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PSYCHOPHYSIOLOGIC ASPECTS OF FUNCTIONAL INTERHEMISPHERIC ASYMMETRY

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Abstract

The aim of the research was to study association of latent left-handedness signs and emotional-personal sphere characteristics and analyze their transformation in age and gender aspects. Four hundred and eight respondents participated in the project: 157 men (38.5%) and 251 women (61.5%) distributed in three groups according to age: Group I – 234 respondents averagely aged (M±SD) 22.7±2.8, Group II – 81 respondents (38.7±6.2), Group III – 93 respondents (57.4±4.4). Psychometric examination was carried out by standardized tests. Signs of latent left-handedness were revealed in 82.4% of respondents. Persons with one sign formed 26.0%, those with two signs – 30.4%, three signs – 14.0%, four signs – 12.0%. In the general sample and gender aspect the number of persons both without signs of latent left-handedness and with a single sign tended to progressively increase with age. A progressing reduction in the number of respondents with two and more signs of latent left-handedness was observed. Seventy eight percent of respondents of the general sample passed the test of sincerity according to Eysenck Personality Inventory (EPI-1 scale), the remaining 87 persons were not further examined. According to test results (EPI-2 scale), an increase in the number of introverts and reduction in the number of extraverts was evident with age, meanwhile the emotional stability index (EPI-3 scale) did not practically change in age and gender aspects. With the increase in age, the number of cholerics was reduced, the number of phlegmatics and melancholics increased. The number of sanguinics among men did not change with age, but was progressively reduced among women. The examination of respondents with Rotter test showed that the number of persons with external personal type increased and the number of those with internal personal type was reduced with age. The associated triad – alexithymia (on Toronto Alexithymia Scale) <=> anxiety (on Staite-Trait Anxiety Inventory) <=> depression (on Beck Depression Inventory) – was in most cases revealed in introverts and externals. With the help of the multiple linear regression model, Spearman and Kendall Tau nonparametric criteria, as well as with cluster and factor analyses it was revealed that positive correlation and the character of association between investigated psychometric parameters altered with age. Thus, it was established, that in age dynamics alongside with the increase of motor interhemispheric asymmetry there occurred an original transformation of respondents' emotional-personal characteristics, which could be considered as an indicator of left-hemispheric lateralization.

Keywords: psychophysiology, interhemispheric asymmetry, psychometrics, emotional-personal sphere, alexithymia, anxiety, depression

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Introduction

The systemic approach in physiology, which provides for asymmetric activity of large hemispheres and peculiarities of their interaction, promoted revision of traditional conceptions on domination of one hemisphere and accentuated functional specialization of each of them [*Windmann S. et al., 2002; Hammond G., 2002; Delvin J. et al., 2003; Hutsler J., Galuske R., 2003; Josse G., Tzourio-Mazoyer N., 2004*]. It is established that the left hemisphere becomes dominant only at a certain stage of ontogenesis. Thus, the process of function transition from the right hemisphere characterized mainly by simultant mode of higher mental function organization to the left one characterized mainly by successive mode of organization has received the name of left-hemispheric lateralization [*Gunturkun O. et al., 2000; Hubner R., Malinowski P., 2002; Gandour J. et al., 2002; Haaland K. et al., 2004*]. In our view, it is essential to consider lateral brain organization as the basis for typology of individual neuropsychologic distinctions. In the opinion of the majority of researchers, the expressiveness of functional interhemispheric asymmetry is a rather dynamic feature based on interaction of genetic and epigenetic factors [*Liang J. et al., 2000; Tomita T. et al., 2000; Geschwind D., Miller B., 2001*]. Methods of brain neurovisualization, lifetime study of its metabolism, neurochemical mapping and determinations of quantitative cerebral blood flow have established that functional interhemispheric asymmetry is based on neuroanatomical and cytomyelo-architectonic [*Rademacher J. et al., 2001; Pujol J. et al., 2002; Barrick T. et al., 2005*], neurophysiological [*Toosy A. et al., 2001; Tsutada T. et al., 2002; Jung P. et al., 2003*] and hemodynamic [*Aubert-Broche B. et al., 2003; Wilson K. et al., 2005*] distinctions of hemispheres themselves, as well as distinctions of some subcortical structures and systems. It has allowed to form a conception on brain asymmetry and the important role of transcallosal interhemispheric interaction [*Reggia J. et al., 2001*].

One of priority directions of modern differential neuropsychology is the investigation of emotional-personal sphere characteristics in the context of motor interhemispheric asymmetry problem. It is revealed that laterality profile of motor, sensor and mental functions correlates with emotional-personal features [*Shenal B. et al., 2003; Brown G. et al., 2004*]. Among motor asymmetries in the majority of neuropsychologic researches manual asymmetry is considered to be the leading one. Study of interhemispheric functional asymmetry becomes especially important for forming of conceptions on partial dominance of the left hemisphere in right-handed persons. Study of association between latent left-handedness signs and emotional-personal sphere characteristics along with analysis of their transformation in age and gender aspects was the purpose of the research.

Material and Methods

Four hundred and eight respondents were involved in the research, including 157 men (38.5%) and 251 women (61.5%) distributed in three groups according to age.

The 1st group was composed of 234 respondents at the age of 19-30, mean age (M) 22.7 (standard deviation [±SD] =2.8), including 102 men (43.6%) and 132 women (56.4%). The 2nd group was composed of 81 respondents at the age of 31-50, mean age (M) 38.7 (standard deviation [±SD] =6.2), including 25 men (30.9%) and 56 women (69.1%).The 3rd group was composed of 93 respondents at the age of 51-65, mean age (M) 57.4 (standard deviation [±SD] = 4.4), including 30 men (32.3%) and 63 women (67.7%) (Fig. 1).

