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Psychophysiological indicators of the human functional state in the process of socio-psychological testing ethnic and religious attitudes

Sergei A. Isaichev, Alexandr M. Chernorizov*,
Timofei V. Adamovich, Evgeniy S. Isaichev

Faculty of Psychology, Lomonosov Moscow State University, Moscow, Russia

*Corresponding author. E-mail: amchern53@mail.ru

Background. To assess the structure of inter-ethnic attitudes and the risks of ethno-religious tension, psychologists mostly use questionnaires, interviews, subjective scaling, content analysis, and special tests. One possible approach to increasing the validity and reliability of these explicit methods is the use of the registration of psychophysiological indicators while a recipient completes the questionnaire or test forms.

Objective. The results of a pilot psychophysiological research are presented, which focus on the study of human psycho-emotional states during socio-psychological testing to identify attitudes in the field of interethnic and interfaith relations.

Design. The essence of the applied experimental approach is to control the functional (psycho-emotional) state of a respondent using the registration of complex psychophysiological (physiological and behavioral) responses in the process of completing the socio-psychological questionnaire.

Results. It was shown that the rhythmic brain activity (ratio of the power indexes of alpha and beta rhythms), the amplitude of the systolic wave (photoplethysmogram) (ASW PhPG) and the magnitude (length) of the 'circumflex line of the Galvanic Skin Response' (GSR-L) may be the complex of indicators that possess sufficiently high selective sensitivity to differentiate nonspecific reactions of the human nervous system to personally important (emotiogenic, stressful) questions in the questionnaire.

Conclusion. The proposed approach may help to identify stressful (emotiogenic) issues (questions) in socio-psychological tests and questionnaires that are of the greatest interest to the subject and, as a result, most adequately reflect individual and population attitudes in the field of social relations.

Keywords: socio-psychological testing, ethnic and religious attitudes, psycho-emotional states, psychophysiological diagnostics

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Introduction

The study of the structure of interethnic and interfaith relations, as well as complex objective assessment, monitoring and forecast of ethnic and religious tensions, currently exist around the world. It is extremely important in regions where different ethnic groups, with their special social, cultural, and religious attitudes, cohabitate. Such special importance of this theme is the result of the impact of recent geopolitical events in the life of the world community. Numerous military conflicts and revolutions have led to an increase in the flow of immigrants who are hard-integrated into a society with other social norms and traditions. Biased coverage of this issue in the media leads to the formation of new or the strengthening of old ethnic and religious attitudes (Van Klingeren et al, 2014; Schemer, 2014; Scharrer & Ramasubramanian, 2015).

Because the problems of interethnic relations and perception of other cultures, nationalities, races, and faiths are of great social importance, in recent years, the number of sociological and psychological works on this topic has increased considerably. Several studies have shown that the presence of negative ethnic attitudes (prejudice) leads to an increase in the number of conflicts on national and religious grounds, increases the likelihood of ethnic discrimination in the workplace (Wrench, Rea, & Ouali, 2016), education (Thijs & Verkuyten, 2016), and healthcare (Priest et al., 2014).

Recently, modern Russian society has also seen new negative trends appear that have manifested in the rise of nationalism and xenophobia. These trends are due to the sharp increase in the influx of immigrants from the former Soviet republics to Russian cities and migration from Africa and the Middle East. All these factors lead to an increase of the probability of the occurrence of conflicts on ethnic and religious grounds and requires continuous monitoring of ethnic and religious tensions in areas of cohabitation of the indigenous population and migrants.

Because the problem of interethnic and interfaith relations is individually and socially significant, the respondents are often not inclined to admit their real biases in questions on this subject because at the official level and in mass media, a policy of equality and tolerance is in place. It is shown that "direct" socio-psychological testing of attitudes in relation to other ethnic and religious groups is hampered by the influence of the phenomenon of social desirability, i.e., the tendency of respondents to give the answers that are acceptable and unduly positive from a social point of view. All this leads to a significant distortion of results of psychological diagnostics of personality traits and attitudes (Paulhus, 2002; Tett et al., 2006; Kawakami et al., 2009; Osin, 2011).

