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COGNITIVE SCIENCE

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

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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

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 Hessel, 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. Zygomatic 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

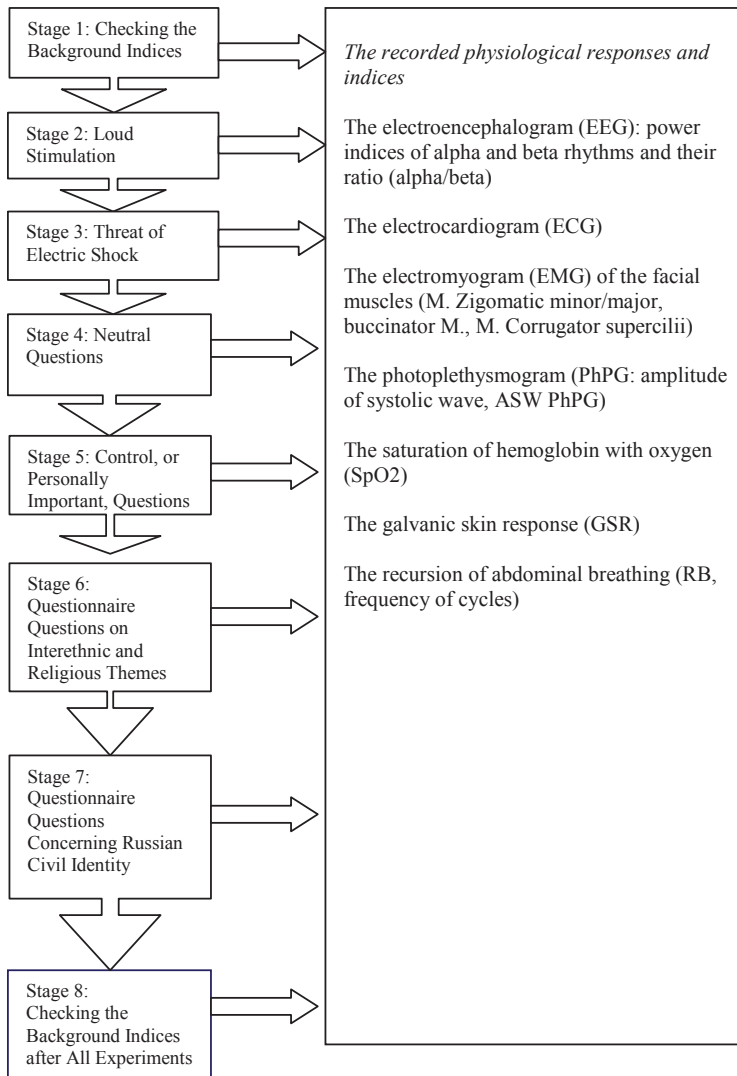


Figure 2. The main stages of the experimental procedure

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 respira- tion cycles
Value of Fried- man 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: * — $p < 0.05$, ** — $p < 0.01$.

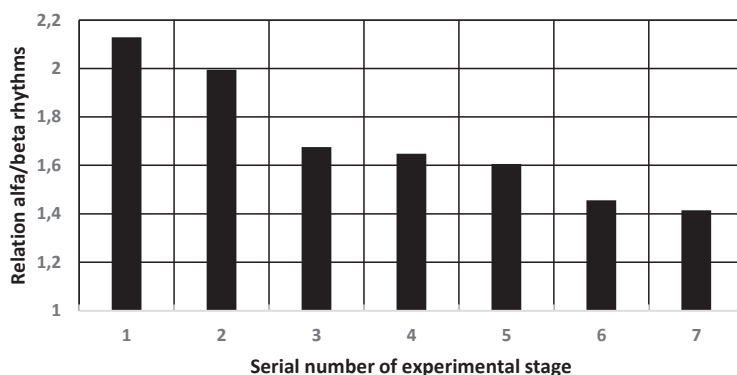
beta rhythm increased, which is reflected in the declining the values of the alpha/beta ratio. This index has been called 'the index of fatigue' because it is often used for diagnostics of human functional states in conditions of monotonous activity, fatigue, or cognitive load (Jap et al., 2009, Cheng,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

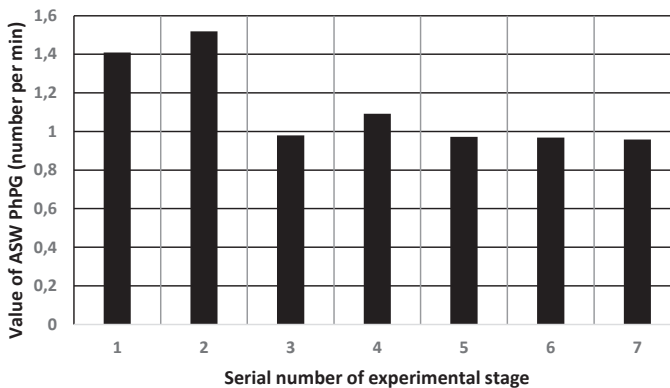


Figure 4. Values of the ASW PhPG as a function of stimulation at different experimental stages. For descriptions of stages: see scheme 1 and text.

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).

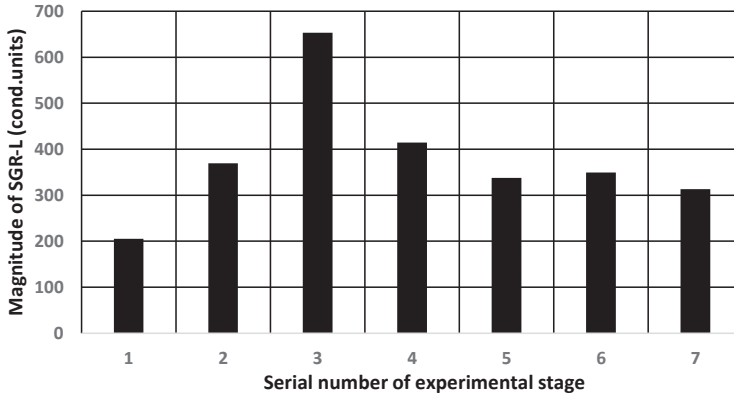


Figure 5. Value of SGR-L as a function of stimulation at different experimental stages. Descriptions of stages: see scheme 1 and text.

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 psycho-emotional (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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The study of ethnic attitudes during interactions with avatars in virtual environments

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Background. Modern technologies provide a wide range of opportunities for studying different types of social processes and phenomena. Currently many original social studies have been done with the use of virtual reality technologies. The effectiveness of their application has been shown for the study of verbal and nonverbal communication; the processes of ethno-cultural identity; and for teaching social skills, as well as correcting social anxiety and ethnic attitudes. One of the very real question concerning spatial behavior during communication with partners from other ethnic groups, however, has not been studied very much.

Objective. In our study we explored proxemic behavior in subjects' face-to-face interactions with avatars of in-group and out-group ethnic appearance. Using the CAVE virtual reality system, we studied preferred interpersonal distances in carrying out memory tasks during interaction with the avatars.

Design. Three virtual environments with avatars of different ethnic appearance were developed. Each virtual scene represented a room where three avatars of the same ethnicity were standing. Their appearance was associable with one of three ethnic groups—the Slavic, North Caucasian, or the Central Asian. The participants (all of whom identified themselves as Russians) were immersed in the virtual scenes with the help of the CAVE virtual reality system. They were instructed to keep in mind as many details of the avatars' appearance as they could.

During the task's execution the interpersonal distances between the participants and the avatars were registered. After leaving the CAVE, the participants were asked to answer questions about the details of avatars' appearance, and to fill out a questionnaire assessing the Presence Effect in virtual environments. The identification accuracy of the avatars' appearance details and the Presence effect were measured. The interpersonal distances were analyzed for the area around the direction of mutual gaze.

Results. The results showed that participants preferred to keep closer interpersonal distances from the avatars of the same ethnic group as their own. During interaction with avatars belonging to another ethnic group, significantly larger interpersonal distances were preferred. A significant correlation between the interpersonal distance and the Presence Effect was also revealed.

Conclusion. Virtual reality technology provides a unique and valuable tool for social researchers, including in ethnic attitude studies. A complex method of measuring interpersonal distances and the Presence Effect allows us to assess the main variables during social interaction with high accuracy. The virtual environments designed for this study can be applied successfully not only for studying proxemic behavior, but also for accomplishing other tasks, such as developing communication skills and forming positive attitudes towards ethnic out-groups.

Keywords: interethnic attitudes, proxemics, nonverbal communication, compensation effect, mutual gaze, CAVE virtual reality technology, avatar, Presence Effect

Introduction

Social studies are currently getting more efficient due to modern technologies, which allow us to design complicated stimuli scenes and detect behavioral reactions in real time. Virtual reality systems, which have been increasingly used for these studies during the past 20 years, are one example of such technologies. One of the main advantages of using virtual reality systems in social studies is that they provide an opportunity to study the social interaction between the study's participants and virtual characters, i.e. avatars (Lanier, 1992; Bailenson et al., 2008a; Eichenberg, 2012). According to the Oxford dictionary, the term „avatar“ is defined as „an icon or figure representing a particular person in a video game, Internet forum, etc.“ (www.oxforddictionaries.com/definition/english/avatar). In the context of our study, we considered avatars to be virtual partners simulating real people's appearance and behavior during interaction in virtual environments.

The active application of virtual reality systems to social studies allows researchers to extend the range of fundamental and applied research objectives which, until recently, could hardly (if ever) be accomplished using classical methods such as questionnaires, surveys, etc. Thus, during the past decade, study of ethno-cultural identification, interethnic and interracial attitudes, and the nonverbal behavior of partners from different cultures has developed a lot (Blascovich et al. 2002; Asmolov et al., 2014; Zinchenko et al., 2015). New methods of analysis and for regulation of social conflicts have been designed due to the new tasks. Thereby, using avatars as virtual partners provides us with original data on the peculiarities of personal space characteristics (Bailenson et al., 2003), the factors determining spatial behavior in virtual environments (Bailenson et al., 2008b), and the specific manifestations of social preferences (McCall et al., 2009).

The dynamics of spatial behavior during communication are among the most significant expressions of interpersonal (and, especially, ethnic) attitudes. The study of spatial behavior is called proxemics (Hall, 1966). Different proxemic signals used in social contacts have been identified, including interpersonal distance, gaze direction, head and body posture, shoulder orientation, and others (Hall, 1966; Schegloff, 1998). The degree of interpersonal distance is considered to be one of the most expressive non-verbal signals in the communication process. A number of distance zones have been distinguished: „Intimate Space“ (0.15–0.45 m); „Personal Space“ (0.46–1.5 m); „Social Space“ (1.6–3.7 m); and „Public Space“ (≥ 3.7 m). The proxemic zone values are assumed to reflect some implicit rules associated with social

laws of secure communication: by observing proxemic rules, people share information about their opinions on social status, race/ethnicity, and cultural features.

The degree of spatial proximity between communicants has been shown to depend on many factors, including gender and age characteristics (Willis, 1966), social prejudices, and stereotypes (Watson, 1970), as well as racial/ethnic preferences (Rosegrant & McCroskey, 1975). A compensation effect in interpersonal distances has been found, which shows that people maintain greater distances from a partner who maintains a constant mutual gaze (Argyle, Dean, 1965). That same effect was found in the interaction between the participants and the avatars (Bailenson et al., 2003). It was shown also that psychological discomfort arises in the case of personal space violation by another person, especially in the case that he/she has a different ethnic affiliation. This sense may manifest itself in involuntary behavioral reactions of contact avoidance: participants prefer to increase the interpersonal distance between themselves and a partner of a different racial/ethnic group.

Methods have been developed for studying the rules of proxemics (Hayduk, 1983), which include:

- The chair selection method, in which a participant himself chooses a place which he/she considers comfortable for communication;
- The stop distance method, in which a participant tells a partner to stop approaching, when the partner reaches the most comfortable distance for communication;
- The method of projective studies, in which participants manipulate puppets or abstract figures; and
- The natural-observation method, when the spatial behavior of communicants in real situations is recorded.

Analysis of the details of their application has revealed both the advantages and disadvantages of each method. Thus, the method of projective studies has been shown to have low ecological validity, while the natural observation method shows a low level of control over the scene's physical parameters. A significant drawback of the other methods is related to the need to involve actors whose behavior (e.g., gestures, facial expressions, voice timbre, etc.) can change a lot between experimental trials. Also, it should be noted that in studies of ethnic preferences, the main difficulty lies in the choice of actors, whose appearance should reflect the representative features of the ethnic groups being studied.

The use of virtual reality systems eliminates most of the above-mentioned disadvantages. Analysis of the application of virtual reality technology for studying social phenomena has shown its obvious benefits (Zinchenko et al., 2015; Fox et al., 2009). The main ones include the ecological validity of virtual environments, and the ability to registrate full real-time responses of the respondent's behavior (Zinchenko et al., 2010). Furthermore, it should be noted that the technical parameters of virtual reality systems provide high-accuracy estimations of the participants' involuntary reactions during communication with virtual partners.

In earlier proxemic studies, the evaluation of spatial metrics was quite rough, thereby limiting the potential for accurate quantitative analysis of the spatial behavior (Jones, Aiello 1979). The more recent development of head- and body-tracking

technology in virtual environments enables researchers to record changes in macro and micro movements during communication with a high accuracy (Oosterhout & Visser 2008; Gamberini et al. 2015). It is also important to mention one more advantage: the ability to standardize the situation of ethnic/racial interaction due to the ability to control the avatars' behavior (their facial expressions, postures, and etc.).

One of the most important issues in applying virtual environments to social studies is the question of how realistic and natural the virtual scenes and virtual partners appear to the participants. It is assumed that the more realistic the perception of a virtual environment, the stronger the feeling of immersion in the virtual world. Immersive experience also suggests the feeling of "being there," as well as one's own body's presence inside the virtual environments (Lombard & Ditton, 1997).

To assess the feeling of immersion, B. Witmer and M. Singer suggested the "Presence Effect" concept. They defined it as "the subjective experience of being in one place or environment, even when one is physically situated in another" (Witmer & Singer, 1998). A questionnaire was developed to elicit the participants' sense of "presence" in virtual environments, together with a questionnaire for measuring a person's immersive tendencies. It included three to four general, and five to six specific questions concerning the realism of the virtual scenes and characters. The questionnaire and its modifications have become a standard tool for measuring the efficiency of virtual reality exposure.

While virtual reality systems have obvious benefits for studying ethnic/race preferences, there are few publications on this issue. Among these works, we can distinguish the study (Dotsch & Wigboldus, 2008) which showed that people with a negative attitude toward some racial group showed the same racial prejudices during interaction with avatars with a corresponding appearance. Virtual systems are successfully used to assess the social attitudes toward the Negroid race (McCall et al., 2009). Groom (Groom et al., 2009) discovered changes in the subjects' racial attitudes after they manipulated their own avatar by giving it a modified skin color.

The goal of our experiment was to study the spatial behavior (proxemics) in face-to-face interactions with avatars of in-group and out-group ethnic appearance. We hypothesized that the interpersonal distance would decrease during communication with avatars with an in-group ethnic appearance, and, conversely, it would increase in the case of interaction with avatars with an out-group ethnic appearance. We also assumed that the value of interpersonal distance would correlate with the strength of the Presence Effect.

Method

Subjects. 40 persons participated (29 female, 11 male), aged 18 to 26. All participants identified themselves as Russians (belonging to the Slavic ethnic group). All of them had normal or corrected-to-normal vision and had no disorders of the vestibular system or brain injuries.

Stimuli. Three-dimensional virtual scenes simulating the situation of inter-ethnic interaction were developed. Each scene represented a living room in the cen-

ter of which a group of three avatars of the same ethnic appearance were located. There were windows and a door in the room, with a hilly landscape visible through them. The avatars stood in a circle facing each other. They differed in height, build, clothing details, facial features, and facial expressions: neutral, less friendly, and friendlier. The avatars were animated: they swayed a little, moved eyes and heads. Three virtual scenes were developed: the first contained three avatars of Slavic appearance; the second, avatars of North Caucasian appearance; and the third, avatars of Central Asian appearance.

Apparatus. Virtual scenes were presented using the CAVE virtual reality system Barco Ispace 4 (Fig. 1). It consisted of four large flat screens, which were combined to form a cube consisting of three walls and a floor. The effect of three-dimensional virtual objects and characters was created using Crystal Eyes glasses. The participants used a Flystick2 manipulator to navigate in the virtual environments. Position data of the participants' movements were recorded using tracking system A.R.T. DTrack 2. Position points were recorded with an 8 Hz update frequency. VirTools 4.0 was used for software development. This system has been successfully used in the research of three-dimensional illusions (Menshikova, 2013) and disorders of vestibular function (Menshikova et al., 2015).



Figure 1. An overview of the CAVE virtual reality system

Procedure. A scenario for the participants' action in the virtual environment was developed. In the beginning, the participants were offered a training session, where they could learn about their possible movements in the virtual environment using Flystick. Each participant was asked to move around the room in all directions, approach the avatars, and get around them. The training session lasted for 5–10 minutes, during which time the participant had mastered the Flystick in order to fully control her/his own movement in the virtual environment.

Then she/he took the main test, which consisted of three sessions. In the first session, the participants interacted with a group of avatars of Slavic appearance; in the second, of North Caucasian appearance; in the third, of Central Asian appearance. The sequence of presentation of the different ethnic groups was randomized.

Before the testing, the following instruction was given: "You are participating in an experiment assessing your accuracy in recollecting the appearance of various avatars. Three scenes representing a room with three avatars are presented. Your task is to approach each avatar using Flystick and remember all the details of its appearance (i.e. clothing details, facial features, facial expression). Then you have to fill out two questionnaires concerning the details of each avatar's appearance, as well as your ethnic preferences toward the avatars you have just seen. Then the second and third scenes will be presented, and the testing of the accuracy of your recollection will be repeated. At the end you will be asked to complete a questionnaire concerning the realism of virtual scenes."

The questionnaire assessing the recognition accuracy of the avatars' appearance was designed for each ethnic group separately. It consisted of eight questions about the details of clothing, eye and hair color, the peculiarities of emotional facial expressions, and others.

The questionnaire for assessing the Presence Effect was a modified version of the Witmer & Singer Questionnaire (Witmer & Singer, 1998), translated by one of the authors (G. Menshikova), and modified in accordance with the objectives of our study. It consisted of 10 questions relating to the general impressions of the virtual environments, the realism of their appearance, and the behavior of the avatars.

To be specific: Three general questions were formulated about the realism of the virtual environments (numbers 1–3); two questions about the realistic properties of the avatars' appearance (numbers 4, 5); three questions about the feelings caused by interaction with the avatars (numbers 6–8); and two questions about the participant's adaptation to the virtual environment (numbers 9, 10). The participants evaluated the questions on a scale from 1 to 7, where one corresponded to minimum, and seven to maximum virtual environment effect.

The variables to be measured were the pathways of the participants' walking around avatars of different ethnic appearance than themselves; the execution time of any session; and the answers to the questionnaire assessing the recognition accuracy of the appearance of avatars from each ethnic group, as well as the answers to the questionnaire assessing the Presence Effect.

Data processing. The data analysis included the calculation of the average and minimal average distances that participants assumed between themselves and avatars of different ethnic groups. To reduce the scatter of data points, the average and minimum distances were summarized in a particular space area around the direction of mutual gaze. The choice of this area was driven by information showing that the participants prefer to maintain a greater distance while in the "eye-to-eye" area, and a shorter distance if they exit the eye contact zone (Bailenson et al., 2003). The strength of the Presence Effect was calculated with scores averaged over the entire sample, and over each group of avatars. Data analysis was made by SPSS Statistics 20.

Results and discussion

The accuracy of the recognition of the avatars' appearance in different ethnic groups. The accuracy of the avatars' appearance recognition, and also the avatars' facial expression recognition, was calculated across the entire sample separately for

each group of avatars. It was shown that the recognition accuracy of certain details remained consistently high regardless of the ethnicity of the group of avatars: $P1=0.98\pm0.02$; $P2=0.97\pm0.015$; and $P3=0.98\pm0.01$, where P1, P2, and P3 were the probabilities of identifying the details of avatars of Slavic, North Caucasian and Central Asian appearance, respectively. A negligible decrease in the identification accuracy was recorded for fine details (e.g., the ring on a finger), for details outside the range of active attention (e.g., shoe color), and also for the recognition of the avatars' facial expressions. For these cases, no significant probability difference across various avatar ethnic groups was observed as well. The results indicated the absence of a significant influence of the ethnicity factor (the situation of social interaction with avatars of different ethnic groups) on the execution of the cognitive memory task.

Inter-individual distance between a participant and the avatars of ethnic in- and out-groups. The specific characteristics of approaching and walking around avatars belonging to different ethnic groups, were mapped by registering the X and Y coordinates of the participant's location in the virtual environment. In Figure 2, three pathways around the avatars of different ethnic appearance performed by a typical participant (A.G.) are shown. The avatars' 2D positions are marked with black circles (numbers 1, 2, 3); the starting point of the participant's position with a brown circle (number 4). The trajectories of the participants' bypass around avatars of different ethnic appearances are marked with different colors: green, red, and blue lines for the bypass around Slavic, North Caucasian, and Central Asian groups, respectively.

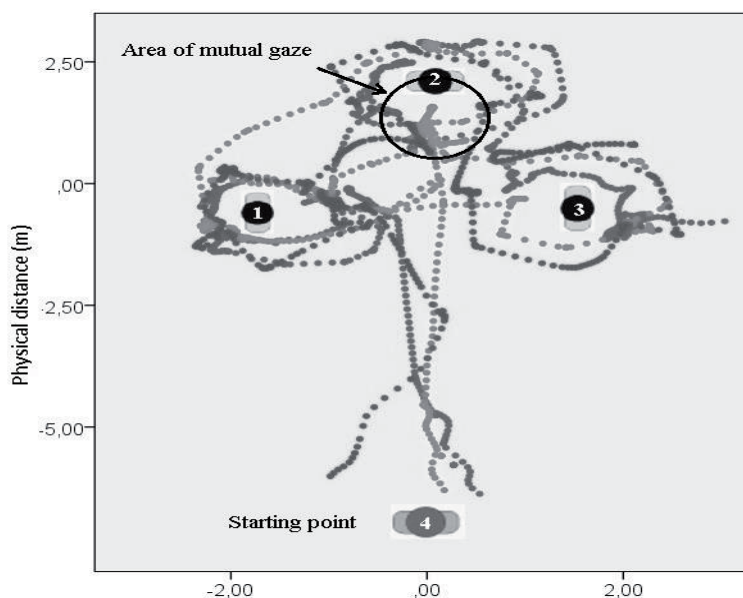


Figure 2. An example of the 3 pathways of a typical participant as she walks from the starting point around the avatars of different ethnic appearance (the red line=Slavic appearance; the green line=North Caucasian appearance; the blue line=Central Asian appearance)

The values of interpersonal distances varied strongly over the entire sample because the participants expressed their implicit attitudes toward the avatars by variable behavioral reactions. Each participant's motion trajectory around the avatars was analyzed, in order to reveal the impact of ethnic preference on the interpersonal distances. The average and minimum average distances for each ethnic avatar group were calculated. Distance estimates were made in a space limited to $\pm 30^\circ$ of the visual angle around the direction of mutual gaze. In Figure 2 this area is marked with a black circle.

The average and minimum average interpersonal distances (in meters) for avatars of Slavic (Group 1), North Caucasian (Group 2), and Central Asian (Group 3) appearance can be seen in Table 1. Standard deviations are shown in brackets.

Table 1. Interpersonal distance: Descriptive statistics

Interpersonal distance	Group 1	Group 2	Group 3
Average distance (m)	1.16 (0.16)	1.20 (0.14)	1.21 (0.15)
Minimum average distance (m)	0.57 (0.14)	0.68 (0.19)	0.73 (0.18)

In Figure 3 the values of average (dark bars) and minimum average (light bars) interpersonal distances are shown. Their values are presented separately for the avatars of different ethnic groups: the Slavic (Group 1), the North Caucasian (Group 2), and the Central Asian (Group 3).

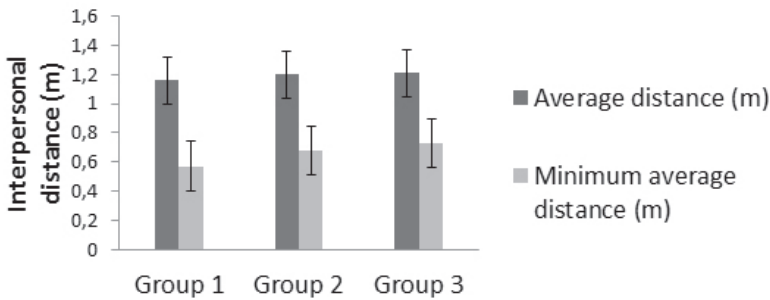


Figure 3. The average (dark bars) and minimum average (light bars) interpersonal distances for avatars of the Slavic (Group 1), North Caucasian (Group 2), and Central Asian (Group 3) groups

The differences between the average interpersonal distances with pairwise comparison of all groups were insignificant: between Groups 1 and 2 ($t(80)=3.67$, $p<0.08$); between Groups 1 and 3 ($t(80)=4.65$, $p<0.09$); and in Groups 2 and 3 ($t(80)=5.44$, $p<0.13$). When comparing the minimum distances, we found that the differences between Groups 1 and 2, as well as between Groups 1 and 3, were significant: $t(80)=2.48$, $p<0.05$ and $t(80)=3.86$, $p<0.04$, respectively. On the contrary, the differences of minimum distances between Groups 2 and 3 were insignificant ($t(80)=5.44$, $p<0.13$).

Thus, the minimum distance data confirmed our hypothesis: its decrease during communication with avatars of in-group ethnic appearance, and, conversely, its increase in the case of interaction with avatars of out-group ethnic appearance. It should be mentioned that the values of minimum distances observed in our experiment (0.58–0.72 m) were higher than the findings (0.34–0.54 m) of a similar study performed with the help of virtual reality systems (Bailenson et al., 2003). Perhaps the decrease in the minimum distances was due to the particular memory tasks given to the participants: in the Bailenson study, the participants were asked to remember the avatars' names, which were written on their clothing in small letters, and thus required maintaining shorter distances from the avatars.

Measuring the Presence Effect. Presence scores were averaged separately for each question over all participants and all avatars' ethnic groups. The mean Presence scores for each question are shown in Figure 4.

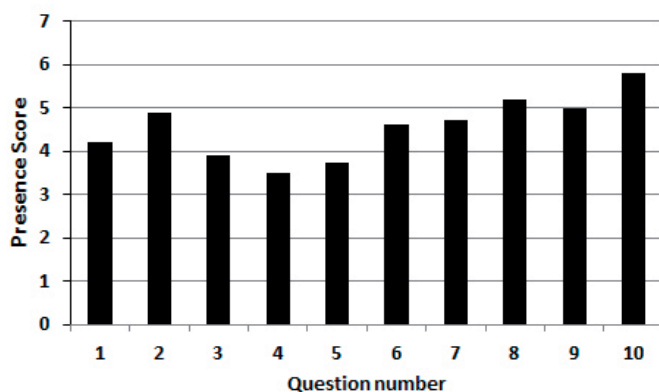


Figure 4. Mean Presence scores versus the question number

Our data showed that the highest scores (> 5 points) were given in response to predictions of further events in a virtual environment, as well as in the estimates of the speed of adaptation to a virtual environment. The least pronounced Presence Effect (~ 3.5–4 points) was shown for the evaluation of the avatars' realism and the naturalness of their movements. The answers to the remaining questions about the realism of the virtual environments were in the middle range of 4–5 points.

We calculated the sample correlation coefficient between the values of mean minimum interpersonal distances and Presence scores, averaged over all 10 questions. The results showed a high negative correlation ($r=0.67$; $p=0.005$), indicating a more pronounced interpersonal effect if the participant's Presence score was higher. In other words, the more realistic the virtual environment is perceived to be, the larger distances the participants kept from the avatars, regardless of their ethnic appearance.

The question arises whether the same behavior would be observed when the participants interact with real people in a real environment. We assume that our results are valid and can describe the real spatial behavior during interaction with partners of other ethnic groups. This assumption is based on the following ideas.

First, it has been shown that many social phenomena manifest themselves in the same way in both real and virtual environments (Bailenson et al., 2003; Fox et al., 2009; Eichenberg, 2012). Second, the similarity of the impact of both environments (real and virtual) on social behavior is indirectly confirmed by the high scores of the Presence Effect. Third, our participants described the avatars as real people in the interview session at the end of the experiment.

Conclusion

Virtual reality technology provides a unique and valuable tool for social research, including ethnic attitude studies.

The assessment of interpersonal distances maintained between participants and avatars of different ethnic appearance, as well as the evaluation of the Presence Effect, allow us to measure ethnic attitudes.

Our method allows us to control and assess a large number of variables during social interaction, including an estimation of proxemics, with high accuracy.

Our method showed that respondents preferred to keep shorter interpersonal distances from avatars of the same ethnic appearance as themselves. During the interaction with avatars with out-group ethnic appearance, significantly larger interpersonal distances were preferred.

These results could be of great importance for developing complex methods of testing behavioral patterns during social interactions.

The virtual environments we designed can be applied successfully not only to studying the respondents' ethnic attitudes, but also to solving other practical tasks, such as developing communication skills with, and forming positive attitudes toward, ethnic out-groups.

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Psychophysiological traits of men with several genotypes in polymorphic locus Val158Met COMT and different levels of aggressiveness

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Background. The catechol-O-methyl transferase gene influences the reuptake of monoamines (dopamine, serotonin, noradrenaline) from the synaptic space. The structural peculiarities of this gene are linked with the duration of stay of neurotransmitters in the synaptic gap and the emergence and duration of emotional reactions, which may considerably affect a person's level of aggressiveness; these peculiarities may manifest as psychophysiological characteristics.

Objective and design. This study investigated the amplitude, spatio-temporal traits and sources of evoked brain activity in men with several genotypes in the polymorphic locus Val158Met in the COMT (Catechol-O-methyl transferase) gene, levels of aggressiveness using the Buss-Darkee inventory, proneness to various types of deviant and addictive behaviors in accordance with the methods of A.N. Oryol and the preferred strategies of behavior during conflict in accordance with the methods of Kenneth Thomas. Statistical processing of psychodiagnostic data included dispersive (ANOVA) and discriminative analyses.

Results. This study found significant differences in the parameters of evoked brain activity components in responses to emotionally charged stimuli ("aggression", "positive", "tolerance", "extremism, terrorism") compared with neutral images. Student's t-test (Holms-corrected for multiple comparisons) was used to analyze the EEG-VEP data.

Conclusion. This study confirmed the hypothesis of differences in spatio-temporal and amplitude parameters of evoked brain potentials in young men exhibiting differing levels of aggressiveness. The sources of evoked brain activity determined using sLORETA (Standardized Low-resolution Brain Electromagnetic Tomography) were different between carriers of different genotypes.

Keywords: aggressiveness, visual-evoked potentials, COMT, neurotransmitters, emotionally charged stimuli

Introduction

Comprehensive studies of personal traits, namely, interconnections between genetic, physiological and psychological characteristics, are currently of great interest. The structure of genes defines the activity of neurotransmitters and neurohormones, which significantly affects the synaptic contacts between various neuronal structures. Therefore, the concentration of neurotransmitters and the length of their staying in the synaptic space are associated with the peculiarities of information transfer from one brain region to another and the duration of reactions, which may manifest as the duration and the intensity of emotions (Brady, 2012).