The 1st group of respondents included students and post-graduate trainees. The 2nd and 3rd groups were represented by intellectual contingent: employees working in science and education at the moment of research. All respondents gave informed consent to participate in the project. The research had concordant character. The use of standardized self-evaluation questionnaires allowed ensuring a maximal level of

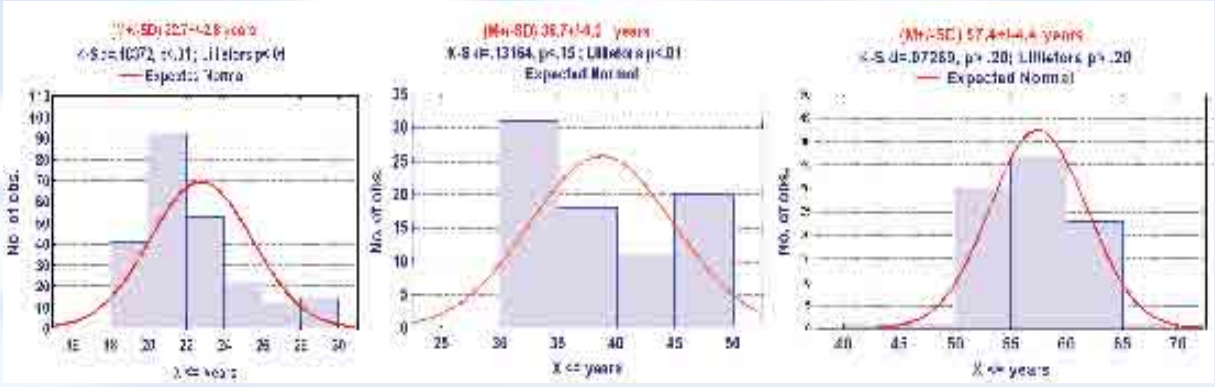

Fig. 1. *Distribution of respondents of various age groups according to Kolmogorov-Smirnov test normality.*

elimination of the researcher's impact on the process of information gathering. The investigations were approved by the Institutional Bioethics Committee. All procedures connected with the interrogation of respondents, information coding, databank formation, primary material storage and its processing were conducted observing ethical standards [*Bernard L., 1995*] and principles of Helsinki Declaration of the World Medical Association and its further supplements.

The following psychometric standardized tests meeting validity and reliability requirements [*Nunnally J., Bernstein I., 1994*] were used in the work:

1. Eysenck Personality Inventory (EPI), intended for study of personal characteristics, including scales for determination of the following parameters:

- EPI-1 sincerity/reticence
- EPI-2 introversion/extraversion
- EPI-3 emotional stability/instability
- EPI-4 temperament (phlegmatic, choleric, sanguinic, melancholic).

The questionnaire totals 57 questions with two answer options.

2. Rotter test – a questionnaire used for revealing external/internal personal type that contains 44 statements with two answer options.

3. Toronto Alexithymia Scale (TAS), which contains 26 questions with 5 answer options and allows grading non-alexithymic and alexithymic personal types.

4. Staite-Trait Anxiety Inventory (STAI), Spielberger anxiety scale, consisting of 40 statements (with 4 answer options), half of them characterizing reactive anxiety (STAI-I) and the rest relating to personal anxiety (STAI-II). The anxiety level has low, moderate, high grades.

5. Beck Depression Inventory (BDI) – a questionnaire consisting of 13 statement groups with 4 answer options that provides an opportunity to discriminate between the light level of depression of situational or neurotic genesis and major depression.

The laterality profile was determined by means of tests for revealing latent left-handedness.

Computer programs were used for processing and standardized interpretation of test results. STATISTICA 6.0, Basic statistic: t-test single sample and Nonparametric Statistic: Correlation [Spearman, Kendal] statistical programs were used for statistical processing of the obtained data. To determine the connection power between the associated factors of the emotional-personal sphere we used STATISTICA 6.0, Multiple Linear Regression. Excel 2003, GraphPad Prism 4 and STATISTICA 6.0 programs were used for making diagrams. Reliability of distinctions between correlation coefficients of investigated parameters in various age groups of respondents was estimated according to Student's t-criterion [*Rosner B., 2006*]. STATISTICA 6.0, Multivariate Exploratory Techniques: Cluster Analysis, Factor Analysis were used for cluster and factor

analysis. Data of psychometric researches are expressed in points (M±SD), (±SE).

Results

Signs of latent left-handedness. Latent left-handedness signs were revealed in 336 (82.4%) out of 408 respondents. It was established that in the general sample the percentage representation of persons with various numbers of latent left-handedness signs was distributed non-uniformly. So, the persons with a single sign constituted 26.0%, two signs – 30.4%, three signs – 14.0%, four signs – 12.0%.

The research revealed that the number of persons both without latent left-handedness signs and with a single sign tended to progressively increase with the age, especially in middle aged persons (31-50 years) and the elderly (51-65 years). At the same time a progressing reduction of the number of respondents with two and more signs of latent left-handedness was marked (Fig. 2).

Sincerity/reticence. During psychometric testing sincerity/reticence characteristic was accepted as a criterion of respondent inclusion and was studied by means of EPI-1 scale. In the general sample 78.6% of respondents (82.2% of men, 76.4% of women) passed the test for sincerity. In the 1st age group sincerity was showed by 85.5% of those surveyed (85.3% of men, 85.6% of women), 2nd group: 75.0% (88.0% of men, 69.1% of women), 3rd group: 64.5% (66.7% of men, 63.5% of women). Hence, it was revealed that the percentage of persons, who showed sincerity, is considerably reduced with age. A marked shift is especially expressed in men of the 3rd age group and in women of the 2nd age group. Based on testing, respondents not showing sincerity (87 persons) were left out of the sample and were not further examined. Thus, the work presents data on psychometric research of 321 respondents (129 men, 192 women).

Introversion/extraversion. Taking into account the existing concepts on domination of the left hemisphere in introverts in contrast to extraverts with the right hemisphere domination and parallel with investigation of individual profile of lateral brain organization manifested in its motor asymmetry, we studied distribution of introverts and extraverts in various age groups.

Data of testing by EPI-2 showed that extraverts and introverts were represented approximately equally in the general sample and made 29.7% and 30.3%, respectively. Among men introverts made 28.7%, extraverts – 32.6%. Among women introverts made 30.4%, extraverts – 28.8%. In the age aspect progressing increase of the number of introverts with simultaneous reduction of that in extraverts was revealed. In the gender aspect a more abrupt increase of the number of introverts and reduction of extraverts' number was typical for men of the 2nd group (Fig. 3, 4).

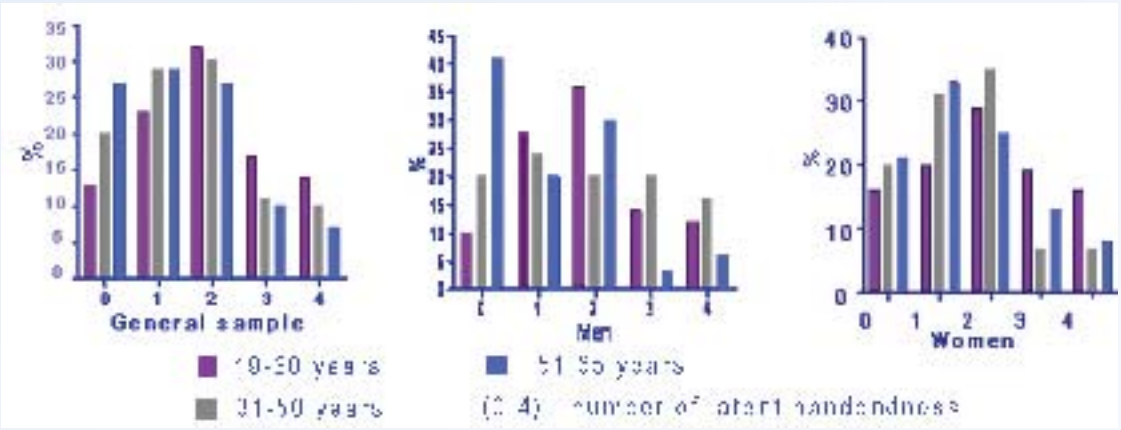

Fig. 2. *Age and gender distribution of respondents with latent left-handedness signs.*