In modern studies, the evaluation of the structure of inter-ethnic attitudes and the risks of ethno-religious tension is carried out using two types of methods — explicit and implicit. In most studies, explicit methods are in the form of questionnaires, interviews, subjective scaling, content analysis, and special tests (Soldatova, 1998; Primakov & Anderzhanova, 2012). These methods allow for the qualitative assessment of socio-psychological phenomena, but the validity of the results often suffers because of the phenomenon of social desirability. Explicit methods used by Western psychologists as well as implicit methods — such as the 'Implicit Associa-

tion Test' or IAT (Greenwald, Nosek, & Banaji, 2003; Greenwald et al., 2009), the emotional priming and the measurement of reaction time (Plotka & Blumenau, 2015) — were used to explore the relationship between implicit interethnic attitudes and behavior (Dovidio et al., 2002; McConnell & Leibold, 2001; Rudman & Ashmore, 2007; Sekaquaptewa et al., 2003; Stepanikova et al., 2011) and the impact of 'hidden' (unconscious) attitudes on racial and ethnic discrimination (Derous, Nguyen, & Ryan, 2009.; Rooth, 2010; Son Hing et al., 2008; Blommaert et al., 2012) on 'generosity', 'duration of eye-to-eye contact', nonverbal behavior during the interaction, the initiative in the conversation, and other types of social behavior. Implicit methods, to some extent, reduce the impact of the factor of 'social desirability'. However, they also reduce the possibility of objective (explicit) evaluation of 'emotional and personal significance of the issues' that most accurately reflect the structure and the degree of influence of attitudes on social behavior. However, the influence of this factor is large since the sphere of the interethnic and interconfessional relationship is quite stressful, especially in cases when people are faced with the manifestations of ethnic and religious tensions. The questionnaire or test is often a cause of significant emotional or cognitive stress, which can serve as a quantitative (objective, explicit) measure for the evaluation of the personal significance of the concrete questionnaire or test questions for a recipient.

One of the possible approaches to increase the validity and reliability of explicit methods is the use of registration of psychophysiological indicators while a recipient completes a questionnaire or test forms. The registration of psychophysiological indices, which reflect the activation processes of the various structures of the central and peripheral nervous system, permits a quantitative assessment of the physiological responses accompanying the flow of emotional, cognitive and behavioral processes. In our research, we used classical psychophysiological methods for the polygraph registration of the indicators of central and peripheral nervous system activity in response to the presentation of different types of stimuli information (see below: "Methods of Stimulation and Registration"). A huge number of domestic and foreign studies testify to the high efficiency level (validity and reliability) of these psychophysiological methods in the diagnosis of functional states (sleep-wake scale), emotions, or physiological or psychological stress (for review, see Hesset, 1981; Leonova, 1984; Danilova, 1985, 1992; Isaychev et al., 2012; Chernorizov et al., 2016; DePaulo et al., 2003; Matsumoto et al., 2011; Meijer et al., 2016; Vrij & Granhag, 2012).

In the present pilot study concerning the 'objective' of assessing the significance of socio-psychological testing, we used a physiological method that is effective in the field of the detection of concealed information (Chernorizov et al., 2016; Isaychev et al., 2011; Soshnikov & Pelenitsyn, 2009). In this case, the significance of the questionnaire questions was assessed according to intensity and the temporal parameters of the psychophysiological responses of the respondent during the completion of the questionnaire. For the control, these responses were compared to similar responses of a respondent to the neutral questions and stressful (physical, emotional) stimuli. Herewith, we expected that use of this technology in socio-psychological testing may help to identify and yield a quantitative assessment of the questions that are personally meaningful and that most adequately reflect the individual and population-specific properties of inter-ethnic attitudes.

The working hypothesis and the main aim of the pilot study

The main hypothesis of the study may be formulated as follows: psychophysiological responses to personally significant clusters of the questionnaire questions, aimed at clarifying the structure of inter-ethnic and inter-religious attitudes, will be significantly different from background responses and responses to 'neutral' or personally irrelevant questions.

The main purpose of the pilot study is to search for informative psychophysiological and behavioral indicators that allow quantification of the degree of the emotional and cognitive impact of the socio-psychological questionnaire issues to identify attitudes on interethnic and interfaith relations linked to the psycho-emotional state of a person while he/she is completing the questionnaire.