Scientists are investigating the mechanisms of the above phenomena, and they are in search of candidate genes that underlie various psychological and psychophysiological functions. However, the accumulated material has not elucidated the genetic and psychophysiological substrates of psychological traits and the accompanying mechanisms. One area of special interest is the study of genetic bases and psychophysiological correlates of human aggressiveness because of the powerful destructive potential of an uncontrolled aggressive reaction. Aggressiveness is a personal biologically and socially based trait, and numerous scientists (e.g., Buckholtz & Meyer-Lindenberg, 2008; Eisenberger et al., 2007; Ermakov, 2014; Vorobyeva et al., 2016) have attempted to identify individual mechanisms of aggression. Several aggressive behavior candidate genes were revealed in recent years; J.W. Buckholtz and A. Meyer-Lindenberg (2008) identified the COMT (Catechol-O-methyltransferase) gene. Some recent investigations examined associations between COMT genotypes and the bioelectric activity of the cerebral cortex. M.V. Alfimova et al. (2014) demonstrated an association between COMT structure and selective attention productivity and anxiety level, which were reflected in the amplitude and temporal parameters of component N100; S.J. Tsai (2003) revealed an association between the structure of the COMT gene and success in intellect test performance and the latency of component P300; M.V. Alfimova et al. (2015) and G. Lelli-Chiesa et al. (2011) viewed images of different valences and arousal effects and discovered an association between COMT genotypes and the level of activation of certain brain structures; and M.N. Smolka (2005) reported an association between the COMT gene and the peculiarities of emotional tolerance. M.V. Alfimova and V.E. Golimbet (2011), and A. Meyer-Lindenberg et al. (2006) demonstrated psychophysiological correlates of emotiogenic stimuli processing in people with various levels of aggression. These correlates reflect emotional regulation and cognitive control processes, which suggests that they may function as a link in aggressive behavior formation.

However, the number of studies of the psychophysiological phenotypes, including aggressiveness, of people carrying various genotypes in the Val158Met polymorphic locus of the COMT gene, remains low.

Method

The aim of this paper was to study the amplitude and spatio-temporal parameters, as well as to localize the sources of evoked brain activity in men with several genotypes in the polymorphic locus Val158Met of the COMT gene who exhibited dif-

ferent levels of aggressiveness. *The originality* of this paper lies in its multifaceted approach to investigate the psychological and psychophysiological personal traits and the sources of evoked brain activity in carriers of various COMT genotypes.

The hypothesis of the study was that the amplitude and spatio-temporal characteristics of the evoked brain activity in men with several genotypes in the polymorphic locus Val158Met COMT and different levels of aggressiveness were distinctly different. We also proposed that the sources of evoked brain activity were different in carriers of various COMT genotypes.

The subjects were right-handed males between 18 and 30 years of age who carried genotypes GG, AA, and GA of the COMT gene (40 people).

The psychogenetic stage of the research involved buccal epithelium sampling and genotype testing. DNA analysis was performed in the “High Tech” Shared Knowledge Center of Southern Federal University (Rostov-on-Don). DNA was extracted using “AmpliPrime DNK-sorb-AM” treatment agents (NextBio LLC, Russia); PCR was performed using the programmed thermostat “Tertsik” (DNK-Tekhnologiya, Russia); and the Val158Met polymorphism of the COMT gene was analyzed using SNP-express agents (Litekh, Russia). Visualization was performed using a UF transilluminator GelDoc (Bio-Rad, USA).

The psychodiagnostic stage examined the aggressiveness level using the Buss-Durkee Hostility Inventory (1957) as adapted by A.K. Osnitsky in 1998. This inventory assesses personal inclinations to various aggression manifestations, summary aggressiveness and hostility indexes. Diagnostics of personal inclinations for deviant behavior were assessed using the inventory by A.N. Oryol (1999). Determinations of the strategies of behavior in conflict were conducted in accordance with the K.W. Thomas (1974) test.

Data of the psychodiagnostic stage of the experiment were analyzed using ANOVA, post-Hoc Fisher’s analysis, and discriminant analysis followed by canonical analysis.

The psychophysiological stage included EEG recordings using 64 leads in monopolar mode with 2 referents (electroencephalograph Neurovisor-136, MKS, Russia). The NeoRec program was used to register EEG data. The EEGLab for Matlab package was used to process recordings, cut epochs, and detect visual-evoked potentials (VEPs). The analysis epoch was [-100; 600 ms]. The sLORETA program (<http://www.uzh.ch/keyinst/loreta>) was used to localize the sources of evoked brain activity.

Evoked potentials were recorded in response to emotionally charged and neutral visual stimuli. All images were arranged in the following groups: “aggression”, “extremism, terrorism”, “tolerance”, “positive” and “neutral” using the expert evaluation method. Each group contained 110 to 115 images. The physical parameters of the visual stimuli (color, intensity, size, and contrast) were equal.

Student’s t-test (Holms-corrected for multiple comparisons) was used to analyze the evoked brain activity parameters. The evoked potentials recorded in each of the 64 leads of the carriers of several genotypes in response to different groups of stimuli were averaged. Evoked potential charts that reflected the peculiarities of the evoked brain activity in response to neutral stimuli and definite group stimuli were created. Student’s t-test revealed significant differences in the amplitude and latency parameters of evoked brain activity in a particular group of trial subjects.

The chosen calculation procedure preserved the individual peculiarities of evoked brain activity in the carriers of definite genotypes.

We used the R.D. Pascual-Marqui sLORETA (Standardized Low-resolution Brain Electromagnetic Tomography, 2002) method to determine evoked brain activity generators. The following data preprocessing was performed prior to application: the VEP parameters in response to neutral stimuli were subtracted from the VEP parameters obtained in response to emotionally significant images of the same test group; thus, the D-wave was analyzed (Ermakov & Kovsh, 2016; Yavna, Kupriyanov, & Kokornikova, 2016; Babenko & Ermakov, 2015; Halford, 2008).

Results

Psychological testing revealed that men with the **high-activity genotype COMT (GG)** were characterized by a low aggression index, which included low scores on the Physical Aggression and Negativism scales. Members of this group did not exhibit any inclination to aggression and violence, and they preferred a collaborative strategy when in conflict. Carriers of this genotype were generally characterized by a low aggressiveness level and commitment to productive collaboration (see Figure 1, 2; $p \leq 0.05$).

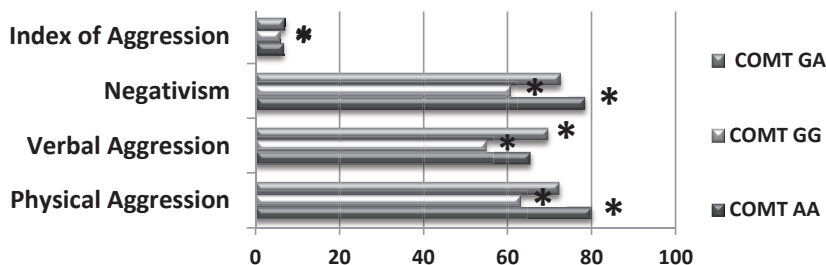


Figure 1. The level and types of aggression in men with several genotypes in the polymorphic locus Val158Met of the COMT gene (Post hoc Fisher analysis, LSD test)

Note: * — $p \leq 0.05$

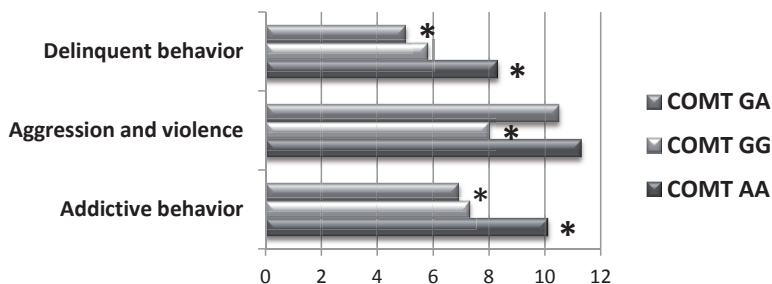


Figure 2. Manifestation of deviant behavior types in men with several genotypes in the polymorphic locus Val158Met of the COMT gene (Post hoc Fisher analysis, LSD test)

Note: * — $p \leq 0.05$

Men with the **low-activity genotype COMT (AA)** were characterized by high negativism and physical aggression level. They were inclined to addictive, delinquent behavior patterns, and aggression actualization in their spontaneous behavior. Members of this group were generally characterized by a high aggressiveness level and commitment to deviant behavior (see Figures 1, 2; $p \leq 0.05$).

Men with the **heterozygous genotype COMT (GA)** were characterized by a high level of verbal aggression and high aggression index, but they were not inclined to violate social norms and rules (see Figures 1, 2; $p \leq 0.05$).

These data suggest that the A allele of the COMT gene is associated with a high aggressiveness level.

Peculiarities of evoked brain activity in men with several COMT genotypes

Carriers of genotype GG COMT exhibited small significant differences ($p \leq 0.05$) in amplitude and spatio-temporal characteristics, as well as in the sources of evoked brain activity while viewing emotionally charged images compared with neutral images.

Test observers exhibited more intensive brain activation during their assessments of the **aggression** group images compared to neutral images, which manifested as a greater positive wave amplitude in the range of the 350th ms (P300 component group) in central leads, with left-side asymmetry of brain activity. The N250 component was expressed in the frontal and central regions during the assessment of both stimuli groups.

The “Standardized Low-resolution Brain Electromagnetic Tomography” method revealed that the principal source of evoked brain activity in men with genotype GG COMT was the left temporal region (40th field, ac. to Brodmann) when viewing aggressive images. At the same time, there were no sources of VEP, located in the frontal regions (see Figure 3).

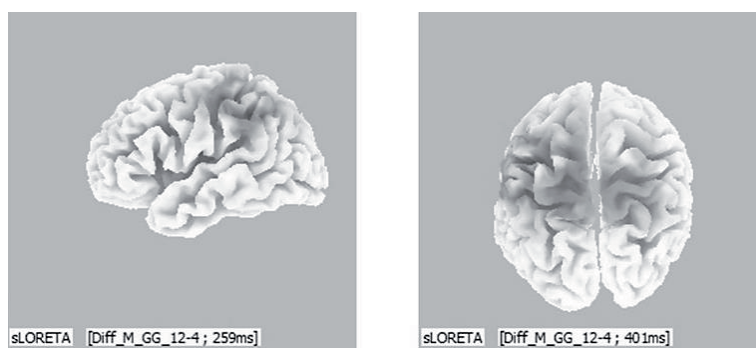


Figure 3. 3D localization of the evoked brain activity sources in response to the “aggression” group stimuli (men with genotype GG of the COMT gene), D-wave, 260-400 ms

Analysis of the parameters of evoked brain activity in response to the “**positive**” group stimuli compared to neutral stimuli revealed a greater amplitude of positive components in the range of the 150th, 350th, 600th ms in frontal brain regions;

posterior regions of both hemispheres exhibited a greater amplitude of component N170 and greater latency of component P2 (see Figure 4). Analysis of the evoked activity sources suggests that the same structures participated in the generation of evoked activity in response to neutral and positively charged stimuli in men with genotype GG.

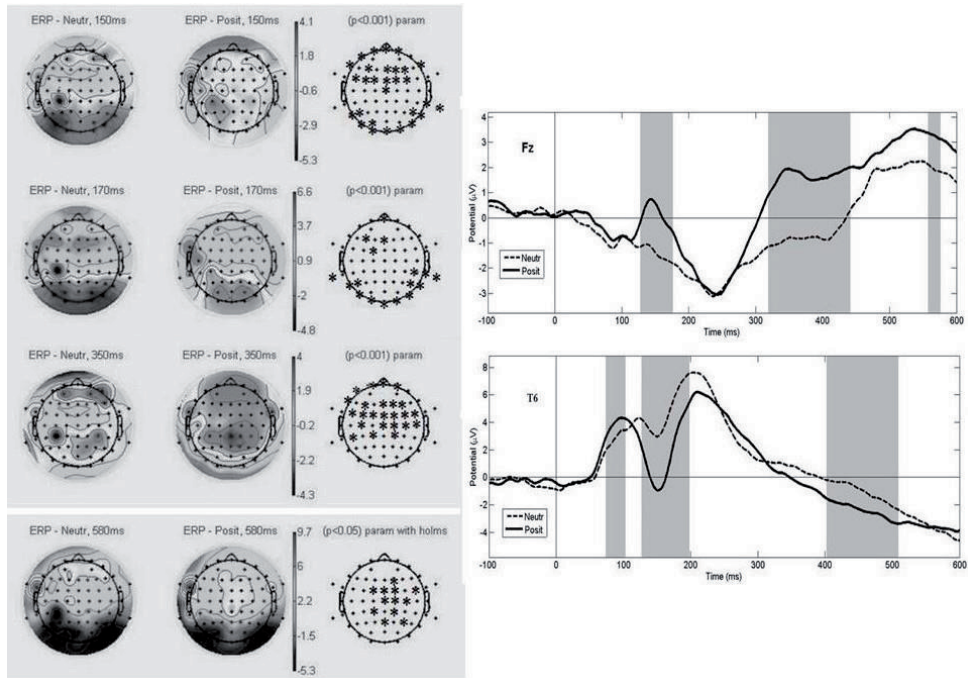


Figure 4. VEPs in different brain regions in response to “positive” and “neutral” images in men with genotype GG in polymorphic locus Val158Met COMT, latent time 150-580 ms

Note: The (*) symbol in the electrodes location scheme indicates significant differences in the evoked activity in brain regions in response to the stimuli of the above categories, $p \leq 0.05$. Vertical lines indicate significant differences between the VEP components in response to neutral (dotted line) and “aggressive” (continuous line) stimuli, $p \leq 0.05$.

No significant differences in the parameters of evoked brain activity in response to images in the “*tolerance*” group compared to neutral images were revealed in men with genotype GG COMT. Notably, negativity growth was observed in the range of the 250th ms (amplitude growth of component N250) in frontal, frontal-central and central brain regions. Assessment of the density of the distribution of the sources of evoked brain activity while viewing images in this category demonstrated that the main VEP generator appeared in the 11th field (ac. to Brodmann) in the right hemisphere in the range of the 116th ms. The source of activity was the 40th field in the left hemisphere in the 527th ms, and the source was located in the parietal regions of both hemispheres in the 574th ms.

The psychophysiological reaction that accompanied the assessment of the “extremism, terrorism” stimuli did not differ from the reaction in response to neutral stimuli in carriers of this genotype. A distinct P300 wave peak was conspicuously

absent, which may be related to the complexity of categorizing the stimuli of this group, as stated by J. Polich (2012). The principal sources of evoked activity in the assessment of the “extremism, terrorism” group images were the 21st and 39th fields of the left hemisphere.

Distinct differences were observed in the components of evoked brain activity in response to emotionally charged stimuli compared to neutral images in carriers of the genotype AA COMT. The 7th, 10th, 21st, and 38th fields (ac. to Brodmann) exhibited the greatest VEP generation, which reflects the involvement of the limbic cortex and tertiary sections that analyze emotional and cognitive stimuli processing (see Figure 5).

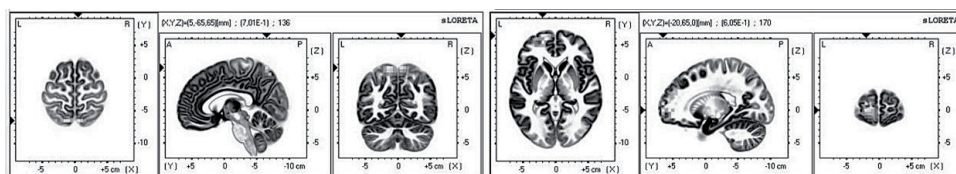


Figure 5. 3D localization of the evoked brain activity sources in response to the “aggression” group stimuli (men with genotype AA of the COMT gene), D-wave, 136-170 ms

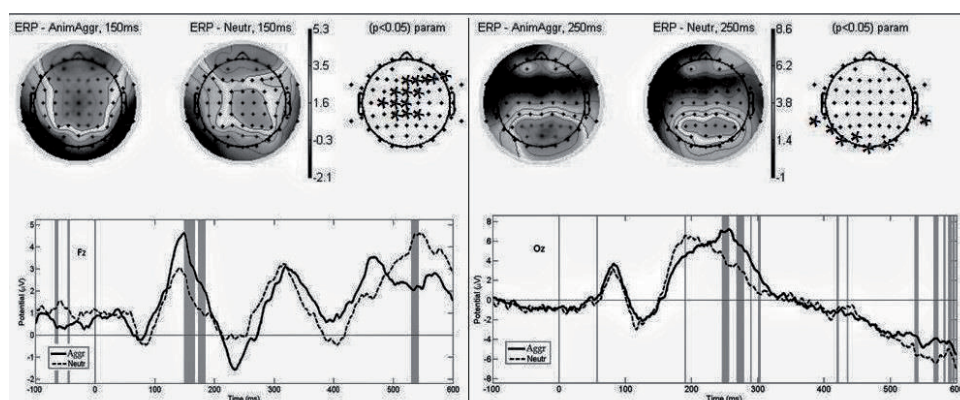


Figure 6. VEPs in different brain regions in response to “aggressive” and “neutral” images of men with genotype AA in polymorphic locus Val158Met COMT, latent time 150; 250 ms

Note: The (*) symbol in the electrodes location scheme indicates significant differences in the evoked activity in brain regions in response to the stimuli of the above categories, $p \leq 0.05$. Vertical lines indicate significant differences between the VEP components in response to neutral (dotted line) and “aggressive” (continuous line) stimuli, $p \leq 0.05$.

Analysis of the evoked brain activity in genotype AA COMT carriers in response to the “aggression” group stimuli revealed greater amplitude and a latent time of component P150, which may be related with attention arresting, according to D. Talsma et al. (2007) and L.I. Aftanas et al. (2001) — with an intensive emotional reaction while viewing the stimuli of this group. The above peculiarities did not manifest during the neutral images. The sources of this VEP component were

frontal, parietal and associative regions. Significant differences ($p \leq 0.05$) were also revealed between the characteristics of component P2 registered bilaterally in the posterior brain regions. These differences manifested as greater latent times and reduced amplitudes of the described component in response to the “aggression” group stimuli, which may reflect a more intensive attention focusing on emotionally charged stimuli, according to J.K. Olofsson et al. (2008). No significant differences were discovered in the later component parameters (see Figure 6). The sources of evoked brain activity in the range of the 286th ms were frontal and posterior regions of the right hemisphere, which may be due to the negative nature of the emotions and the cognitive processing of the visual modality stimuli. The sources of activity in the 387th ms were the parietal regions of both hemispheres, which may reflect analytical and synthetic brain activity.

Notably, significant differences ($p \leq 0.05$) in evoked brain activity parameters during the first 400 ms after a stimulus presentation were largely focused in the neuronal structures of the right hemisphere, which may be related to non-conscious (intuitional) assessments of stimuli. The most intensive activity after the 400th ms was recorded in the prefrontal regions of the left hemisphere, which may reflect the rationalization of an early intuitional assessment and follow stimulus categorizing, according to M.N. Rusalova (2004).

Evoked brain activity in men with genotype AA was characterized by expressed positive components P150, P300, and P500 while viewing emotionally charged and neutral stimuli. This fact may be related with a high intensity of cognition while processing stimuli with different emotional valences. According to J. Gallinat et al. (2003), this process may be explained by long presence of dopamine in the prefrontal regions. The greatest density of the sources of evoked activity was focused in the prefrontal region of the right hemisphere (8th field), prefrontal convexital region of the left hemisphere (10th field) and parietal regions of both hemispheres (7th field).

In the “**positive**” group stimuli assessment, Greater amplitudes of the P100 and P500 components in the frontal-central regions and greater negativity in component N170 with a reduced amplitude of component P2 in the parietal-occipital regions were noted; A.A. Kovalenko and V.B. Pavlenko (2009) suggest that these results indicate greater efficacy of selective attention and recognition of different image elements and idea formation on the basis of recollections actualized in memory in response to the “positive” group stimuli compared to neutral images. The sources of evoked activity during the middle stages of stimuli assessment were the prefrontal regions of both hemispheres, and the greatest density of the sources of evoked potentials during later stages was focused in the parietal regions of both hemispheres and the prefrontal region of the right hemisphere.

Evoked brain activity in the carriers of genotype AA COMT in response to the “**tolerance**” group stimuli compared to the parameters of reactions to neutral stimuli was characterized by a greater amplitude of components P150 and N2 in the frontal-central and central regions of both hemispheres; this activity may reflect the attraction of voluntary attention followed by an expressed emotional reaction. Evoked activity of posterior brain regions was characterized by a reduced amplitude of component P2. The peculiarities of the density distribution of the evoked activity sources should be noted because of the semantic complexity of these stimuli. VEP

generation occurred in the prefrontal and temporal regions of the left hemisphere (the 21st and 38th fields, ac. to Brodmann). The basic evoked activity source at the stage of cognitive stimuli processing (starting with the 300th ms) was the right hemisphere, and the density of the sources was distributed between the frontal and temporal regions of both hemispheres starting at the 350th ms.

Assessment by carriers of genotype AA COMT of the “*extremism, terrorism*” group stimuli revealed the following peculiarities: a greater amplitude of peak N250 in the central-parietal regions and a reduced amplitude of component N400 in the frontal regions. The sources of activity were the 8th and 40th fields (ac. to Brodmann).

Analysis of the evoked brain activity peculiarities in observers with genotype GA COMT revealed the absence of shaped component P100 while visualizing negatively charged stimuli (“aggression”, “extremism, terrorism”) and the same response to images in the “positive” and “tolerance” groups. Cognitive component P300 was expressed in response to the “aggression” and “positive” group stimuli, and it was absent in response to stimuli with greater semantic complexity (i.e., “tolerance”, “extremism, terrorism”). The dominant role in the generation of evoked brain activity in this genotype carriers occurred in the left hemisphere structures, which suggests a discrete mechanism for the processing of emotionally charged stimuli (see Figure 7).

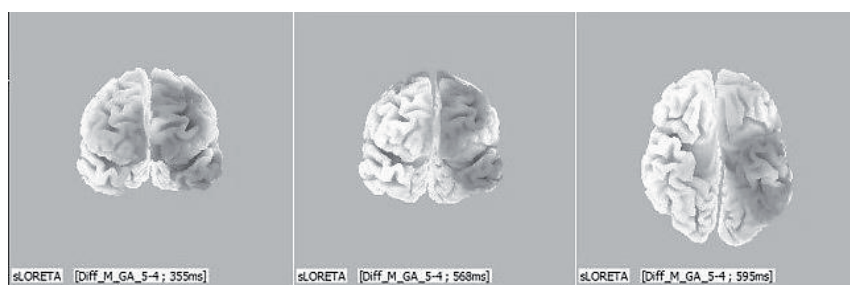


Figure 7. 3D localization of evoked brain activity sources in response to “positive” group stimuli (men with genotype GA of the COMT gene), D-wave, 355-600 ms

Reduction in the amplitude of component P200 in the occipital regions and the growth of positive wave amplitude in the range of the 300th ms in the frontal-central regions were noted while visualizing “*aggression*” group stimuli compared to neutral images. The greatest density of VEP sources was focused in the prefrontal and temporal regions of the left hemisphere and the parietal regions of both hemispheres.

We observed greater negativity of component N1 while visualizing “*positive*” group stimuli, which may reflect face recognition activation. The cognitive processing of stimuli was reflected in greater positivity in the range of the 350th ms in the frontal-central regions. Significantly greater amplitude of the late positive wave in the temporal-parietal-occipital zone (TPO) of the right hemisphere was also observed in the range of the 600th ms, which may reflect a more effective categorization of the stimuli of this group compared to the neutral stimuli group. The sLORETA results suggest that the perception of emotionally charged visual stimuli

involves the frontal and temporal regions of the left hemisphere and the limbic cortex of both hemispheres.

Evoked brain activity in response to “*tolerance*” group stimuli was characterized by greater amplitude of component N2 in the TPO zone of the right hemisphere. The positive wave reflected that cognitive processing of the stimuli of this group was formed with great delay, as late as the 600th ms, which may be due to the complexity of categorizing these images.

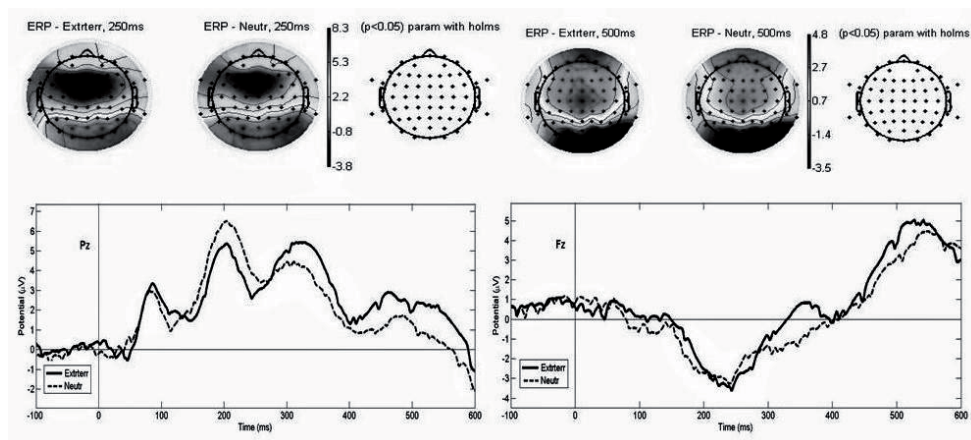


Figure 8. VEP in different brain regions in response to the “extremism, terrorism” and “neutral” images of men with genotype GA in polymorphic locus Val158Met COMT, latent time 250, 500 ms

Note: The (*) symbol in the electrodes location scheme indicates significant differences in the evoked activity in brain regions in response to stimuli of the above categories, $p \leq 0.05$. Vertical lines indicate significant differences between the VEP components in response to neutral (dotted line) and “aggressive” (continuous line) stimuli, $p \leq 0.05$.

There were no significant differences in the amplitude and latency characteristics of evoked brain activity in male carriers of genotype GA COMT while visualizing images of the “*extremism, terrorism*” group. However, component N250 was expressed in the frontal and central brain regions, and positive peaks corresponding to the early, middle and late stages of stimuli processing were recorded in the central-parietal regions of both hemispheres in response to images of both groups (see Figure 8). The neuronal ensembles that actively participated in VEP generation in response to images in the “extremism, terrorism” group were located in the prefrontal, temporal and parietal regions of the left hemisphere with involvement of the 10th–11th fields of the right hemisphere.

Conclusion

The results of this investigation support the following conclusions of the psychophysiological traits of men who exhibit different aggressiveness levels and carry different genotypes in polymorphic locus Val158Met of the COMT gene.

1. **Carriers of genotype GG COMT** were characterized by a low level of aggressiveness and were inclined to collaboration in conflict. The greatest density of

the sources of evoked activity in response to emotionally charged stimuli was focused in the temporal region of the left hemisphere. Representatives of this group best differentiated the “positive” group images from the neutral stimuli, which was reflected in the parameters of the evoked brain activity.

2. Carriers of genotype AA COMT were characterized by a high level of aggressiveness and inclination to addictions. Generators of evoked brain activity in response to emotionally charged stimuli were located in the prefrontal and parietal regions of both hemispheres, which may be due to the alternating of emotionally charged, intuitive and rational assessments. Intensive activation of the limbic structures may explain the expressed VEP waves, which corresponded to different stages of the stimulus emotional assessment in neutral and emotionally charged image visualization. Distribution of activity sources between structures of the right and left hemispheres promotes a more effective processing of new stimuli.

3. Carriers of genotype GA COMT were characterized by a high level of aggressiveness, but these men were not inclined to deviant behavior patterns. Assessment of different emotionally charged images was followed by *left-side asymmetry of the evoked activity sources* with the involvement in its generation of the temporal-occipital region of the right hemisphere, which suggests a dominating discrete mechanism of information processing and a rational, conscious approach to the assessment of emotionally charged stimuli. Analysis of the amplitude-time VEP characteristics demonstrated that the above approach was ineffective because the evoked brain activity charts of the carriers of this genotype practically did not reflect any differences in the VEP parameters in response to neutral and emotionally charged images.

Therefore, the hypothesis of significant differences in the amplitude and spatio-temporal characteristics of evoked brain activity in men carrying various genotypes in polymorphic locus Val158Met COMT with different aggressiveness levels was confirmed. Our supposition of different localizations of the evoked brain activity sources in carriers of different COMT genotypes was also confirmed, which suggests definite peculiarities in the cerebration of carriers of COMT genotypes who exhibit different aggressiveness levels. The obtained results serve as a basis for further investigation of the specificities of bioelectric brain activity and distribution of its most active sources, which mediate the influence of genes on behavior. The results of these studies will reveal the endophenotypes of aggressiveness.

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EDUCATIONAL PSYCHOLOGY

School readiness outcomes of different preschool educational approaches

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Background. The variety of preschools is one of the primary issues of contemporary early education in Russia. The *traditional approach* focuses on the transmission of knowledge, patterns of social behavior, and assumes teacher-centered interaction between child and teacher. The *developmental approach* focuses on developing the child's abilities and using cultural tools, rather than just transmitting educational content. A comparison of different preschool approaches and outcomes may help in choosing the most suitable one for each child.

Objective. The aim of this study is to identify the connection between approaches in preschool and children's school readiness.

Our hypothesis is that the traditional approach and the developmental approach provide different school readiness outcomes.

Design. Ninety-two preschool students (51 boys and 41 girls) aged six to seven were involved in this study. These children attended preschools in the western and southwestern districts of Moscow. Six preschool psychologists and teachers were interviewed. The research was conducted between 2011 and 2013.

Results: An empirical study proved that most children achieve a high level of cognitive readiness, can interact with successfully peers, and can control aggression; however, they also have difficulties with cooperative relations with their teacher and with expressing their opinion. A comparison of school readiness outcomes of the traditional and developmental approaches showed that the children who attended a preschool with the developmental approach demonstrated a higher level of school readiness: They are able to ask for help, to coordinate their creative intentions with peers, and to empathize with them. Their self-consciousness is greater than that of their peers who are educated under the traditional approach. Also, they demonstrate a greater voluntary readiness for school. Meanwhile, children who attended preschools with the traditional approach demonstrated a higher level of verbal-logical reasoning.

Conclusions: The traditional and developmental preschool approaches both provide some components of children's school readiness. However, the developmental approach has higher outcomes because it fosters children's initiative, an equitable teacher-child relationship, and takes into account children's individual characteristics.

Keywords: *school readiness, traditional preschool approach, developmental preschool approach*

Introduction

In the Russian Federation, education is divided into general and occupational parts. Preschool education is the first stage of general education, according to the Education Act. Children aged 6.5 to 8 are required to be in school (Federal law of the Russian Federation of 29 December 2012, N 273-FZ "On education in the Russian Federation"). Preschools accept children aged 2 months to 7 years.

Russian law states that all children have the right to equal opportunities and access to an appropriate educational trajectory, according to their educational needs, interests, and personal characteristics (Federal law of the Russian Federation of 29 December 2012 N 273-FZ «On education in the Russian Federation»). That is why the variety of preschools is a primary issue of contemporary early education in Russia. The traditional approach focuses on the transmission of knowledge, patterns of social behavior, and assumes teacher-centered interaction between child and teacher. The developmental approach focuses on developing the child's abilities and using cultural tools, rather than just transmitting educational content. Child-teacher communication assumes a partnership, an individualized approach, and aims to develop children's initiative (Rubtsov & Yudina, 2010).

A comparison of different preschool approaches and outcomes may help in choosing the most suitable approach for each child.

School Readiness

School readiness ensures that children start school with the best possible trajectory for later life (Emig, 2000). Over the past 25 years, ideas about school readiness have changed significantly. School readiness is no longer assumed to correspond to a child's chronological age or specific skills and competencies (Snow, 2006). School readiness not only applies to the child; the kindergarten, family, and school are also responsible for the child's school readiness.

According to the *ecological approach*, school readiness is multifactorial and takes into account the child, the family, the school, and the community (Pianta, Rimm-Kaufman, & Cox, 1999). The child factors include cognitive development, physical well-being and motor development, social-emotional development, emerging literacy, etc. The family factor refers to the available resources to meet such family needs as medicine, social services, education, and employment. The school (and preschool) factor mostly depends on developmentally appropriate programming. The community factor refers to access to quality childcare (Ladd, Herald, & Kochel, 2006).

As stated by the U.S. National School Readiness Indicators Initiative (2005), "Children will not enter school ready to learn unless families, schools, and communities provide the environments and experiences that support the physical, social,

emotional, language, literacy and cognitive development of ... preschool children". This reconceptualization of school readiness shows the importance of the environmental factors that contribute to child development.

This article focuses on the connection between the preschool factors and child factors.

