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Features of the localization of intra – and interhemispheric coherent relations among boys and girls with different psychological, psychophysiological characteristics and level of achievement

This article describes the analysis of specific spatial-temporal organization of EEG in solving creative problems of various kinds of respondents with different levels of academic achievement and certain individual characteristics.

Key words: level of creativity, the type of lateral organization (TLO), intrahemispheric coherent communication, interhemispheric coherent communications, converged task, divergent task, performance level.

The problem of sex differences in modern psychophysiology occupies a central place. To date, there are numerous studies that suggest about the anatomical differences in brain structure between men and women (E.P. Kononov, J. Crichton-Browne, V.V. Amunts, S. Vitelson, S.V. Alekseenko, D. Svaab, etc.) on the connection between lateral signs with the sex (M. Annette, M. Bezrukikh, N.N. Bragin, T.A. Dobrokhotova, E.M. Berdichevsky, V.P. Leutin, E.I. Nikolayev and others) about the features of the frequency-spatial characteristics of EEG in men and women in different spheres of activity (L.A. Zhavoronkova, E.A. Kostandov, G.N. Bodyreva, Knyazev et al.). No less urgent problem, as in modern psychophysiology, and in all psychological science in general, is the problem of singularities of education and development in the context of the learning environment for men and women in primary, secondary and higher schools (Assovskaya, Tsvetkova, Yanicheva, 1997; Petrova, 2008; Bardysheva, 2006, etc).

Therefore, **the aim of our research** was to study the features of localization intra – and interhemispheric coherent relations, the high- and underachievement boys and girls with different psychological and psychophysiological features for solving problems of various kinds.

The object of the study were students of 2–5 courses of 90 patients aged 18–23 years. Of them 43 boys and 47 girls.

Research hypothesis: boys and girls with different academic achievement, psychological and psychophysiological features may vary the frequency – spatial characteristics of EEG.

During the investigation, we have been using the following method: a technique used to modify objects Guilford Tunick (for the diagnosis of verbal creativity), the test Torrens «Completion of images» (for the diagnosis of non-verbal creativity), the method of determining the type of functional interhemispheric asymmetry T.A. Bragin and N.N. Dobrokhotova, the method of peer review, the EEG method. We analyzed the frequency range from θ_1 – β_2 .



Our study gave the following **results**: regardless of the frequency range for low creativity girls with low achievers and left TLO in solving verbal problems converged was characterized by the presence high cortico-cortical connection between the left parietal and mid-frontal or right occipital and right central, left posterior temporal and central left areas of the brain (P3-F4, O2-C3, T6-C3), for boys between the right frontal and anterior temporal brain areas right (Fp2-T4). For girls with high levels of achievement – between the occipital areas in both hemispheres, the left frontal and parietal areas of the brain right (O2-O1, Fp1-P4); boys between the parietal and central areas of the right hemisphere, frontal and posterior temporal zones of the left (P4-C4, Fp1-T5). For the highly creative girls with low achievers and left TLO was characterized by the presence high-coherent communication between mid-frontal and lateral-frontal areas of the right hemisphere, anterior temporal and left posterior temporal, right, left frontal and posterior temporal brain areas, right (F4-F8, T3-T6, Fp1-T6); for boys – between the right central and left occipital, posterior temporal and right middle frontal, right-brain areas (C4-O2, T6-F4). The girls with high levels of achievement – between the central and left posterior temporal, right, parietal and posterior temporal zones of the left hemisphere (C3-T6, P3-T5); boys between the mid-frontal zones of both hemispheres (F4-F3). Low-creative girls with low achievers and right TLO in solving verbal problems converged was characterized by the presence high-coherent communication between the posterior temporal and central areas of the right hemisphere, left temporal, right posterior and frontal areas of the brain (T6-C4, Fp2-T5); for boys between – anterior temporal and left mid-frontal area of the right hemisphere (T3-F4). For girls with high levels of achievement – between the central right and left frontal, left occipital and anterior temporal, right, mid-frontal and left lateral-frontal, right (C4-Fp1, O1-T4, T3-F8). For boys between the right and left frontal areas of both hemispheres (Fp1-Fp2). For the highly creative girls with low achievers and right TLO in solving verbal problems converged was characterized by the presence high-coherent communication between the central and lateral-frontal areas of the right hemisphere, the central and right posterior temporal left (T5-C4, C4-F8); for boys – between the right frontal and posterior temporal zones of the left hemisphere (Fp2-T5). The girls with high levels of achievement – between the parietal areas of both hemispheres, right frontal and left occipital areas of the brain (P4-P3, Fp2-O1). The young men – between the left frontal and right parietal brain areas (Fp1-P4).

Low-creative girls with low achievers and left TLO in solving verbal divergent task was characterized by the presence high-coherent communication between the right frontal and central zones, the middle-frontal and posterior temporal zones of the right hemisphere (Fp2-C4, F4-T6); for boys – between the middle frontal-and lateral-frontal areas of the right hemisphere (F4-F8). For girls with high levels of achievement – between the parietal and temporal posterior areas of the right hemisphere, parietal areas of both hemispheres (P4-T6, P4-P3). For boys – between the right occipital and left anterior temporal brain areas (O2-T3).