Method

Methods of stimulation and registration

Seventeen students from the Faculty of Psychology at Lomonosov Moscow State University (11 women and 6 men), aged 18 to 30 years (mean age 23.6 years, standard deviation of 2.87), took part in the study. None of the subjects had health abnormalities, and all gave voluntary written consent to participate in the study. The experiments were carried out using a system that consisted of a set of hardware and software that allowed for simultaneous registration of the subject's psychophysiological and behavioral responses during the presentation of the stimuli of different modalities and duration. Registration of the psychophysiological indicators of activity of the central and peripheral nervous system (NS) was conducted using a portable telemetric device that was manufactured by Medicom-MTD. The indices of the alpha and beta rhythms of the electroencephalogram (EEG) and their ratio (alpha/beta) were used as indices of brain activity.

An electrocardiogram (ECG), electromyogram (EMG) of the facial muscles (*M. Zigomatic minor/major, buccinator M., M. Corrugator supercilii*), photoplethysmogram (PhPG: amplitude of systolic wave, ASW PhPG), saturation of hemoglobin with oxygen (SpO2), galvanic skin response (GSR), and recursion abdominal breathing (RB: frequency of cycles per minute) were used as indicators of peripheral NS activity. A Logitech HD Webcam C525 960-000723 (China, Logitech Inc.) was used to record behavioral and facial reactions.

According to the experimental procedure, the subjects were presented with two types of stressors — physical and psycho-emotional (emotional or cognitive). A loud sound was used as a physical stressor. The psycho-emotional stressors were as follows: (1) the threat of electric shock — electrocutaneous stimulation with an intensity of 20–35 mA ('emotiogenic stimulus'); (2) the questions unrelated to the socio-psychological testing — neutral or personally important issues designed to invoke intensive mental activity ('cognitive stressors'); and (3) the original socio-psychological test questions (Zinchenko et al., 2016) aimed at identifying the structure of personal attitudes in the field of interethnic and interfaith relations. The questions were presented on the computer screen. The subject's answers were

recorded in written form using a device with a touch-sensitive graphic input (monitor-tablet Wacom CINTIQ 13HD).

The loud sounds served three functions. First, the responses to the sounds were used to assess the magnitude of the responses to stressful physical stressors. Second, the dynamics of extinction of the responses to these audial stimuli was used to separate the orientation response to the novelty of the stimulus from the defensive response to the stimulus (response to the stressful meaning of the sound). Third, the responses to sounds served as markers of individual resistance to stress. The threat of electrocutaneous electric shock was used as an unconditioned stimulus to invoke negative stressful emotional reactions. Psychophysiological indicators of responses to such stimulation were considered reference points for constructing the conditional non-metric 'scale of emotional intensity' of the respondent's responses to stressors. This scale was employed to assess the emotional significance of the questions in the questionnaire. Neutral questions served a similar function ("Are you ready for the test?", "Are you a citizen of the Russian Federation?", "Where do you live?", "In what year were you born?") and control, i.e., personally important, questions ("Are you providing honest answers?", "How cruel you are?", "Have you ever cheated on an exam?", "Can we trust you?"). The main issues of the questionnaire touched on various ethnic, religious and socially significant aspects of human behavior (Zinchenko, 2016).

The physiological and behavioral responses were recorded synchronously with the presentation of stimuli. The different indicators of the responses were then compared to the values of these indexes in 'background' experimental stages (parameters in the absence of stimulation) and with each other.

Research procedure

In figures 1 and 2, the overall design of the organization of the experimental procedure is presented.

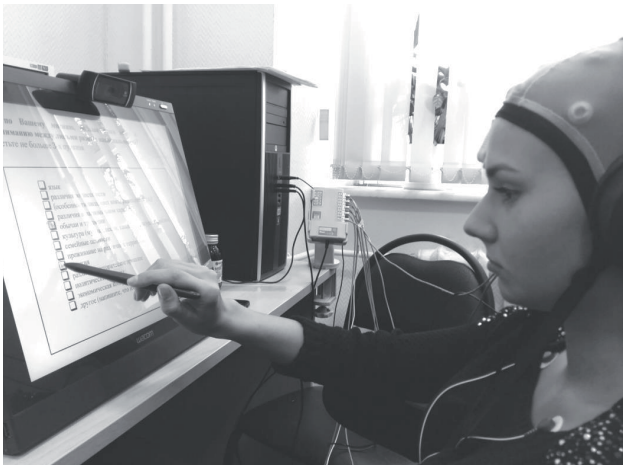

Figure 1. Experimental setup for the simultaneous registration of psychophysiological indicators in the process of conducting psychodiagnostic research aimed at testing one's personal ethnic and cultural identity