Child Factors of School Readiness

A child's school readiness is defined as the level of mental development that is necessary and sufficient for the development of a common school curriculum (Paramonova, 1989; Smirnova, 1998; Vygotsky, 1956).

The specific terms used by researchers to label school readiness domains vary. Most common are physical health, social knowledge, emotional maturity, language and cognitive development, and general knowledge (Prior, Bavin, & Ong, 2011). In keeping with Russian tradition, a child's school readiness includes cognitive and personal components, and voluntary behavior regulation (Gutkina, 2006). The cognitive component includes intellectual abilities, imagination, and non-verbal intelligence (El'konin & Venger, 1988). The personal component consists of the ability to cooperate with peers, and to ask for help from the teacher or peers. The cognitive development of a child is frequently thrust into the spotlight, while the fields of personality and social interaction do not get enough attention. Cognitive abilities are not the only important features of a person at different stages of development. To be successful and accepted by a group, one should also possess definite communicative skills, be able to justify one's point of view, solve problems constructively, and be ready to accept that others may have a differing point of view. Some researchers call these abilities social intelligence; this construct is also known as social competence. It addresses such important aspects of child development as the emotional realm and social interaction with both adults and peers. Voluntary behavior regulation refers to the ability to remember and follow rules (Smirnova, 1998; Tsukerman & Polivanova, 1992). Children's readiness for school has many components and is shaped by numerous factors. Improving school readiness, therefore, must address children's development of skills and behaviors as well as the environments in which they spend their time.

Preschool Factors Contributing To School Readiness

One of the factors that facilitate children's school readiness is participation in some type of high-quality preschool education. Such education is advantageous to all children, but developmentally targeted preschool approaches can be especially effective.

There are nevertheless a number of specific strategies that facilitate the transition to school and underpin later success (Elliott, 2006).

The new concept of school readiness recognizes that early childhood development is influenced by the characteristics of and relationships among children, the family, and the broader social environment.

Early education is very important. Participation in preschool educational programs by children aged four to six is more effective than correction of dysfunctional development at a later stage. This happens due to the openness of preschoolers to

environmental influences. Preschool education brings a better result in achieving the best possible developmental trajectory (Emig, 2000).

Preschool is the first stage of education in Russia. The state guarantees all children aged three to seven free access to preschool. There are about 45,000 preschools serving more than 5,000,000 children. Because of the significant increase in the birth rate during the last five years and the lack of sufficient preschools, new types of institutions, including family kindergartens, have been established.

One of the most significant fundamental characteristics of contemporary preschool education is the recognition of the diversity of children's needs, abilities, interests, and living conditions.

Moreover, all children are guaranteed access to an appropriate preschool, with different parameters to fit their needs, opportunities, and conditions. Contemporary educational conditions allow preschools to choose the content, methods, and developmental trajectories for their students, to develop original curricula, innovations, etc.

On the one hand, the growing variety of preschools expands the opportunity to create educational conditions that best fit a child's individual needs. On the other hand, it is not clear whether there are significant differences between the different approaches.

Differences in Preschool Approaches

Preschool pedagogy in Russia may differ by its curriculum, teacher-student ratio, main goals, teacher-parent interaction style, etc.

According to the ecological approach to preschool, there is a spatial component (classrooms, adjacent area), a social component (teacher-student interaction, peer communication), and a psycho-didactic component (teaching methods, curriculum, and educational content) (Yasvin, 2001).

The two most popular approaches are the traditional and the developmental. These differ in their objectives, the type of child-teacher interaction, class space, as well as how to prepare a child for school.

The distinction between the traditional approach and the developmental approach is based on Davydov's theory of developmental education (1996) and on the idea that learning stimulates development (Vygotsky, 1956). The key concept of developmental education is that tasks can't be solved automatically. Children are involved in situations where they need to actively search for a tool to solve the problem. The basis for this approach is how the child is treated, and how self-changing is the subject of the teaching. The traditional approach conceived of the child as an object of teaching by adults. The developmental approach considers a child as a being who requires and is able to perform self-modification (Rubtsov & Yudina, 2010).

Thus, the developmental approach focuses on developing abilities, using mental tools, and taking initiative. This occurs through the development of a child's personality. The educational content highlights the individual characteristics of each child. An adult encourages children to take independent action in experimentation, solving tasks, and the everyday routine. The developmental approach seems to be useful to develop independence, curiosity, and creativity.

Table 1. Differences in preschool approaches

	Developmental approach	Traditional approach
Objectives	Developing learning abilities and using cultural tools, rather than just educational content	Transmission of knowledge, patterns of behavior in society, social attitudes
Child-teacher interaction	How to learn is more important, than what to learn. Child-centered interactions Cooperation and partnership between teacher and children Child-teacher communication assumes cooperation, partnership, goodwill, an individual approach to every child. Teacher promotes freedom and educational initiative. Teacher does not transmit knowledge but provokes children to explore interesting questions and investigate problems on their own.	What to learn is more important than how to learn. Teacher-centered interaction Teacher has exclusive authority. Teacher is the repository of knowledge, skills, and life experience. Teacher directs and manages the education and care of the children.
Classroom	Materials used in learning are available during play time. Class space provides enrichment according to recent learning tasks. Toys, games, and other items that pique child's interest	Classroom designed to prioritize safety, aesthetic, and educational benefits Classroom assumed to be spacious, safe, attractive
School readiness	Children learn how to use mental tools, how to cope with different tasks. Children learn to solve problems independently, to learn consciously, to be active, responsible, and innovative.	Children learn math, reading, writing, etc. Children learn to be patient, polite, and to behave appropriately.

The traditional approach is aimed at socialization as well as knowledge and skills enrichment. The educational content is the same for all the children regardless of their individual interests and needs. The teacher imparts knowledge to the children through conversations, lessons, or games. The traditional approach seems to be useful for raising obedient, cooperative, and disciplined children, whose attention is focused on the adult.

In conclusion, we can state that there are differences that affect curriculum design based on their educational environments and the realization of their potential.

The main objective of the developmental approach is the development of child's abilities, initiative, and curiosity, involving themselves in their surroundings by internalizing mental tools.

This approach is assumed to provide a high level of self-regulation, and awareness. Along with socialization, individualization occurs by considering the children's unique characteristics. Personal and social development are derived from learning.

The traditional approach focuses on developing social skills, promotes health, and transfers knowledge from teacher to student.

All these differences may lead to different learning outcomes. The traditional and developmental approaches may have long-term effects (employment, health, happiness), short-term effects (social and emotional well-being, intelligence) or include learning outcomes and components of school readiness.

Research Questions and Hypotheses

The aim of this study is to identify a connection between preschool approaches (as a part of the societal factor of school readiness) and children's school readiness. Our research questions are:

- Q1.** Are there any differences in the school readiness outcomes for the developmental and traditional approaches and what are they?
- Q2.** What are the benefits of the traditional preschool approach and the developmental preschool approach for children who attend them?

Method

Participants: 92 preschool students (51 boys and 41 girls), aged six to seven. Forty-four of these children attended a preschool with the traditional approach and 46 attended a preschool with the developmental approach. The two preschools were located in different Moscow districts. Six preschool psychologists and teachers employed in these preschools were interviewed for this study. Research was conducted between 2011 and 2013.

Measures

1. The Method of Express-Diagnostics of Intellectual Abilities (Shcheblanova, Averina, & Zadorina, 1994).

This method contains four subtests, each subtest containing five tasks. Subtest 1 is aimed to evaluate awareness. According to the manual, children have to identify a specific subject among five pictures. For example, it might be the word "rodent", or "hand plane". Subtest 2 evaluates the understanding quantitative and qualitative ratios. The children have to identify a picture of a thermometer that shows a temperature higher than the lowest one, but lower than the others. Subtest 3 evaluates verbal-logical reasoning. The task is to identify and mark one irrelevant picture from among five other pictures (for example, a square among various circles). Subtest 4 evaluates mathematical abilities. For example, the children are asked to look at a picture of a piece of cake. Then the children are asked to choose another piece of cake (from among the pictures shown below), which, in combination with the first one, gives a whole cake.

2. Standardized diagnostic technique "Schematization" (D'yachenko & Bulycheva, 1996).

This technique measures figurative thinking. The test material is a 12-page copybook. Each page contains the image of branched paths (a maze) that lead to the houses. Under the image of the paths, there is a map showing the path to a particular house. The child's task is to find and mark this house.

3. Standardized diagnostic technique “Systematization” (N.B. Venger) (D’yachenko & Bulcheva, 1996).

This technique evaluates verbal-logical reasoning. The test material is a 9-page notebook. Each page contains a grid of 36 cells. In the top row of the table there are circles decreasing in size. The left column of the table is filled with geometric shapes: triangle, trapezoid, square, pentagon, hexagon, circle (all the figures are large). The right column is packed with the same shapes, but small. The cells themselves are blank. Under the table there are two geometric shapes. The child’s task is to put these shapes in the empty cells of the table.

4. Raven’s Colored Progressive Matrices (Raven, Raven, & Court, 2003).

Colored Progressive Matrices are designed for children aged 5 through 11, the elderly, and mentally and physically impaired individuals. This test contains sets A and B from the standard matrices, with an additional set of 12 items inserted between the two, as set Ab. Most items are presented on a colored background to make the test visually stimulating. However, the very last few items in set B are presented as black-on-white; in this way, if a subject exceeds the tester’s expectations, transition to sets C, D, and E of the standard matrices is eased.

5. Structured teacher’s survey

This survey investigates teachers’ opinions about their students’ social and personal development. It asks them to evaluate the child’s ability to make contact with adults, to interact with peers, to ask for help, to coordinate their creative intentions with peers, to be empathic toward peers, to defend their own opinions, and to be self-conscious. For example, questions included: Does the child easily make contact with adults? Is she/he able to interact with the teacher politely? Is she/he interested in the opinion of the adult about the child’s achievements and behavior? The teachers had to evaluate each competency level from 1 (very poor, child rarely acts like this) to 3 (very good, child usually acts like this).

6. “Educational Activity” (L.I. Tsechanskaya) (D’yachenko & Bulcheva, 1996).

This method identifies the child’s ability to subordinate his or her actions to the rules, to act in accordance with the instructions of an adult. The task is to draw an ornament combining geometric shapes according to the adult’s instructions and three specific rules.

The assessment of mental abilities, figurative thinking, verbal-logical reasoning, and self-regulation was conducted in a kindergarten. Small groups of children (5-7 children) were invited to the psychologist’s office, where the researcher asked them to complete the task according to the manual. Each child sat at a desk and performed the tasks on individual paper forms. Measuring of abstract reasoning (Raven’s Colored Progressive Matrices) was conducted with each child individually. The results of the evaluation were available only to the parents.

A structured teacher’s survey was conducted individually; teachers could fill out questionnaire at any convenient time. They were assured that their answers would be used for research purposes only.

All the students’ parents signed an informed consent form at the beginning of the school year, stating that the children could go through psychological assessment.

Table 2. Indicators and methods

Readiness component	Setting	Name of test
Cognitive	Awareness	The Method of Express-Diagnostics of Intellectual Abilities (Shcheblanova et al., 1994)
	Figurative thinking	Standardized diagnostic technique "Schematization" (D'yachenko & Bulicheva, 1996; Venger, Kholmovskaya, et al., 1978) (R=0.86)
	Verbal-logical reasoning	The Method of Express-Diagnostics of Intellectual Abilities (Shcheblanova et al., 1994), "Systematization" (D'yachenko & Bulicheva, 1996; Venger et al., 1978) (R=0.91) Raven's Progressive Matrices (R=0.70–0.90)
Personal	Contact with adults	Structured teacher's survey
	Peer interaction	
	Asking for help	
	Coordinating creative intentions with peers	
	Empathy toward peers	
	Ability to defend own opinion	
	Self-consciousness	
Voluntary behavior regulation	Controlling aggressive reactions	Structured teacher's survey
	Following rules and adult's instructions	"Educational Activity" (D'yachenko & Bulicheva, 1996; Venger et al., 1978) (R=0.78–0.90)

Results

Cognitive school readiness component of children from the traditional approach groups

The awareness of 66.7% of preschoolers in this subgroup was at a medium level; 21.8% of participants had a high level of awareness; 5.6% had a low level of awareness. 61.1% of children from the traditional approach groups possessed a medium level of development of figurative thinking; a high level of development was demonstrated by 22.2%; a low level by 16.7%.

Verbal logical reasoning was highly developed for 66.7% of these preschoolers; a medium level for 27.8%; and a low level for 5.6%.

Cognitive school readiness component of children from the developmental approach groups

70.5% of children from the developmental approach groups had a medium level of awareness; a high level was observed in 29.5% of cases. A low level was not detected.

Well-developed figurative thinking was demonstrated by 45.5% of preschoolers from the developmental approach groups. These children were able to use a map and follow directions. A medium level of acquisition of the ability to plan was demonstrated by 54.5% of respondents. These children independently oriented themselves in visible space, and oriented successfully according to a plan with a little adult assistance. No subjects from this subgroup demonstrated low figurative thinking.

A high level of development of elements of verbal-logical reasoning was shown by 38.7% of the sample. They were able to classify objects according to given characteristics. 59.1% of children from the developmental approach groups had a medium level of logical reasoning. They were able to classify objects according to given characteristics with insignificant adult assistance. However, justification of their personal conclusions about objects' belonging to a particular class was difficult for many of them. Only one respondent possessed a low level of verbal-logical reasoning. He was able to classify objects only with significant adult assistance.

Personal school readiness component of children from the traditional approach groups

The following features of the personal component of school readiness are distinguished for late preschool children from traditional approach groups. 54.5% of participants easily make contact with adults. They are able to interact with teacher politely; they are interested in the opinion of an adult about their achievements and behavior, and consider adults to be source of cultural norms and examples of the proper behavior. 45.5% of participants experience slight difficulties in making contact with the teacher. There were no preschoolers experiencing significant difficulties in interaction with a teacher in this group.

61.4% of children from the traditional approach groups were successful in their interaction with peers. It did not require much effort from them to make contact with others in their preschool group; they made friends, and took part in games and the social life of their group with pleasure. 38.6% of children faced some problems while interacting with their peers. It was not easy for them to find common interests with other children and to establish long-term friendships without adult assistance. There were no children in this group who were not able to establish any contact with their peers.

Asking for help from others in difficult situations was also analyzed as an indicator of a child's social readiness for school. 56.8% of participants from the traditional approach part of the sample were seldom able to ask their teachers and peers for help. These children were used to resolving conflicts with other children with the help of their teacher, but they did not use this opportunity often. Rendering assistance to peers can be characterized as episodic and random. Asking for help and helping others were habitual for 40.9% of participants. Unwillingness and an inability to help others characterized only one child.

The ability to cooperate is also an important part of the communicative component of personal readiness. Coordination of creative intentions with peers characterized 54.5% of children from the traditional approach groups. They listened to their teacher's and peers' advice; they were able to compromise; but, at the same,

they were not always interested in a joint result, but more in the realization of their own personal wishes. Regular and engaged cooperation was found in 45.5% of children. These participants eagerly cooperated with their peers both in play and in solving cognitive tasks. There were no children unable to coordinate their creative intentions in this group.

Emotional maturity expressed in empathy toward peers was at a medium level for 56.8% of participants. However, while these preschoolers were able to adequately appraise the emotional state of their counterpart, their actions did not always correspond to this state and were not always directed towards helping the other child. 40.9% of children from the traditional approach groups were able to correctly identify the emotional state of their counterpart and give them emotional support. Only one child was unable to show empathy toward peers. His behavior could be characterized as infantile and indifferent to the feelings of others.

The ability to argue in support of their position was at a medium level for 52.3% of participants. Preschool children tended to defend their opinion, but if their argumentation was not sufficient to convince their opponents, they easily abandoned it, altered their point of view, or became depressed and withdrew from the situation. 27.3% of the children possessed a high level of argumentation and a relatively consistent point of view. 20.5% of participants used explanations to defend their opinion. Usually disagreements turned into quarrels or conflicts.

Self-consciousness in 63.3% of children from the traditional approach groups was characterized primarily by a medium level of development of representation of the self and one's personal abilities. These children have a representation of the most significant areas of their personal success (in particular, their ability to follow norms and rules), but usually these self-representations were weakly differentiated. A high level of self-consciousness was characteristic of 36.4% of respondents of the subgroup under consideration here. These preschoolers were able to estimate their merits and difficulties and had a sufficiently complex self-representation and understanding of how they are perceived by people surrounding them (teachers, parents, etc.)

Personal school readiness component of children from the developmental approach groups

74.5% of children from the developmental approach groups could make contact with adults successfully. These children knew how to address their teacher in a culturally acceptable form; the teacher is a source of new knowledge and emotions for them, and the children are sensitized to interaction in the situation of a cognitive task. A medium level of consideration skills was observed in 21.3% of respondents. Interaction with the teacher for them means getting assignments and tasks, which they tend to manage on their own, demonstrating their results to the teacher occasionally.

69.9% of children from the developmental approach groups could interact with peers successfully. Their interaction was characterized by ease of making contact, including contact in joint cognitive activity. A medium level of these skills was observed in 26.1% of participants. 4.3% of children had a low level of social skills. They are self-contained and experienced difficulties in interacting with peers.

76.1% of the participants were willing to ask for help and render assistance to others. 23.9% of respondents did that rarely. There were no children who did not respond to requests for help and did not ask for help in this subsample.

Coordination of creative intention with peers is necessary for cooperation and was habitual for 73.9% of the subgroup under consideration here. 26.1% occasionally addressed their partners. There were no preschoolers who were not able to cooperate and coordinate creative intentions among children from the developmental approach groups.

78.3% of the sample had a high level of empathy toward peers. These children understood the emotional state of another child and could offer emotional support. Such qualities of empathy were not common for 17.4% of preschool children from this subgroup. 4.3% were unable to console and give support to others.

80.4% of children from the developmental approach groups were able to use arguments to defend their opinions in interaction with other children. A medium level of this communicative skill was observed in 17.4% of children. A low level was perceived in only one respondent. This child was inclined to stick to his own point of view without attempting to explain it.

84.8% of children had adequate self-consciousness, representation of self and their abilities. They could assess their achievements and successes and were aware of the fact that some of their skills and qualities are imperfect. Their self-representation was sufficiently explicit. For example, one of the participants, Fedya D., told the researchers that he liked and had been able to tell stories and solve problems well, but was “not able to draw a man or an animal”. Moreover, he was capable of comparing his abilities in a particular area with the achievements of his counterparts: “Amir is obviously a much better dancer than I am, but I am better at constructing things”. 13.0% of respondents had less differentiated and adequate self-consciousness. These children were not able to distinguish between their real and ideal selves. Their personal capabilities were sometimes perceived inappropriately by them. For example, Dima S. praised his friend and himself for a similar ability to draw, but this generalization was caused mostly by his wish to be similar to his successful partner, not by real achievement of his own. Inadequate self-representations and inability to assess personal abilities fairly were significant for only one child.

Voluntary behavior regulation of children from the traditional approach groups

Ability to control aggressive reactions was also analyzed in the context of school readiness. 52.3% of children from the traditional approach groups did not show any aggression towards people surrounding them. These children solved problem situations with the help of their teacher; they did not resort to hostile actions or statements. 43.2% of the respondents were not always ready to contain their aggressive tendencies, but in most cases behaved in a friendly manner even in conflict situations. 4.5% of children displayed aggression regularly, using verbal and physical pressure against their peers as a way of dealing with conflicts that were beyond their control.

Table 3. School readiness components

		Developmental Approach	Traditional Approach
Cognitive school readiness component			
Awareness	High	29.5%	21.8%
	Medium	70.5%	66.7%
	Low	0%	5.6%
Figurative thinking	High	45.5%	22.2%
	Medium	54.5%	61.1%
	Low	0%	16.7%
Verbal-logical reasoning	High	38.7%	66.7%
	Medium	59.1%	27.8%
	Low	2.3%	5.6%
Personal school readiness component			
Contact with adults	High	74.5%	54.5%
	Medium	21.3%	45.5%
	Low	4.3%	0%
Peer interaction	High	69.6%	61.4%
	Medium	26.1%	38.6%
	Low	4.3%	0%
Asking for help	High	76.1%	40.9%
	Medium	23.9%	56.8%
	Low	0%	2.3%
Coordinating creative intentions with peers	High	73.9%	52.3%
	Medium	26.1%	43.2%
	Low	0%	4.5%
Empathy toward peers	High	78.3%	45.5%
	Medium	17.4%	54.5%
	Low	4.3%	0%
Ability to defend own opinion	High	80.4%	27.3%
	Medium	17.4%	52.3%
	Low	2.2%	20.5%
Self-consciousness	High	84.8%	36.4%
	Medium	13. 0%	63.6%
	Low	2.2%	0%
Voluntary behavior regulation			
Controlling aggressive reactions	High	80.4%	40.9%
	Medium	10.9%	56.8%
	Low	8.7%	2.3%
Following rules and adult's instructions	High	4.3%	7.1%
	Above average	56.5%	26.2%
	Medium	28.3%	42.9%
	Below average	6.5%	2.4%
	Low	4.3%	21.4%

Voluntary behavior regulation of children from the developmental approach groups

Control of aggressive reactions was demonstrated by 80.4% of children from the developmental approach groups. Slight difficulties were experienced by 10.9% of respondents. The least number of children, 8.7%, were unable to control hostility towards their peers and usually found themselves at the center of conflicts.

Significant Differences in School Readiness Outcomes

Analysis of the psychological school readiness of children from the developmental and traditional approach groups demonstrates their essential specificity. The Mann-Whitney test ($p=0.05$) was performed to find significant differences between the two groups. Comparison of the traditional and developmental approaches' school readiness outcomes showed the following:

Differences in personal school readiness component

Children from the developmental approach groups make contact with adults significantly more successfully (mean in the developmental approach=49.33, in the traditional approach=41.50, $p=0.08$). These children are more eager to ask for help and to assist other people (mean in the developmental approach=52.74, mean in the traditional approach=37.08, $p=0.001$).

The emotional development of children from the developmental approach groups is characterized by greater empathy toward peers (mean in the developmental approach=52.64, mean in the traditional approach=37.18, $p=0.001$).

Table 4. Traditional and Developmental Approach Outcomes in Components of Personal Preschool Readiness

Measure	Approach	Number of participants	Mean	Significance level
Communicative				
Asking for help	Traditional approach	44	37.08	0.001
	Developmental approach	45	52.74	
	Total	89		
Coordinating creative intentions with peers	Traditional approach	44	38.73	0.008
	Developmental approach	45	51.13	
	Total	89		
Emotional				
Empathy toward peers	Traditional approach	44	37.18	0.001
	Developmental approach	45	52.64	
	Total	89		
Self-concept				
Self-consciousness	Traditional approach	44	34.50	0.000
	Developmental approach	45	55.27	
	Total	89		

The self-consciousness of the developmental approach students is significantly higher than the traditional approach students (mean in the developmental approach=55.27, mean in the traditional approach=34.50, $p=0.000$).

Differences in voluntary behavior regulation component of school readiness

The level of voluntary behavior regulation ("following rules and adult's instructions") is much higher in the developmental approach groups (mean in developmental approach=50.38, mean in traditional approach=38.06, $p=0.016$).

Control of aggressive reactions turned out to be higher for children from the developmental approach groups (mean in developmental approach=50.37, mean in traditional approach=39.51, $p=0.017$).

Table 5. Traditional and Developmental Approach Outcomes in Voluntary Behavior Regulation

Measure	Approach	Number of participants	Mean	Significance level
Following rules and adult's instructions	Traditional approach	42	38.06	0.016
	Developmental approach	46	50.38	
	Total	88		
Control of aggressive reactions	Traditional approach	44	39.51	0.017
	Developmental approach	45	50.37	
	Total	89		

Discussion

The characteristics of components of readiness indicate that among the most difficult for preschool students was mastering such communicative competencies of the social component of readiness as establishing working relations with the teacher, and upholding one's own point of view in situations of disagreement with other children. Cognitive readiness, self-representation, and the skill of controlling of aggressive manifestations were regularly formed.

The developmental preschool approach has better school readiness outcomes in personal components and voluntary behavior regulation.

This approach develops better communicative skills, which can be interpreted as an effect of promoting cooperation. Children in the developmental approach groups need to reach agreement in order to achieve success in experimental activity, in story creation, in constructing, etc.

A higher self-conception in the developmental approach groups is provided by educational practices that foster children's freedom in choosing how to resolve issues, that encourage originality and creativity, that take into account individual pace and other features of the psyche. Therefore, children are faced with the need to reflect upon their desires, capabilities, and limitations.

Higher development of voluntary regulation of behavior contributes to mediating the development of universal skills, mastery of mental tools, and frequent play in groups using the developmental approach.

A consolidated body of research shows that early childhood education provides a crucial foundation for future learning by fostering the development of cognitive and non-cognitive skills that are important for success later in life.

It is well known that access and involvement are not a guarantee of high-quality preschool education, so indicators of the quality of early childhood education are receiving greater research attention (OECD, 2017). According to recent research, a balanced curriculum, organization of the teacher's time, and ratio of children to teaching staff can strongly influence child development (Huntsman, 2008).

The present research elaborated the concept of preschool education quality and demonstrated certain benefits of the developmental approach (fostering children's initiative, an equitable teacher-child relationship, taking into account children's individual characteristics). This is consistent with the data that argues that offering children problem-oriented tasks is much more beneficial than giving them the correct answers and full information to learn (Shian et al., 2017).

An emerging body of research highlights certain effective transition practices. It is suggested that preschool curricula have a positive impact on child development and school readiness (OECD, 2017). Our research allows us to clarify what kind of curriculum is more beneficial in achieving school readiness and a smooth transition from preschool to school.

Conclusion

School readiness is assumed to include child readiness and societal readiness. The readiness of schools and especially of preschools is one of the most important societal components of school readiness.

A connection between the preschool's approach and children's school readiness has been shown.

Children who attend a preschool with the developmental approach demonstrate a higher level of personal school readiness: They are able to ask for help, to coordinate creative intent with peers, and to empathize with them. Their level of self-consciousness is higher than that of their peers who learn under the traditional approach.

Also, they demonstrate greater voluntary readiness for school: They easily follow rules and adults' instructions, and keep their aggressive reactions under control.

In our opinion, this is because the developmental preschool approach is oriented towards preschoolers' needs and abilities, provides greater equality in teacher-student relationships, and takes into consideration the child's individual characteristics. The teacher encourages children's initiative and independence. These conditions can be evaluated as features of an outstanding societal (in particular, preschool) school readiness. They promote a high level of child school readiness.

The traditional approach does not provide personal and voluntary readiness as successfully as the developmental approach does. Children who attended a preschool with the traditional approach demonstrated lower levels of asking for help,

coordinating creative intentions with peers, empathy toward peers, self-consciousness, following rules and an adult's instructions, control of aggressive reactions, awareness, and figurative thinking. It may be explained by a lack of children's independence, teachers' authoritative communication style, and lack of playtime.

Meanwhile, these children demonstrated a higher level of verbal-logical reasoning. In our opinion, this is because the teachers were using traditional school-type learning methods. Therefore, children are familiar with math, verbal, and logical tasks.

In summary, we can conclude that the traditional and developmental approaches both provide some components of children's school readiness. However, the developmental preschool approach has higher outcomes because it fosters children's initiative, an equitable teacher-child relationship, and takes into account children's individual characteristics.

The results we obtained show the potential of not only a specially organized and targeted training, but also of the environment in the pre-school organization.

In addition, in the future it is necessary to consider not only the impact of preschool, but also of educational practices in the family.

Nevertheless, in conclusion it is necessary to emphasize once again that a flexible preschooler-friendly environment, where partner communication conditions between children and adults have been created, contributes to an effective transition to the first grade.

Limitations and further directions

The major limitation of our study was the small number of participating children, especially from Russian cities other than Moscow; therefore, the results should be considered with caution. In addition, preschool infrastructure, corporate culture, staff educational level, and personal features may also influence children's school readiness and have to be taken in account.

Analysis of the approach to preschool is not complete if we leave out some widely used curricula (in Moscow there are a lot of them, for example, "Childhood", "Springs", "Rainbow"). These curricula may contain highly beneficial content. This limitation could be overcome by analysis of a significant number of preschool settings, including in different regions of Russia.

Another limitation is that the research of the two different approaches was focused only on their theoretical framework, child-teacher interaction analysis, whereas information about equipment, toys, and furniture available in the classes was excluded. Also, the research overlooked the corporate culture of preschool settings, relations among staff, established traditions, and personality characteristics of teachers. All these features may strongly affect students' achievements and the way the teacher evaluates them.

A huge body of articles indicates that parents' educational level and child-rearing style play a crucial role in child development and well-being. We did not analyze the socio-demographic status of the families and parental pedagogical practices or beliefs.

In the future, it would be interesting to examine how family-related factors affect children's school readiness.

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The impact of cultural congruence on the creative thinking of primary school children

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Background. There have been many psychological studies, which show what factors enhance creative thinking in childhood, including studies on the impact of intelligence, personality, self-esteem, and other characteristics. But little is known of the impact of cultural congruence on the enhancement of creative thinking in childhood. In that regard, it would be interesting to explore whether cultural congruence influences the enhancement of the creative thinking of primary school students.

Objective. This study is aimed at examining the impact of cultural congruence on enhancing the creative thinking of primary school students. Cultural congruence can be described as a personality trait based on compliance with the rules which a society determines appropriate according to age and culture. 303 respondents participated in this study, of which 293 were primary school students aged 8-10 years ($M=9$, $\sigma\pm 0.5$), and 10 were primary school teachers who worked with these children.

Results. The results of this study indicate that children's compliance with the rules of age-specific normative situations — i.e. the level of cultural congruence— correlate, albeit negatively, with expressions of creative thinking.

Conclusion. The findings in this study provide further evidence of reasons for enhancing creative thinking in childhood, where cultural congruence and its factors defining the preschool child's compliance with the rules in a normative situation influence the enhancement of the creative thinking of primary school students. This paper is aimed at identifying the impact of cultural congruence and its factors on the creative thinking of primary school students. The previously highlighted fact that cultural congruence has an impact on creative thinking of primary school students may be ascribed to various causes. First of all, it is noteworthy that there are no typical invariable rules within the factors making up cultural congruence which would enhance a child's creative thinking. This provision defines the essence of the cultural context and the culturally shaped rules regulating the child's behavior. Thus, the impact of cultural congruence is that it limits creative thinking. This tendency is noticeable in elementary school. The impact of cultural congruence on creative thinking also deals with the fact that socially accepted conventions limit children's spontaneous activity, since the rules impose particular behavioral patterns on them. Therefore, children focus more on imitation than on finding their own solutions. Not coincidentally, cultural congruence had an impact on subtests,

which measured creative thinking through non-verbal materials. These materials dealt with the child's ability to find unusual ways to use everyday objects, to forecast different consequences of a hypothetical situation, to make specific objects with a set of shapes, to create new drawings from identical figures, and to find figures hidden in poorly structured images.

Keywords: creative thinking, cultural congruence, normative situations, rules, norms, behavior, primary school student.

Introduction

Psychologists have conducted a lot of research on factors that are supposed to nurture creativity at a young age. These studies have a hands-on application for modern educational practice. There has been research on the impact of instructional style on early creative development in children (Leggett, 2017), (Alajmi, 2012), (Sali, Akyol, 2015), (Fryer & Collings, 1991). The studies of the correlation between personality traits and creative thinking have established that the degree of self-esteem and self-control evinced by primary school students is linked to creativity (Y. Wang & L. Wang, 2016). The series of studies conducted by other researchers in this area have focused on exposing the character of the correlation between creative thinking and self-esteem through regulatory focus, i.e. independent self-evaluation by a child while executing tasks. Different ways of regulating some mental aspects between motivation of a person and the way in which he/she achieves the goal, called regulative focus, have a great influence on behavior and personality. (Jin et al., 2016).

Cross-cultural comparison of creativity in children has come to the fore in recent years, e.g. in investigations by P.C. Cheung, S. Lau, T. Lubart, D.H.W. Chu, and M. Storme. These studies revealed differences in creativity between Chinese children in Hong Kong and French children in Paris (Cheung et al., 2016); differences in the relationship between intelligence and creative thinking in Chinese children in urban and rural areas (Shi et al, 2016); and higher creative capability among school students in a culturally diverse environment (Petre, 2011; Fryer, 2014).

