lateral phenotype

Groups of children with different lateral phenotype	abs.	%	confidence interval
1 group (left lateral profile)	6	57.0	-
2 group (symmetric profile)	12	56.6	53.5-59.6
3 group (a mixed profile)	33	38.0	36.2-39.8
4 group (right lateral profile)	40	38.8	37.2-40.4
P	P1,2-3<0.05; P1,2-4<0.01		

Emotional instability was recorded at more than one-third of all children surveyed. Its level was in the range of high emotional instability (16-17 points) and reached a very high level of emotional instability (19-22 points) in the groups of children with symmetrical profile and left lateral sensorimotor asymmetry, and was accompanied by an increase in the number of these children in these groups ($P_{1,2-4} < 0.01$, $P_{1,2-3} < 0.05$).

We found that children in Krasnoyarsk prevailed emotional stability (70%). The characteristics of

neuroticism and emotional stability by G.Y. Eysenck [2] between Krasnoyarsk schoolchildren with mixed and right profile of lateral phenotype are presented in Table 2. The level of statistical significance was achieved in the group of students with mixed and right lateral profile of sensorimotor asymmetry (11-12 points, average emotional stability). In other groups (left lateral and symmetric profile), the differences were not significant.

Table 2. Characteristic of neuroticism and emotional stability (G.Y. Eysenck) between Krasnoyarsk schoolchildren with lateral phenotype

Data	Groups of children with mixed profile of lateral phenotype		Groups of children with right profile of lateral phenotype	
	emotional stability	emotional instability	emotional stability	emotional instability
abs.	54	33	63	40
%	62	38	61	39
confidence interval	60.6-63.4	36.2-39.8	59.9-62.5	37.2-40.4
P	0.0015		0.0014	

Discussion

The knowledge about individual differences of a child plays the most essential role in the educational process at school. Accounting for the patterns of development of mental functions is the basis of individualization of the learning process with a focus on maintaining the health of children and teenagers [6]. Our data showed the predominance of right and mixed indicators of lateral phenotype among healthy school-age children. The most numerous, among the schoolchildren in Krasnoyarsk, were groups of students with right lateral profile of sensorimotor asymmetry (group 4, 56.42%) and with mixed indicators of the lateral phenotype (group 3, 30.71%). This is consistent with the data of other authors [4] and reflects the correct type of hemispheric response significant part of children to traditional (European) settings pedagogy oriented «left-brain type» response. Hemispheric relations of the brain are psycho-physiological basis of emotional processes [11].

Data of emotional status of the schoolchildren with different lateral phenotype confirmed the concept of lateral brain organization of the emotiogenic systems. Smoothing functional brain asymmetry (2 group, symmetric profile) and increase left lateral signs (1 group, left lateral profile) lead to an increase in the imbalance of personality traits (neuroticism).

Among the children with the left lateral and symmetric phenotypes almost half of the subjects (57%) recorded introverted personality type combined with high levels of neuroticism.

Variations in the level of anxiety among students with different lateral phenotype demonstrate the presence of initially unequal adaptable opportunities of a child organism. Individual lateral phenotype and especially emotional states may be predictive of the success or failure training.

Conclusions

Schoolchildren revealed differences in the distribution of lateral phenotype characterized by an increase in the proportion of subjects with the right parameters and mixed lateral phenotype, in the emotional- personal sphere which prevailed extroverted personality type and emotional stability. The school groups with symmetric and left- lateral phenotype indicators were in minority. We did notice the children with introverted personality type and emotionally unstable, and therefore they may need psychological and special education.

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