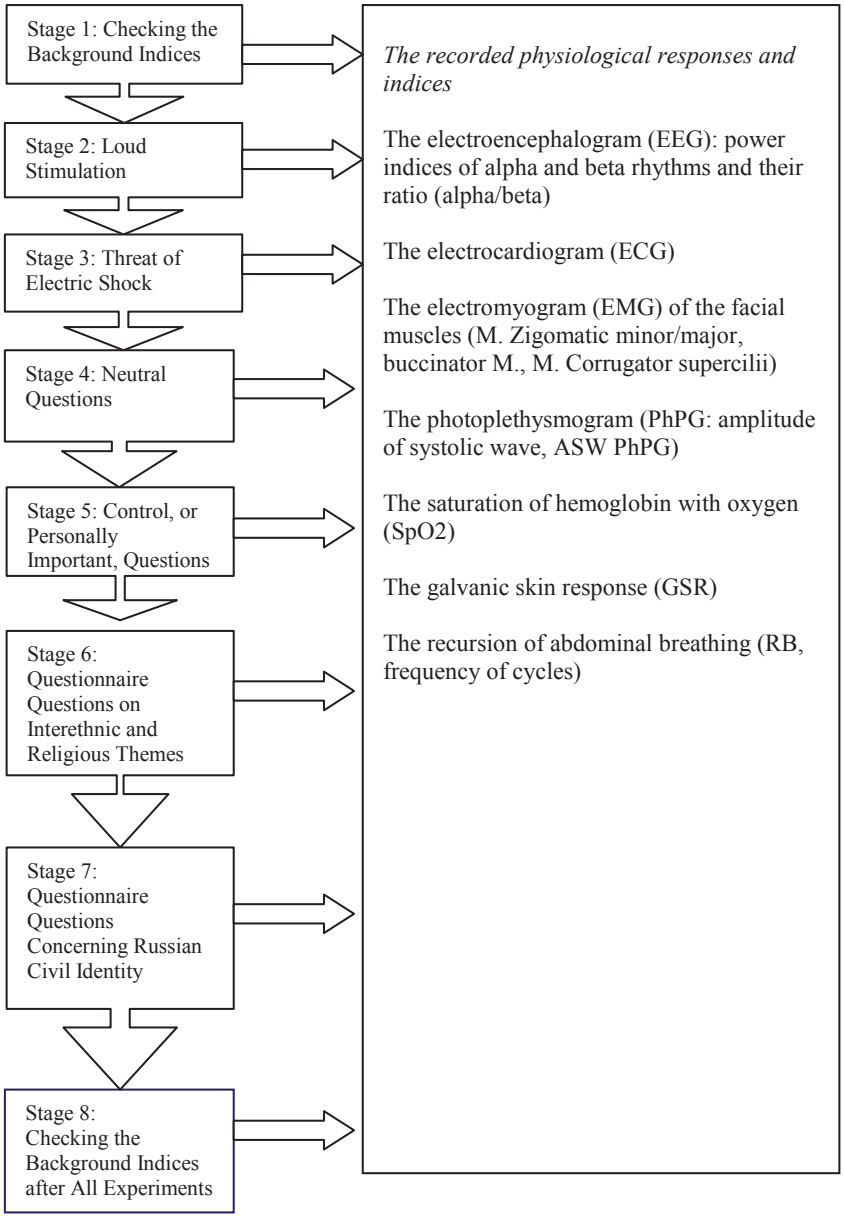

Figure 2. The main stages of the experimental procedure

The experiments included 8 stages: Stage 1 — "Checking the Background Indices of the Responses before Starting the Experiments" (5 min); Stage 2 — "Loud Stimulation" (3 min); Stage 3 — "Threat of Electric Shock" (1.5 min); Stage 4 — "Neutral Questions" (3 min); Stage 5 — "Control, or Personally Important, Questions" (3 min); Stage 6 — "Questionnaire Questions on Interethnic and Religious Themes" (3 min); Stage 7 — "Questionnaire Questions Concerning Russian Civil Identity" (3 min); Stage 8 — "Checking the Background Indices of the Responses after All Experiments" (5 min). At the beginning of the study, the subjects were informed about the aims and circumstances of the testing. Before each stage, the corresponding instruction was presented on the monitor.