Emotional stability/instability. According to EPI-3 scale, the emotionally unstable personal type (41.6%) prevailed among survey participants, comprising 37.2% of men and 44.5% of women. Emotionally stable personal type was revealed in 27.2% of respondents: 31.8% of men and 24.1% of women. The specified distribution was almost the same in the age and gender aspects (Fig. 5, 6).

Temperament. To reveal the distribution of temperament types the "Eysenck circle" model was used, according to which extraversion in combination with emotional instability characterizes a choleric, while in combination with emotional stability it characterizes a sanguinic. Similarly, introversion in combination with emotional instability characterizes a melancholic, while with emotional stability it characterizes a phlegmatic. The study of temperament revealed that in the general sample cholerics comprised the highest percent (32.8%), followed by melancholics (25.6%), phlegmatics (21.9%), and sanguinics (19.7%). In the age dynamics there was a tendency of increase in the number of phlegmatics and melancholics and, accordingly, to reduction of that of cholerics and sanguinics. In gender aspect, men showed an increase in the number of melancholics, especially among persons of the 3rd group. The same was true for women of the 2nd age group. The number of sanguinics among men did not change with age; meanwhile it progressively decreased among women. On the whole, a reduction in the number of cholerics and an increase in the number of phlegmatics occurred with age both in men and women (Fig. 7).

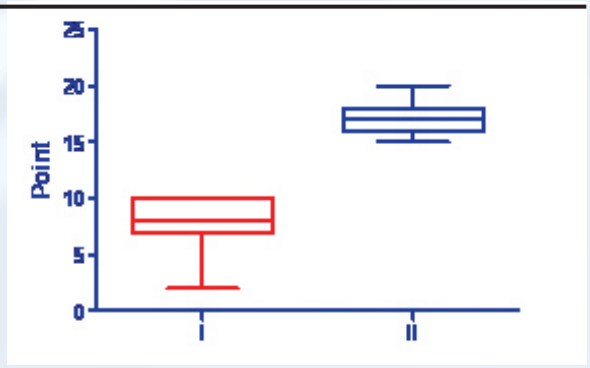

Fig. 3. *Results of testing by EPI-2 scale.*
I – introverts (M±SD) 7.8±2.07, (±SE)=2.07
II– extraverts (M±SD) 16.8±1.39, (±SE)=0.14, p<0.001.

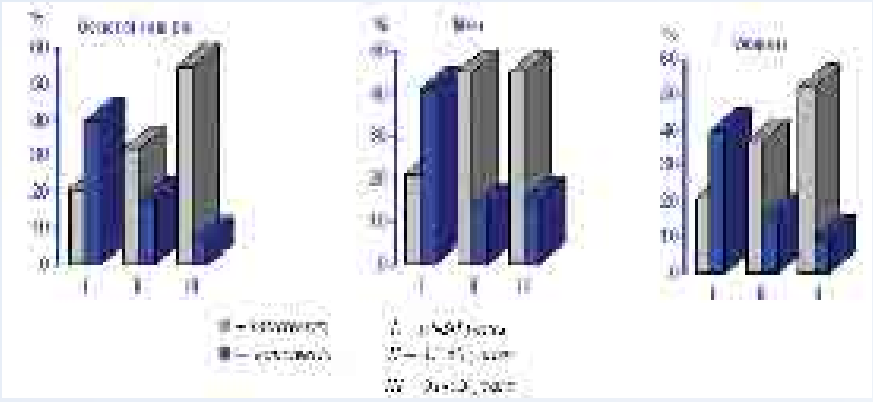

Fig. 4. *Age and gender distribution of respondents according to Eysenck test, EPI-2 scale.*

Externality/internality. Testing by Rotter questionnaire showed that according to the general internality scale 53.4 % of respondents belonged to the external personal type, 22.5 % – to the internal one. On the whole, the external type made a greater percent in women (58.1%) than in men (46.5%). In the general sample, as well as among men and women the number of external type persons increased and that of internal type persons decreased (Fig. 8, 9) with age.

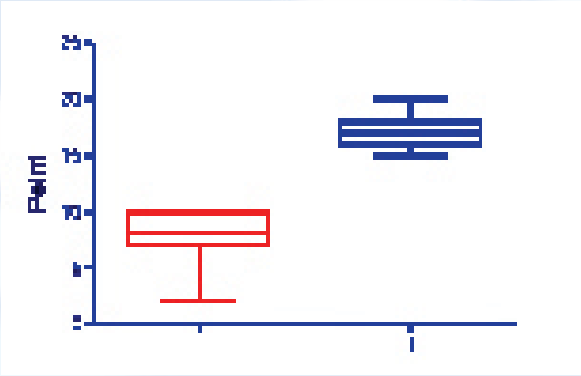

Fig. 5. *Results of testing by EPI-3 scale.*

of introverts, externals and persons with high level of personal anxiety in the general sample, was an evidence of the left-hand brain lateralization in the course of ontogenesis.

The next step of psychometric analysis included the study of alexithymia, reactive anxiety and depression in age and gender aspects. This approach was adopted as emotions and personal features were considered a product of bihemispheric activity, i.e. they contain both the right-hemispheric (sensory) and left-hemispheric (abstract) components.

