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Ethnic Characteristics of Temperament Types and Properties of the Central Nervous System

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***Abstract* – Two samples (Russian, n = 155 and Chechen, n = 184) were used to study the differences in the temperament scales using the "Eysenck Personality Questionnaire" and the peculiarities of the central nervous system functioning using the computerized chronoreflexometry method. Ethnic and gender differences are identified between Russian and Chechen nationals. Chechen men are less extroverted than Russian men. Ethnic differences in extraversion and introversion are less pronounced among women. The level of neurotism in Chechen men, as well as in women, was lower for choleric men and higher for phlegmatic men compared to Russians. Changes in personality properties correlate with changes in the properties of the CNS in the number of preemptive response, differentiation errors, time, and level of formation and stability of sensorimotor responses, which can be considered as markers of a certain type of temperament.**

Keywords – temperament, central nervous system, extraversion, introversion, neuroticism, ethnicity.

1. INTRODUCTION

The performance of various professional tasks, as well as the efficiency of work and training, adaptation to natural and social environmental conditions depend on the compliance of functional capabilities of the central nervous system (CNS) and individual typological features of the personality, including temperament, the requirements of the profession or habitat [1, 2]. The physiological basis for individual differences between people is the genetically determined typological features of higher nervous activity and, above all, the properties of the nervous system – the strength, mobility, and equilibrium of excitation and inhibition processes in the cortex of large hemispheres, which form the basis of temperament according to I.P. Pavlov [3], on the basis of which individual traits of character and behavior are formed and developed under the influence of environmental conditions [4, 5]. At the same time, ethnic peculiarities of temperament and properties of the nervous system in men and women have not been sufficiently studied.

Research objective: to study the peculiarities of functioning of the central nervous system and temperamental characteristics in representatives of different ethnic groups (Russians and Chechens).

2. METHODS AND MATERIALS

The experimental study was conducted at North-Caucasus Federal University. There were 339 participants, including 155 Russian students of the North-Caucasus Federal University and 184 students of Chechen nationality from the Chechen State University aged 18 to 22 years old who had no genetic pathology. The average age of the participants was 19.1±0.3 years for Russian men and 19.7±0.3 years for Chechen men, and 19.2±0.4 and 19.0±0.2 years for women ($p>0.5$), respectively. We analyzed the results of the study of "pure" types of temperament – choleric, sanguine, phlegmatic and melancholic (90 men and 104 women, Table 1). The study was conducted in accordance with the requirements of biomedical ethics and the Helsinki Declaration on Human Rights.

We used physiological and psychological methods of investigation: chronoreflexometry with the help of computer device "Psychophysiologist UPFT-1/30" (manufactured and verified by specialists of "Medicom" LLC, Taganrog), "Personal questionnaire of Izenka" [6] to determine the type of temperament. The studies were carried out taking into account the circadian (from 8.00 a.m. to 1.00 p.m.), circasseptal (Tuesday, Wednesday) and seasonal (from 15 September to 01 November) biorhythms. The obtained data were statistically processed in Microsoft Excel-2006 (using the Student's parametric t-test).

3. RESULTS

The analysis of the results of the extraversion and introversion study in Russian and Chechen students showed that the minimum introversion values in men were revealed among phlegmatic men, and in women among melancholic women, the maximum extraversion values were revealed in both Russian and Chechen choleric and sanguine (Table 1). It should be noted that in terms of absolute mean group values, the men of Chechen nationality belonging to extroverted types (choleric and sanguine) have lower extraversion values compared to Russian men, while Chechen men belonging to introverted types (phlegmatic and melancholic) have higher introversion values compared to Russian men ($p<0.05$-0.01).

Among women, only sanguine women have significant ethnic differences: Chechen women have a lower level of extraversion than Russians ($p<0.05$, Table 1).

Sexual differences in extraversion are more pronounced in Chechens: choleric women have a higher level of extraversion, while phlegmatic and melancholic women have a lower level of introversion as compared to men ($p<0.05$–0.01, Table 1). Among Russian, sexual differences were revealed in phlegmatic men: Russian men are more introverted than women ($p<0.05$, Table 1).

Significant ethnic differences in neurotism level among men and women were revealed in representatives of choleric and phlegmatic types of temperament ($p<0.05$, Table 1). The level of neurotism in Chechen women, as well as in men, was lower for choleric men and higher for phlegmatic men compared to Russians.

Gender differences were revealed: women of Russian nationality of sanguine and melancholic temperament types have higher neurotism level than men ($p<0.05$, Table 1). Sanguine women in Chechnya have a higher level of neurotism: they have a higher level of neurotism than men ($p<0.05$, Table 1).