Methods of experimental data processing

After the registration and initial processing of indicators of the psychophysiological responses of the central and peripheral NS in response to the presentation of different types of stimuli information, the data were reduced in the 'Microsoft Excel' spreadsheets, and a group analysis of differences for all experimental stages and indices was performed.

Because of the small data sample, the obtained results were analyzed using nonparametric tests. In the first step, we assessed the differences in the average values of every index between the experimental stages using the Friedman test. Table 1 presents the values of the Friedman test statistics, where one can see that, aside from the heart rate and the frequency of cycles of respiration per minute, all indices reveal significant differences. The exceptions are based on the fact that some subjects had alternative responses to stressors: three of the 17 subjects discovered decreasing (but not increasing) frequency of their breathing cycles and heart rate in the presence of the stressors. Factors, which showed significant differences according to the Friedman test (the indices of alpha and beta rhythms, alpha/beta relation, ASW PhPG, GSR), were included in the subsequent analyses and discussion.

Table 1. Friedman test statistics for the assessment of differences between average values of physiological indices of responses obtained at different experimental stages

	Power of beta rhythm	Power of alpha rhythm	Relation alfa/beta	Heart rate (ECG)	ACW PhPG	SGR	Frequency of respiration cycles
Value of Friedman Test Statistics	17.672*	34.765**	17.950*	8.521	30.807**	24.303**	9.555

Note. * — p-value > 0.01; ** — p-value > 0.001

A post-hoc analysis was performed with the help of the T-Wilcoxon test for the parameters, which discovered significant differences between stages (table 1). The values of the statistics were considered significant if the bilateral p-value was less than 0.05. An analysis was conducted using the 'R' programming language (version 3.3.4) and the development environment 'RStudio' (version 1.0.143).

Results and Discussion

The results of the statistical analysis of the group differences between psychophysiological indicators of responses to the action of stressors of different types are presented in Tables 2–4.

The dynamics of the total brain activity (EEG) at different stages of the experimental procedure is most clearly reflected by the ratio of the power indices of alpha and beta rhythms (tables 1-2; histogram 1). Several studies have shown that the cognitive load power index of the alpha rhythm decreases and the power index of

Table 2. Estimates of the differences between the experimental stages on the relationship between the alpha/beta rhythms of the EEG (T-Wilcoxon test)

	Stage 1	**Stage 2**	**Stage 3**	**Stage 4**	**Stage 5**	**Stage 6**	**Stage 7**
Stage 1	0	70	116	117	119*	128**	127**
Stage 2	83	0	111	109	124*	133**	133**
Stage 3	37	42	0	85	93	116	115
Stage 4	36	44	68	0	89	128**	113
Stage 5	34*	29*	60	64	0	125*	101
Stage 6	25**	20**	37	25**	28*	0	89
Stage 7	26**	20**	38	40	52	64	0

Note. Descriptions of stages; see scheme 1 and text.
Values of T-Wilcoxon test: * — p<0 .05, ** — p<0.01.

Table 3. Estimates of the differences between the experimental stages on the relationship of SGR (T-Wilcoxon test)

	Stage 1	**Stage 2**	**Stage 3**	**Stage 4**	**Stage 5**	**Stage 6**	**Stage 7**
Stage 1	0	22*	0**	0**	1**	6**	17**
Stage 2	114*	0	16**	55	63	67	71
Stage 3	136**	120**	0	126**	133**	127**	131**
Stage 4	136**	81	10**	0	108*	107*	118**
Stage 5	135**	73	3**	28*	0	61	97
Stage 6	130**	69	9**	29*	75	0	113*
Stage 7	119**	65	5**	18**	39	23*	0

Note. Descriptions of stages; see scheme 1 and text.
Values of T-Wilcoxon test: * — p<0 .05, ** — p< 0.01.

beta rhythm increased, which is reflected in the declining the values of the alpha/beta ratio. This index has been called 'the index of fatigue' because it is often used for diagnostics of human functional states in conditions of monotonous activity, fatigue, or cognitive load (Jap et al., 2009, Cheng, 2011; Thien Nguyen et al., 2017; Polikanova & Sergeev, 2014).