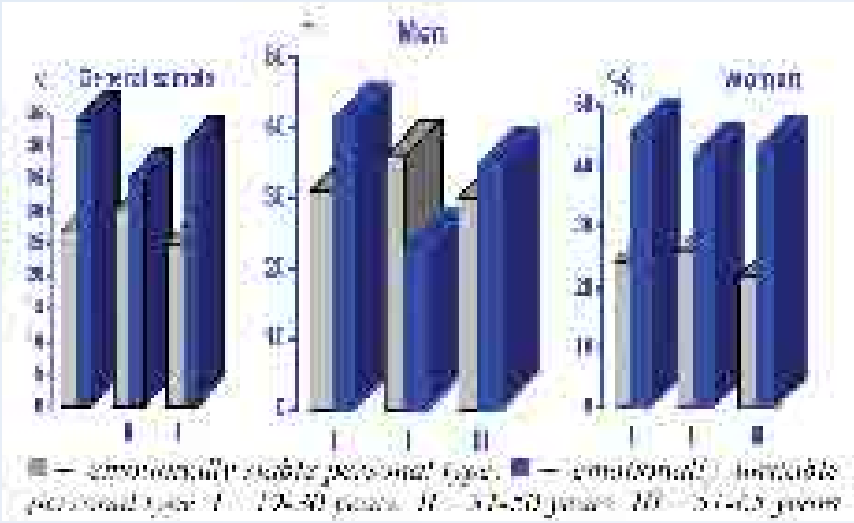

Fig. 6. *Age and gender distribution of respondents according to Eysenck test*

Personal anxiety. According to the results of testing by STAI-II scale, the high level of personal anxiety was revealed in 51.9% of respondents; the moderate level was revealed in 45.9% of cases and was considered as the attributive parameter. In the age aspect, gradual increase of the number of persons with high level of personal anxiety was marked, more evidently manifested during the discrete analysis of data received from men and women (Fig. 10).

Thus, it was established that the age dynamics of changes of signs of latent left-handedness, which is an indicator of functional interhemispheric motor asymmetry, in aggregate with revealed tendency of personal characteristic displacement in the form of increase in number

Alexithymia. The alexithymic personal type was revealed by means of TAS scale. In the general sample the alexithymic personal type was revealed in 34.3% of cases: in 31.0% of men and in 36.6% of women. Alexithymia was revealed in 35.0% of persons of the 1st age group, in 38.3% of the 2nd group, and in 28.3% of the 3rd group. More often alexithymia was revealed in women of all age groups and was sharply reduced in men of the 3rd age group (Fig. 11).

Reactive anxiety. In the general sample the average level of reactive anxiety according to STAI-I was revealed in 40.0% of respondents (in 37.2% of men and 56.3% of women). The high level of reactive anxiety was revealed in 58.1% of respondents (in 41.9% of men and

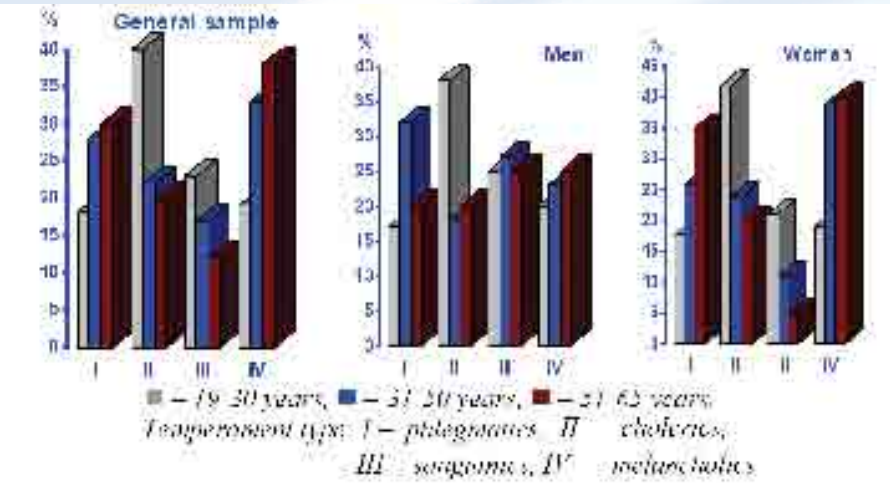

Fig 7. *Age and gender distribution of respondents according to Eysenck test, EPI-4 scale.*

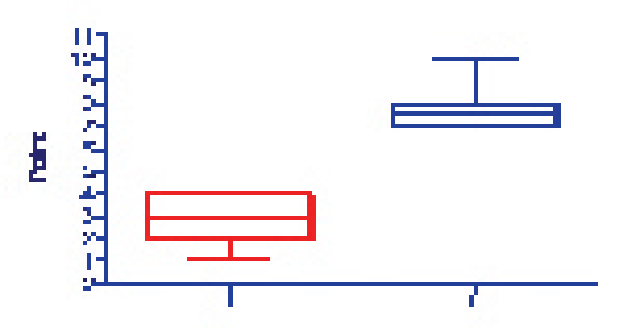

Fig. 8. *Results of Rotter test.*
I – external personal type: (M±SD) 2.6±1.14, (±SE)=0.08
II – internal personal type: (M±SD) 7.7±0.91, (±SE)=0.11,
p<0.01