Many researchers have highlighted the role of art in developing children's creativity. For instance, P.R. Webster called children "creative thinkers in music" (Webster, 2008). An experimental study by T. Koutsoupidou and D.J. Hargreaves demonstrated the effects of improvisation on the development of children's creative thinking (Koutsoupidou & Hargreaves, 2009). K. Young-Mi, and H. Hye-Jeon designed an integrated dance educational program for elementary school students which showed the role of dance in improving the creative thinking ability (Young-Mi et al., 2016).

We find it interesting to study the relationship between child behavior patterns developed as part of the socialization process, and their levels of creative thinking. Each culture dictates its own rules of behavior. A child grows up in a cultural environment and learns to behave in line with the rules. Compliance with rules has been the subject of investigation in contemporary developmental psychology. Among the most recent practical research on rule compliance are papers by T. Kushnir and N. Chernyak from Cornell University (USA); E. Jordan and A. Cowan

from the University of Newcastle (Australia); R. Kapitany, M. Nielsen, and R. Elkins from the University of Queensland (Australia); D. Mullins and M.S. Tisak from Bowling Green State University (Ohio, USA); and others. We have previously presented a detailed theoretical review of research on rule compliance (Bayanova & Bayramyan, 2016). Most of the empirical research employs the CBCL (Children Behavior Check List) to analyze the rule-following behavior. Our papers looked at child behavior as an age- and culture-specific function, an assessment linked to Lev Vygotsky's theory.

According to Lev Vygotsky, each age is characterized by a specific social situation, i.e. a pattern of interaction with other people that is conducive to a child's development (Vygotsky, 1956). The adult uses this social situation as a setting for passing on to the child a set of cultural rules that are to regulate his or her behavior. Each age has its own set of rules. The more age-specific rules a child fits into his or her behavior, the more culturally congruent he or she is.

In our research, we identified typical cultural rules that regulate the behavior of pre-school and primary school children. We then designed diagnostic tests that help to reveal the degree of a child's cultural congruence, or, in other words, the extent to which a child's behavior fits certain age-specific rules (Bayanova & Mustafin, 2016; Bayanova et al., 2016). Our study on pre-school children revealed an inverse correlation between the level of a child's cultural congruence and their creativity. Essentially, the more rule-fitting behavior a child demonstrates, the less creative he or she is (Bayanova, 2013). We then proceeded to find out whether the same trend of an inverse correlation continues into the primary school age.

It is vital for instructional purposes to establish what impact cultural congruence has on the primary school students' creative capacity. Following enrollment, children's behavior becomes increasingly limited by school rules; they are less free to do what they want and spend less time on their own. More often than not, children find themselves not just in a social situation, but in a situation that N. Veraksa has called "normative" (Veraksa, 2000). Any normative situation has rules that regulate behavior. A normative situation imposes upon a child the need to comply with culturally agreeable requirements, norms, and typical rules set for a certain age.

Method

The present research was designed to study how cultural congruence, as a personality trait in the form of compliance with the rules of a normative situation, can impact creative thinking in primary school students.

Out of 303 respondents, there were 293 primary school students aged between 8 and 10 ($M=9$, $\sigma\pm0.5$), plus 10 of their instructors.

In conducting the study, we fully complied with the ethics of working with children and the ethical standards of child-related studies that have been adopted by the Child Development Research Society. All the respondents' parents were informed and submitted their consent.

The following diagnostics tests were selected to fit the study's main objective:

1. A battery of Creative Thinking Tests designed by E.E. Tunik, a modified version of Guilford's and Torrance's tests for primary school children (Tunik, 2002). The tests focus on originality, accuracy, fluency, and flexibility.

2. The Cultural Congruence Test for primary school students designed by L.F. Bayanova, E.A. Tsivilskaya, R. M. Bayramyan, and K.S. Chulyukin (Bayanova et al., 2016). It features six factors: *social interaction*, *academic competence*, *self-control*, *obedience*, *self-service*, and *regulation*. Each factor consists of several primary school age-specific rules that define a child's behavior. The instructor is supposed to benchmark the behavior of primary school students against the rules, i.e. their cultural congruence.

We relied on correlation and single factor dispersion analysis for the mathematical and empirical data analysis. Data processing was done with the help of professional software, SPSS Statistics 22.0.

The study was carried out in several steps:

Step 1. A battery of Creative Thinking Tests for primary school students, including seven subtests for four factors—fluency, originality, flexibility, and accuracy. The primary school students were offered a battery of tests with verbal, logical, figurative, and projective tasks. Each task (a subtest) had to be completed within a fixed time period, during which the respondents had to give/add as many original answers as possible, and find/add details to the shapes. The results of each subtest were measured in scores based on the number and originality of the answers. A total score was calculated for each subtest, and then an aggregate score was calculated as a measure of a child's creative thinking.

Step 2. Then we administered the Cultural Congruence Test for primary school students with its six factors—*social interaction*, *academic competence*, *self-control*, *obedience*, *self-service*, and *regulation*. Each factor was represented by statements describing rules and situations applicable to primary school age children living in a big Russian city. A questionnaire was handed out to the primary school instructors who were believed to be instrumental in passing down those rules to the primary school students. The total score on each of the factors was calculated in line with the test keys.

Step 3. Running the Pearson correlation analysis with professional software SPSS Statistics 22.0 to calculate the correlation coefficient, and identify the link between cultural congruence factors and creative thinking.

Step 4. Running the single factor dispersion analysis with professional software SPSS Statistics 22.0 to measure the impact of each of the cultural congruence factors on the total creativity score of the primary school student.

The study used individual and frontal forms, with instructions read out loud to the respondents, and a limited time frame.

Results

The research outcomes included quantitative and qualitative test data, as well as data from the correlation analysis and the single factor dispersion analysis.

In the case of Tunik's Creative Thinking Test, total scores for each of the seven subtests were calculated, and then an aggregate tally reflecting the level of creative thinking was calculated for each respondent across the verbal and figurative creativity parameters. A majority, i.e. 57 percent of the respondents, displayed an av-

erage tally in terms of creative thinking. Twenty-three percent of primary school students had higher than average scores. A lesser number of primary school students (20 percent) did not provide unusual or original answers to the verbal and projective assignments, a sign of a low level of creative thinking.

In the case of the Cultural Congruence Test for primary school students, total scores for each of the six factors that collectively define the level of cultural congruence, were calculated across the sample. The results were: *social interaction*=19.16%; *regulation*=11.17%; *academic competence*=17.27%; *obedience*=20.32%; *self-service*=11.02%; and *self-control*=19.06%.

Each factor was represented by statements describing rules inherent in the primary school setting. These data show that the respondents exhibited average (40%) and high (35%) levels of cultural congruence, a conclusion which reflects a primary school student's commitment to following all age-specific rules, norms, regulations, and requirements in a bid to get approval from their reference groups (instructors, parents). Twenty-five percent of the respondents demonstrated a low level of cultural congruence, a signal that their behavior was not in line with the most typical rules inherent in normative situations.

Table 1. Impact of cultural congruence on creative thinking for primary school students, if N=293

ANOVA						
Factors		SS	DoF	MS	F	Value
cultural congruence	Between groups	61291,894	104	589,345	2.767	.000
	Within groups	40039,922	118	212,978		
social interaction	Between groups	43391,766	27	1607,102	7.350	.000
	Within groups	57940,050	265	218,642		
academic competence	Between groups	43221,462	26	1662,364	7.609	.000
	Within groups	58110,354	266	218,460		
self-control	Between groups	43991,752	26	1691,990	7.849	.000
	Within groups	57340,063	266	215,564		
obedience	Between groups	42768,561	25	1710,742	7.800	.,000
	Within groups	58563,255	267	219,338		
self-service	Between groups	37247,768	15	2483,185	10.733	.000
	Within groups	64084,048	277	231,350		
regulation	Between groups	43112,063	16	2694,504	12.774	.000
	Within groups	58219,753	276	210,941		

The tests and score calculations were followed by the single factor ANOVA for related samples to verify our hypothesis. Each of the cultural congruence factors was taken as an independent variable and defined as a key one, while creative thinking was exposed to these factors as a dependent variable. *Table 1* provides the

results of the single factor dispersion analysis, along with calculations for Fisher's F, as well as intermediary data on the sum of squares, degrees of freedom, mean square, and the significance of the differences.

The scores presented in the ANOVA table show credible differences in the variables at a significant level. Cultural congruence does have an impact on creative thinking as shown by $F(\text{emp.})=2.767$ (if $p \leq 0.01$). The biggest positive impact on creative thinking is produced by all the tested elements of cultural congruence. According to the study's outcome, the impact of cultural congruence factors on the respondents' creative thinking varies. *Regulation* and *self-service* have the biggest effects, with $F(\text{emp.})=12.777$ (if $p \leq 0.01$) and $F(\text{emp.})=10.733$ (if $p \leq 0.01$), respectively. This result serves as evidence that the level of attribute variation depends on the variable, which reflects the higher impact of these factors on creative thinking for primary school students.

A more detailed analysis of the impact of cultural congruence on creative thinking produced the following results (Table 2).

Table 2. Impact of cultural congruence on creative thinking subtests, if $N=293$

		ANOVA				
		SS	DoF	MS	F	Value
Use of objects	Between groups	1608,564	104	15,467	2.935	.000
	Within groups	990,617	188	5,269		
	Total	2599,181	292			
Situation consequences	Between groups	1120,212	104	10,771	2.048	.000
	Within groups	988,716	188	5,259		
	Total	2108,928	292			
Expression	Between groups	1150,317	104	11,061	1.439	.016
	Within groups	1444,769	188	7,685		
	Total	2595,085	292			
Verbal association	Between groups	1398,472	104	13,447	1.413	.021
	Within groups	1789,508	188	9,519		
	Total	3187,980	292			
Building images	Between groups	1908,355	104	18,350	2.294	.000
	Within groups	1503,863	188	7,999		
	Total	3412,218	292			
Sketches	Between groups	2486,062	104	23,904	2.429	.000
	Within groups	1849,985	188	9,840		
	Total	4336,048	292			
Hidden form	Between groups	2320,518	104	22,313	1.861	.000
	Within groups	2254,158	188	11,990		
	Total	4574,676	292			

The general trend that cultural congruence has an impact on critical thinking subtests remains, but it's now clear that it has an impact on different aspects of creative thinking.

Our study also revealed that children who have a low level of cultural congruence, and do not comply with the rules of a normative situation, exhibit a higher capacity for creative thinking in verbal and figurative functions. Conversely, a higher level of cultural congruence entails fewer signs of the capacity for creative thinking, which represents the antinomy of this phenomenon. On the one hand, a child is committed to unconditional compliance with all the requirements, regulations, rules, and the regimen as a whole; on the other hand, a child needs to expressly demonstrate creativity. This paradox was documented in studies by N.E. Veraksa and O.M. Dyachenko (Veraksa & Dyachenko, 1996), which revealed that behavior regulation—taken in a generic way as a cultural tool—is internalized by children as a psychological tool for regulating their own behavior.

Previously, we studied this correlation between cultural congruence and creative thinking for pre-school children (Bayanova, 2013). According to those results, children who displayed higher levels of cultural congruence and compliance with age-specific behavior rules exhibited a deficit in creative thinking. Our research into cultural congruence of preschool children employed a dedicated proprietary test where rule categorization was different from the one presented for primary school students (Bayanova & Mustafin, 2016).

The effects of cultural congruence shown on the critical thinking subtests are statistically significant. For the *use of objects* subtest, $F(\text{emp.})=2.935$ (if $p < 0.01$); for the *situation consequences* subtest, $F(\text{emp.})=2.048$ (if $p < 0.01$); for the *building images* subtest, $F(\text{emp.})=2.294$ (if $p < 0.01$); for the *sketches* subtest, $F(\text{emp.})=2.429$ (if $p < 0.01$); for the *hidden form* subtest, $F(\text{emp.})=1.861$ (if $p < 0.01$). These results demonstrate the impact of cultural congruence on critical thinking with a high level of credibility. A detailed analysis of the impact of cultural congruence on creative thinking revealed that this impact is statistically higher in non-verbal creative thinking subtests. The impact is displayed with a lower level of credibility in verbal subtests (*expression* and *verbal association*).

The credibility and validity of our study's results have been ensured through a comprehensive theoretical analysis, a representative sample of respondents, the validity and reliability of the psycho-diagnostic tools, and the use of appropriate methods of statistical data treatment.

Discussion

The previously highlighted fact that cultural congruence has an impact on creative thinking of primary school students may be ascribed to various causes.

First of all, it is noteworthy that there are no typical invariable rules within factors of cultural congruence which would enhance creative thinking of a child. This is the essence of the cultural context and the culturally shaped rules regulating a child's behavior. Thus, the impact of cultural congruence is that it limits creative thinking. This tendency is noticeable in elementary school.

The impact of cultural congruence on creative thinking also deals with the fact that socially accepted conventions limit children's spontaneous activity, since the

rules impose particular behavioral patterns on them. Therefore, children focus more on imitation than on finding their own solutions.

Not coincidentally, cultural congruence had an impact on the subtests determining creative thinking through non-verbal materials. These materials deal with the ability to find unusual ways to use everyday objects, to forecast different consequences of a hypothetical situation, to make specific objects with a set of shapes, to create new drawings from identical figures, and to find figures hidden in poorly structured images.

Conclusion

This study provides additional evidence about the factors that shape a child's capacity for creative thinking.

1. Cultural congruence has an impact on creative thinking. The ANOVA analysis provided empirical evidence that the impact of cultural congruence is statistically significant with a high degree of credibility for non-verbal subtests, including on unusual ways to use an object; forecasting different consequences of a hypothetical situation, making specific objects with a set of shapes; transformation of identical figures into different images; finding forms hidden in a complex and poorly structured image.

2. The impact of cultural congruence on creative thinking is less prominent in the case of verbal subtests. The values of the impact are statistically credible in the case of tests which involve inventing four-word sentences where each word starts with a specific letter, and naming attributes for commonly used words.

3. The empirical data analysis of the research on primary school students leads to the conclusion that a child's compliance with age-specific rules inherent to a normative situation, or, more specifically, the manifestations of cultural congruence in terms of rule-following, has a meaningful impact on the specific forms whereby a child can express creative thinking. Rule-based child behavior restrictions decrease primary school students' capacity for creative thinking.

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A study of first-year students' adaptation difficulties as the basis to promote their personal development in university education

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Background. The relevance of the paper is determined by the study of types, structure of adaptive difficulties and their impact on the student's personal development in the process of professionalization in the university.

Objective. To examine the psychological characteristics of difficulties that arise in the process of students' adaptation to university instruction.

Design. The authors divide the difficulty in adaptation into four categories: motivational, communicational, cognitive, and regulatory. For each category, the authors offer pedagogical technologies that promote the personal development of students on the basis of their prevailing difficulties.

Results. Motivational difficulties are related to poor cognitive motivation, poor motivation to master a profession. Communication difficulties are attributed by the authors to poor communication skills. Cognitive difficulties are defined by insufficient general learning skills and a poor capacity for reflection and self-esteem. The source of regulatory difficulties is a lack of self-organization skills and poor self-control.

Conclusion. Correlation analysis confirmed that there are significant connections between, on the one hand, students' adaptability to the educational process and to their study group, and on the other, the investigated parameters that show their motivational, communicative, cognitive, and regulatory difficulties. Using cluster analysis of the empirical data, the authors identified four main student subgroups with different graphic profiles reflecting their personal difficulties in adaptation to university education; their psychological characteristics are given. Analysis of these difficulties has allowed the authors to offer an optimal psychological and educational strategy for the interactions of each of the subgroups, to optimize their personal development in the educational process.

Keywords: adaptation; personal development; adaptational difficulties

Introduction

The adaptation of a modern student to instruction at the university entails a number of problems that require timely detection and acknowledgement in the process of training for a career, in particular the promotion of personal development.

Any adaptation involves transformation of human relationships with the environment, changes in attitude to the content and organization of one's activities (Andreeva, 2008). The essence of human adaptation is optimal adjustment to the demands of the environment. If the subject moves to another environment (object adaptation), with unfamiliar living conditions, and faces changes in the environment, this undermines stability; it creates a discrepancy between the characteristics of the subject and the object, which can lead to functional disorders and a loss of the integrity of the systemic relations between them. An adaptive situation arises when the system or its individual elements restore equilibrium. This situation is typical for all kinds of human adaptation, which is considered in modern psychology as an active, purposeful process of conflict resolution originating from interaction with the new natural or social environment (Nalchajyan, 2010). The release mechanism for adaptation is a change of environment, as a result of which habitual behavioral norms become less effective, which in turn gives rise to the need to overcome the difficulties encountered (Nagorkina, 2006). We share the opinion of authors who believe that the concept of man as an adapting creature is limited and must be superseded by analysis of actions and self-development (e.g., Alekhin, 2008; Badanina, 2009; Vasiliev, 2000). An important result of adaptation is the subject's personal development. Our study examines adaptation in several aspects: adaptation of students to educational activities and adaptation to their study group; both cases are accompanied by changes in the personal traits and relationships of a first-year student (Orlov, Isaev, Fedotenkov, & Turevsky, 2007).

Successful adaptation facilitates the students' rapid adjustment to requirements and learning styles that are new to them, building positive relationships with teachers and fellow students, the actualization of self-realization motives in creative work, socially significant work, sports, and the Students' Scientific Research Activity (SSRA); it becomes a fertile ground for personal and professional self-development. Various aspects of the process of students' adaptation to university education have been studied by many domestic and foreign scientists. Thus L. Reisberg (2000) paid particular attention to student stress. L.A. Kolmogorova (2008) identified the features of adaptation and motivation of first-year students' learning for various types of professional self-determination. The specific nature of the social and psychological adaptation of students is treated by B.G. Meshcheryakov and G.I. Sobolev (2010), O.N. Dolgova (2014), and A.A. Kuz'mishkin (2014). G.Yu. Avdienko (2007) showed the influence of psychological help as psychological counseling for students, in the initial period of their instruction, on the success of their adaptation to the university environment. L.A. Antipova (2008) described pedagogical technologies that promote successful adaptation of students to university education. The value of specific technologies and academic subjects in facilitating the successful adaptation of first-year students was shown by A.A. Karabanov, A.N. Pogorelko, and E.A. Il'in (2010) and A.Yu. Lakhtin (2014). Yu.I. Tolstykh (2011) developed

criteria for evaluating the adaptation of first-year university students. A.V. Panikhina (2015) considered the adaptation of first-year students to their university education.

In the present work, we have focused on the specific personal difficulties that occur during first-year students' adaptation to instruction in a higher educational institution. This research was important to us for scientific substantiation and the further development of students' individual educational pathways, to make it possible to optimize their personal development. Our objectives are the following: to diagnose types and psychological features of personal adaptation difficulties; to identify the dependence between various types of difficulties; to determine the negative impact of the difficulties upon first-year students' adaptation to the educational activity and to the educational group; and to define strategies for interaction with the students to overcome the difficulties identified.

For theoretical understanding of the problem, we have highlighted a number of personal difficulties that prevent successful adaptation, which we have classified into four groups: motivational, communicational, cognitive, and regulatory.

The following indicators of *motivational difficulties* have been considered: low level of cognitive motivation, lack of interest in learning particular disciplines, undeveloped motives associated with mastery of a profession, predominance of external over internal motives, and ambivalence of motives. Indicators of *communicative difficulties* are: low level of communicative skills, inability to communicate with peers, problematic interaction with teachers, poorly developed organizational skills, inability to work in a group (team), excessively blunt communication, and lack of flexibility. We relate *cognitive difficulties* to insufficient general learning skills necessary for successful university studies, and to a poorly developed capacity for self-assessment and reflection. *Regulatory difficulties* are judged by: underdeveloped self-organization, poor self-control, and lack of independence.

Methods

The study was based at Tula State Lev Tolstoy Pedagogical University. Two study groups composed of 46 undergraduates in the Department of Mathematics, Physics, and Computer Science participated in a pilot experiment.

The following complementary techniques were used for the diagnosis of personal adaptational difficulties by dedicated criteria and indicators: T.D. Dubovitskaya's and A.V. Krylova's methods of studying university students' adaptation; T.I. Ilyina's method of studying motivation in university studies; B.A. Fedorshina's method of studying communicational and organizational skills (COS); V.I. Morosanova's method "style of behavioral self-regulation"; O.V. Kalashnikova's method to determine pedagogical reflection formation. All tests meet the required quality indicators for a psychodiagnostic toolkit: validity, reliability, accuracy, and a standardized view.

The empirical results for each of these methods are summarized in a single matrix. For several scales, all values had been previously converted into a uniform 10-point system. They were then subjected to quantitative analysis using mathematical statistics.

Results

By *cluster analysis*, we have allocated four main subgroups (clusters) of students in the test sample, with various graphic profiles according to the parameters studied. All profiles were constructed based on the use of average values by the relevant indicators of scales in a subgroup (cluster).

Each scale corresponds to one of the indicators:

scale 1 — motive to acquire knowledge

scale 2 — motive for professional mastery

scale 3 — motive to obtain a degree

scale 4 — adaptability to the study group

scale 5 — adaptability to learning activity

scale 6 — communication skills

scale 7 — organizational skills

scale 8 — planning

scale 9 — modelling

scale 10 — programming (i.e., it aims to diagnose individual development of conscious programming by a person of their own actions)

scale 11 — evaluation

scale 12 — flexibility

scale 13 — independence

scale 14 — overall self-regulation

scale 15 — level of reflection.

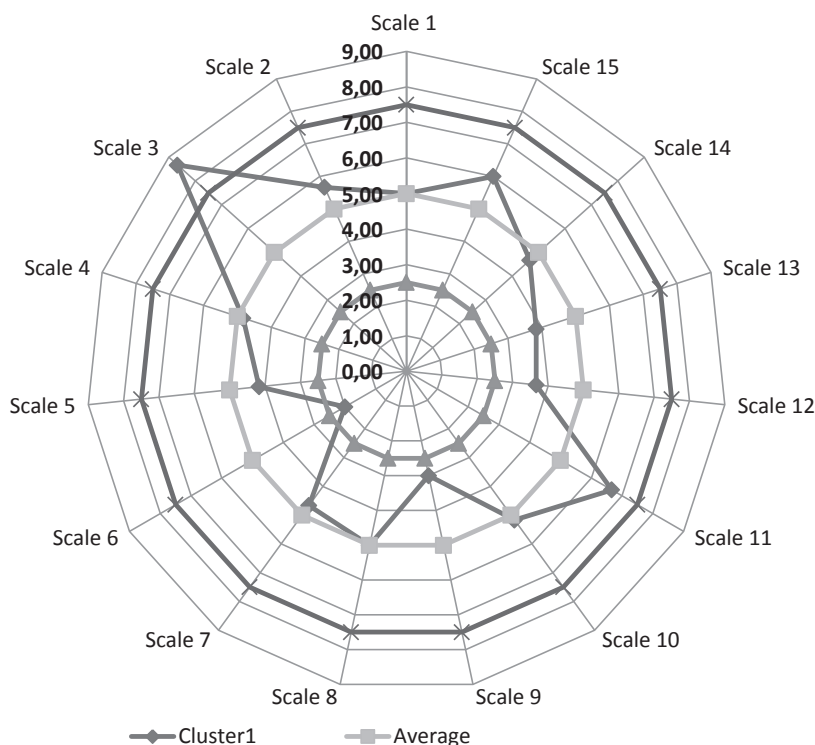


Figure 1. Generalized graphic profile of the first subgroup of students

Motivational difficulties are correlated with indicators on scales 1, 2, and 3. Communication difficulties have been judged by scales 4, 6, 7, and 12. Low results on scales 5, 8, 9, and 10 showed cognitive difficulties. Low indicators on scales 11, 13, 14, and 15 indicted regulatory difficulties.

Describing students in the *first subgroup* (cluster), it should be noted that their generic graphic profile has a curved, uneven, asymmetrical, and angular view. The profile has both below-average indicators and indicators exceeding the boundaries that were based on average values (Figure 1).

The highest scores in the first subgroup of students are found on scale 3 (motivation to obtain a degree); scale 11 (ability to evaluate results); and slightly below those, on scale 15 (level of reflection). The findings suggest that for these students, conscious motivations external to the university's educational process predominate, associated with the desire to acquire a degree through formal mastery of knowledge. The predominance of motives on the third scale indicates a formal approach to the students' choice of profession, and dissatisfaction with it. As a rule, these students are studying in an institution which they are able to enter with their scores on the Unified State Examination (USE). At the same time they assess their capabilities appropriately (as shown by their relatively high scores on scales 11 and 15); they know that their level is below average and do not seek high scores and a high position in their group.

Scales 6 (communication skills), 9 (modelling), 12 (flexibility), and 13 (independence) rank low in the first profile. The lowest indicators are found on these scales in the subgroup. The data show that students in this cluster have serious communication difficulties (poor communication skills, undeveloped skill of communication with peers, potential problems in interaction with faculty). First-year students with low indicators on the scale of flexibility in a dynamic, rapidly changing environment feel insecure in their adaptation to university, find it hard to adjust to changes, to the change of environment and lifestyle. They are unable to respond appropriately to a situation, to plan their own activities and behavior quickly and promptly; to develop a program of action; to evaluate a misalignment of their results with the purpose of the activities; and to make adjustments in a timely manner. As a result, failures of self-regulation and, as a consequence, failure in learning activities will inevitably occur with these students.

Poor development of the "modelling" skill is seen in students with low indicators on scale 9. This leads to an inappropriate assessment of significant internal states and external circumstances arising in the learning process, which is shown in fantasizing, and may be accompanied by rapid changes in relation to the development of the situation and the consequences of one's own actions. Such students often have difficulty determining the goals of and programs for their own actions that are appropriate to the current situation; they do not always notice changes in circumstances, often leading to failures in learning activities.

Low levels of independence on scale 13 indicate respondents' dependence on the opinions and evaluations of others. Such students cannot develop plans and programs for their own actions; they often uncritically follow someone else's advice. If there is no outside help, they will inevitably have problems in learning.

These difficulties of a personal nature will inevitably result in the low scores for the students' adaptation to educational activity that can be seen in their graphic profiles (values below average on scale 5).

The students of the first subgroup had mainly average scores on the other indicators.

Thus, first-year students in the first cluster are characterized by distinct motivational, communicative, cognitive, and regulatory difficulties. As a rule, they are quiet and dependent people, C-students, usually loners, who are not particularly popular in their study group.

In order to promote the personal development of the students, it is advisable to use a *strategy of psychological and educational assistance* in pedagogical interaction with them. This means the maximum individualization of learning activities that will generate intrinsic motivation, the necessary communication skills, and abilities to overcome the problems that impede the process of cognition and to produce qualities that ensure a normal level of self-regulation of these first-year students.

The *second cluster* is characterized by a quite asymmetrical, angular histogram image, showing the disproportion of several of the scores (Figure 2). However, unlike in the first subgroup, in this cluster all scores, even on the lower scales, are in the above-average range.

The highest values for the second subgroup are on scales 3 (motive to obtain a degree), 4 (adaptability to the study group), and 12 (flexibility in behavior and communication). Consequently, both these students and those in the first subgroup have predominantly external conscious motivation associated with the desire to obtain a degree in the formal acquisition of knowledge, and to look for shortcuts during exams, tests, etc. As a rule, such students do not care so much

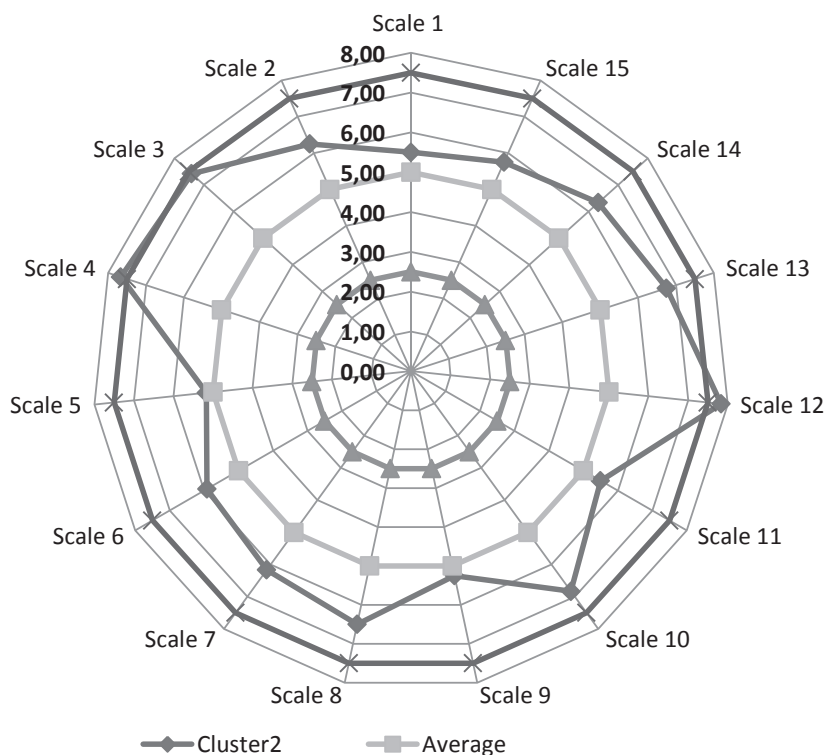


Figure 2. Generalized graphic profile of the second subgroup of students

where they study, as long as they get a diploma in higher education. They do not need knowledge itself, but just want a mark in a gradebook, usually without any special effort, using the qualities they already have: flexibility of behavior in various communicative situations, a good relationship with the group, and all kinds of assistance from acquaintances. If necessary, such students interact with other students in the group, others taking the course, faculty, or familiar teachers who can prompt, give a write-off, negotiate, etc.; they do not hesitate to ask for help and quietly use cheat sheets written by fellow students; they post requests on the Internet to upload the lectures of a particular teacher, ask who takes exams and tests with which teachers and how they are, etc.; they can easily change their point of view to the opposite depending on the situation, and tend to flexibly manipulate information and people.

Relatively high points in the second subgroup of students are also recorded on scales 10 (programming) and 13 (independence). The ability to program is manifested in the individual development of ways of consciously thinking through one's actions and behaviors to achieve one's goals. The programs are independently developed. If there is a discrepancy between the results and the objectives, the program of action is corrected until an acceptable result is achieved. All this is done with a well-developed sense of independence, which is a weak point of the first group of students.

High indicators on the scale of independence demonstrate autonomy in organizing the students' activities, their ability to plan and conduct operations by themselves, to work towards advanced targets, to monitor the progress of implementation, to analyze and evaluate both the intermediate and final results of the activity.

As already mentioned, there are no low indicators in the second subgroup of students. All values are either at the middle levels or above average. Nevertheless, analysis of three relatively low scales in this subgroup is of interest.

The lowest scores of the students in the second cluster are on scale 5 (adaptability to learning activity), 9 (modelling), and 11 (evaluation). The histogram graphically shows the relationship between lack of the necessary motivation to learn and low adaptability to the instructional activity, which, in our opinion, is logical.

The ability to model reflects the individual development of ideas about significant external and internal conditions, the degree of their awareness, specification, and relevance. These students are not always able to identify the significant conditions for achieving their goals, either in the current situation or in the more distant future, as is manifested in a number of cases in the incompatibility of the action programs with their activity plans, as well as in the disparity between the results and the established goals.

Finally, not very high average scores on the "evaluation" scale point to the fact that in this subgroup of students, assessment of oneself and the results of one's activity is not sufficiently developed and not always appropriate.