Figure 3 demonstrates the dependence of the ratio of alpha/beta rhythms on the degree of the stress load. It is seen that the most pronounced differences in the values of this indicator are discovered between background stage 1 and stages 5 (the responses to personally significant issues), 6 and 7 (the questionnaire concerning attitudes in the field of interethnic and interfaith relations). Less pronounced differences are revealed between background stage 1 and stages 2-3 (loud sounds and threat of electric shock).

Table 4. Estimates of the differences between the experimental stages on the relationship of ACW PhPG (T-Wilcoxon test)

	Stage 1	**Stage 2**	**Stage 3**	**Stage 4**	**Stage 5**	**Stage 6**	**Stage 7**
Stage 1	0	77	145**	138**	138**	133**	121*
Stage 2	76	0	149**	133**	131**	129**	112
Stage 3	8**	4**	0	43	69	72	73
Stage 4	15**	20**	110	0	114	112	98
Stage 5	15**	22**	84	39	0	75	73
Stage 6	20**	24**	81	41	78	0	74
Stage 7	32*	41	80	55	80	79	0

Note. Descriptions of stages see scheme 1 and text.
Values of T-Wilcoxon test: * - p < 0 .05, ** - p < 0.01.

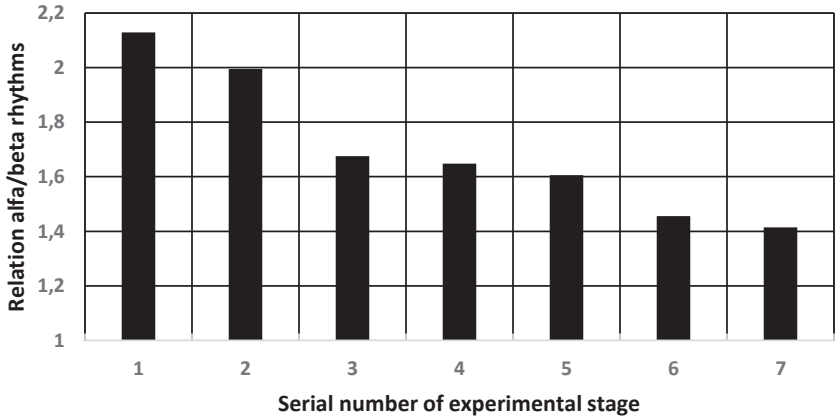

Figure 3. Dependence of the alpha/beta rhythms relationship on the stress load at different experimental stages. For descriptions of stages: see Figure 1 and text.

The evident decline in the ratio of alpha/beta indices depending on the increasing complexity of cognitive load and the simultaneous minor changes of this indicator given physical (stage 2) and emotional (stage 3) stressors reveal high selective sensitivity of this index of brain activity mainly due to the actions of cognitive stressors. In this case, the increase in psychological stress is due to the need to evaluate question content and prepare an appropriate response to it.

In contrast to the EEG indices, which are sensitive to changes in the degree of cognitive load, the indicators of peripheral NS activity (GSR, ASW PhPG) most effectively reflect the stress level in response to physical and emotional stressors. For example, the amplitude of ASW PhPG demonstrates the same reduction in almost all experimental stages except for stage 2 (loud stressful auditory stimuli) (histogram 2). It is known that the magnitude of the ASW PhPG is greatly affected by various stress factors. The typical reaction of blood vascular system of the brain to stress exposure is an increase of the resistive vessels tonus (small arteries, arterioles,

venules, and small veins), which is reflected in the decrease in the amplitude of the systolic wave. This fact is often used to assess the intensity of action of various stress factors. Indices of ASW PhPG are broadly used to diagnose different human functional states: fatigue (Suzuki, Okada, 2008), emotional arousal, or physiological or psychological stress (mental stress) (Minakuchi et al., 2013).

According to the preliminary data of our pilot research, the indicators ASW PhPG at stages 1 (background) and 2 (auditory stimulation) are not significantly different from each other (Table 4, Figure 4), i.e., most of the subjects subjected to sound stimulation did not discover a reduction of ASW PhPG. At the same time, at stages 3-7, the magnitudes of ASW PhPG are statistically significantly different from the magnitudes of ASW PhPG at background stage 1, showing approximately the same magnitude of decline of this indicator in response to psycho-emotional stressors. Such dynamics of this parameter indicate the nonspecific nature of its relationship to the type of stressor: qualitatively different stressors — in our work, emotiogenic stressor (stage 3: the threat of electrical stimulation) and different versions of psycho-emotional stressors (stages 4-7) — cause the same changes as ASW PhPG.