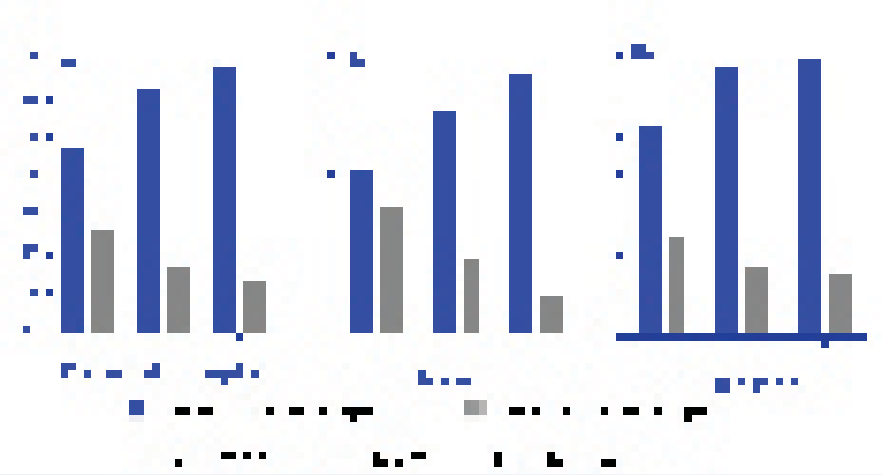

Fig. 9. *Age and gender distribution of respondents according to Rotter test.*

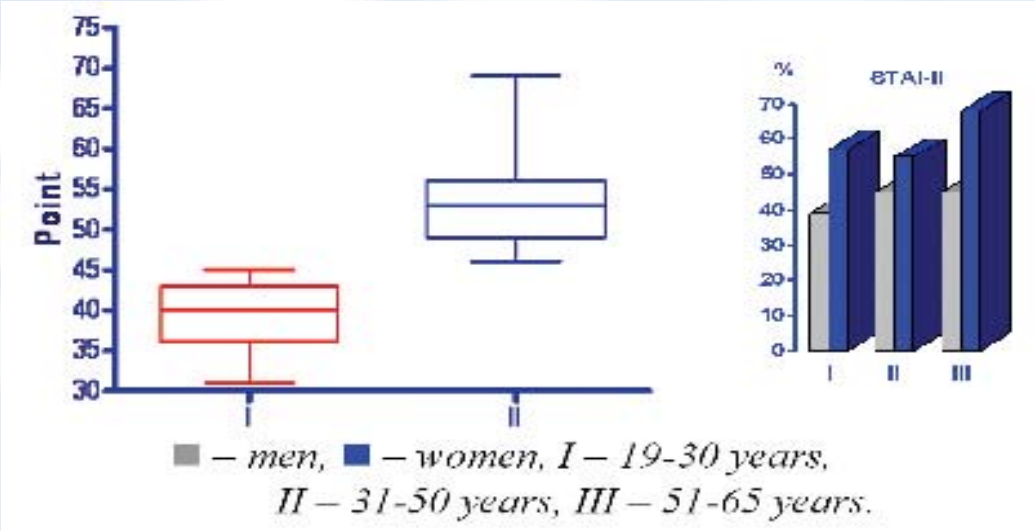

Fig. 10. *Results of testing by STAI-II scale;*
on the left: I – average level of personal anxiety: (M±SD) 39.8± 4.11, (±SE)=0.33.
II – high level of personal anxiety: (M±SD) 53.4± 5.31, (±SE)=0.41,
p<0.01;
on the right: age and gender distribution of respondents with high level of personal anxiety.

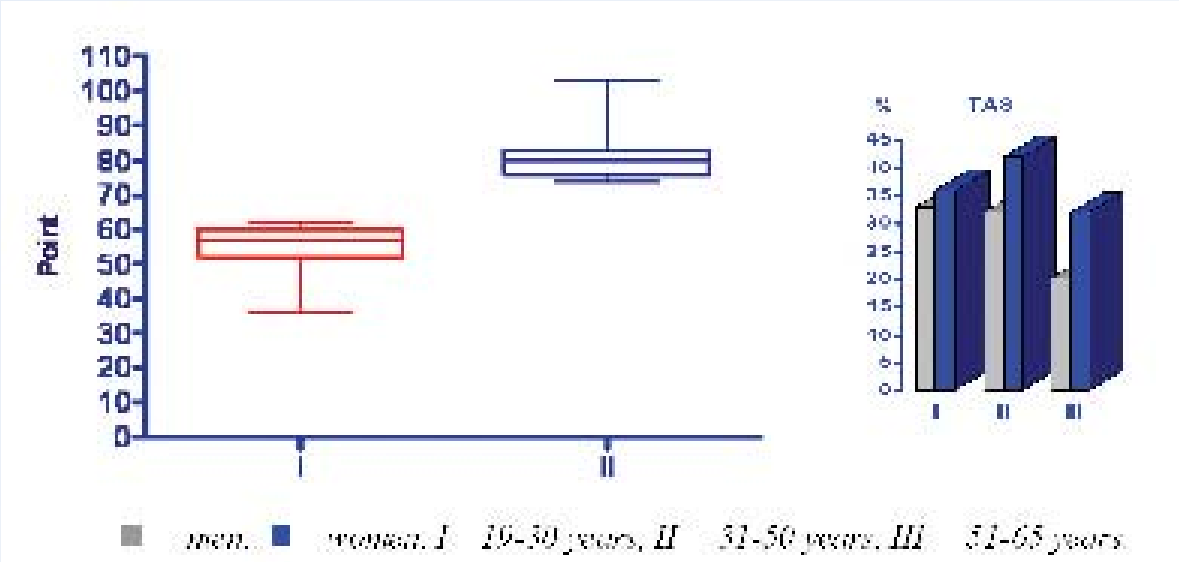

Fig. 11. *Results of TAS test;*
on the left: I – non-alexithymic personal type: (M±SD) 55.3±5.74, (±SE)=0.56
II – alexithymic personal type: (M±SD) 80.7±5.89, (±SE)=0.56,
p<0.02;
on the right: age and gender distribution of respondents with alexithymic personal type.

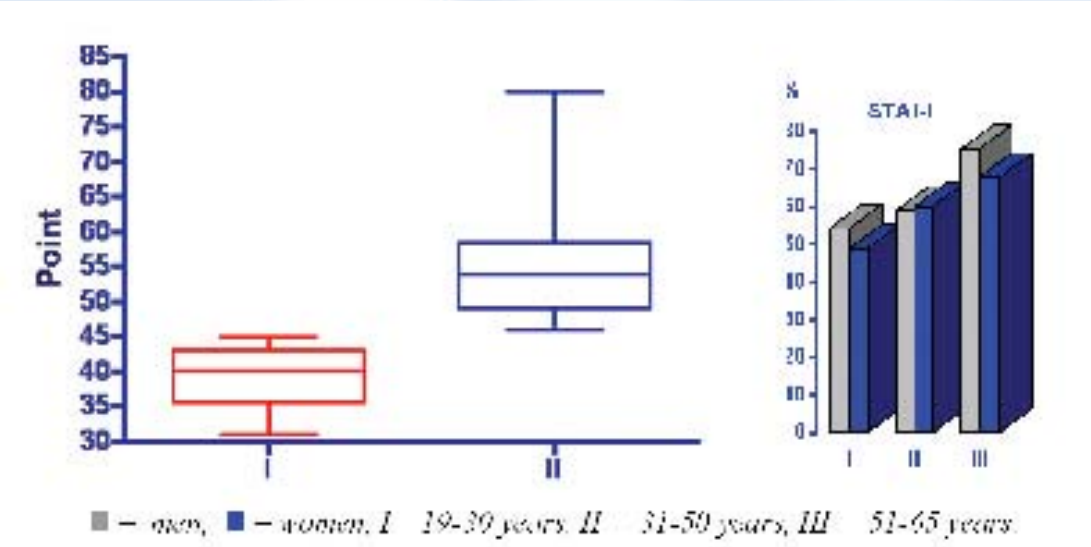

Fig. 12. *Results of testing by STAI-I scale;*
on the left: I – average level of reactive anxiety: (M±SD) 39.2± 4.17, (±SE)=0.36,
II – high level of reactive anxiety: (M ±SD) 54.6± 6.87, (±SE)=0.51, p<0.01;
on the right: age and gender distribution of respondents with high level of reactive anxiety,