Thus, in the second subgroup, only motivational difficulties are diagnosed as clearly defined. To improve the effectiveness of the students' personal development, in our opinion, a *strategy of psychological and pedagogical support* will be optimal. The essence of pedagogical interaction between teachers and students is to promote students' individual initiatives, to enhance their participation in research, and to include them in social and pedagogical design work. It is also necessary to take into

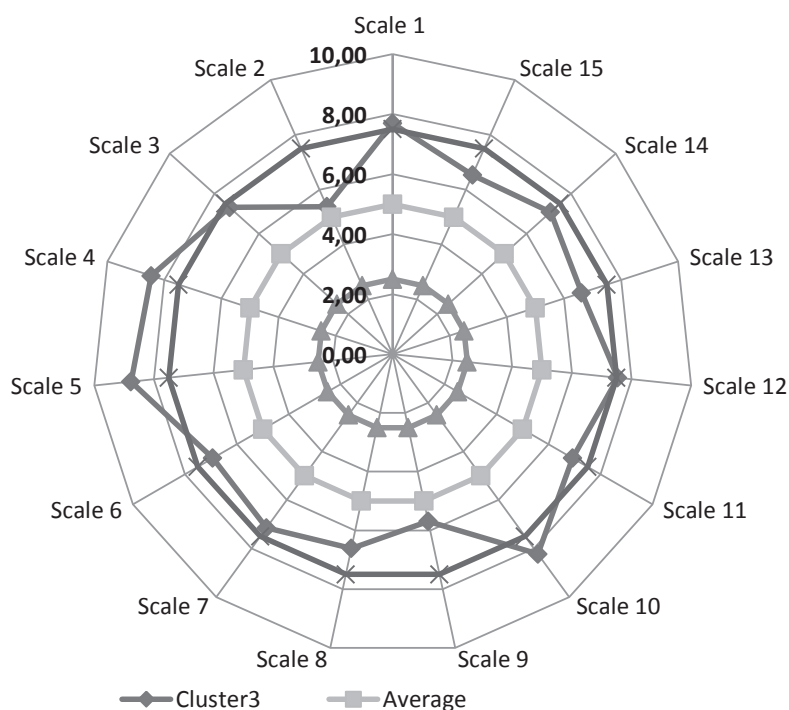


Figure 3. Generalized graphic profile of the third subgroup of students

account their independence, flexibility of behavior, not always appropriate self-esteem, and to strive for the development of internal motivation for educational and professional activity.

A generalized profile of the students referred to the *third subgroup* (cluster) is characterized by predominance of values above average. Their graphic profile has uneven edges and is not particularly symmetrical (Figure 3). There are several peak vertices which clearly stand out above the others, and there are two scales that are clearly lower than the other averages.

The highest values of the third subgroup are on scales 1 (motive to acquire knowledge), 4 (adaptability to the study group), 5 (adaptability to learning activity), and 10 (programming). High values on the first scale point to the prevalence of internal conscious cognitive motivation, expressed in striving for knowledge, interest in learning the academic subjects, and intellectual curiosity. Developed cognitive motivation conforms to good adaptability to the educational activity, which is manifested in the fact that students easily master academic subjects, successfully fulfil learning tasks in a timely manner, can ask the teacher for help if necessary, freely express their thoughts in seminars, and can express their personalities and abilities in the classroom.

Students of the third subgroup, according to the average values reflected in the chart, are well adapted not only to learning activity, but also to the study group. They have a genuine friendly relationship with fellow students developed in the course of instruction at the university; a cohesive team is formed; a sense of mutual responsibility and unity in value-orientation emerges. These students feel comfort-

able in the group; it is easy for them to find a common language with classmates and to adhere to the group norms and regulations. If necessary, they can apply to group mates for help, be proactive and take the lead in the group. Fellow students also accept and support the views and interests of such students.

High indicators on the "programming" scale show that the students have developed a need to think over the way they act to achieve the established goals, how well the programs they have worked out are detailed and deployed. Programs are developed by them independently, changing flexibly in new circumstances and sustainable in a situation of disturbance.

The average values in the cluster are recorded on scales 2 (motive of professional mastery) and 9 (modelling). We can assume that these students are interested in studying at the university; they like to learn new disciplines, but they have not quite decided on their profession and see no connection between the acquired knowledge and their future professional activities. This is reflected in their modeling of important conditions for achieving their goals, both in the current situation and in the more distant future, which is manifested in the insufficient conformity of their action programs to the plans for their future professional activity, and a not very clear correlation of their results with the established goals.

Thus, the third subgroup has no obviously expressed difficulties of a personal nature that arise in the process of adaptation to instruction at the university. On the contrary, they can be described as almost perfect first-year students, who are ready and able to learn in groups, in particular with teamwork and joint activities. They need help in the formation of proper professional motivation, to reveal as much as possible their capabilities for future professional activity, to build (to model) relevant plans for the future: "I'm part of the profession." When designing pedagogical

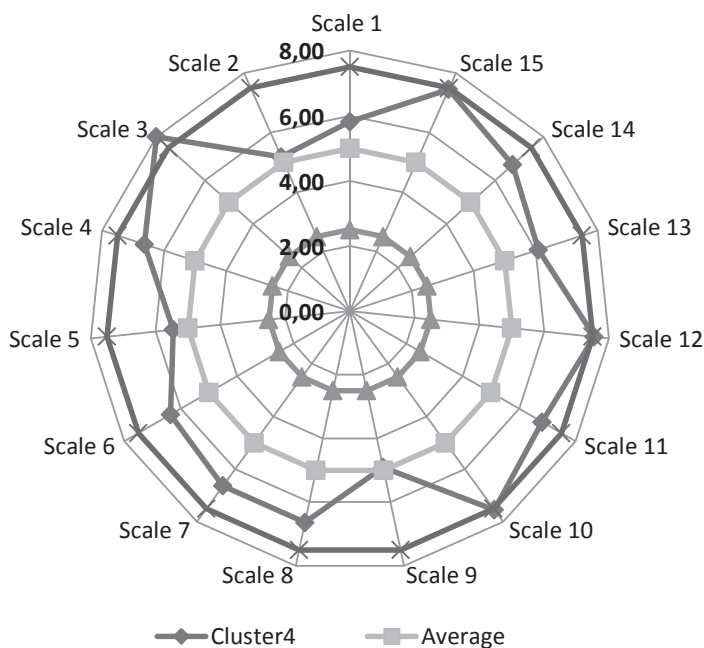


Figure 4. A generalized graphic profile of the fourth subgroup of students

interaction with these students in order to optimize their personal development, in our view, a *strategy of psychological and pedagogical support* through coaching will be suitable, whereby the teacher teaches students how to solve educational and professional problems.

The generalized graphic profile of students whom we have assigned to the *fourth subgroup* in cluster analysis has an asymmetrical view with protruding edges and several relatively low indicators (Figure 4). Most values on this scale are above average.

Peak vertices in the fourth cluster are fixed on scales 3 (motive to obtain a degree), 10 (programming), 12 (flexibility), and 15 (reflection). Thus, in this subgroup, there is dominance of external conscious formal motivation associated with the desire to get a diploma. At the same time, cognitive motivation (scale 1) has values higher than average.

The fourth subgroup is characterized by students' individual development of conscious programming of their actions. They tend to think carefully about how their own actions can contribute to the achievement of the established goals. Typically, these students develop detailed, comprehensive programs on their own; they are able to adjust them, to change flexibly according to the circumstances, and to defend their expediency in a challenging situation of interference.

Students in this cluster demonstrate rather high regulatory flexibility, i.e., the ability to revise, to make a correction to the system of self-regulation under changing internal and external conditions. If unforeseen circumstances occur, such students easily revise the plans and programs for implementation and behavior; they are able to quickly assess changes in significant conditions and revise their plan of action. If there is a discrepancy between the results and the accepted goal, they assess the fact of the mismatch in a timely manner and make the appropriate correction. Regulatory flexibility allows them to respond appropriately to rapidly changing events and to successfully solve assigned tasks, even in a situation of risk.

In contrast to the other subgroups of students, representatives of the fourth cluster have high indicators on the scale of "reflection", which is manifested in the ability to analyze themselves, their mental states, personal knowledge, the results of their own activity, their rethinking, and so on.

In the fourth subgroup, relatively low values in the middle zone are found on scales 2 (motive of professional mastery) and 9 (modelling). This indicates insufficient awareness about the choice of a future career or low satisfaction with their chosen profession. Doubts about the correctness of a professional choice affect the modelling of significant conditions to achieve the goals by such students, both in the current situation, and in the future perspective that is manifested by insufficient conformity of their programs of action with the plans for their future professional activity, and in a not entirely clear correlation of the results with the established goals.

In general, the students from the fourth cluster do not have any significant adaptation difficulties from our list of personal difficulties. When designing pedagogical interaction with them, it is advisable to use a *strategy of one-on-one psychological and pedagogical counselling*, with an emphasis on self-evaluation activities because of the relatively high level of development of reflexive abilities in these stu-

dents. Such pedagogical interactions, in our opinion, will stimulate most effectively the further personal development of students in this group.

We have conducted a *correlation analysis* of the data obtained during this work, which has shown a number of significant relationships between the adaptability of first-year students to the learning activities and the educational group, and to the specified indicators of personal adaptational difficulties.

We have shown that *adaptability to learning activity* is positively correlated with *the motivation to acquire knowledge* (the Pearson's r linear correlation coefficient between these indices was 0.35, which is significant for the study sample at $p < 0.05$), *communicative abilities* ($r = 0.46$, $p < 0.01$), *organizational skills* ($r = 0.52$, $p < 0.01$), *planning* ($r = 0.32$, $p < 0.05$), *modelling* ($r = 0.39$, $p \leq 0.01$), *programming* ($r = 0.33$, $p < 0.05$), *flexibility* ($r = 0.39$, $p \leq 0.01$), *independence* ($r = 0.3$, $p \leq 0.05$) and *general level of self-regulation* ($r = 0.52$, $p < 0.01$). It was found that *cognitive motivation* is positively correlated with *programming* of oneself and one's future professional activity ($r = 0.41$, $p < 0.01$); *reflection* also had a positive correlation with "programming" ($r = 0.52$, $p < 0.01$).

Adaptability to the study group had positive correlations with *communication skills* ($r = 0.5$, $p < 0.01$) and *organizational skills* of first year students ($r = 0.55$, $p < 0.01$), *adaptability to learning activity* ($r = 0.44$, $p < 0.01$), *overall self-regulation* ($r = 0.39$, $p \leq 0.01$) as well as *flexibility* ($r = 0.5$, $p < 0.01$).

The strongest positive correlations were recorded between *communication skills* and *flexibility* (Pearson's r linear correlation coefficient between these indices was 0.74, which is significant for the study sample at $p < 0.01$), *general level of self-regulation* and *programming* ($r = 0.7$, $p < 0.01$).

A significant negative correlation was established between the formal activities external to the educational and professional activities at the university, *motive to obtain a degree* and *modelling one's future in the profession* ($r = -0.35$, $p < 0.05$).

These correlations have helped to adjust strategies for interaction with students who have various kinds of personal difficulties that impede their productive adaptation to the educational process of higher education.

Conclusion

In the course of this pilot study, we have identified a number of difficulties of a personal nature (motivational, communicative, cognitive, and regulatory) preventing successful adaptation of first-year students to instruction at a higher educational institution.

Correlation analysis has confirmed the presence of significant interrelations between students' adaptability to the instructional activity and study group, and the indicators we studied showed the students' motivational, communicative, cognitive, and regulatory difficulties.

Using cluster analysis of the data, we identified four main subgroups of students with different graphic profiles reflecting the type of personal difficulties arising in the process of their adaptation to instruction at university; their psychological characteristics are given.

Analysis of the specific adaptational difficulties allows us to offer an optimal psychological and educational strategy for the organization of pedagogical interac-

tion with students for each of the selected subgroups; its use to the greatest degree possible will contribute to their personal development at a higher educational institution.

In the future, we plan to expand the sampling and to conduct a full-scale pilot study to identify the most productive periods of students' personal development in the educational process at the university and the impact of these on the students' professional development.

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Detecting and overcoming infantilism in students at teachers colleges

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Background. One of the obstacles to developing professionals which is encountered among students in higher education is a special form of infantilization. The present study focuses on academic and professional infantilism. While numerous papers by domestic and foreign scientists have analyzed infantilism, there is a clear lack of research on how to overcome this problem in students.

Objective. This article deals with the problem of infantilism in the context of the academic and professional activities of students at teachers colleges (known in Russia as pedagogical higher education institutions). We have analyzed domestic and foreign research on problems of infantilism, and have developed a diagnostic system to distinguish the various levels of academic and professional infantilism. Structural components of students' academic and professional infantilism are described.

Design. Four groups of students are identified, presenting different levels of infantilism. We have theoretically clarified and experimentally demonstrated the special conditions that make it possible to overcome infantilism in students in higher educational institutions.

Results. Two groups of conditions, external and internal, are distinguished. A special program which contributes to overcoming infantilism in students has been theoretically identified and experimentally substantiated. **Conclusions.** We describe three stages of the decrease in infantilism as a result of the special program, and present the dynamics of the declining infantilism level as a result of the special program.

Keywords: infantilism, overcoming academic and professional infantilism, self-actualization, internality, structural components of infantilism, conditions to overcome infantilism

Introduction

Training professional teachers is both a priority and a prerequisite to ensuring that the education of future generations is of high quality. One of the steps that aspiring teachers need to take to become a professional is their self-actualization in the

profession, that is, developing an awareness of the opportunities that the teaching profession provides for self-development.

One of the obstacles to developing professionals which is encountered among students in higher education is a special form of infantilization, here described as academic and professional infantilism. While reviewing academic and professional infantilism as a complex phenomenon with many root causes, we define it as a special, destructive method of attempted personal self-fulfillment in educational and professional environments, under the influence of certain mental conditions and mechanisms.

The phenomenon of infantilism has become a trend in the younger generations as a whole. The identifying factor of this phenomenon, in the eyes of experts, is avoidance of choice and the relegation of responsibility for decision making to others. The social role of the “eternal child” or “kidult” exempts a person from responsibility for their behavior (A.G. Asmolov).

Numerous papers in the history of psychology as well as more recent works by domestic and foreign scientists have analyzed infantilism. Foreign psychologists such as E. Lasègue, G. Anton, P. Lorrain, S. Freud, G. Stutte, E. Kraepelin, and R. Corbo have sought to explain the concepts, classify the characteristics, and advance possible reasons for the origination and development of infantilism. In domestic psychology, more focus has been placed on studying the problems of infantilism, as seen in the papers of L.S. Vygotsky, V.V. Kovalev, V.V. Lebedinsky, and others.

Infantilism is understood as retention of the physical and/or psychological characteristics of childhood into a relatively advanced age; as childishness combined with an incomplete mind (E. Brissaud); and as arrested emotional development (R. Corbo). Psychoanalysts have explained infantilism as a manifestation of the unconscious, as immaturity of mental protections of the personality, and as a disorder of hormonal activity (K. Abraham, S. Freud, C.G. Jung).

Infantilism has been described as a disorder of involuted child development (L.S. Vygotsky); as a form of intellectual activity disorder that is part of general arrested mental development (I.B. Shenfil, M.I. Buyanov); as arrested mental development (V.V. Lebedinsky, E.P. Ilyin); and as a special characteristic of the physical and socio-psychological development of adolescents (E.I. Isaeva, A.E. Lichko).

Method

In our study, we have posited the following characteristics of infantilism: underdevelopment and immaturity in the emotional-volitional sphere (i.e., emotional immaturity, lack of self-control, lack of discipline, weakness, lack of initiative, and vague life and/or professional goals) (M. Bleuler, T. Simson, Ya.A. Egolinsky); reluctance to engage in work and low work motivation (Yu.N. Davydov); a specific system of values and delay in moral maturation (A.A. Bodalev, Yu.N. Davydov); a hedonistic pursuit of entertainment (K. Abraham, S. Freud); a low level of reflexive capabilities (M.I. Buyanov); unusually dependent, parasitic, and irresponsible behavior (Yu.N. Davydov, G.E. Sukhareva); disordered and chaotic behavior (G.E. Sukhareva); and a lack of desire to achieve (M.I. Buyanov, T. Simson).

By academic and professional infantilism in students, we mean a destructive method of attempted personal self-fulfillment within the learning and pedagogical

process. It is not just about manifestations of infantilism itself, but also about pre-disposition towards certain forms of self-destruction in academic and professional activity.

Academic and professional infantilism is characterized by negative attitudes towards academic and professional activities, an excessive exactingness towards the environment, active and passive resistance to the educational process, the lack of an appropriate view of one's own professional development, the lack of professional and life plans or any real ways to achieve such plans if they exist, and a lack of personal orientation in professional and academic activity.

The objective of this paper is to define the nature and manifestations of infantilism and the conditions for overcoming it in university students.

We assumed that the psychological and pedagogical requirements for overcoming academic and professional infantilism in students at higher educational institutions are associated with the implementation of a specially developed psychological and educational program, the developmental nature of which is relevant to the structural components of academic and professional infantilism, with the leading ones being:

- The lack of any real capability or inclination to perform a particular activity (in this case, pedagogical activity) and, as a result, markedly diminished or complete lack of interest in the subject being studied, regardless of how and how well that subject is taught;
- The lack of an appropriate personal position in relation to one's own professional development, no professional and life plans, and no real ways to achieve such plans if they exist;
- A disproportionately high claim to have mastered the structural and content-related processes of organizing field-specific (pedagogical) education, which is out of line with one's own efforts to become immersed in the educational challenge.

Psychological and pedagogical provisions for overcoming learning and professional infantilism in students of higher educational institutions are necessary to develop students in the emotional-volitional sphere, to improve their system of values, to increase their motivation for work and learning, to develop their reflective capabilities, to increase their desire for achievement, etc.

A working structural and procedural model of infantilism that determines the place, role and interaction of its various components has been developed based on a theoretical study of academic and professional infantilism. This model can be described as an integral, dynamic, and varied educational process that includes cognitive, evaluative, emotional, axiological, motivational, and reflective elements.

This model of academic and professional infantilism in students highlights a negative attitude towards the following: common standards accepted in society and in the group; the significance of personal goals and standards; matching self-perception with personal goals; quality self-esteem; the ability to think reflectively; assessment of personal effectiveness in any given field of activity, whether one is confident or not about one's own competence and ability to organize and perform actions needed for certain achievements.

We conducted a pilot study of academic and professional infantilism, involving 167 1st through 5th-year students at Moscow State Pedagogical University.

The group of students who displayed pronounced manifestations of learning and professional infantilism amounted to approximately 45% of the sample. These students were selected on the basis of the results of psychological diagnoses and the expert opinions of their teachers. We used diagnostic measures consisting of psychological and diagnostic methodologies delineated in the following works: "Level of subjective control" by J. Rotter, as adapted by E.F. Bazhin (the questionnaire contains 44 statements and requires answers using a six-point scale); "Need for achievements test", by Yu.M. Orlov (the questionnaire contains 23 statements which are to be accepted or rejected by the subjects); "Diagnostics of motivational structure of personality", a technique by V.E. Milman (the test contains 14 statements, each with eight options for the answer); "Level of infantilism evidence" (LIE), a questionnaire by A.A. Seriogina (the questionnaire include 48 questions; the subject has to choose one of four possible answers).

The results of the diagnostics allowed us to divide the students into four groups (non-infantile, slightly infantile, moderately infantile, and highly infantile) displaying differing levels of academic and professional infantilism in accordance with the data provided by the LIE questionnaire. 32% of subjects were allocated to the non-infantile group, 23% to the slightly infantile group, 27% to the moderately infantile group, and the remaining 18% to the highly infantile group.

The following indicative qualitative and quantitative differences between the groups were identified and described on the basis of methodological scales.

Group 1 — non-infantile — This group was characterized by high levels of development in the emotional and volitional sphere, well-developed self-control, clear and achievable aims; discipline, courage, proactivity, resoluteness; high work motivation, a sustained desire to learn; a prevalence of moral over material values, firmness of principles, belief in the significance of health, love, and interesting work; a strong will and high valuation of responsibility; a lack of interest in entertainment, a link between pleasure and evaluating the consequences of an action; a high level of self-reflection; an active pursuit of rational behavior in organizing their lives; an active and ongoing attempt to overcome obstacles; a high degree of independence and autonomy. This group valued the need to achieve at about 60% of the maximum possible value.

Group 2 — slightly infantile — This group displayed a degree of flawed self-control. The students were characterized by an ability to control their emotions which is situational and unstable; an ability to set life goals, but with some difficulties in planning ways to achieve them; by high work motivation; a focus on favorable circumstances in their learning activities; situational zeal in their studies; a prevalence of moral values over material values; a situational willingness to sacrifice their principles for the sake of satisfying their needs; a sense of enjoyment which is not always tied to evaluating the consequences of their actions; a desire to have pleasure in everything; situational reflection; a rather vague pursuit of order and rationality; an intention to avoid difficult situations; limited success in overcoming their own weaknesses; relative independence, but low zeal; and a low sense of personal responsibility in all spheres of life. This group valued the need to achieve somewhat lower than Group 1, at 54%.

Group 3 — moderately infantile — This group is characterized by a limited ability to control their emotions; moderate impulsiveness; weak self-control; diffuse life goals and a lack of confidence in the possibility of achieving them; randomness in planning and the means adopted to achieve objectives; lack of discipline; low work motivation; low zeal about their studies; waiting for the help of others; a tendency to place material values above moral values; a potentiality to break the law; a pursuit of fun without thinking; seeing fun as one of the purposes of life; a potential to engage in unlawful forms of entertainment; a proclivity towards being better at assessing the consequences of an action than the reasons for performing the action; a penchant for spontaneity and rashness; a tendency to find order stifling; passivity in the face of difficulties; a tendency to adopt a dependent position; reluctance to assume responsibility; a preference for civil marriage; and a high degree of dependency. This group valued the need to achieve the lowest among the groups, at about 54% of the possible maximum values.

Group 4 — highly infantile — This group was characterized by an extremely poor ability to control their emotions; impulsiveness; lack of self-control; uncertain life goals and plans; lack of discipline, lack of initiative, passivity, indecisiveness; low motivation to work; seeing university life as an opportunity to have a good time; an unwillingness to learn or acquire knowledge if they are provided with material support; complete absence of desire to develop a career; an extreme preference for recreation and entertainment over work; an extreme preference to place material values above moral and ethical values; a propensity to breach the law to satisfy their own needs; a desire to get everything at once here and now “for free”; failure to analyze the consequences associated with having fun; a tendency to see “having fun” as the purpose of life; a focus on day-to-day existence rather than longer term planning; very low reflective capabilities; irritation when faced with restrictions; passivity towards difficulties; apparent dependency in all spheres of life, lack of autonomy, irresponsibility; a belief that parents or relatives should provide everything necessary for a dignified existence; and a preference for non-official marriages. This group valued the need to achieve at about 45%.

Results

By way of psychological and pedagogical provisions for overcoming infantilism, we developed a special comprehensive program, the developmental nature of which is relevant to the structural components of infantilism and focused on the development of students in the emotional and volitional sphere as well as in their systems of values, learning and work motivation, reflective abilities, and their desire to achieve.

The process of overcoming infantilism consists of three stages. The first stage involves a person becoming aware of their own problem, i.e., becoming dissatisfied and developing the motivation to find solutions. The second stage involves understanding the reasons for failure, identifying the origins of a problem and developing a new model of activity. During this stage the person becomes aware of his/her behavior and develops a new behavioral model to eliminate or reduce the infantilism. Finally, the third stage involves mastering and internalizing the new model, analyzing its results.

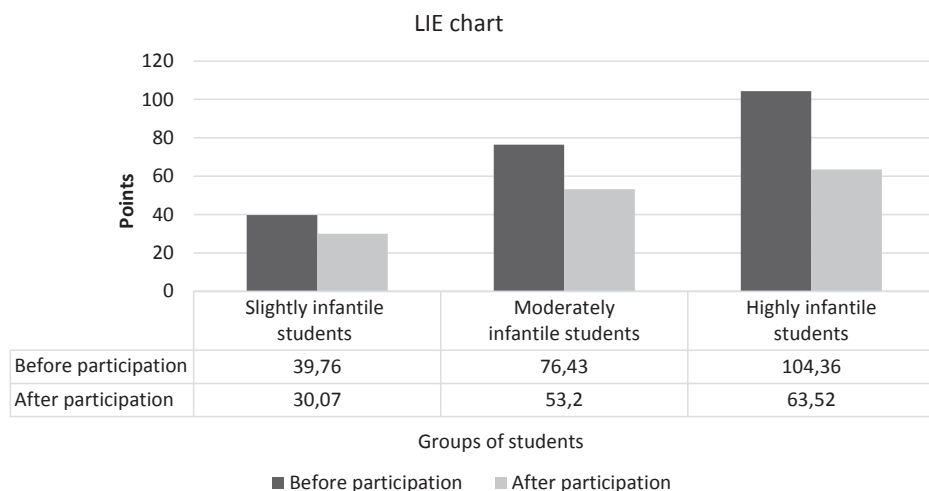


Figure 1. Changes in levels of infantilism according to the LIE questionnaire in three groups of students, before and after participation in the program

The implementation of the program involved three groups of 1st- through to 5th- year students from Moscow State Pedagogical University (50 students in total). Of these, 13 students were classified as slightly infantile, 26 as moderately infantile and 11 as highly infantile.

Figure 1 shows the changes in the level of infantilism according to the LIE questionnaire in the three groups of students, before and after their participation in the program.

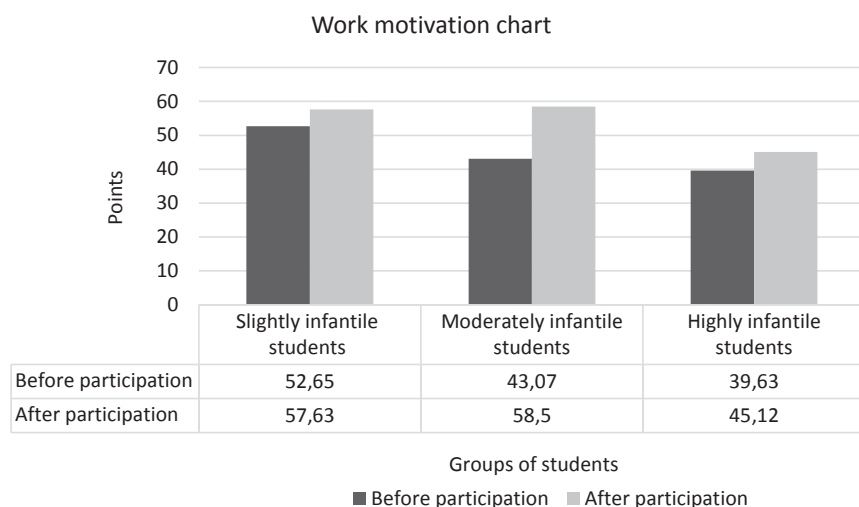


Figure 2. Changes in values for work motivation according to V.E. Milman's technique, in three groups of students before and after participation in the program

The group of slightly infantile students scored 39.76 points before participation in the program. After participating, this value decreased to 30.07 points, which indicates that the severity of their infantilism dropped to the border between in-

fantilism and non-infantilism. We think such a change is positive and worthy of notice. The group of moderately infantile students showed an average score of 76.43 points before participating; the change was again positive, and the mean infantilism value dropped to 53.2 points. According to its infantilism scores, however, this group cannot be considered to be only slightly infantile. Highly infantile students scored an average of 104.36 points on the LIE questionnaire before participating in the program. After participating, this value dropped significantly to 63.52 points, a score which corresponds to moderate infantilism according to the LIE questionnaire.

According to “Diagnostics of Motivational Structure of Personality” by V.E. Milman, shown in Figure 2, work motivation values have also changed.

Work motivation values have increased in all groups. The mean value of 52.65 points in the group of slightly infantile students has risen to 57.63 points. The work motivation of the group of moderately infantile students reached 58.5 points, starting from 43.07 points prior to their participation in the program. This indicates an even more positive trend in this group, when compared with the group of slightly infantile students. The work motivation value of highly infantile students rose from 39.63 points to 45.12 points. These changes show a positive trend, which also confirms the effectiveness of the psychological and pedagogical provisions we used. The changes in internality values for groups of infantile students according to J. Rotter’s LSC technique are shown in Figure 3.

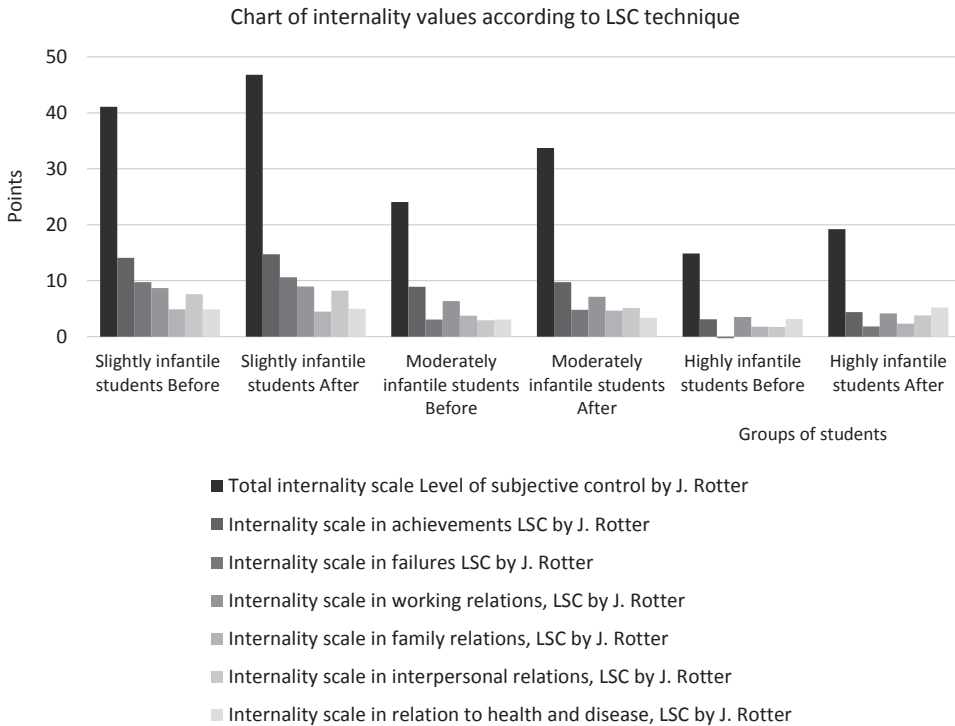


Figure 3. Changes in internality values according to J. Rotter’s LSC technique for groups of infantile students

Value changes on the scale of this technique in the group of slightly infantile students are as follows: TI (Total internality) scale: the respondents scored 41.07 points before participation and 46.8 points after participation. AI (Achievement internality) scale: 14.11 points before participation and 14.72 points after, a small positive increase. The Wilcoxon signed-rank test indicates the absence of pronounced change, which shows that this increase is insufficient to determine a reliably prevailing change. FI (Failure internality) scale: the respondents' average score was 9.73 points before participations, and rose to 10.63 points after. WI (Working relation internality) scale: the figure increased from 7.61 points to 8.25 points after completion of the program. FI (Family relations internality) scale: the value declined by 0.41 points (from 4.92 points at the beginning of the program to 4.51 points at the end), while the Wilcoxon signed-rank test indicates the absence of pronounced change. HI (Health area internality) scale: there is a slight positive increase (from 4.91 to 4.97 points), but the Wilcoxon signed-rank test shows no pronounced changes.

Based on these data, we can assert the predominance of positive trends in the figures that characterize internality, and, therefore, a reduction of infantile manifestations in this group of students.

The group of moderately infantile students displays the following trend: TI scale: 24.05 points before correction of infantilism and 33.7 points after. AI scale: this figure increases significantly from 8.93 to 9.75 points. FI scale: the internality figure increased from 3.09 to 4.79 points. WI scale: the initial figure increased from 6.36 to 7.16 points. II scale: increased significantly from 2.93 to 5.13 points, which indicates the positive trend of the changes. Fall scale: reached 4.68 points after participation in the program, up from 3.75 points before participation, though the Wilcoxon signed-rank test again shows no pronounced changes. HI scale: 3.09 points before correction of infantilism and 3.41 points after correction.