Chechen men of all temperament types and Chechen women of sanguine, phlegmatic and melancholic temperament have higher rates of lies than Russians ($p<0.05$-0.01, Table 1).

Taking into account the fact that temperament values are genetically determined [7] and are largely determined by the properties of the nervous system, i.e. the strength of excitation and inhibition processes and their mobility, we used a hardware method to study the properties of the CNS – computerized chronoreflexometry, in particular, the method of complex visual-motor reaction, which allows us to determine the ratio of excitation and inhibition processes and reaction rate.

TABLE I. INDICATORS OF EXTRA INTROVERSION, NEUROTICISM AND LIES (M±m) IN RUSSIAN AND CHECHEN STUDENTS BELONGING TO DIFFERENT TYPES OF TEMPERAMENT

Indices	**Russians (n=90)**		**P_2**	**Chechens (n=104)**		**P_2**
	Male	***Female***		***Male***	***Female***	
	Choleric (55)					
1. Extraversion, introversion, score	16.75±0.40	15.80±0.46	>0.05	13.88±0.31	15.96±0.35	<0.01
P_1				<0.01	>0.5	
2. Neurotism, score	17.37±0.77	18.70±0.90	>0.1	15.25±0.70	15.64±0.38	>0.5
P_1				≤0.05	<0.05	
3. Lie, score	2.12±0.35	2.33±0.32	>0.5	4.16±0.27	2.96±0.24	<0.05
P_1				<0.01	>0.05	
	Sanguine (64)					
1. Extraversion,in roversion, score	16.41±0.31	17.33±0,48	>0.05	15.16±0.35	15.45±0.35	>0.5
P_1				<0.05	<0.05	
2. Neurotism, score	6.77±0.32	8.66±0.55	<0.05	7.53±0.46	9.27±0.27	<0.05
P_1				>0.05	>0.05	
3.Lie, score	2.50±0.17	2.75±0.34	>0.5	4.47±0.33	3.71±0.22	>0.05
P_1				<0.05	<0.05	
	Phlegmatic (34)					
1. Extraversion, introversion, score	6.33±0.90	9.13±0.48	<0.05	10.0±0.37	8.70±0.51	<0.05
P_1				<0.05	>0.5	
2. Neurotism, score	7.33±0.60	8.50±0.71	>0.05	9.67±0.56	11.1±0.70	>0.05
P_1				<0.05	<0.05	
3. Lie, score	2.25±0.11	2.50±0.26	>0.05	4.33±0.45	3.80±0.48	>0.5
P_1				<0.05	<0.05	
	Melancholic (41)					
1. Extraversion, introversion, score	8.80±0.64	7.73±0.38	>0.05	10.67±0.23	7.53±0.41	<0.01
P_1				<0.05	>0.5	
2. Neurotism, score	15.60±0.60	17.60±0.56	<0.05	16.0±0.40	16.53±0.40	>0.5
P_1				>0.5	>0.05	
3.Lie, score	2.0±0.01	2.0±0.11	>0.5	3.66±0.62	3.66±0.23	>0.5
P_1				<0.05	<0.01	

[a.] ***Note:*** P1 – authenticity of differences between Russian and Chechen men and women; P2 – authenticity of intersex differences; in parentheses – number of people surveyed.

According to the data obtained by us, the maximum number of preemptive response, indicating the prevalence of excitation over the processes of inhibition, was found among Russian men in the choleric and melancholic types of temperament, the minimum – in the representatives of the phlegmatic type (figure 1). Among Russian women, the maximum number of preemptive response was registered in choleric and sanguine women, while the minimum number was registered in melancholic women (figure 1). Chechen men differed from Russians in that the number of preemptive response in sanguine and phlegmatic men was higher ($p<0.01$, figure 1), which can be regarded as an indicator of higher excitability of the CNS in Chechen men as compared to Russian men. No significant differences in the number of preemptive responses were found among Chechen women compared to Russians (figure 1).

Significant sexual differences were revealed in men and women of phlegmatic and melancholic types of temperament (p<0.05, figure 1).

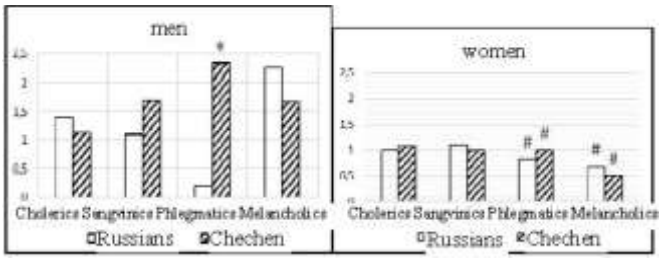

Fig. 1. The number of preemptive response in Russians and Chechens belonging to different types of temperament.