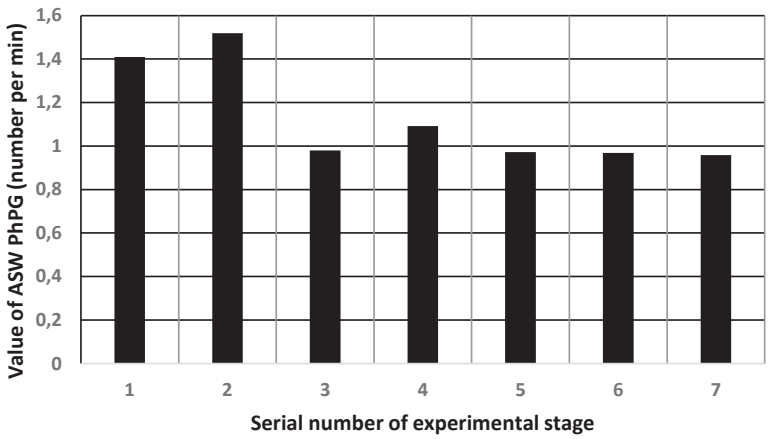

Figure 4. Values of the ASW PhPG as a function of stimulation at different experimental stages. For descriptions of stages: see scheme 1 and text.

A traditional indicator of the sympathetic division response of the autonomic NS to the actions of physiological and psycho-emotional stressors are changes in the amplitude of tonic and phasic components (waves) of the GSR (Hassett, 1981; Boucsein, 1992; Neil, Carlson, 2013; Silvert et al., 2004; Sequeira et al., 2009; Kreibig, 2010; Hot et al., 2005; Coulter, Pelenitsyna, 2009). The value of the tonic skin resistance increases in the relaxed states and decreases with high activation. Phasic GSR oscillations are more sensitive to stress, anxiety, and mental activity (Large psychological dictionary, 2003). In our research, we used the value (length) of the 'circumflex line of GSR' (GSR-L), which reflects the total dynamics of the phasic and tonic components of the GSR.

On Figure 4, the fluctuations of the GSR-L value, fixed at different experimental stages, are represented. The magnitude of the GSR-L under all types of stimulation is significantly different from the background levels. The most pronounced changes of SGR-L are observed in response to emotiogenic stressor (stage 3: the threat of

electrical stimulation). Thus, the changes of this parameter nonspecifically reflect the reaction of subjects to the impact of stressors as having various qualities (physical and psycho-emotional) and intensity (Figure 4).

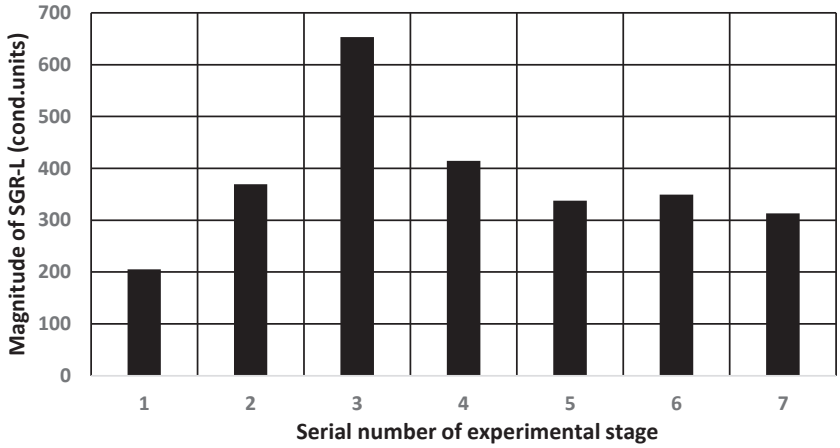

Figure 5. Value of SGR-L as a function of stimulation at different experimental stages. Descriptions of stages: see scheme 1 and text.