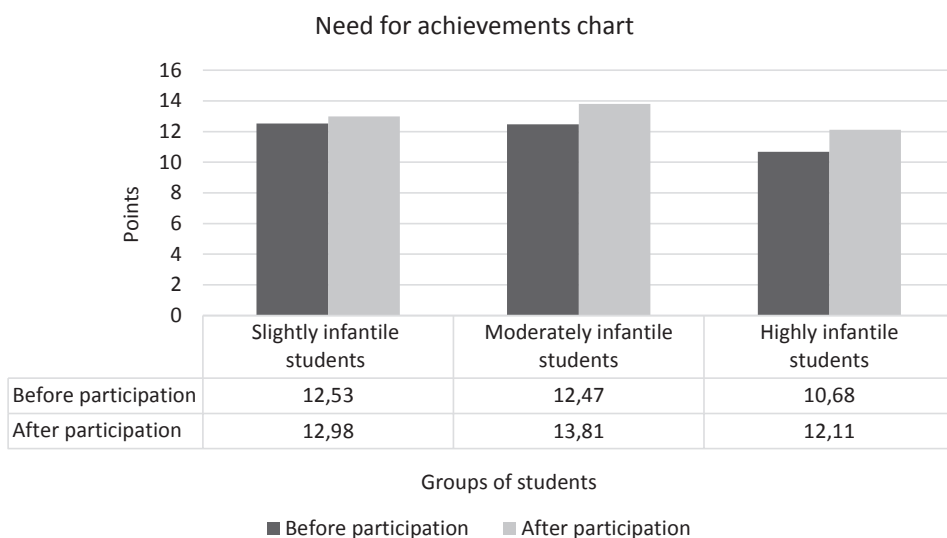


Figure 4. Changes in values characterized by the need for achievement

Thus, we can argue the predominance of positive trends regarding internality figures for this group.

TI scale in the group of highly infantile students: the figure rose from 14.89 to 19.2 points. AI scale: 3.1 points at the beginning of the program and 4.41 points at the end. Fall scale: rose from 0.84 points to 1.84 points, while the Wilcoxon signed-rank test shows no changes. WI scale: increased from 3.52 points to 4.17 points. II scale: increased from 1.73 points to 3.82 points; the Wilcoxon signed-rank test shows no pronounced changes. Fall scale: the figure increased from 1.78 points to 2.35 points, which also makes it impossible to talk about significant changes in terms of the Wilcoxon signed-rank test. HI scale: increased from 3.15 points to 5.23 points.

Thus, this group is also dominated by positive changes in internality value.

Changes in values characterized by the need for achievement are shown in Figure 4.

This figure rose in all three groups that participated in the program, although the Wilcoxon signed-rank test shows a significant change only in the moderately infantile group: the slightly infantile group scored 12.53 points before participation and 12.98 points after; the moderately infantile group's score increased from 12.47 points to 13.81 points, and the score of the slightly infantile group increased from 10.68 points to 12.11 points.

The results suggest that the psychological and pedagogical provisions we developed contributed to overcoming infantilism in students, future teachers.

Conclusions

1. Infantilism in learning and professional instruction is regarded as a destructive strategy of personal self-fulfillment of students in academic and professional environments, which manifests as a lack of motivation for professional development; as the establishment of a system of negative values in relation to personal development; as an inadequate attitude to real-life crisis situations; as academic and social passivity; as a tendency to refuse help and support by teachers; as indifference to one's own academic progress; and as an inability to apply knowledge in practice.
2. The structural and dynamic model of infantilism includes the following: a psychological component (immaturity in the emotional and volitional sphere, low desire to achieve, lack of motivation in work and education, poorly developed reflective skills), a social component (dependence on others when making decisions or taking action, chaotic behavior, dependency, hedonism), and a physical component.
3. Psychological and pedagogical prescriptions for overcoming academic and professional infantilism in students are associated with the implementation of the program, the developmental nature of which is relevant to structural components of infantilism and is focused on the development of students in the emotional and volitional sphere, their systems of values, their motivation for work and education, their reflective abilities, their desire to achieve, etc. It is necessary to distinguish external and internal conditions for overcoming academic and professional infantilism in students. External conditions include

organized activities aimed to decrease infantilism among students, such as professional orientation. Internal conditions are related to goal-directed influences on personal features of students during correction of infantilism, such as reflectivity, work and learning motivation, and value orientation.

4. Three stages in overcoming infantilism are to be distinguished: The first stage involves a person becoming aware of his/her problem. The second stage involves understanding the reasons for failure, identifying the origins of a problem, and developing a new model of activity. The third stage involves mastering and internalizing the new model, evaluating and analyzing the results achieved.

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The axiological orientation of students' personalities

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Background. Our empirical research and analysis revealed characteristics of the axiological orientation of students' personalities.

Objective. We identified the principal types of orientation, dominant values, and attitudes of the personality in the motivational-needs sphere through a variety of validated and reliable techniques and methods.

Design We understand the axiological orientation of the personality as a relatively stable set of values, motivations, needs, and moral structures produced through the lens of actions, in and through various spheres of social life, which describes complex system of a person's perception of him-/herself, his or her perceptions of others, and his or her attitude towards work and other activities.

Results. The results of the empirical research demonstrate that a set of axiological, motivational, and need characteristics form *pragmatic-professional*, *social-communicative*, or *individual-egoistic* types of axiological orientation of the personality, which in turn describe the subject's attitude to the surrounding external reality and to him/herself. The pragmatic-professional type of person is dominated by values such as work, results, money, and process. The least attractive value to this type appears to be power. Respondents with a social-communicative type of axiological orientation have altruism, result and money as their main personal values. Values such as egocentrism, power, money, and freedom are a distinguishing mark of those with the individual-egoistic axiological orientation.

Conclusion. This study also addresses how and through what patterns and mechanisms the axiological orientation of students' personalities is expressed, which could enable professionals to develop educational programs aimed at harmonizing and aligning societal values and the individual's attitudes.

Keywords: values, axiological orientation, students, personality, attitudes

Introduction

There are two major approaches in contemporary psychology, each with its own view of the relation between meaning and personal values.

In the first approach, personal values are the awareness and perception by a person of the general reasons for his existence (Kudinov, Kudinov, & Aybazova, 2015). Particular attention is paid to the need for both understanding of meaning — what is intended to be, or actually is, expressed or indicated — and decisions that determine a preference to accept or reject it. With the same view, Budinayte and Kornilova (1993) say that at the heart of personal values lie meanings — ends, purpose, significance — that were considered, realized, and finally internalized by a subject. Thus, the initial realization by an individual of his/her personal values and their further positioning and ranking on a “recognition and acceptance” scale is a prerequisite and an indispensable condition for value formation.

The second approach is based on the idea of the primacy of individual value orientations which form a structure of personal meanings. In examining the human search for the meaning of life, Frankl (1990) considers a person's inner motivational orientation to be a driving force of behavior and the development of personality. In foreign psychology, the problem of value orientations is also considered from the perspective of cognitive dissonance, the resolution of which, according to Festinger (1957), is the restructuring of the value system. The humanistic and existential trends in psychology accepted the thesis of social determinism of value orientations. Thus Rogers (1997) and Maslow (1999) included both social values experienced directly by the person, and borrowed ones conducive to preserving and improving the condition of the person in the self-structure. Allport (2002) sees the source of most values in society's dominant moral norms. This orientation serves as a condition and means of formation of internal values and goals.

The present authors hold a similar view to that of D.A. Leontiev (2000), considering personal values to be both sources and conveyors of significant personal meanings in human ontogenesis. The dynamic development of systems of personal meanings and value orientations, as well as their functioning, are interconnected and interdependent.

Sample and Research Methods

The study was carried out in Moscow, with final-year university students as subjects. The total sample consisted of 210 respondents, aged 23–27; there were 120 men and 90 women.

The study made use of the “Meaning of Life Orientations Test” (D.A. Leontiev), which allows researchers to identify the “meaning of life”, as determined by a subject for the future (a target), the present (a process), or the past (a result) or in all these components of life; the “Orientation Inventory” (B. Bass), which identifies three types of personal orientation: a focus on one's own interests, on communication, or on activity; and the “Questionnaire on the Social-Psychological Attitudes of the Individual in the Motivational-Needs Sphere” (O.F. Potyomkina), which determines a person's orientation in decision-making and activity with respect to certain socially and psychologically meaningful values: altruism–selfishness, process–result, work–money, freedom–power.

A quantitative analysis was performed using the methods of mathematical statistics: descriptive statistics, which allowed us to form groups of respondents based

on dominance of orientation (A, B, C, etc.); and cluster analysis, which allowed us to identify the axiological orientation of the students' personalities (using the SPSS 11.5 program). A qualitative analysis of the results was based on comparison, hierarchy of variables (by highest degree), and their domination in the structural organization.

Results

The empirical results from the three above-mentioned methods were analyzed to identify the axiological orientation of the personality. The data obtained from Bass's "Orientation Inventory" was subjected to a quantitative analysis, the provisions of which were summarized, so that several groups of respondents were identified through the dominance of their orientation and were designated as groups A, B, C, etc. (Table 1).

Table 1. Average values of the students' personality orientation indices (n=210)

Orientation indices	A	B	C	D	E	F	G
Self-oriented	42	24	25	32	16	36	28
Communication-oriented	23	38	22	41	34	21	33
Task (work)-oriented	25	28	43	17	40	33	29
Number of respondents	46	39	42	25	30	13	15

Group A — self-centered or self-oriented personalities — comprised 46 people, who are oriented towards their own feelings, perceptions, senses, and psychological well-being. In the process of interaction and communication with others, as well as in their activities, they are focused exclusively on emotional and material rewards. They care little about corporate issues; they are focused on their own well-being. They see their work, their relationships with colleagues and managers as an opportunity to enjoy benefits — for example job promotion, higher salary, higher social status or better working conditions. These respondents' work, communications, and behavior are all driven by purely egocentric motivation. Favorable prospects or good forecasts may lead them to become more active and proactive, self-motivated or ambitious, boosting their high organizational skills and self-efficacy. In the absence of material, financial or psychological rewards, these respondents are not inclined to "put themselves out".

Group B — personalities oriented towards others — comprised 39 respondents with a clear personal focus on communication and interaction with other people. For these respondents, relationships are vital. They seek to establish and maintain a lot of contacts with different people, to build positive relationships with colleagues, neighbors, relatives, and strangers. The majority of the group's respondents are likely to be extroverts. For them the relationships with colleagues appear to be more valuable than the work done.

Group C, with 42 respondents, was composed of respondents with a distinct orientation to work and results. They are fully immersed in their work. Their own interests, including career progress, relations with their colleagues and superiors,

seem less valuable for them, while the work performed is their main value. These respondents are satisfied with, appreciate, and set a high value on their work, so they do not look for easier work. It can be assumed that such employees would become highly skilled professionals.

Group D — personalities oriented toward themselves and toward communication — included 25 respondents, characterized by a strong desire for self-expression through communication and interaction with others. They are more likely eager to satisfy their aspirations through interactions with colleagues than just to realize their ambitions. The work itself is of very little interest to them.

Group E — communication- and work-oriented personalities — consisted of 30 respondents who are interested in their work, but constant communication with others also brings them pleasure. Such an employee is most likely to be a team player. He/she will neither strive to receive a career promotion nor seek to run a team.

Group F — self- and work-oriented personalities — comprised 13 respondents. Employees of this type consider their work as a means for achieving personal well-being in its material, financial, social, and professional aspects. When working they are driven by selfish motivations: They are constantly in search of a better position; they are careerists.

Group G — Finally, the 15 respondents from this group have no specific focus. They not only seek to achieve personal well-being, but also want to maintain, preserve, and expand good relations with their colleagues and other people; their aim is to achieve positive, tangible results in their work.

Thus the group of 210 respondents was divided into seven sub-groups, each with a specific personal orientation, once the pilot stage of the study had been completed. For a thorough study of the axiological orientation of the personality, the 15-person group with an undifferentiated orientation was excluded from the further research.

At the next stage, the individual's social-psychological attitudes in the motivational-needs sphere were analyzed within the three contrasting groups. In our opinion, social-psychological attitudes play a key role in the axiological orientation of the personality, while stimulating the individual's proactive behavior in order to meet his/her pressing needs. Attitudes define the subject's orientation not only in the business environment and work, communication, and behavior, but also for certain socially and psychologically important values such as sociocentrism–egoism, process–result, freedom–power, and work–money (Table 2).

Table 2. Average values of indicators for individuals' attitudes (n=127)

Indicators of attitudes	Process	Result	Altruism	Egoism	Work	Freedom	Power	Money
Self-oriented	2	6	3	10	5	9	10	10
Communication-oriented		8	9	4	3	4	5	8
Task (work)-oriented	7	10	5	7	10	8	4	9

"Self-centered/-oriented" respondents have the following dominant social-psychological attitudes: egoism, power, money, and freedom, while process and altruism are less expressed. The intensity of these attitudes indicates that in their everyday life, these respondents are guided by an egocentric motivation to benefit from everything they do. To a greater or lesser degree, it is possible to speak about their desire for maximum freedom, to break free from others' control and to manage their work environment and workflow themselves. They have a great desire to be independent and autonomous. Hence the respondents need to satisfy their inner desires for freedom and set their hearts upon money and power, as from their perspective only money and power could make them feel free. The respondents from this group show low expression of the following attitudes: process and work. On the one hand, this may indicate a low motivation to carry out professional activities, and on the other, it may be an indicator of a difficult and complex external socio-economic environment which is most likely to be the limiting factor for young people in satisfying their fundamental material requirements and needs.

"Communication-oriented" subjects have the following dominant attitudes: altruism, result, money, process. These attitudes indicate that in the process of communication these respondents tend to be useful to other people, their team, their senior management, etc. The process of specific work, the activity itself, and the result these respondents achieve, are equally significant for them. The power of money, as one of the dominant attitudes for these respondents, could be explained by the economic weakness of the health care system. Since money for these respondents is primarily linked to and closely associated with the satisfaction of their basic requirements, its attraction is considerable and strong, while work, egoism, and freedom are less often expressed by these respondents. But there is a certain contradiction here. On the one hand, process and result are top-ranked, but on the other, work has low priority. This contradiction becomes understandable if we consider that communication is also a kind of activity. Therefore, these respondents are more likely to consider the process and the result as belonging to the category of communication: The work it is interpreted by them as performance of professional or other intellectual and physical activities.

In the hierarchy of the dominant social-psychological attitudes of the respondents with an orientation toward work, results, work, and money are in the top ranking, while freedom and process are a little less pronounced. The strength of these attitudes within this group becomes clear, judging from respondents' personal orientations. Apparently, these students seem to make their career choices quite consciously, and this gives them full satisfaction. Work, process, and results mean a lot to them too. It is important to mention that not only the process itself is important to them, but also the result, as they constantly tend to improve things, excel in their activities and work, etc. They also appreciate freedom. It may be assumed that achieving and maintaining quality performance with high productivity at work requires a certain freedom. A high level of professional activity correlates with creativity, and the creative process is only possible in an atmosphere of freedom. Another interesting fact is their attitude towards money. Since this attitude can be seen in the three groups, it can be assumed that in the current socio-economic situation this is a key attitude, given the small material rewards to public-sector employees.

Based on the methodology of D.A. Leontiev, let us consider the initial results of the meaning of life orientations survey (Table 3).

Table 3. Average values of purpose-of-life personality orientation indices (n=127)

Indicators of attitudes	Goals	Process	Result	"Me, myself, and I" locus of control	Locus of control of one's life
Self-oriented	32	20	17	20	27
Communication- oriented	27	31	25	22	24
Task (work)-oriented	34	35	27	26	35

Our data show that the "self-centered/-oriented" respondents are primarily focused on their purpose in life. The level of this indicator is slightly above average, which means that they have very specific, meaningful plans for their lives and are eager to put them into action. Based upon the personal orientation of an individual, this goal is interconnected to a great extent with satisfaction of the individual's egoistical ambitions to achieve personal well-being. The individual's internal locus of control ranks second regarding orientation to the purpose of life, with results slightly above average in the test standardization scores. In other words, respondents from this group have a very clear conception of themselves, an understanding of their capabilities and opportunities. The other axiological orientations of these respondents are below average, which means that they are dissatisfied with life as a whole, both past and present. These respondents are not capable of being open, enjoying communication, activities, and self-improvement. They feel constrained by their dependence on their social environment: colleagues, friends, relatives, and the external circumstances at work and in society at large.

The hierarchy of expressiveness and evidence of the purpose-of-life orientations of "communication-oriented" respondents show a somewhat different but also consistent picture. The dominant orientations of these respondents are the process, the result, the "me, myself, and I" locus of control; their level of expression is slightly above average. In fact, this data is manifest likewise in these respondents' satisfaction with a life that is rich in emotions, activities, and events. Their lives seem to be quite meaningful, purposeful, and fruitful. These respondents are satisfied with their past and get pleasure from their present lives. Most likely, their self-realization comes through the process of communication, their relationships with others; thus the satisfaction with the process itself is an indicator of their quality of life. They are able to make their own decisions and choices. The low expression of such orientations as goals in life and the locus of control of one's life, suggests that these students do not have clearly established goals for the future, but just a short-term outlook. It is possible that this is because they are not able to strictly control their own lives, without taking into account the views of other people and situational variables.

Finally, the group of "work-oriented" respondents demonstrates a medium-high level of all purpose-of-life orientations. This indicates that these respondents

have vividly expressed goals in life, conscious ideas of what they want to achieve. At the same time, they are quite satisfied with their present and past; they consider their self-realization and self-evaluations to be quite successful. They are distinguished by steady self-control; they believe they create and manage their own lives and all successes and failures depend only on them, and that life can only follow the scenario they wrote, and no external factors could change the vector of their lives or significantly affect their quality.

At the next stage, the study used cluster analysis of the data, which found three groups of similar respondents, with big differences between the groups' average ratings. These three groups, or clusters, are found in the variables of contrasting axiological orientations. When applying the cluster method of «k-averages,» it was shown that the three clusters differ significantly on their all average values, except those of freedom and money, and the process when comparing the first and the second cluster. The clusters are divided into three categories: high, medium, and low expression of the axiological components of the personality (Figure 1).

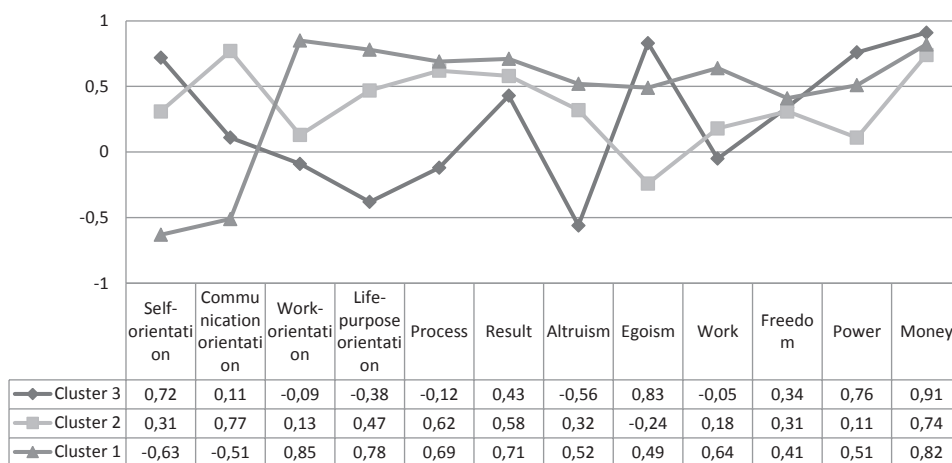


Figure 1. Indices of axiological orientation of the personality (n=195)

The first cluster is comprised of 78 respondents who have a low “self-orientation” parameter (N=-0.63) and a low “communication-orientation” parameter (N=-0.51). These low rates suggest that the respondents don’t see much value in promoting themselves, satisfying their ambitions and their own egoistic needs. They do not value communication; for them, communication is just a useful instrument to establish interaction with others. All the remaining parameters have vivid positive expression. The orientation to work has the highest rate (N=0.85); it shows that for these respondents, work is a primary personal orientation. The general parameter of purpose-of-life orientation is (N=0.78), which means that respondents who were assigned to this group set and pursue their own goals in life, are satisfied with the quality of their lives, and practice good self-control. Other parameters have the following values: process (N=0.69), results (N=0.71), altruism (N=0.52), egocentrism (n=0.49), work (N=0.64), freedom (N=0.41), power (N=0.51), money (N=0.82).

The respondents from this cluster have a quite conscious axiological career orientation. They are looking to their job for the meaning of life; they have a meaning and purpose in their lives, and both are centered in their professional sphere, orbiting around their career. They set themselves specific objectives; the process itself gives them full satisfaction; they enjoy what they do; they are quite satisfied with their lives, and they are positive about their past and make pragmatic plans for the near future. They know what they want in life, so making decisions is natural for them. They are eager to be independent from other people and external circumstances; they are the masters of their own lives. In their professional environment and at work, although the process itself gives them satisfaction, they are results-oriented, which influences their business success. Work is an important value for them, and it is critical to their present and future success. At work they are equally driven by self-enhancement, socio-centric and ego-centric motives; they look for freedom of action and try to avoid being controlled by senior staff or colleagues. This shows the adequacy, pragmatism, and empathy of these respondents. At the same time, they also place a high value on money and power; what the findings actually emphasize, therefore, is their pragmatism and desire for self-fulfillment. This type of axiological orientation can be called “*pragmatic-professional*.”

The second cluster is comprised of 52 respondents. This cluster lies between the first and the third clusters, according to the expression of the axiological orientation's components. The majority of parameters demonstrate an average expression. The values are: self-orientation ($N=0.31$), communication orientation ($N=0.77$), work orientation ($N=0.13$). This data makes clear that the dominant orientation of these respondents is communication, while “self-orientation” occupies second place, and work orientation is insignificant. Communication is the priority in their way of life. Communications are meant to be used to solve problems and satisfy their personal needs. Activities, including professional ones, do not appear to be among the necessary values for them. The other values are as follows: overall purpose-of-life orientation ($N=0.47$), as the respondents have a set of values for the purpose of life; process ($N=0.62$), results ($N=0.58$), altruism ($N=0.32$), egocentrism ($N=-0.24$), work ($N=0.18$), freedom ($N=0.31$), power ($N=0.11$), money ($N=0.74$).

The respondents included in this cluster can be characterized as trying to satisfy their needs through communication. The communication process takes most of their time; they are ready to socialize with the most diverse people for a long time and on any topics, even when resolving professional and personal issues. Despite their focus on communication, they have a goal; they clearly understand what they want in their lives and at work; they are quite optimistic about their prospects in the different spheres of life; they are satisfied with the present and the past; they are quite satisfied with their self-realization. They experience satisfaction in what they are doing, but at the same time they want their activities or work to result in positive outcomes. In the course of communication and work performance, they are often motivated by altruistic motives, i.e., they try to be helpful to their friends, colleagues or neighbors, to other people, and society as a whole. Selfishness is not manifest in the actions of these individuals. They don't make work and power a priority. In other words, work itself is not attractive for them. Work appeals to them only for its communicative aspect. The same is true for power. They do not aspire

to career progress or promotion; they do not feel any need to manage their careers, to be promoted and get high leadership positions, feeling comfortable in the workplace interacting with their colleagues. They prefer to feel at home among rank-and-file employees. At the same time, they have a need for freedom and money. They have the same attitude towards money as the previous group. Money itself is not valuable for them, but it is considered to be an important tool to satisfy their basic needs. Freedom as a value is influenced by the desire for self-fulfillment, as they believe that self-fulfillment could be achieved by only a truly free person through work, activities, communication, and interaction with others.

Thus the respondents included in this cluster could be referred to as having a "*social-communicative*" type of axiological orientation.

And finally, the third cluster was made up of 65 respondents. They show unequal values of the parameters: "self-orientation" ($N=0.72$), communication ($N=0.11$), work ($N=-0.09$). These respondents' main personal orientations translate into a focus on themselves and their personalities. Other parameters have the following values: overall purpose-of-life orientation ($N=-0.38$), which suggests a vagueness and narrowness of their life goals, a weak internal locus of control, dissatisfaction with their present and past, as well as pessimistic predictions for their future; process ($N=-0.12$), results ($N=0.43$), altruism ($N=-0.56$), egocentrism ($N=0.83$), work ($N=-0.05$), freedom ($N=0.34$), power ($N=0.76$), and money ($N=0.91$). These respondents have a strong focus on themselves, their career, their inner world, their self-fulfillment, satisfaction of their ambitions and specific personal needs. Communication with others is not a priority for them, so it is only initiated, engaged in, or promoted on the basis of necessity. Work is not highly valued, but is rather unattractive to them. Apparently, this is due to the weak expression of goals in life, the fact that they live in the present. It can also be assumed that they do not plan for the future. They are not satisfied with the process of their self-realization and the quality of their lives. They do not derive great satisfaction from their lives and work. They work or engage in communications only as an immediate, practical necessity and seek to benefit from them, since they are always result-oriented. Their work, communication, and behavior are self-centered. The fact that concern with the self outweighs concern for others is behind their actions and efforts; they want these to be useful only to themselves. These respondents possess very few altruistic motives. Work is not of significant value to them, but the same can be said about the previous group; however, freedom, power, and money are top priorities for them. In other words, these respondents aspire to freedom, power, and the acquisition of material well-being.

This group can be referred to an "*individual-egoistic*" type of axiological orientation of the personality.

Discussion

These empirical data allowed us to identify and characterize the specific axiological orientation of the final-year students. In distinction from previous studies, we used a comprehensive approach, which takes into account not only individual values, motives, and meanings, but a number of characteristics to highlight a typology of axiological orientation of students' personalities. The empirical data can be devel-

oped in further investigations of the particular features of self-actualization and professionalization of specialists with different axiological orientations. This data is also helpful for the practice of psycho-pedagogical employees of educational institutions who are interested in the formation and correction of this phenomenon among students.

In addition, the findings allowed us to specify a definition of «axiological orientation of the personality» in theoretical terms and to relate it to the existing approaches to this problem and that of value orientation. The axiological orientation of personality is understood as a relatively stable set of values, motivations, needs, and moral structures of a subject produced through the lens of actions, in and through various spheres of social life, which describes the complex system of a person's perception of him-/herself, his or her perceptions of others, and his or her attitude towards work and other activities (Kudinov, Kudinov, & Kudinov, 2015).

Conclusions

Thus the study identifies and specifies the types of axiological orientation of students' personalities, underlining and characterizing such types of value-semantic orientation of the person as *pragmatic-professional*, *social-communicative*, and *individual-egoistic*. Respondents with a pragmatic-professional orientation are characterized by the dominance of values such as work, results, money, and process; the value of power seems to be the least attractive to them. Respondents with a social-communicative orientation have the following basic values: altruism, results, money. Respondents of the individual-egoistical type have the following core values: egoism, power, money, and freedom.

The typology of axiological orientation of personality that we have identified defines the subject's self-fulfillment in different spheres of life through activities and work, communication, attitude, and behavior.

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The influence of student ethnicity on teacher expectations and teacher perceptions of warmth and competence

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Background. Previous research shows that incorrect teacher expectations about students can affect students' academic success. Moreover, students' ethnicity was found to be one of the most influential characteristics affecting teacher expectations, which can be based on ethnic stereotypes. Most studies test this relationship by comparing teacher expectations of multiple ethnic groups; however, we propose here another perspective, assuming that the connection between ethnic stereotypes and expectations may be determined by the content of the stereotypes.

Objective. This study examines the influence of students' ethnicity on teacher expectations and stereotypes, as well as the relationship of teacher expectations and stereotypes toward ethnic minority students, by including the stereotype content model in the analysis.

Design. Thirty-four primary school teachers participated in the experiment in which they analyzed six fictional profiles of students, two of which were experimental. The experimental profiles contained identical information (annual school grade, a teacher testimonial, gender), but differed in names of the students and their parents, and in their migration background. Thus, we manipulated only the information related to ethnicity and migration history of two students.

Results. Teacher expectations about the performance of minority students were always unfavorable compared with expectations about the *performance* of the majority students, but their expectations about the *abilities* of minority and majority students, which include teachers' beliefs about students' educational skills, attitudes and motivation, and capacity for school work, were mixed. We also discovered that the teacher expectations were positively related to perceptions of competence and not to perceptions of warmth. However, the minority student was evaluated by teachers as just as warm and competent as the majority.

Conclusion. This study shows the relevance of the problem of correct expectations of teachers toward students with different ethnic backgrounds. In contrast to the teachers' perceptions of the warmth and competence of students, information about the ethnicity of the child influences their expectations. Meanwhile the teachers' expectations are differently related to the various components of their stereotypes. The results raise a question about the definition and operationalization of teachers' expectations.

Keywords: teacher expectations, stereotypes, stereotype content model, warmth, competence, ethnic minority students.

Introduction

Teacher perception of students as members of certain groups can contribute to inequality in schools. According to a classic study by R. Rosenthal and L. Jacobson (1968), incorrect expectations on the part of teachers can trigger the "Pygmalion effect," which manifests itself in the fact that the behavior of students seems to be linked with teacher expectations and students begin to perform in the way that teachers expect from them (Brophy & Good, 1970; Rosenthal & Jacobson, 1968). Although follow-up studies have shown contradictory results, there is evidence that teachers' expectations and their beliefs about students were in some cases related to the students' academic success (Ferguson, 2003; Jussim & Harber, 2005; Peterson, Rubie-Davies, Osborne, & Sibley, 2016; Rubie-Davies, Hattie, & Hamilton, 2006).

Furthermore, researchers have been able to identify a number of student characteristics that can influence teacher perceptions, such as gender, socioeconomic status, and special educational needs (Auwarter & Aruguete, 2008; Levins, Bornholt, & Lennon, 2005; Page & Rosenthal, 1990; Ready & Wright, 2011).

The relationship between student ethnicity and teacher expectations is of particular interest for the study of inter-ethnic relations in the school and the causes of an ethnic achievement gap. Many studies have shown that teacher perceptions may result in ethnic minority students having lower academic achievement than their peers belonging to the ethnic majority (Peterson et al., 2016; Rubie-Davies et al., 2006; Tenenbaum & Ruck, 2007). One of the most common explanations for the low expectations of teachers toward ethnic minority students is that teachers' perceptions and expectations can be based on ethnic stereotypes (Glock, Krolak-Schwerdt, Klapproth, & Böhmer, 2013; Glock, Krolak-Schwerdt, & Pit-ten Cate, 2015; Parks & Kennedy, 2007). This conclusion is not observed in relation to all ethnic minorities, however, or has weak evidence or is not supported at all (Jussim & Eccles, 1995; Rubie-Davies et al., 2006).

In many studies, the connection between ethnic stereotypes and expectations is tested through the study of the expectations of teachers towards various ethnic minorities. Differences in expectations suggest the influence of a stereotype. It can be assumed that a connection between ethnic stereotypes and expectations is determined by the content of the stereotypes. According to the stereotype content model, each stereotype has two dimensions, "warmth" and "competence", and stereotypes are typically mixed, which means that out-groups may be seen as competent but not warm, or vice versa (Fiske, 2015; Fiske, Cuddy, Glick, & Xu, 2002). Various dimensions of stereotype may be differently related to academic expectations. It can be assumed that the perception of student "competence" is consistent

with high expectations on the part of teachers, but student “warmth” is not at all related to the expectations of the teachers towards these students. Thus, the question arises how teacher expectations are related to each of the components of their stereotypes.

While in Western countries the low academic achievement of children belonging to ethnic minorities is a problem that has been studied for decades, the influx of migrants from the CIS countries to Russia, which since the 1990s has resulted in an increasing number of immigrant children in Russian schools, actualizes the problem of correct teacher expectations in a new way in the Russian context. Most of today's immigrants, who bring with them children of all ages, are from Central Asia (Alexandrov, Ivaniushina, & Kazartseva, 2015). Although xenophobic sentiments in Russia in relation to migrants from countries in this region have been falling in recent years, they are still high: 29% of Russians surveyed in 2015 believed that immigration from the former Central Asian Soviet republics should be limited and, in 2014, 17% and 20% of respondents felt anger and hostility towards the migrants from the southern republics, respectively (Levada Center, 2014, 2015). The stereotypical image of migrants is negative: that they are low-skilled and impolite, have a repulsive appearance, have difficulty communicating, and so on (Levada Center, 2013). This data suggests that the stereotypes toward adult migrants would be “contemptuous” or “paternalistic”; that is, that their perceived “competence” is low. Apparently, it is also typical of teachers to perceive “one and a half generation” and first-generation immigrant students as incompetent, because of their real difficulties with the Russian language, which is not their native one, as well as the perception of them as children in need of adaptation to the new environment (Akifjeva, 2015; Alexandrov, Ivaniushina, Kostenko, Savelyeva, & Tenisheva, 2012). In the present study, we have also tested the hypothesis that teachers perceive immigrant students from Central Asia more paternalistically or contemptuously and have lower expectations for them compared to non-migrant students, which would be correlated with a perception of their low “competence”.