Note: * – authenticity of differences between Russian and Chechen men and women; # – authenticity of intersex differences.

An important indicator of the functionality of the CNS is the number of errors at differentiation visual stimuli's (the number of incorrect reactions), which characterizes the ability to working-out of differentiating inhibition. According to the results of the study, men with phlegmatic temperament and women with melancholic temperament have a high ability to differentiate visual stimuli among Russians. The minimum number of differentiation errors in phlegmatic men and melancholic women (figure 2) is a proof of that. Among Chechen men and women, the minimum values of the number of differentiation errors were found in representatives of the phlegmatic type of temperament, but in men they did not differ significantly from that of representatives of other types of temperament (figure 2).

A comparison of the absolute mean group values of the number of errors at differentiation visual stimuli's showed that Chechen men make more errors for differentiation than Russians, regardless of the type of temperament. Notable differences were identified in phlegmatic (p<0.01, figure 2). Among Chechen women, melancholic women make significantly more mistakes than Russians (p<0.05, figure 2).

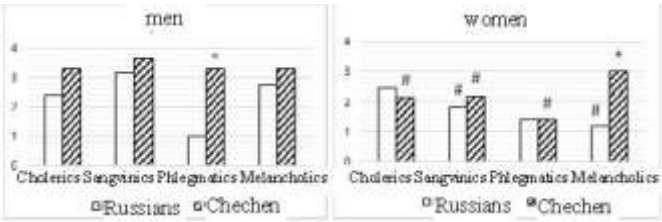

Fig. 2. The number of differentiation errors in Russians and Chechens belonging to different types of temperament.

Note: sie fig. 1.

Significant sexual differences in the number of differentiation errors were revealed in sanguine and melancholic temperament types among Russians and in choleric, sanguine and phlegmatic temperament types among Chechens (p<0.05–0.01, figure 2).

Thus, the accuracy of differentiation of visual stimuli in Chechen men is less developed than in Russians, especially in phlegmatic men. Chechen women, as well as Russians, differentiate visual stimuli more accurately than men and, accordingly, perform complex visual-motor reactions more precisely.

Higher accuracy of differentiation reactions to visual stimuli leads to a higher level of performance of complex sensorimotor acts, typical for Russian men of phlegmatic type and women of melancholic type in comparison with other types of temperament (figure 3). The analysis of ethnic differences in the level of sensorimotor reactions (SMR) revealed lower indicators of SMR level in Chechen men of phlegmatic temperament type (p<0.01, figure 3) in comparison with Russian men.

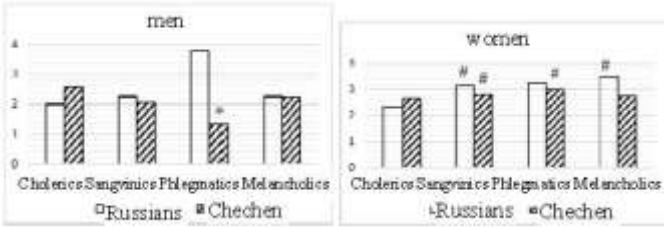

Fig. 3. The number of sensorimotor stimuli in Russians and Chechens belonging to different types of temperament.

Note: sie fig. 1.

The sexual differences in the level of SMR have been revealed: women of sanguine and melancholic types of temperament have a higher level of SMR among Russians than men, and women of sanguine and phlegmatic types of temperament among Chechens as compared to men have a higher level of SMR (p<0.05, figure 3).

Ethnic and sexual differences have also been identified in time indicator of complex visual-motor response (CVMR). Thus, in Chechen men of phlegmatic temperament, the time of CVMR is significantly lower (p<0.05), and in men of melancholic temperament is significantly higher (p<0.05) than in Russian men. No significant ethnic differences were found among women (figure 4). At the same time, there is a tendency for Chechen women with choleric and phlegmatic temperament to have more at the time of CVMR (сомневаюсь) than Russian women (figure 4).

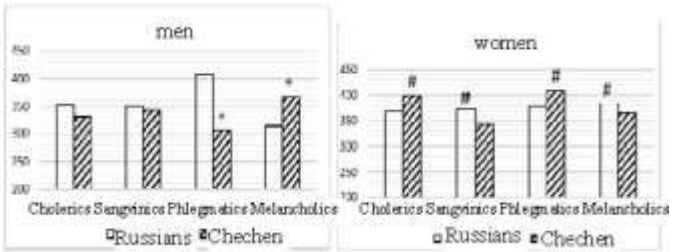

Fig. 4. Time of complex visual-motor reaction (ms) in Russians and Chechens belonging to different types of temperament.

Note: sie fig. 1.