The preliminary results of our pilot study argue that psychophysiological methods may allow us to quantitatively assess the degree (intensity) of human responses not only to physical and physiological stimuli but also to the psycho-emotional content of a socio-psychological questionnaire. The experimental procedure that is proposed in this research and based on classical psychophysiological indices, allows the researchers, in the first approximation, to simulate and study the impact of physical and psycho-emotional (emotiogenic, cognitive) stressors on human physiological responses and mental activity. The indices we used in the research have selective specificity and sensitivity to the effects of different stressors, but when considered complex, they can serve as adequate indicators for the evaluation of human responses to stressors of a different quality and intensity. It is shown that the complex of only three psychophysiological indicators — the ratio of the power indices of alpha/beta rhythms, ASW PHPG and GSR-L — permits the evaluation of the functional state of a person while he/she completes the socio-psychological test to identify the structure of his/her attitudes in interethnic and interconfessional relations. Note that in our study, the sample of subjects did not include individuals with strong positions on issues of interethnic and interfaith relations. The subjects mainly held neutral views, and their reactions to the test questions were reasonable and moderate. However, even in this case, the complex of indicators has been sufficiently effective for the differentiation of reactions to personally significant questions in the questionnaire from reactions to the physical and psycho-emotional stressors, which were irrelevant in the test. These data offer grounds for hope that the use of psychophysiological indicators for evaluating human functional states in the study of personal attitudes in social spheres will provide more reliable and valid data, which may serve as a basis for the development of new, more efficient interdisciplinary technologies for socio-psychological investigations and surveys.

Conclusion

The results of the comparative analysis of intergroup differences in the central and peripheral nervous system (NS) activity indicators to the physical and psychoemotional (emotional and cognitive) stressor action, including the stressful questions in the questionnaire, yield the following conclusions.

1. The magnitudes of the psychophysiological reaction indices that were recorded in response to stimuli of different quality (content) and intensity are statistically significantly different from the background. These reactions can be recorded and evaluated using quantitative indexes reflecting the degree of activation of the various structures of the central (brain) and autonomic nervous system.
2. The indicator of rhythmic brain activity, the ratio of power indexes of alpha and beta rhythms (alpha/beta), possess high selective sensitivity to cognitive stressor action, provoking a high level of mental activity. The reaction of this indicator to personally important questions in the questionnaire exceeded the response to physical and emotiogenic stressors.
3. The dynamics of the ASW PhPG effectively reflects a nonspecific reaction of NS to stressors of a different nature (physical, emotional, or cognitive). Any stressor reaching a certain threshold intensity (determined by individual resistance to stress) causes a reduction of the ASW PhPG.
4. The magnitude (length) of the 'circumflex line of GSR' (GSR-L) may serve as a reliable indicator for a quantitative evaluation of the impact on humans' emotiogenic stressors that are different in quality and intensity. The maximum value of this parameter characterizes a negative emotional human reaction caused by the action of a typical emotiogenic stressor — expectation of electrocutaneous stimulation. The dynamics of this parameter also reasonably and quantitatively reflect the intensity of human reactions to the impact of physical and psychosocial stressors, which makes this index versatile in assessing the emotional reactions that accompany exposure to different stressors.
5. Indices of subject responses to questions concerning interethnic attitudes and the Russian civil identity, as well as to personally important questions not related to the questionnaire, are significantly different from indices recorded in the resting state. This means that the intensity of reactions to semantic, emotiogenic, and personally significant issues are comparable to reactions to physical stressors, and concerning the single indicators (the ratio of alpha/beta), is even greater than the intensity of reactions to "classical" physical and emotiogenic stressors.
6. The application of psychophysiological methods in conducting socio-psychological testing may help to identify groups of stressful questions that most adequately reflect the individual and group structure of human inter-ethnic attitudes in the area of social relations. As a consequence, this will provide a more reliable and valid experimental basis for the development of new, more efficient interdisciplinary technologies for socio-psychological investigations and surveys.
7. The proposed psychophysiological procedure for socio-psychological investigations has two obvious limitations. The first restriction is associated with the challenges concerning the observance of human rights when conducting large-scale testing. The second limitation is determined by the time-scaled characteristics of measured physiological parameters (inertia; time required for statistical

analysis). Given the noninvasiveness of the registration and reliability of quickly (online) obtained data, we propose rhythmic brain activity (ratio of power indexes of alpha and beta rhythms), the dynamics of the ASW PhPG and the magnitude (length) of the 'circumflex line of GSR' (GSR-L) as the complex of indicators that possess sufficiently high selective sensitivity to differentiate nonspecific reactions of the human nervous system to stressors of a different nature (physical, emotional, or cognitive).

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