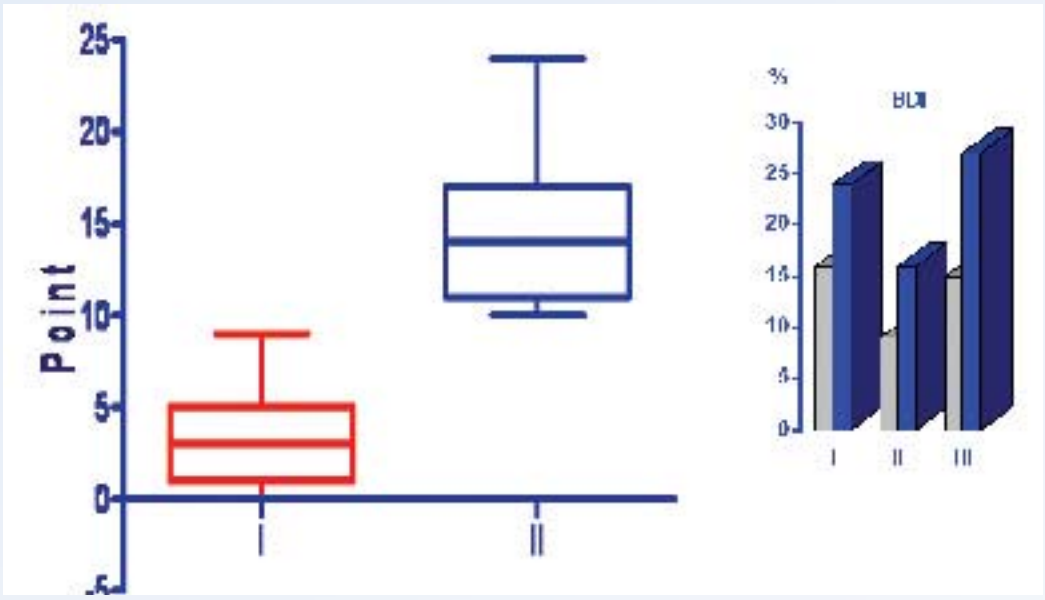

Fig. 13. Results of testing by BDI;
on the left: I – without depression: (M ±SD) 3.31 ± 2.64, (±SE)=0.16,
II – light level of depression: (M ±SD) 14.5 ± 4.21, (±SE)=0.41,
p<0.01;
on the right: age and gender distribution of respondents with depression of situational and neurotic genesis.

Table 1.

Distribution of alexithymic personal type, high level of reactive anxiety and light level of depression of situational or neurotic genesis in respondents with various personal characteristics (in %).

	n	Introverts 95	Extraverts 98	Externals 172	Internals 72
	M±SE (points)	7.9±0.41	16.8±0.14	2.6±0.08	7.7±0.11
General sample					
Alexithymia	80.7±0.56	37.9	34.7	43.6	19.4
Anxiety	54.6±0.51	66.3	51.0	66.9	31.9
Depression	14.5±0.53	22.1	13.3	14.0	8.3
Men					
Alexithymia	80.7±0.95	12.6	13.3	12.2	6.9
Anxiety	54.2±1.12	29.5	19.4	24.4	13.9
Depression	15.7±1.18	8.4	3.1	7.6	2.7
Women					
Alexithymia	80.7±0.69	25.3	21.4	31.4	12.5
Anxiety	54.9±0.71	36.8	31.6	42.2	18.1
Depression	13.9±0.58	13.7	10.2	17.4	6.9

54.9% of women). A tendency of increase in the number of persons with high level of reactive anxiety was marked in age aspect without any essential gender distinctions (Fig. 12).

Depression. In the general sample light level of depression of situational or neurotic genesis on Beck scale was revealed in 19.6% of respondents (in 14.7% of men and 25.1% of women). In the 1st age group depression was revealed in 22.5% of respondents, in the 2nd group in 13.3%, in the 3rd group in 23.3%. More often depression was revealed in women of all age groups and abruptly decreased in men of the 2nd age group (Fig. 13).

Results of interrelation analysis of the personal characteristics and alexithymia <=> anxiety <=> depression triad testified that in the general sample, on the whole, the specified triad was revealed in a greater percent of introverts than extraverts. The specified peculiarity of introverts was more precisely manifested in case of high level of reactive anxiety and light level of depression of situational or neurotic genesis. Respondents with alexithymic personal type and high level of reactive anxiety formed the greatest percent among externals. No significant gender distinctions were found in distribution of the triad (Table 1).

Correlation analysis. Despite the circumstance that interrelation between alexithymia, anxiety and depression within the normal range and in various pathological conditions continues to draw the attention of researchers, the question of quantitative estimation of their association, especially in age and gender aspects, remains open. Revealing age transformation of some personal characteristics against the background of practical invariability of others in the surveyed persons of various age groups provided a basis for studying the interrelation of those personal characteristics.

Positive correlation between the investigated parameters was revealed in the general sample by means of the linear regression model:

General sample:
TAS<=>STAI-I (F[1.319]=65.857), p<0.001, beta=0.41
TAS<=>BDI (F[1.319]=52.553), p<0.001 beta=0.38
STAI-I<=>BDI (F[1.319]=120.59), p<0.001, beta=0.52

In age aspect transformation of correlation between investigated parameters is observed, manifested in beta value change among the researched age groups:

I group:
TAS<=>STAI-I (F[1.198]=55.035), p<0.001, beta=0.46
TAS<=>BDI (F[1.198]=42.210), p<0.001, beta=0.42
STAI-I<=>BDI (F[1.198]=81.173), p<0.001, beta=0.54

II group:
TAS<=>STAI-I (F[1.590]=6.292), p<0.01, beta=0.31
TAS<=>BDI, (F[1.590]=7.509), p<0.01, beta=0.34
STAI-I<=>BDI (F[1.59]=13.995), p<0.001, beta=0.43

III group:
TAS<=>STAI-I (F[1.58]=8.247), p<0.01, beta=0.35
TAS<=>BDI (F[1.58]=4.339), p<0.05, beta=0.26
STAI-I<=>BDI (F[1.58]=34.461), p<0.001, beta=0.61

The study of correlation between the investigated parameters carried out by Spearman and Kendall Tau nonparametric criteria confirmed the data obtained, while using the multiple linear regress model to examine the power of correlation between the investigated parameters of the emotional-personal sphere (Table 2).

Table 2.

Correlation of emotional-personal sphere parameters in the general sample and in age aspect.

	General sample			19-50 years			31-50 years			51-65 years		
n=	321			200			61			60		
	1	2	3	1	2	3	1	2	3	1	2	3
M ± SE	68.3 0.64	47.3 0.57	5.8 0.33	68.2 0.81	46.4 0.75	6.1 0.45	68.5 1.57	47.7 1.32	4.9 0.60	68.3 1.41	50.1 1.32	6.0 0.68
1.TAS												
2.STAI-I												
r	0.41***			0.45***			0.28*			0.36**		
r1	0.29**			0.32***			0.19*			0.25**		
beta	0.41***			0.46***			0.31**			0.35**		
3. BDI												
r	0.39***	0.55***		0.45***	0.58***		0.34**	039***		0.33**	0.57***	
r1	0.28**	0.41***		0.32***	0.43***		0.25**	0.27**		0.25**	0.44***	

r and r1 – are Spearman and Kendall Tau nonparametric criteria respectively,
beta is the linear regression value.
*p<0.05, ** p<0.01, *** p<0.001.