Thus, the main question of our research is how a student's ethnicity influences stereotypes and teacher expectations, and how teacher expectations relate to the various components of their stereotypes.

Theoretical Background

Content of Stereotypes

Stereotypes can be defined as “qualities perceived to be associated with particular groups and categories of people” (Schneider, 2004, p. 24).

According to the stereotype content model, stereotypes about any social groups are captured by two dimensions: “warmth” and “competence” (Fiske, 2015; Fiske et al., 2002). “Warmth” refers to personal qualities reflecting the positive orientation of members of the perceived group to others (tolerant, warm, good natured, sincere), while “competence” refers to their qualities contributing to success and their abilities (competent, confident, independent, competitive, intelligent). Those researchers showed that the majority of stereotypes in relation to different social groups are mixed, that is, the social group may have a high indicator of one of these

two scales and a low one on the other (Fiske et al., 2002). This differentiation is the basis for the allocation of two types of ambivalent stereotypes: paternalistic stereotypes, combining high levels of warmth and low levels of competence; and envious stereotypes, combining low levels of warmth and high levels of competence.

This model regarding the content of stereotypes, based on two main dimensions, was confirmed in a study of women and men, different subgroups of women and men (for example, hippy, housewife, yuppie, rocker), and different ethnic groups (Cuadrado-Guirado & López-Turrillo, 2014; Ebert, Steffens, & Kroth, 2014; Eckes, 2002; Janssens, Verkuyten, & Khan, 2015). Research on stereotypes about immigrants demonstrated not only cross-cultural differences in the content of stereotypes, but also differences in relation to the various immigrant groups, for example, in the U.S., “undocumented immigrants” are perceived as having low competence, and “Asians” as having high competence, which correlates with their perceived socioeconomic status (Cuddy et al., 2009; Lee & Fiske, 2006).

Teacher Expectations and Stereotypes/Attitudes

According to the definition of Christine Rubie-Davies, “teacher expectations are notions teachers hold about students’ long- and short-term performance – beliefs teachers hold about what students are capable of achieving on a daily and long-term basis” (Rubie-Davies, 2008, p. 254).

Starting with the work of Rosenthal and Jacobson (1968), it became clear that there is a deep connection between teacher expectations and student performance (McKown & Weinstein, 2008; Peterson et al., 2016; Rubie-Davies et al., 2006; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). Teachers’ expectations often unconsciously influence their interaction with students; they display different behavior, provide students with different opportunities to prove themselves in the classroom, praise and encourage some children and offer them additional instructional material (Good, 1987). Low expectations on the part of teachers can result in a child passing an exam with worse results than his real abilities would suggest, and, on the other hand, high teacher expectations can have a positive effect on student motivation and educational aspirations (Brind, Harper, & Moore, 2008).

Several studies have demonstrated that the perception of students by teachers corresponds to reality; for example, that these are more consistent with the personal characteristics of individual students than with their group characteristics (Jussim & Eccles, 1995; Madon et al., 1998).

However, many studies have shown that the different group characteristics of students can influence the expectations of teachers. The most studied characteristics, along with gender and socioeconomic status, are ethnicity and migratory status. Many studies suggest that teachers may perceive students belonging to ethnic minorities differently than students who belong to the ethnic majority. However, despite the large number of studies, there is still controversy regarding the nature of this influence. Thus, on the one hand, there is evidence that teachers tend to generate higher expectations for the ethnic minority than for the ethnic majority students (Hachfeld, Anders, Schroeder, Stanat, & Kunter, 2010). On the other hand, numerous studies have shown that teachers tend to have low expectations for ethnic minority students and to recommend for them a lower educational track

(Glock et al., 2013; Ready & Wright, 2011; Rubie-Davies et al., 2006; Tenenbaum & Ruck, 2007; Wigfield, Galper, Denton, & Seefeldt, 1999). There are studies in which the results are mixed. For example, depending on the information that is manipulated by the researchers, in some cases minority students were recommended for a higher school track, and in other cases for a lower one than the majority students (Glock et al., 2015). Another study showed that teachers have both favorable and unfavorable expectations of their minority students, depending on how expectations are measured (King Lewis, 2014).

Several authors have studied how expectations of teachers are interconnected with their ethnic stereotypes. A study of the attitudes and expectations of teachers in Germany showed that German teachers have less positive attitudes towards Turkish people than towards Germans, but the attitudes of the teachers are not related to their expectations for German and Turkish students (Sprietsma, 2013). In another study, it was shown that there is a relationship between the implicit attitudes of teachers and their expectations. Teachers who showed negative implicit prejudiced attitudes towards ethnic minorities had expressed low expectations of them (van den Bergh et al., 2010).

Interviews with teachers have confirmed the existence of stereotypes: that their expectations are based on their beliefs about minority students' lack of motivation and their parents' failure to provide them with resources (Turner, Rubie-Davies, & Webber, 2015). Ethnic stereotypes can mean that teachers and pre-service teachers, after familiarizing themselves with student profiles, ignore real information about minority students, such as their academic grades, and have inaccurate expectations of them (Glock et al., 2015).

Although many researchers have been interested in studying the relationship between stereotypes and expectations, there has been no research examining the relationship between expectations and the content of stereotypes, based on the two dimensions of "warmth" and "competence", even if some of the results can be interpreted in terms of the stereotype content model. For instance, within the studies of expectations and teacher attitudes towards students from different ethnic groups, attitudes were measured by a "feeling thermometer", which has a scale from 0 (very cold/ uncomfortable) to 100 (very warm/ comfortable) (Sprietsma 2013; van Ewijk, 2011). It has been shown that teachers give children from ethnic minorities a lower "temperature" than the ethnic majority. This thermometer directly refers to the measurement of "warmth" from the stereotype content model, but "competence" was not measured in either of these studies.

"Expectations" have been defined and operationalized in a way that may interfere with the researcher's operationalization of a stereotype (Brault et al., 2014; King Lewis, 2014; Regalla, 2013; van den Bergh et al., 2010). For example, van den Bergh et al. constructed a scale measuring teacher expectations according to the definition given by Dusek and Joseph (1983): "teacher perceptions of an individual student's performance, ability, and level of educational attainment" (van den Bergh et al., 2010, p. 507). The scale includes items that measure not only teacher perceptions of the academic success of students in the present and future, such as, "He or she will probably have a successful school career", but also items measuring their perception of the students' abilities, for example, "He or she is an intelligent student", which is a direct reference to the classic scales measuring "competence".

In summary, while some research has concluded that teacher expectations are based on ethnic stereotypes, studies that have focused on stereotype content indicate that stereotypes of ethnic minorities are typically ambivalent. We believe that taking into consideration the heterogeneity of the content of stereotypes allows a better understanding of the contradictory findings. We assume that it is not the negative image of a group as a whole that affects the expectations of teachers, but only their perceptions of the competence of the members of the group, that is, if teacher expectations are based on a stereotype, then it is the dimension of “competence” that has the most influence, not that of “warmth”.

Methods

Our study involved 34 primary school teachers from five general education schools located in the same district of St. Petersburg. All teachers were women, whose average age was 38.29 (SD=10.22), and the average teaching experience was 14.24 years (SD=9.74).

The experiment was conducted in the Spring of 2015. Teachers were invited to look at the personal profiles of six students and fill in questionnaires that included scales measuring stereotypes and the expectations of the teachers in respect to each student, as well as socio-demographic information about the teachers.

Experimental Design

Student name is an important marker of ethnicity (Anderson-Clark, Green, & Henley, 2008), which is most significant for Russian teachers (Panova, 2006). In our study, we operationalized ethnicity through the migration status of the students, as well as their and their parents' ethnic name.

Six excerpts from the “personal profiles” of fictional students were used as stimulus material. The students were said to have completed the second grade in 2014 and then changed schools. Each excerpt looked like a typical Russian school “personal profile” which accompanies students when they start to attend school, leave a school, and throughout their school study. In our research it included: 1) information about the name, gender, date of birth, names of parents, kindergarten address, and former place of study, if there was one; 2) grades which the student received at the end of second grade; and 3) a testimonial prepared by the class teacher after second grade. All of this information is obligatory and has to be included in their personal profiles if a student changes school in Russia.

Only two of the six personal profiles were experimental. These contained identical information (school grade, testimonial, gender – male; date of birth – October 15, 2007), but the two children were given different names (Ilya Barabanov was used as ethnically neutral and Ahmad Sangaliev as ethnically marked), and similarly for the names of their parents. Both students had a migrant background, but Ilya had moved to St. Petersburg from Moscow, and Ahmad had moved from Tashkent, Uzbekistan. This migration experience was reflected in the section that contained information about where they had studied in the past and the address of that school (one in Moscow and one in Tashkent). Thus, in the course of the experiment, we manipulated only information related to ethnicity and migration history: the names of the children and parents and the fact of moving from another

capital city. This allowed us to create a typical image of a “one and a half generation” migrant child, who had moved to St. Petersburg from Central Asia. In this article, the student with external migration history (Ahmad) will be called the ethnic minority student, and the student with internal migration history the ethnic majority student.

During the experiment, the teacher filled in two types of questionnaires: one with questions about expectations and stereotypes in relation to the students, and another which collected socio-demographic data about teachers, as well as a rating expectation scale.

Measures

Stereotypes. These were measured by eight classic scales used in the study of the content of stereotypes: four focused on the measurement of “warmth” (good natured, friendly, sincere, warm) and four on the measurement of “competence” (capable, intelligent, efficient, confident) (Fiske, 2002). To avoid bias in the estimation, some adjectives were replaced by semantic opposites: warmth (good natured, unfriendly, insincere, cold) and competence (capable, intelligent, efficient, unconfident). Respondents were asked to rate on a five-point Likert scale (where 1 – “totally disagree” and 5 – “totally agree”), “... the extent to which each of the following qualities corresponds to the student ...”, whose personal profiles they had read. Scale antonyms were recoded during data analysis, so for clarity, we will continue to call them “friendly”, “sincere”, “warm”, “confident”.

Expectations. These were measured in several ways:

- 1) using eight scales which were made by short adaptation of Regalla’s scales (Regalla, 2013), each of which represents a degree of agreement (from 1 – “totally disagree” to 5 – “totally agree”) with the items about student performance in the present and the future, and his/her academic potential:
 1. In your opinion, at the new school this student will perform academically as well as his middle-class peers.
 2. In your opinion, at the new school this student is capable of at least average academic performance in all subjects.
 3. In your opinion, at the new school this student is capable of learning the material presented in class.
 4. In your opinion, at the new school this student has the skills necessary to be successful in school.
 5. In your opinion, at the new school this student is motivated to do his best in class.
 6. In your opinion, at the new school this student works very hard to do his best in class.
 7. In your opinion, at the new school this student will quit school in high school.
 8. In your opinion, at the new school this student thinks that education is very important.

During data analysis, the item “In your opinion, at the new school this student will quit school in high school” was recoded so that all items were about positive expectations. Therefore, we call this item “will not quit school in high school”.

All items were translated into Russian by a multiple back-translation procedure applying to all stereotypes and Regalla's scales. Similarly, antonyms for stereotypes were chosen.

- 2) Using rating scale expectations. Respondents were asked to rate the six children whose "personal profile" they evaluated, in accordance with their expected future academic performance; therefore, the scale ranges from 1 ("will study better than other students") to 6 ("will study worse than other students").
- 3) Teachers also pointed out how well they thought each of the children would study at the end of the third grade (i.e., one year after the "personal profiles" had been prepared) in four subjects: Russian language, mathematics, English language, and literature. The scales ranged from 1 to 5, where 1 = "very badly" and 5 - "very well".

Procedure

Data was collected from each teacher individually. Teachers were informed that the research focused on the role that information from the personal profiles plays in the educational process. Teachers were asked to familiarize themselves with the first personal profile and form an impression of the child. When the teachers announced their readiness, the "personal profile" was taken away and Questionnaire 1 was issued. Therefore, teachers familiarized themselves with all six profiles and filled in six questionnaires, one for each student. After that, the teacher was given Questionnaire 2 and the experiment ended.

Personal profiles were issued in strict sequence: One of the experimental profiles was always shown second, and the other was always shown sixth. The two experimental profiles were randomly swapped between positions two and six, with some teachers receiving the experimental majority student profile in position two, some in position six, and the same for the minority profile. This was done in order to eliminate the effect of information from the non-experimental personal profiles on perception of the experimental profiles.

A pilot study was conducted to make sure that the teachers did not notice the virtually identical content of the two experimental profiles. Four subjects participated in the entire experiment from beginning to end. None of the subjects during the pilot study noticed that two of the six profiles were identical (except the characteristics that had been manipulated — ethnicity and migration background).

We analyzed the teachers' responses with respect to only the two experimental profiles.

Results

Perceptions of Ethnic Minority and Majority Students: Differences in Teachers' Stereotypes and Expectations

In the first stage of the analysis, we created generalized scales measuring teachers' stereotypes and expectations by calculating the arithmetic means of the initial variables. This resulted in 10 scales (5 for minority and 5 for majority students):

1. "Warmth" scale (good natured, friendly, sincere, warm), Cronbach's $\alpha = 0.68$ for majority student and 0.83 for minority student;
2. "Competence" scale (capable, intelligent, efficient, confident), Cronbach's $\alpha = 0.35$ for majority student and 0.71 for minority student;
3. Teacher expectations about performance which included sub-scales measuring teachers' notions about students' performance (prospective grades in 1) mathematics, 2) Russian language, 3) literature, and 3) English language, as well as two Regalla sub-scales 4) "this student will perform academically as well as his middle-class peers", and 5) "the student is capable of at least average academic performance in all subjects"), Cronbach's $\alpha = 0.39$ for majority student and 0.84 for minority student;
4. Teacher expectations about abilities, including sub-scales measuring teachers' evaluation of student's abilities (the remaining six Regalla scales), Cronbach's $\alpha = 0.58$ for majority student and 0.69 for minority student;
5. The resulting overall measure of teacher expectations, which combined all expectation sub-scales included in the two expectation variables above; Cronbach's $\alpha = 0.65$ for majority student and 0.82 for minority student.

While for minority student all Cronbach's alphas could be interpreted as acceptable, low alpha scores for majority student technically indicate unreliable scales. However, low alpha scores for all scales in which the teacher was evaluating of the majority student indicate low internal consistency of the variables, which may reflect the out-group covariation effect supported by the research of Patricia W. Linville, Gregory W. Fischer, and Carolyn Yoon (1996). According to this effect, people tend to perceive greater covariation among the features of out-group members compared with their perception of in-group members. Moreover, low alpha scores for the generalized scales associated with two dimensions of stereotype in the case of the majority student can signify that teachers do not perceive the student in a stereotypical way, whereas in case of the minority student, teachers' stereotypes are activated, and that could be why the stereotype content model finds support in this case. Nevertheless, Cronbach's alpha as a reliability estimate and a measure of internal consistency, has major problems (Field, 2013). For example, the value of alpha depends on the number of items in the scale, and therefore alpha increases as the number of items increases.

Then we studied the differences in teachers' perceptions of the ethnic minority and majority students and expectations about them. Comparative analysis using the paired-samples t-test showed no significant differences in teachers' evaluations of the ethnic minority and majority students on the "warmth" and "competence" scales or the scale that measured expectations about abilities. The null hypothesis can be accepted, that there are no significant differences in the teachers' stereotypical perception of students with different ethnic and immigrant backgrounds on either the warmth or competence scales ($t=0$, $p=1$; $t=0$, $p=1$) (Table 1). On average, teachers held significantly lower expectations about the performance of the minority student ($M=3.45$, $SE=0.09$) compared with the majority student ($M=3.85$, $SE=0.05$). This difference, 0.41, BCa 95% CI [0.18, 0.63], was significant $t(33)=3.79$, $p=0.01$ and represents a large effect, $r=0.55$. There was also a significant difference (0.22, BCa 95% CI [0.01, 0.43], $t(33)=2.16$, $p=0.04$) in the resulting overall measure

of teacher expectations in respect to the minority student ($M=3.38$, $SE=0.08$) compared to the majority student ($M=3.60$, $SE=0.05$), which represented a medium-sized effect, $r=0.35$.

Table 1. Means of the stereotypes and expectations scales, values of t , effect sizes, and results of bootstrapping

	M Majority (SE)	M Minority (SE)	t (33)	r	BCa 95% CI
warmth	3.75 (0.09)	3.75 (0.10)	0 ($p=1.00$)	0	[-0.18, 0.19]
competence	3.64 (0.07)	3.64 (0.09)	0 ($p=1.00$)	0	[-0.21, 0.22]
expectations about performance	3.85 (0.05)	3.45 (0.09)	3.79 ($p=0.01$)	0.55	[0.18, 0.63]
expectations about abilities	3.34 (0.08)	3.32 (0.09)	0.21 ($p=0.84$)	0.04	[-0.21, 0.26]
general expectation scale	3.60 (0.05)	3.38 (0.08)	2.16 ($p=0.04$)	0.35	[0.01, 0.43]

In the next step of the analysis we used the Wilcoxon test to compare the teachers' expectations of the ethnic minority and majority students, measured by the expectation sub-scales. This revealed differences in most cases. Predicting the students' performance at the end of the school year for four subjects (mathematics, Russian language, English language, and literature), the teachers believed that the minority student would perform worse than the majority one (Table 2). The prospective grades of the minority student are significantly lower than those of the majority student, although in the experiment the teachers were shown an identical school progress record, according to which students at the end of the second grade got a grade of 4 for Russian language, literature, and foreign languages, as well as a 5 for mathematics. In the Russian educational system, the following grading scheme is used: 5 (excellent), 4 (good), 3 (satisfactory), 2 (fail).

Table 2. Means of expectation sub-scales (grades), values of z , and effect sizes

	M Majority (SD)	M Minority (SD)	z	r
How well he will study mathematics at the end of the third grade	4.41 (0.56)	4 (0.79)	-2.56 ($p=0.01$)	-0.31
How well he will study the Russian language at the end of the third grade	3.65 (0.49)	3.39 (0.52)	-2.68 ($p=0.01$)	-0.32
How well he will study literature at the end of the third grade	4.00 (0.43)	3.56 (0.66)	-3.27 ($p=0.00$)	-0.40
How well he will study the English language at the end of the third grade	3.79 (0.41)	3.44 (0.61)	-3.21 ($p=0.00$)	-0.39

Teachers also indicated that those two students in general were different in progress and believed that the «local» student would study significantly better than the «migrant» one:

Those who study better than other students: (Mdn1=3, Mdn2=5, $z=-4.66$, $p=0.00$, $r=-0.57$).

When the teachers ranked the six students whose personal profiles were shown in the experiment, 56% of the teachers put the majority student at the 1st–3rd places and 100% at the 1st–4th places, while 85% of the teachers put the minority student at 4th–6th places and 3% at the 1st–2nd places. Only 3 teachers out of the 34 believed that the minority student would study better than the majority student; the others suggested the opposite.

The analysis also showed significant differences when comparing the teachers' evaluations of students on four items of the Regalla scales (Table 3). Teachers assessed the student marked as minority significantly lower on three items; however, in one case, we observed the opposite effect: The teachers evaluated the «migrant» significantly higher on the item “works very hard to do their best in class”. Statistically significant differences were not found when comparing the evaluations assigned to the rest of the Regalla scales.

Table 3. Means of expectation sub-scales (Regalla), values of z and effect sizes

	M Majority (SD)	M Minority (SD)	z	r
This student will perform academically as well as his middle-class peers	3.44 (0.79)	2.97 (0.94)	-2.66 ($p=0.01$)	-0.32
This student is capable of at least average academic performance in all subjects	3.82 (0.63)	3.41 (0.82)	-2.22 ($p=0.04$)	-0.27
This student is capable of learning the material presented in class	3.79 (0.59)	3.41 (0.89)	-2.20 ($p=0.03$)	-0.27
This student works very hard to do his best in class	2.85 (0.82)	3.18 (0.72)	-2.01 ($p=0.04$)	-0.24
This student has the skills necessary to be successful in school	3.53 (0.86)	3.38 (0.85)	-0.93 ($p=0.35$)	-0.11
This student is motivated to do his best in class	3.15 (0.89)	3.32 (0.81)	-0.98 ($p=0.33$)	-0.12
This student will not quit school in high school	3.65 (0.81)	3.44 (1.02)	-0.94 ($p=0.35$)	-0.11
This student thinks that education is very important	3.09 (0.71)	3.18 (0.90)	-0.43 ($p=0.67$)	-0.05

These results demonstrate the heterogeneity of teachers' expectations: While no significant differences were found in four sub-scales, on the other four sub-scales they did exist and demonstrated mixed expectations: For three items of the scale, teacher expectations were higher for the majority student and for one item, expectations were higher for the minority student. Moreover, teachers' expectations about student's performance are underestimated in relation to the ethnic mi-

nority student compared to the ethnic majority, while expectations about student's abilities are both favorable and unfavorable, which is consistent with other studies of teachers' expectations about minority and majority students (King Lewis, 2014; Regalla, 2013).

Analysis of Relations Between Teachers' Stereotypes and Expectations

Table 4 shows Spearman's correlation coefficients for all the created scales for majority student. Correlation analysis shows that neither "warmth" nor "competence" is statistically related to the scales measuring teacher expectations about performance, teacher expectations about abilities, and the general expectation scale.

Table 4. Spearman's correlation coefficients for all variables created for the majority student

	1	2	3	4	5
warmth	1	-0.08	0.02	0.12	0.11
competence		1	0.19	0.24	0.25
expectations about performance			1	0.28	0.68*
expectations about abilities				1	0.87*
general expectations					1

*p = 0.00

The same analysis for the minority student reveals a significant relationship between the "competence" scale and all the expectation scales (p=0.00). The "warmth" scale is insignificantly related to "competence" (r=0.21, p=0.23), "expectations about performance" (r=0.18, p=0.31), "expectations about abilities" (r=0.25, p=0.16), and the general expectations scale (r=0.18, p=0.30).

Table 5. Spearman's correlation coefficients for all variables created for the minority student

	1	2	3	4	5
warmth	1	0.21	0.18	0.25	0.18
competence		1	0.59*	0.65*	0.74*
expectations about performance			1	0.38**	0.86*
expectations about abilities				1	0.76*
general expectations					1

*p = 0.00, **p = 0.03

The results of the analysis show that teachers' expectations regarding the minority student are not related to their perception of his warmth, but related to the perception of his competence – the more competent the minority student is perceived, the higher are teacher expectations, measured in different ways – beliefs about how well he will study and which abilities are needed for his education. These

results partially confirm our hypothesis that when studying the relationship between teacher expectations and stereotypes, it is necessary to take into account the content of stereotypes and their homogeneity.

For the next stage of the analysis, stereotypes and expectations sub-scales were recoded. We have created new variables for all sub-scales measuring stereotypes and expectations with 21 new variables. For each pair of variables (“majority student”/ “minority student”), new variables were created, which reflected the differences in the evaluation of minority and majority students by each teacher on each scale. Thus, if a teacher evaluates the majority student higher than the minority one, a value of «1» is assigned to a new variable; if a teacher evaluates the minority student higher than the majority one, the value of the variable is «-1»; and if a teacher evaluates both students equally, it is assigned a value of «0». The variables finally created reflect the stereotypes and expectations of the teachers, their biases. While these scales measure the *difference* between teachers’ expectations of minority and majority students, not the expectations as such, for convenience we use the terms proposed above to identify them. In further analysis, we will use only the new variables.

Then, we created generalized variables from these new variables by calculating their arithmetic means: “warmth” (Cronbach’s $\alpha = 0.65$), “competence” (Cronbach’s $\alpha = 0.66$), teacher expectations about performance (Cronbach’s $\alpha = 0.84$), teacher expectations about abilities (Cronbach’s $\alpha = 0.64$), overall measure of teacher expectation (Cronbach’s $\alpha = 0.84$).

For the resulting overall measure of teacher expectations and the measure of teacher expectations about performance, the items that were included in these variables were z-scored, because the items’ scores have different dimensions. Table 6 shows Spearman’s correlation coefficients for all new created scales.

Table 6. Spearman’s correlation coefficients for all new created variables

	1	2	3	4	5
warmth	1	0.11	0.00	0.02	0.02
competence		1	0.55*	0.66*	0.62*
expectations about performance			1	0.56*	0.90*
expectations about abilities				1	0.83*
general expectation scale					1

* $p = 0.00$

«Competence» is statistically related to all the scales of expectations ($p = 0.00$). There was no significant relationship between “warmth” and “competence” ($r = 0.11$, $p = 0.54$), “warmth” and expectations about abilities ($r = 0.02$, $p = 0.91$), “warmth” and the general expectation scale ($r = 0.02$, $p = 0.91$). The null hypothesis can be accepted that «warmth» is not related to expectations about performance ($r = 0.00$, $p = 0.99$). The analysis once again confirms our hypothesis about the relationship between the teachers’ expectations and the “competence” dimension, but not the “warmth” dimension.

Discussion

This study contributes to the debate on the relationship between teachers' expectations and stereotypes in relation to students with different migrant backgrounds, by including the stereotype content model in our analysis.

We examine whether teacher expectations are related differentially to their perceptions of warmth and competence of ethnic minority students. The results confirmed our hypothesis that the expectations of teachers positively related to perceptions of competence and not to perceptions of warmth. This study, in our opinion, provides a new way to answer the question whether expectations are related to stereotypes. We propose to take into consideration the fact that, in accordance with the stereotype content model, stereotypes are more complicated than just being positive or negative: They have a two-dimensional structure and vary according to the perceived warmth and competence of the group (Cuddy et al., 2009; Fiske, 2015; Fiske et al., 2002; Lee & Fiske, 2006). According to this view, people perceive migrants as competent to a certain degree and warm to a different degree (Lee & Fiske, 2006). We studied teachers' perceptions of the migrant student from Central Asia as a typical ethnic minority student for St. Petersburg schools. The research would benefit if there had been an opportunity to explore the special features of teachers' perception of not only the migrant student from Central Asia, but also of other migrant groups that are assigned to different clusters, based on warmth and competence scores.

Migrants from Central Asia are a group that has been perceived negatively by Russians for many years. Various opinion surveys have shown that they are perceived as people with low competence (see, for example, Levada Center, 2013). The same trend is observed in relation to migrant children in the context of Russian schools – teachers perceive them as less competent than Russian students (Akiyeva, 2015; Alexandrov et al., 2012). We believe that our research confirms this tendency, but the results have turned out to be more complicated.

Looking at the content of the stereotypes, there are no statistical differences in the evaluation of the minority and the majority students by teachers on the "warmth" and "competence" scales. Since teachers judged equally the two experimental profiles out of the six that were shown, it can be assumed that some of the same information from the profiles had an influence on the teachers' judgments about these children. The testimonials indicated which personal qualities students had, from the point of view of teachers from their previous schools, and it is possible that this was the information on which teachers relied when forming their images of the students. Previous experimental studies have shown that teachers' judgments about ethnic minorities depend on the type of information that the teacher received about the student: expectation-confirming or expectation-disconfirming information (Glock, 2016; Glock & Krolak-Schwerdt, 2013). It is possible that the results were influenced by what type of information (confirming or disconfirming) was in the testimonials. If the information was disconfirming, evaluations of teachers probably do not reflect stereotypes that they may hold. Following Glock and Krolak-Schwerdt, we can assume that the information on the personal qualities of a student that teachers receive from external sources plays an important role, at least in the formation of their first impression of the student. However, additional

research is necessary to make sure that it was the information in the testimonials that had an impact on the fact that the teachers evaluated the students equally. Additionally, the small sample size does not allow us to conclude that the differences are not random.

This study showed the relevance of the problem of correct expectations of teachers in relation to students with different ethnic backgrounds, in the context of Russian schools. In contrast to the teacher perceptions of the warmth and competence of students, information about the ethnicity of the child influences their expectations. Teachers' expectations about the performance of minority student were always more unfavorable than expectations about the performance of majority students. Given that we presented to teachers identical records within both profiles, it can be concluded that in forming judgments about the potential performance of children with a migration background, teachers take into account the ethnicity of the children, which is an important factor that determined the significant differences in the forecasts of performance of the students of different ethnicities. These results are consistent with those of the experimental study in which researchers manipulated ethnicity in the profile of students, leaving unchanged other information, including grades, and showed that in-service and pre-service teachers more poorly memorized grades from the profiles of ethnic minority students and, when making school placement recommendations for them, they paid less attention to information about their grades than for ethnic majority students (Glock et al., 2015).

Our study also demonstrated that teacher expectations about the abilities of minority and majority students, which include teacher beliefs about students' educational skills, attitudes and motivation, and capacity for schoolwork, are mixed. The teachers believed that the minority students work harder to do their best in class and are less capable of learning the material presented in class than the majority students. This indicates that the expectations of teachers with regard to the minority students can be both favorable and unfavorable, which confirms the findings of some studies (King Lewis, 2014; Regalla, 2013). These results raise a question about the definition and operationalization of teacher expectations. Teacher expectations are often defined as teacher perceptions of academic success as well as of the abilities of students (Rubie-Davies, 2008; van den Bergh et al., 2010), which is reflected in the operationalization of the phenomenon, in particular through measures that include questions about school achievements and the abilities of students (van den Bergh et al., 2010).

Previous research has mostly focused on teachers' beliefs about students' school achievements (McKown & Weinstein, 2008; Peterson et al., 2016; Rubie-Davies, Flint, & McDonald, 2012; Timmermans, de Boer, & van der Werf, 2016). Meanwhile, multiple operationalizations of teacher expectations were utilized even in earlier studies (Bognar, 1983; Hoge, 1984; Williams, 1976). Williams proposed a two-factor model of teacher expectations, which included cognitive expectations — "expectations for student performance in academic (instruction) activities" and normative expectations — "expectations for student adherence to the norms of classroom behavior" (Williams, 1976), operationalized as ratings on students' reliability, cooperation, and industry. It has been shown that teachers' cognitive expectations have a positive effect on teachers' normative expectations about female students and a negative effect on teachers' normative expectations about male stu-

dents. These results indicate that teachers can have a mixture of favorable and unfavorable expectations with respect to students with specific attributions (gender, in this case). Thus, there are studies that indicate that in some cases, expectations may be mixed, but more research is required to explain all the various cases.

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PSYCHOLOGY AND CULTURE

Rudimentary functions: Important reminders of history and relationship

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Background. When Vygotsky suggested the term *rudimentary functions* for psychological phenomena, he drew a parallel with organismic rudiments that existed and continue to exist in a number of biological species. These rudiments used to play an important role in the life of an organism and allow us to study that life in the process of its development. Vygotsky originally gave three explicit examples of psychological rudimentary functions: 1) attributing an important decision to the result of a solitaire card game, 2) tying a knot in a handkerchief in order to remember and do something later, and 3) counting on one's fingers.

Objective. The purpose of this article is to offer a contemporary overview and paths for development of L.S. Vygotsky's notion of rudimentary function.

Design. This paper, in the genre of a theoretical article, drew on existing research and theoretical literature to advance a theory. I analyzed Vygotsky's original example of a solitaire game and similar actions (for example, flipping a coin), arguing that these actions represent key events mediating choice and exercising human will over affect. I then focused on three more psychological functions that fit Vygotsky's definition of rudiments: 1) photographic memory and *déjà vu* as instances of historically primitive eidetic memory, 2) talking to oneself aloud as a rudiment of a key event forming the self-regulatory mechanism of inner speech in childhood, and 3) fantasizing, which could remind us of our young age, when imagination readily created what was lacking in external world.

Results. This analysis allowed me to vividly illustrate the historical and relational focus of Vygotsky's theories.

Conclusions. Rudimentary functions, often perceived as mysterious, in their simplicity can be powerful reminders that historically primitive functions do not disappear, but enter complex relationships with other psychological functions, and that many relationships are possible within different cultural-historical formations, with Western civilization being just one example.