The analysis of sexual differences has shown that Russian men of sanguine and melancholic temperament types are a higher level sensorimotor reaction in comparison with women, judging by the time of CVMR (p<0.05, figure 4). Chechens have a higher level of CVMR in men of choleric and

phlegmatic types of temperament compared to women (p<0.05–0.01, figure 4).

Equally important is the functional stability of the central nervous system. According to our data, the representatives of sanguine and melancholic temperament types have maximum stability of CNS functioning among Russian men, and representatives of choleric, sanguine and phlegmatic types of temperament among Chechen men (figure 5).

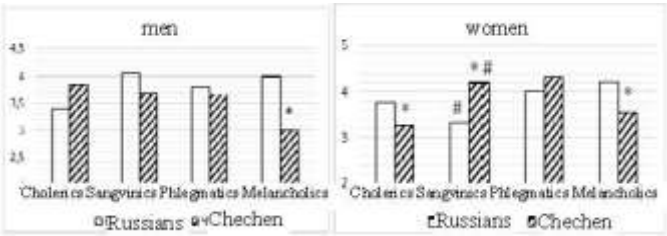

Fig. 5. Level of reaction stability in Russians and Chechens belonging to different types of temperament.

Note: sie fig. 1.

Among Russian women, the high stability of the CNS functioning is characteristic of representatives of phlegmatic and melancholic types of temperament, and among Chechen women – representatives of sanguine and phlegmatic types of temperament. Significant ethnic differences were found in men with melancholic temperaments: Chechens have a lower level of reaction stability than Russians (p<0.05). In Chechen women, the stability of complex visual-motor reactions is significantly lower in choleric and melancholic women compared to Russian women and significantly higher in sanguine women (p<0.05, figure 5).

4. DISCUSSION

The temperament is considered to be the biological component of individuality [8, 9]. The type of temperament according to the data of V.I. Nikolaeva and her co-authors [10] can determine the individual's sensitivity to adverse effects (может быть лучше influences?), influence the nature of the response, their quality and social adaptation.

Important characteristics of a socially adapted personality are the indicators of extraversion and introversion, as well as "neurotism, which is a continuum from normal affective stability to its pronounced lability" [6, 11].

The results of our research suggest that long-term living in the middle mountains of the majority of the population of the Chechen Republic, strict norms of social order and family relations contributed to the "smoothing" of diametrically opposite properties of the personality, which are the basis of temperament – extraversion and introversion, emotional stability and instability. Thus, Chechen men belonging to extroverted types (choleric and sanguine) have lower extroversion scores, while those belonging to introverted types (phlegmatic and melancholic) have higher introversion scores than Russian men. Ethnic differences in extraversion and introversion are less pronounced among women.

The level of neurotism in Chechen men, as well as in women, was lower for choleric men and higher for phlegmatic men compared to Russians.

Changes in personality traits correlate with changes in the properties of the central nervous system. Chechen men differ from Russians in that they have a higher number of preemptive response in sanguine and phlegmatic men, which can be regarded as an indicator of the higher excitability of the CNS in Chechen men as compared to Russians. Ethnic differences in the number of pre-emptive stimuli are less pronounced among women.

Chechen men make more errors in differentiation than Russians, regardless of the type of temperament. Notable differences were identified among phlegmatic people. Among Chechen women, melancholic women make a much larger number of differentiation errors than Russians.

The analysis of ethnic differences in the level of sensorimotor reactions revealed lower indicators of the level of SMR in Chechen men of phlegmatic type of temperament as compared to Russian men.

The level of stability of complex visual-motor reactions in Chechen men is lower than in Russians, especially in melancholic men. Chechen women have significantly lower stability of complex visual-motor reactions than Russian women with cholerics and melancholics type temperament and significantly higher stability in sanguine.

The data obtained are similar to the modern understanding, according to which the properties of the nervous system do not predetermine certain forms of behavior, but form the basis for easier formation of some forms of behavior, more difficult for others. The endocrine system makes a certain contribution to the formation of behavioral stereotypes and personality properties [2, 12].

5. CONCLUSION

1. Ethnic and sexual differences are identified between Russian and Chechen nationals. Chechen men are less extroverted than Russian men. Ethnic differences in extraversion and introversion are less pronounced among women. The level of neurotism in Chechen men, as well as in women, was lower for choleric men and higher for phlegmatic men compared to Russians.

2. Changes in personal properties correlate with changes in the properties of the central nervous system in the number of preemptive response, differentiation errors, time of complex visual-motor reactions, the level of formation and stability of sensorimotor reactions, which can be considered as markers of belonging to a certain type of temperament.

3. The additional markers of typological belonging to a certain temperament revealed by us expand the possibilities of taking into account temperamental characteristics at vocational orientation and professional selection, as well as at the choice of methods of group and individual psychocorrection and psychotherapy.

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