It was established that distinctions of the calculated coefficients were statistically significant as they were below the critical value (1.98) of Student's bilateral t-criterion at significance value p=0.05 (Table 3).

Cluster and factor analyses. Based on cluster analysis of the parameter set of the emotional-personal sphere of respondents of various age groups, cluster I was revealed, which was steadily reproduced in respondents of all age groups (STAI-I, BDI, TAS), as well as cluster II with the ratio components characterized by certain variability. Factor analysis results of the same set testified significant heterogeneity of distribution of emotional-personal parameters among respondents of various age groups within the framework of the given model (Factors 1, 2) (Fig. 14).

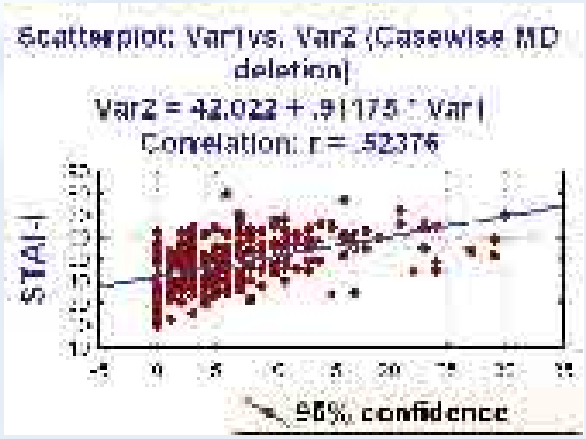

Fig. 14. *Positive correlation between parameters of reactive anxiety (STAI-I) and depression (BDI). r – Spearman correlation coefficient.*

Discussion

The research carried out showed that in the general sample as well as in the gender aspect the number of persons either without latent left-handedness signs or with a single sign tended to increase with age. Simultaneously, a progressing reduction in the number of respondents with two and more latent left-handedness signs was marked. The given shifts can be qualified as an indicator of an increase of motor interhemispheric asymmetry with age manifested as left-hemispheric lateralization.

Not manifesting any significant gender distinctions, the emotional stability parameter was not practically transformed in age and gender aspects. Meanwhile, an increase in the number of introverts and reduction of that of extraverts was observed with age. We consider the specified shift to be essential because the concept of introversion implies person's orientation towards his/her own subjective world, absorption in internal experiences at the expense of environmental perception. Extraversion is a person's stronger concentration on the external world rather than himself/herself and internal experiences. Changes of the ratio of introverts/extraverts in the sample, upon constancy of emotional stability/instability parameter, were accompanied with changes in the profile of distribution of persons with different temperaments in the investigated age groups. In the general sample simultaneously to the increase in age the number of cholerics decreased and the number of phlegmatics and melancholics increased, though the number of sanguinics among men did not change with age, while among women it was progressively reduced. Finally, with age an increase in

Table 3.

Estimation of reliability of correlation coefficient distinctions.

	19-30 years		31-50 years				51-65 years			
	R	beta	r	t	beta	t	r	t	beta	t
TAS<=>STAI-I	0.45	0.46	0.28	1.24	0.31	1.19	0.35	0.46	0.35	0.85
r – Spearman correlation coefficient, beta – linear regression factor, t – Student's criterion.										