For the highly creative girls with low achievers and left TPS in solving verbal divergent task was characterized by the presence high-coherent communication between the parietal and right lateral frontal, left, left frontal and right lateral-frontal areas of the brain (P4-F7, Fp1-F8); for boys – between the central zones of both hemispheres (C4-C3). For girls with high levels of achievement – between mid-frontal and lateral-frontal areas of the right hemisphere (F4-F8). For boys – between the left frontal and parietal brain areas left (Fp1-P3).

For the highly creative girls with low achievers and right TLO in solving verbal divergent task was characterized by the presence high-coherent communication between parietal and frontal areas of the right hemisphere (P4-Fp2); for boys – between the mid-frontal and lateral frontal areas of the right hemisphere (F4-F8). For girls with high levels of achievement – between mid-frontal and anterior-temporal zones of the right hemisphere (F4-T4). For boys – between the rear left temporal and central areas of the brain left hemisphere (T5-C3).

For the highly creative girls with low achievers and left TLO in solving nonverbal tasks converged was characterized by the presence high-coherent communication between symmetrical central areas of the brain in both hemispheres (C3-C4); for boys – between the central and frontal areas of the left hemisphere (C3-Fp1). The girls with high levels of achievement – between the occipital and parietal areas of the right hemisphere (O2-P4). The young men – between the temporal zones of both hemispheres, the right occipital and parietal areas of the brain (T6-T5, O2-P4). For the highly creative girls with low achievers and left TLO in solving nonverbal tasks converged was characterized by the presence high-coherent communication between left frontal and right central areas of the brain, the anterior temporal and lateral-frontal left (Fp1-C4, T4-F7); for boys – between the temporal zones of the left hemisphere (T3-T5). For girls with high levels of achievement – between the rear right temporal and parietal left (T6-P3). For boys – between the mid-frontal and left lateral-frontal areas, right brain (F3-F8).

Low-creative girls with low achievers and right TLO in solving nonverbal tasks converged was characterized by the presence high-coherent communication between the posterior temporal and frontal areas of the left hemisphere (T5-Fp1); for boys – between the parietal and temporal zones of the left hemisphere (P3-T6). For girls with high levels of achievement – between mid-frontal and right parietal areas left brain (F4-P3). For boys, between the central zones of both hemispheres, the right frontal and left central (C3-C4, Fp2-C3). For the highly creative girls with low achievers and right TLO in solving nonverbal tasks converged was characterized by the presence high-coherent communication between the left temporal and parietal areas of the brain right (T3-P4); high-performance – between the mid-frontal and left posterior temporal, right, central zones right and left brain hemispheres (C3-C4, F3-T6). Low-creative girls with low achievers and left TPS in solving nonverbal divergent task was characterized by the presence high-coherent communication between the left occipital and right central areas, mid-frontal zones of both hemispheres (C4-O1); for boys –



between the anterior temporal left and right occipital, the left parietal and occipital left (T3-O2, P3-O1). The girls with high levels of achievement – between the central and lateral left-right frontal brain areas (C3-F8). The young men – between the parietal areas of both hemispheres (P3-P4). For the highly creative girls with low achievers and left TPS in solving nonverbal divergent task was characterized by the presence high-coherent communication between the parietal and right posterior temporal left (P4-T5); for boys – between the occipital areas in both hemispheres, the right parietal and left middle-frontal areas of the brain (O2-O1, P4-F3). For girls with high levels of achievement – between the central and left temporal, right posterior, lateral-frontal and right posterior temporal left (C3-T6, F8-T5). For boys – between the left frontal and parietal brain areas left (Fp1-P3). Low-creative girls with low achievers and right TLO in solving nonverbal divergent task was characterized by the presence high-coherent communication between the right occipital-temporal and posterior areas of the brain, central and anterior temporal areas of the right hemisphere (O2-T6, C4-T4); for boys – between left mid-frontal and right frontal brain areas (F3-Fp2). For girls with high levels of achievement – between the posterior occipital and right posterior temporal left (O2-T5). For boys – between the central and lateral-frontal areas of the brain hemispheres (C3- F7). For the highly creative girls with low achievers and right TLO in solving nonverbal divergent task was characterized by the presence high-coherent communication between the left parietal and mid-left frontal areas of the brain (P3-F4); for boys – between the front and rear areas of the left hemisphere (T3 -T5). The girls with high levels of achievement – between the right lateral-frontal and left central areas of the brain (F8-C3). The young men – between the lateral-frontal area of the left hemisphere and mid-frontal area of the right hemisphere (F7-F4).

Based on the above said we have identified specific brain systems that are characteristic for each of the surveyed groups, depending on the characteristics of sex, level of creativity, the profile asymmetry and performance level.

References

1. Barysheva T.A. Creativity. Diagnosis and development. – St. Petersburg, 2002. – 205 p.
2. Barysheva T.A., Zhigalov Y.A. Psycho-pedagogical foundations of creativity. – St. Petersburg, 2006. – 268 p.
3. Gusel'nikova M.S. Cultural-analytical approach to the phenomena of creativity, non-adaptive and genius // Questions of psychology. – 2008. – # 2. – P. 17–29.
4. Ilyin E.P. Psychology of creativity, creativity, talent. – St. Petersburg: Piter, 2009. – 448 p.
5. Razumnikova O.M. Thinking and functional brain asymmetry. – Novosibirsk: Izd. RAMS, 2004. – 272 p.