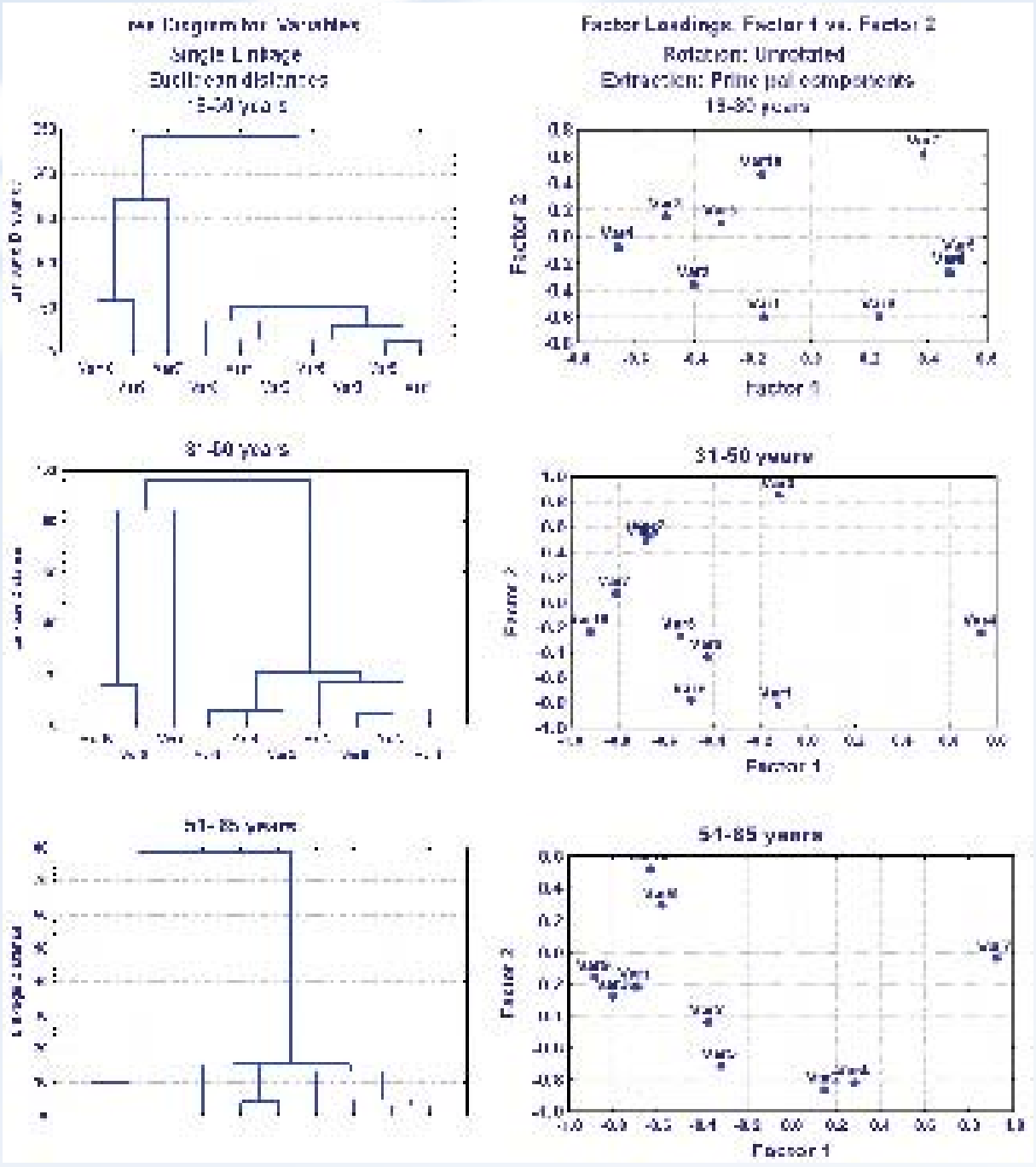

Fig. 15. *Comparison of the results of cluster and factor association analyses of the emotional-personal sphere parameters among respondents of various age groups. Var1 – introversion, Var2 – extraversion, Var3 – emotional stability, Var4 – emotional instability, Var5 – externality, Var6 – internality, Var7 – alexithymic personal type, Var8 – light depression level of situational or neurotic genesis, Var9 – high level of reactive anxiety, Var10 – high level of personal anxiety.*

the number of externals and a reduction in the number of internals were observed. It is necessary to note that internality category is characterized by person's propensity to make himself/herself responsible for everything happening in his/her life. In contrast, externality implies propensity to attribute causes of events to external factors: environment, destiny, fortuity.

Thus, it was established that during ontogenesis alongside with increased motor interhemispheric asymmetry there occurs an original transformation of emotional-personal characteristics of respondents that conforms to the research results of Gruzelier J. (2002), Boles D., Turan T. (2003). Though the morphological-functional aspect of interhemispheric asymmetry evolution, as well as association character of emotional-personal and behavioral features with brain lateral organization profile are still subject to discussion, pubertal and involution periods are admitted as the critical periods in the process of ontogenesis. It has been established that in young age the trigger role in neuroplasticy changes belongs to steroid-dependent [*Garcia-Segura L. et al., 1994*] and steroid-independent [*Sisk C., Foster D., 2004*] mechanisms of active brain maturing, during which occurs glia proliferation and activation along with nervous fibers myelinization [*Shughrue P., Marchenthaler I., 2000*]. Plastic changes occurring in neuronal structures in the specified period are so expressed that the concept of "adolescence brain" [*Spear L., 2000; Takeuchi Y. et al., 2000*] has appeared in the literature. In brain tissue kisspeptin (kiss-1) peptide has recently been distinguished and identified that happened to be endogenous ligand of G-protein-bind receptor – GPR54 [*Han S. et al., 2005*], the so-called "pubertal gene", which provides the trigger mechanism of GnRH secretion with hypothalamic neurons [*Smith J. et al., 2006*].

Complex changes, which occur in this period and determine psychological peculiarities of the juvenile period are closely connected with plastic changes in brain structures. According to Kipke D. (1999), brain hemispheric development comes to the end only at the beginning of the third decade of life. Interhemispheric structural-functional and neurochemical asymmetry is considered to be not a static, but rather dynamic phenomenon, in the formation of which endogenous modulators participate. It is transformed in the course of ontogenesis [*Rossini P., Dal Forno G., 2004*] and interhemispheric asymmetry disturbance is typical to schizophrenia and nervous anorexia [*Kalb R. et al., 2003; Bellgrove M. et al., 2004; Grunwald M. et al., 2004*]. Data are available on neuropeptide asymmetric distribution: releasing-factors, cholecystokinin, angiotensin II and their neuropeptidases [*Ramirez M. et al., 2004*]. Asymmetry has been revealed in distribution of brain monoaminergic terminals [*Diaz Palarea M. et al., 1987*], GABA- and parvalbumin-positive neurons [*Manns M., Gunturkun O., 2003*], receptors of mineral- and glucocorticoids [*Neveu P. et al., 1998; Wei Q. et al., 2004*] in various brain structures.

It has been established that with age there occurs an increase in the number of persons with high level of personal anxiety, which is characterized by propensity, predisposition to perceive a rather wide circle of situations as menacing and to react to these by anxiety of various levels [*Bienvenu O., Stein M., 2003*]. Though alexithymic personal type is revealed more often in women and its frequency is extremely reduced in elderly men, on the whole, the structure of alexithymia distribution among age groups does not essentially differ. Recently alexithymia has increasingly drawn attention, being considered as a peculiar personal characteristic [*Velasco C. et al., 2006; Mattila A. et al., 2006; Martina L., 2006; Salminen J. et al., 2006; Vanheule S. et al., 2007*], predictor and attribute of personal psychosomatic structure [*Mueller J. et al., 2006; Friedberg F., Quick J., 2007*], emotional disturbances associated with anxiety and depression [*Kooiman C. et al., 2000; Deary I. et al., 2003*], a psychopathological syndrome component [*Berthoz S. et al., 2007; Le H., Ramos M., 2007; van Wout M. et al., 2007*].

The ambivalent concept of alexithymia, for the first time suggested by Sifneous P. (1996), includes reduced ability of adequate perception and verbalization of emotional states. Conceptions are currently being devised on alexithymia subtypes – type I alexithymia and type II alexithymia [*Bermond B. et al., 2006; Bailey P., Henry J., 2007*]. It was revealed that with the increase of age there is a tendency to increase in the number of persons with high level of reactive anxiety considered as reaction to a situation, emotional state characterized by sensation of tension, alarm, feeling of danger, unclear threat at a given moment [*Spielberger C., 1977; Hjelle L., Ziegler D., 1992*]. Simultaneously, the light level of depression of situational or neurotic genesis was revealed in 14.7% of men and in 25.1% of women. It was established that depression occurrence was abruptly reduced among middle-aged men. Though anxiety and depression essentially differ in character of the affect and its neurophysiologic structure, their association has been demonstrated [*Goldstein M., 2002; Heyerdahl S. et al., 2004; Matsudaira T., Kitamura T., 2006*]. It was revealed that the triad – a peculiar pattern of "alexithymia-anxiety-depression" – was associated with such personal categories as introversion and externality, which tended to prevail in older age groups. Thus, the viewpoint that "laterality profile" of motor functions correlates with emotional-personal peculiarities proves to be true. Simultaneously, it was established that correlation between reactive anxiety and depression, as well as the character of their association with the investigated personal characteristics was considerably transformed, which was confirmed by outcomes of cluster and factor analyses. The obtained results are considered significant for both further study of evolution peculiarities of the functional interhemispheric asymmetry and deeper insight into developmental mechanisms of left-hemispheric lateralization taking into consideration the existing ideas of brain structure-functional asymmetry.

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