Keywords: Cultural-historical theory, higher and lower-order psychological functions, double stimulation

Introduction

Have you ever flipped a coin when unable to make a choice or drawn a cross on your palm in order to remember to do something later? If so, have you also thought about the significance of these actions, or compared them to the vestigial appendix in your lower right abdomen?

This manuscript is dedicated to creating a contemporary, comprehensive overview and, most importantly, to the development of Vygotsky's ideas related to rudimentary functions. The most focused analysis of these ideas was given by that author in his essay "Istoriya razvitiya vysshikh psikhicheskikh funktsii" ["The history of development of higher-order psychological functions"] written in 1931 and published in volume 3 of his collected works in 1983. He wrote: "Rudimentary functions, in the same way as organs, are documents of development, living witnesses of old epochs...." (Vygotsky, 1983). Vygotsky (1983) made it clear that the point of studying rudimentary functions was to find an answer to the question of *what* is developing and also to establish a historical (or, as he also called it, genetic) method of studying human psychological development overall.

The answer to the question of *what* is developing can be posed as *the process of mediation of human response to the environment*. In a dialogue with writings by Russian physiologist Ivan Pavlov (on the development of conditioned stimuli), Vygotsky proposed a simple understanding of the difference between the conditioned stimulus and the process of human mediation: the former remains largely unchanged within the species, while the latter develops historically, thus proclaiming the fundamental superiority of human species. Vygotsky stated that rudimentary functions are "symptoms, evidence" (1983) of this historical development.

Rudimentary functions deserve close attention for several reasons. First, a contemporary exploration of rudimentary functions can become a vivid reminder of the historical nature of human development as a key Vygotskian idea. It can deepen the attribution of a Vygotskian essence to such models as sociocultural theory and social constructivism. These theoretical models in themselves lack a genetic and cultural-historical focus. I first determined the need for such a reminder when teaching educational psychology in the United States. I felt that the textbooks often lead pre- and in-service teachers to believe that Vygotsky wanted them 1) to organize days of international food tasting as an application of his sociocultural theory, and 2) to encourage group work in order to enact his Vygotskian social constructivism. I found that Vygotskian thought was given much more credit when we discussed with the students of pedagogy how, for example, the child's seemingly immature response to a problem could be a reflection of an important psychological development of the human species far back in history. We concluded that when a young child randomly picks an answer on a bubble sheet, the teacher could think of this as a remnant of the first time that a man threw dice in order to make a choice, taking control of a situation (instead of thinking of the child's action as careless guessing).

Another reason to revisit the idea of rudimentary functions is their importance for advancing the field of developmental psychology. According to Vygotsky, psychological rudiments in adults correspond to what we observe in the process of child development (1983). Using the terms *phylogenesis* to describe the development of the human species, and *ontogenesis* to describe the individual

development of a child, Vygotsky endorsed the idea that ontogenesis recapitulates phylogenesis in a complex and significant way. As Vygotsky's student Vasily V. Davydov wrote (1980), understanding the relationship between the historical laws that shape practical and theoretical human activity in phylogenesis and the activity of a child that reproduces culturally and historically formed abilities, is critically important for advancing the cultural-historical, dialectical theory of human development.

The goal of calling attention to rudimentary functions is to explore what becomes "fossilized" in these functions, and what they are capable of reminding us about when they surface in our everyday lives. "They are monuments of the greatest attainments of culture, dragging out a pitiful existence in an epoch that is foreign to them. If anyone wanted to discover the history of each rudimentary form, he would see it on one of the great historical roads of humankind. If we were to discover it ethnologically, we would see a universal stage of culture, to which all peoples rose at different epochs and in a different form" (1983). The holistic nature of what becomes a rudimentary function (e.g., flipping a coin to make a choice) helped Vygotsky to achieve the revelation (which he first articulated in a presentation made in 1930) that lower-order functions are not simply transformed into higher-order ones, losing their identity, but enter new relationships with other psychological functions (Vygotsky, 1982, vol. 1). Initially collective functions do not stop being social when they become internalized. This reminds us of the primacy of our collective nature and the essence of *relationship* in our lives. Inspired by this powerful reminder, my hope in this paper is to create, using Vygotskian language, new Zones of Proximal Development (ZPDs) for understanding the meaning of rudimentary functions, and consequently to create new ZPDs in our everyday development and interactions.

Method

This paper, in the genre of a theoretical article, drew on existing research and theoretical literature to advance a theory. It was guided by the initial question, "How can the classic cultural-historical concept of a rudimentary function help create new understandings of human development?" Multiple sources were revisited and newly located in a search for most relevant concepts, which were then organized in four parts, each investigating one of the rudimentary functions (flipping a coin, eidetic memory, self-talk, and fantasy).

Results

Flipping a Coin

The human ability to use auxiliary stimuli in order to mediate a choice was central to Vygotsky's exploration of rudimentary functions. He gave the example of Pierre Bezukhov from Lev Tolstoy's "War and Piece" using a game of solitaire when deciding whether he should remain in Moscow or join the army. Another common form of this rudimentary action is flipping a coin. Playing a card game or flipping a coin have no relevance to making important choices, but they are ways to bring a situation of choice under control, which is something that historically distinguishes a

human being from the rest of the animal world. To illustrate this idea, Vygotsky described the philosophical problem with a donkey (attributed to the medieval philosopher Buridan), where the animal died when placed at an equal distance from two equal heaps of hay. The story was that the donkey (now famously known as “Buridan’s ass”) could not choose between two competing stimuli, whereas a man would take control over nature, at the same time changing his own nature once and forever. Unlike Buridan’s ass, a primitive man, when faced with a difficult choice or decision, could throw dice or wait to see a dream about the decision that needed to be made (Vygotsky, 1983). Vygotsky further supported the idea of animals’ inability to choose, as in the case of the fictitious Buridan’s ass, with actual experiments performed by Pavlov on dogs and by several psychologists on chickens. Pavlov’s dogs did not have the expected responses when presented with competing stimuli; moreover, they became mentally disturbed. The chickens were trained to always peck from a lighter surface, and then were presented with surfaces the tones of which they could not differentiate. Unable to choose from which surface to peck, the chickens died — not from hunger, as in the case of Buridan’s ass, but from intensity of *affect*.

Being able to mediate choice is an activity of auto-stimulation that goes beyond external stimuli, i.e., immediate options presented for a choice. The higher-order psychological function of auto-stimulation establishes control over *affect* through categories of cognition and volition. For Vygotsky, this is one of the key moments in the historical development of human activity, closely connected to his readings of Baruch Spinoza (Derry, 2013). In the process of its phylogenesis, civilized society has developed many ways to mediate natural, primitive reactions. Vygotsky focused on finding the root of mediation, the unmediated unit, and this unit could be expressed in a dialectical opposition of affect and volition.

As was proposed in a hypothesis of complex interconnectedness of phylogenesis and ontogenesis by Vygotsky and emphasized by Davydov (1980), children also begin with primitive, impulsive responses guided by affect alone and gradually learn to mediate them in... play. If we think again about the rudimentary functions that fossilized the first instances of mediating choice, we find that they are elements of a game: Throwing a coin is akin to throwing dice in a board game, while playing solitaire is just that — playing a game. As was thoroughly and passionately investigated by Vygotsky’s colleague Daniil B. El’konin (El’konin, 1978), play historically is an adult activity reflected in the rituals of primitive peoples — for example, in the rituals that surrounded hunting. Playing, or performing, a successful hunt was a way to take control over an actual collective event. The elements of adult play remained not only as rudiments: They fully exist, for example, in team sports and gambling. For another example, games that help build effective collective work are popular for the purposes of personnel training (Williams-Bell et al., 2015; Chittaro, 2015).

Play is fully understood when one realizes that its core unit is a *role* and that what is played is always a social relationship (El’konin, 1978). Children begin to role play relationships in the cultural-historical formations that Marx so famously characterized by division of labor. When labor becomes divided, children can no longer fully participate in the practices of their community as true apprentices, and start learning professional and family relationships by playing them. Children’s

play in the bourgeois middle-class world reproduces most important features of concrete social relationships, making them abstract. Abstraction in itself is an important cognitive tool of taking control. It is important to understand that children take control not over the relationships themselves, but over the historical capital of the human species, following, in the words of Marx, its familial nature and at the same time creating it.

A Vygotskian understanding of initial affect can be a powerful humanistic tool in dealing with young children's outbursts. It helps us remember that children's emotions are never meant to upset anyone. Encouraging play remains the most historically relevant activity in helping children establish their will, first over their interactions with another person, and ultimately over oneself (Lobman & Katelyn, 2015; Perone, 2014). Contemporary Vygotskians also propose that play is equally relevant to the development of adults (Holzman & Newman, 2013). The unique power of human beings to *create* auxiliary stimuli in mediating choice between immediate stimuli, according to Fred Newman and Lois Holzman, can and should continue to be used by adults in creating new emotions in their relationships with others, instead of seeing them as personal attributes created by the past and affecting their present and future (Lobman & O'Neill, 2011). Holzman, after the death of Newman, has endured a battle against clinical labels such as depression and ADHD, offering an alternative of gathering people for playful performances of their better selves (Holzman, 2015 and 2016).

Eidetic Memory

When I was a student in high school and university, I sometimes had an ability to look through the pages I needed to study and "photograph" them in my memory. When asked to retell the information, I could visualize the photographed pages and mentally "read" them while standing in front of the teacher and my peers. Years later, I read an explanation of this phenomenon given by Vygotsky's colleague Alexander R. Luria: "The essence of this form of memory is in that person is able to see, literally, the object that was shown once right after viewing it, or even after a long period of time. Such persons and the form of this memory are called eidetic" (Vygotsky & Luria, 1993).

Vygotsky and his colleagues explain that the cornerstone of historical development of human memory is in its shift from reproductive remembering to creative ponderings. Until human beings in the history of their development begin to mediate their memory by symbols, unmediated memory is stunningly vast. It is also associative in nature, making connections among what is remembered based on mostly sensory experiences. This feature of historically primitive memory may also explain another phenomenon that seems to readily fit the definition of a rudimentary function: *déjà vu* (French, "already seen"). In cases of *déjà vu*, when we have a feeling that what is happening has happened before, but we cannot recall when and how, the memory presents itself as an image, as a text saved in a file format that does not allow us to perform a word search or edit a specific sentence.

Reproductive memory and imagination are two unmediated psychological functions that are most vivid and often studied in children, both by Vygotskians and many other psychologists. Vygotskians, and Alexey N. Leontiev in particu-

lar (Leontiev, 1959), in their investigations of memory in preschool children and unschooled populations, arrived at the conclusion that both initially remembered large amounts of information verbatim and did not rely on symbols offered by the experimenters to organize information. At the time of the child's first school experiences, both groups of subjects began to increasingly remember more with the help of external signs offered by the experimenter. As formal learning accumulated, the presence of external symbols on notecards stopped making a significant difference in the amounts of remembered information. Educated children and adults had internalized mediation/signification and now organized their memories without the need of physical artifacts. Leontiev discovered that remembering with and without notecards formed two lines that initially grew apart and then flowed towards each other. He graphically portrayed this discovery in what is known as "the parallelogram of development," where the use of notecards represented the upper line and internal remembering depicted a lower line (Vygotsky, 1983; Vygotsky, 1984).

Neurology and special education are examples of two prominent fields that pay attention to lower-order capacities of memory, which are often also approached in the study of savants. Historically and rudimentarily possible synthesis of perception and cognition, which also happens in atypical development, is fascinating and full of potential. Imaginative thinking is a successful pedagogical and psychological method (Miranda, 2015; Herkert & Miller, 2015). Most arts are inconceivable without imagery. I am certainly not an eidetic person — photographic memory and *déjà vu* rarely surface in my life — and I seem to have little control over them, as seems to be the case with most rudimentary functions for most people. Thinking about them as rudimentary functions in the Vygotskian sense, however (rather than random, inexplicable occurrences), helps establish the familial nature of the human species and to take control over rudimentary functions in a dialectically scientific way.

While eidetic memory and *déjà vu* are rare rudiments of unmediated forms of memory, the first instances of signification also became crystalized, illustrating the history of development of human memory. Vygotsky describes them as out-of-date instances of tying a knot in one's handkerchief in order to remember to do something later. Now handkerchiefs are rarely used, and not everyone will recognize this action, but I remember my great-grandmother doing it with a little hankie that she carried in her pocket. The same rudimentary function got preserved in English language as an idiom "tie a string around your finger". Today we may more frequently observe a person drawing a cross on his or her palm, which has the same function as a knot or a string. Even more frequently, we see the use of mnemonic devices in education, such as "Please Excuse My Dear Aunt Sally" (PEMDAS: parentheses, exponents, multiplication, division, addition, subtraction); the acronym is intended to help students remember the order of these mathematical operations. No matter what the form is, these rudimentary actions remind us of the first uses of auxiliary symbols in mediating one's perception, turning it into purposeful memories. It is important to mention that the activity of tying knots was also a form of primitive writing, thus connecting it to memory in a very important historical context of development. "The first knot tied to remember, signified the birth of written speech, without which civilization wouldn't be possible" (Vygotsky, 1983).

Self-Talk

I decided to begin this section with a vignette of a situation that initially inspired my decision to write about rudimentary functions. One day I walked into the printer room at work and saw my colleague Norma there. "OK," she was saying, "open the upper drawer, make sure the paper is not jammed, then lift the handle on the left, check underneath..." At that point she noticed me and declared: "I talk to myself." Then she scratched her gray-haired head and continued verbally guiding herself through solving the mystery of the printer not printing when needed the most.

Norma's talking to herself is probably one of the easiest examples of rudimentary functions to understand. When she "talked to herself" at the age of five, she never announced this to the audience as something out of the ordinary. By the time her hair had turned gray, self-talk had become a rudiment that is as familiar and mysterious to us as the timing and conditions of printer breakdowns. Norma fixed the printer. Will I be able to help shed more light on what role talking to herself played in this success story?

This is going to be more complex than in the cases of flipping a coin and eidetic memory, mostly because it is not as easy to point to the historical equivalent of self-talk in phylogenesis. In the works of Vygotsky and his colleagues, one can find many instances of genetic analysis proving the absence of speech in chimpanzees and the presence of egocentric speech in young children, but no proof of primitive people talking to themselves out loud. It is the absence of an obvious counterpart that I will use as a path in this journey.

The lack of a direct historical parallel to self-talk, first and foremost, may be used to point at a difference in the genetic roots of speech and thought that was at the core of Vygotskian investigation. In an argument with many other psychologists of his time, Vygotsky repeatedly pointed out that inner speech (which also can be referred to as verbal intellect, or mental discourse, from the Russian *reche-voe myshlenie*) is not *thought* by itself and only represents a small part of it: "The relationship between speech and thought can be illustrated by two intercepting spheres that would show that part of the processes coincides in the area of verbal intellect. But verbal intellect comprises neither all forms of thought, nor all forms of speech" (Vygotsky, 1982, vol. 2). For Vygotsky it was important to remind us that a large part of our thinking is non-verbal and governed by laws of practical (technical, instrumental) intellect that we share with the rest of the animal kingdom. It is verbal intellect and speech, however, that made the human species unique and superior on the path of development. "The word, itself intellectually developing on the basis of action, puts the action on a higher step, ... puts a stamp of will on the action.... [I]f at the beginning of the development there was action, independent of the word, then at the end of it stands the word that becomes a deed. The word that makes human action free" (Vygotsky, 1984). Thus, self-talk can remind us that verbal thought both distinguishes humankind and doesn't let it forget about its closeness to nature, because it neighbors with practical intellect that is shared across the species.

The inability to readily find a primitive ancestor of self-talk can also illustrate the complexity of change in relationships among psychological functions at various stages of historical development. The main function of self-talk is in creatively

planning an action. We certainly find many instances of such creative planning in primitive societies, for example in the ritual performance of a future hunt, as discussed above. The rituals were not primarily verbal, but clearly had the principal function of planning rather than communicating. Given the difference in the genetic roots of speech and thinking, they can be understood as early instances of the speech category and even as the historical counterpart of self-talk that seems to be missing. In this case it would be not speaking, but another activity that historically entered new relationships to what later became inner speech.

Vygotsky and his colleagues emphasized the study of self-talk in children, in which context they often called it egocentric speech, borrowing the term of Jean Piaget. Even if we can't find the ancient precursor of self-talk, when adults speak aloud to themselves, they reveal a rudiment of an important organ that used to be fully functioning in their childhood. Piaget approached egocentric speech as the most cognitively limited stage in language development, gradually purged by speech directed to the other, as the brain grows and gains capacity to consistently accept that other's point of reference. Piaget considered egocentric speech as different from social speech and described them co-existing for some time during the process of child development. From the cultural-historical perspective, children's speech, just like the speech of Neanderthals, is initially purely social, with a primary function of communicating something to someone. Egocentric speech develops when the leading function becomes that of planning an action, of taking control of one's behavior. Vygotsky admitted that egocentric speech in its structure is simpler than social speech, but only to support the overall principle that he proposed: "When complex social forms of cooperation enter the sphere of individual behavior, they begin to function according to the laws of the primitive whole, part of which they now embody.... The transition from the collective form to the individual one initially lowers the level of the whole operation.... [E]gocentric speech in its structure is lower than regular speech, but as a stage of development it is higher than the social speech of a child of the same age" (Vygotsky, 1984). Thus talking out loud to oneself, in both children and adults, is an important reminder of the social, cooperative origin of all psychological functions, and of the initial simplification in the process of their internalization.

Just as in the case of play, many fields and disciplines have explored self-talk for its rich potential. For example, it has been proposed as a powerful tool for increasing athletic performance (Blanchfield et al., 2014; Cutton & Hearon, 2014; Zourbanos, 2013), establishing psychological well-being (Kross et al., 2014; Wiley, 2016), and leadership training (Regelberg et al., 2013).

Fantasy

Here I take a risk of sharing an even more personal account of understanding the importance and continued existence of rudimentary psychological functions in their new, higher-order cultural and historical relationships. It came from my experience with a play, "Carmen's Place (A Fantasy)," by Fred Newman (1998), a contemporary Vygotskian scholar, author, and activist who was introduced earlier in this article. The main character in the play is a waitress named Carmen who has a boyfriend named José, who is a police officer. They are both typical working-class

New Yorkers, second generation immigrants from Puerto Rico. They are special in knowing that *to love* means to give, and not to possess. Carmen is not ready to make a commitment to marriage, feeling a void, a need to experience something new. This new thing becomes a possessive love by Placido, an opera singer who happens to perform the role of the toreador Escamillo at the time of their relationship. Unlike Carmen from the famous opera by Bizet (based on a novel by Merimée), Newman's character does not get destroyed by the affair and does not betray José. In Carmen's words, an experience with passionate romanticism creates a space for herself, a space where she can fantasize.

Fantasy and dreaming are two more psychological functions that seems rudimentary in the contemporary Western cultural-historical formation. "It is rather different in case of a small child. Not capable of organized actions, they take the path of minimal resistance: If the external world doesn't give them something in reality, they compensate for it in fantasy. Incapable of reacting appropriately to delay in fulfilling their needs, they react inappropriately and create an illusory world, where all desires come true and where they are full masters of their universe; they create a world of illusory egocentric thinking" (Vygotsky & Luria, 1993).

I have already discussed the Vygotskian perspective on egocentrism and now would like to make another connection. While inner speech is still developing egocentrically, psychological functions of interaction remain mostly social, happening concurrently in two or more minds. A common occurrence in this social space is claiming possession of something: "This place is mine. — No, mine. — I claimed it earlier" (Vygotsky, 1982, vol. 1). What Piaget saw here as *undeveloped* within a line of predetermined maturation, Vygotsky designated as *unmediated* on a path of cultural-historical development. This unmediated desire for ownership, on the path of Western civilization, enters the relationship of dialectical unity and opposition with the key instrument of mediation — also ownership, and even though ultimately ownership of one's own will, by the nature of ownership spreading into other relationships.

Rudimentary desire for ownership which exists in many human relationships can be illustrated by the example of "Carmen's Place." Carmen's affair can also be seen as a rudimentary desire to be someone's Carmen, to be owned by someone in a life where she is otherwise independent, in charge, and happy in a relationship with José where they never tell each other what to do. In Newman's play, a possessive relationship fills the void that Carmen has been feeling and strengthens her commitment to José, who continues to completely trust her and respect her freedom. The notion of a rudimentary function, however, becomes complicated by the second meaning of the word "fantasy" in the title of the play. Indeed, how often do we meet a man without jealousy and a woman who is so much at peace with a passionate romantic affair remaining a rudimentary fantasy? This fantasy of non-possessive love does seem like a very fitting higher-order psychological function for the cultural-historical formation where gender roles and relationships gain more and more equality. A woman's fantasy of being passionately desired could be an appropriate rudiment, filling the void and reminding us that the life we live is only one cultural and historical formation. The parallel that Newman created between the Carmen of Bizet that was written by Merimée in 1845 and his own Carmen could not have been a better illustration of this idea.

Conclusion

This article offered a contemporary overview and development of Vygotsky's notion of rudimentary functions. It focused on the psychological rudiments mediating choice, such as flipping a coin, eidetic memory with its instances of photographic memory and *déjà vu*, self-talk, and fantasy. The format of this article did not allow inclusion of some other illustrations. For example, as one of his original three examples of rudimentary functions, Vygotsky mentioned counting on one's fingers (Vygotsky, 1983). He described this as a rudiment of a tool that initially mediated our historically holistic perception of quantities as qualities of a group, for instance as in the case of shepherds noticing an absence of one sheep in a herd, with no numerical operations involved. This genetic analysis could explain why some children have a hard time adding 2 and 2, and how they may think about what we are adding to what, because if it is sheep to wolves in a barn, the answer is certainly unknown.

Another prominent rudimentary function left outside this narrative is magical thinking (induction, transduction) as a rudiment of formal operational thought (deduction). In a genetic analysis, magical thinking showcases concrete cultural-historical (rather than universal and supreme) nature of formal logic, supporting the significance that Vygotsky attributed to the study of rudimentary functions: "[It] should be the point of departure when unfolding historical perspective in psychological investigations. At this point, past and present are inseparably joined. In it the present is lit by the light of history, and we find ourselves in two planes: what is, and what was. It is the end of the thread that connects present and past, the highest stages of development with the initial ones" (Vygotsky, 1983).

The study of rudimentary functions is only one lens for understanding the cultural and historical roots of Vygotsky's theories. Annalisa Sannino, for example, recently chose to focus on the method of double stimulation for similar purposes, and briefly noted rudimentary functions as examples of double stimulations, stating that this was not only a method of investigation, but a principle of development (Sannino, 2015). Given the complexity of Vygotskian work, it is hard to reduce it to just one focal point, and it is my hope that the one offered in this paper was helpful.

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Rehabilitation of semantic aphasia in a spanish-speaking patient

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Background. Aphasia is defined as a language disorder resulting from brain damage. The establishment of the relationship between the assessment and the procedures for rehabilitation is one of fundamental aspects of clinical neuropsychology.

Objective. The objective of this study is to describe the case of a Spanish-speaking patient with semantic aphasia, along with the strategies used in her neuropsychological assessment, and the procedures and results of her rehabilitation.

Design. The study method consisted of a clinical “Case Study” through qualitative neuropsychological syndrome analysis during pre- and post-assessment. The program for rehabilitation was designed especially for this case, and applied in individual therapeutic sessions with the patient. The inclusion of different kinds of material, perceptual, and verbal tasks permitted the patient to follow the levels of formation of actions with spatial orientation, starting from the most concrete level, and passing on to a more general, abstract level. The process of rehabilitation was carried out as a joint activity, taking into account the patient’s motivation and personality.

Results. Important positive changes were obtained by the time of the final assessment. The patient became able to understand complex grammatical structures in sentences and texts, in order to fulfill construction tasks and to express herself correctly both orally and in writing.

Conclusion. The authors conclude that an effective assessment leads directly to the effectiveness of the whole process of elaborating and realizing rehabilitation. Semantic aphasia can be studied in Spanish-speaking patients by using the qualitative methodology of neuropsychological assessment proposed in the works of A.R. Luria.

Keywords: Aphasia; Semantic aphasia; diagnosis of aphasia; neuropsychological rehabilitation; brain injury.

Introduction

Aphasia is commonly defined as a language disorder resulting from brain damage (Benson & Ardila, 1996), or as an alteration of the ability to communicate due to circumscribed injuries (Hécaen, 1979). However, it is not always clear what the

basis for these alterations is. Are those alterations a system which includes different kinds of speech defects only, or does it include diverse mental operations?

Apparently, the point of view that there are different types and syndromes of aphasia is a predominant one (Goodglass & Kaplan, 1972; Kertesz, 1979; Ardila, 2010), and is used by the authors when considering assessment and classification. At the same time, proposals for differentiated rehabilitation for different types of aphasia are not very common. Normally, articles on the topic of rehabilitation are directed to aphasia in general (Moreno & Blanco, 2000; Marini et al., 2007; Boo & Rose, 2011; Kiran et al., 2015), or even in a more general way to patients with brain injury (López, 2001; Pulvermüller & Berthier, 2008; Cherney et al., 2008; Rasquin, Welter, & Van Heugten, 2013; Harris & Olson, 2014; Smeets et al., 2017).

According to Luria's conception (1947), it is possible to classify aphasic syndromes according to the neuropsychological factors or mechanisms which determine the syndrome observed in each patient. A well-known example is the classification of types of aphasia (Luria, 1964; Lázaro, Quintanar, & Solovieva, 2010). Semantic aphasia is described as a specific neuropsychological clinical syndrome, or a kind of speech impairment, which can be observed in cases of brain damage in the posterior temporal parietal and occipital (TPO region) zones of both hemispheres. However, in the case of semantic aphasia, the phonic and phonemic level of language is preserved. No difficulties in either pronunciation or comprehension on the level of speech sounds (phonemes) can be observed. There are no defects of oral praxis or of the motor aspects of articulation. All the patients' primary functions are also preserved. No specific mistakes can be observed on the level of isolated vowels or consonants, and even words. The meaning of frequent concrete words is preserved, as well as visual recognition of single objects.

On the other hand, severe defects in the logical and grammatical level of speech production and understanding can be found. The patients with this kind of aphasia manifest peculiar disturbances of language production and comprehension at the level of sentences and texts. The disturbances specific to semantic aphasia are expressed in the absence of access to complex grammatical structures which involve temporal, spatial, comparative, and causal relations, as well as genitive prepositions (possessives). Examples of such constructions might be: "Put the pencil under the book and upon the notebook"; "Show the picture in which you observe that the bird is on the right (left) side of the tree"; "Walk four steps forward and two back," and so on. Such constructions are difficult for patients in both a written and oral modality. The patients have no access to de-codification of such types of sentences, nor can they use them in their own speech (Solovieva, Chávez, & Quintanar, 2001; Solovieva, Rentería, & Quintanar, 2001; Solovieva et al., 2001).

Such a phenomenon was described for the first time with respect to Russian-speaking patients in the works by A.R. Luria (Luria, 1973). A patient with semantic aphasia was famously described in Luria's bestseller "A man with a shattered world" (1972). Afterwards, similar cases were described and presented by neuropsychologists of Luria's school (Kogan, 1962; Tsvetkova, 1977, 1988; Glozman, 1999). The linguistic difficulties of patients with semantic aphasia could be described as grammatical disturbances, which are related to simultaneous disorganization of spatial orientation and perceptions. It is important to stress that if no such sentences were included in the neuropsychological assessment, the specialist might not notice any

kind of aphasia at all, and would relate the patient's difficulties to problems of memory or logical processing (Solovieva, Chávez, & Quintanar, 2001). It is interesting that the patients themselves stress their memory defects, but not speech difficulties (Quintanar & Solovieva, 2001).

In order to accurately identify such problems, the neuropsychologist has to first have conceptual knowledge about the kinds of structures used in the patient's specific language. Secondly, it is necessary to provide appropriate items for assessing the verbal sphere of patients with brain injury, and especially those with aphasia. Many well-known batteries of aphasia testing do not include such items (Boston). Probably there are no examples of such items for aphasia testing in English. As for Spanish authors, the examples are the Barcelona Test (Peña-Casanova, 2005); the Brief Neuropsychological Assessment for Adults (Quintanar & Solovieva, 2013); the Guide for Neuropsychological Diagnosis (Ardila & Ostrosky, 2011) and the Clinical Assessment of Aphasia (Quintanar, Solovieva & León-Carrión (2013).

For assessing oral production, we used the following example: "Our uncle had his breakfast after reading the newspaper. What did he do first?" (Quintanar & Solovieva, 2013).

During the assessment procedure it is useful to verify how successfully the patient understands complex verbal structures by presenting him or her with pictures with options. Some examples used during assessment in the Spanish language are: "In which picture can you see that the pupil of the teacher (teacher of the pupil) is writing on the board?"; "In which picture can you see that there are more orange flowers than white flowers in the vase?"; "In which picture do you see that the father of the son is giving a gift" (Quintanar, Solovieva, & León-Carrión, 2013). With this last example we wanted to show that not all spatial complex structures in one language (Spanish) are spatial complex structures in English or any other language. In the Spanish language, the construction "father of the son" and "son of the father" are spatially complex, but commonly used. In English, direct translation doesn't show the level of structural complexity. That is why it is necessary to create language-specific items for neuropsychological assessment, instead of directly translating from one language to another. We believe that translating neuropsychological tests for assessment of aphasia is not a proper methodology (Goodglass, Kaplan, & Barresi, 1996).

Language difficulties are not the only troubles patients with semantic aphasia have. The patients also present severe difficulties in organizing conceptual writing at the level of sentences and text. Additionally, important problems with numeric operations, problem solving, and constructive abilities can commonly be detected. Such problems also occur in patients with "agraphia within aphasia," and patients with logical (mental) processing or constructive disabilities, or parallel alterations of oral and written language (Balasurbramanian, 2005; Luria & Tsvetkova, 1979; Lázaro, Quintanar, & Solovieva, 2010). The absence of adequate testing procedures and knowledge of this kind of aphasia might lead to severe diagnostic errors. In linguistic contexts other than Russian, semantic aphasia frequently is not considered because the types of linguistic tests used are not directed to spatial organization of speech. Constructive problems, lack of spatial orientation, and numeric disorganization could be often considered as problems related to executive functions

separately from language level (Luria, 1973; Solovieva, Chávez, & Quintanar, 2001; Lázaro, Quintanar, & Solovieva, 2010).

Objective

The objective of this study was to demonstrate the advantages and possibilities of the method proposed by A.R. Luria for analyzing aphasia in the case of a Spanish-speaking patient with semantic aphasia. At the same time, the study showed the necessity of a profound relationship between the strategies used for neuropsychological assessment and the procedures for rehabilitation.

Method

The study used the clinical “Case Study” method with qualitative neuropsychological syndrome analysis during pre- and post-assessment. The program for rehabilitation was designed specifically for this case, and applied in individual therapeutic sessions with the patient.

Case description

Our case was a 34 year old female patient, right-handed, with a formal education of 12 years in the Mexican educational system (technical level or high school), and a police officer by profession. The patient suffered brain injury by a bullet wound gotten during night duty. The patient had suffered severe CTE in the posterior bilateral cortical region. The patient temporarily manifested loss of smell and taste, loss of orientation in space, places, and temporal aspects, and memory problems. Primary perception was preserved for all modalities. The patient had a consultation with the Neuropsychological Service of University Hospital of the City of Puebla (Mexico). This clinical service is provided by the Masters Program on Neuropsychological Diagnosis and Rehabilitation of the Faculty of Psychology of Autonomous University of Puebla. The patient expressed the need for neuropsychological attention due to having serious difficulties in the process of writing, reading, comprehension of language, and general orientation.

Stages of study and procedure

The Neuropsychological Assessment was applied in five individual sessions of one hour each. After that, the Program of Neuropsychological Rehabilitation was created and applied in 37 individual sessions of one hour each over six months. At the end, another neuropsychological assessment was done, and the qualitative results were compared.

The initial Neuropsychological Assessment was carried out using instruments for qualitative neuropsychological assessment created for Spanish-speaking patients (Quintanar, Solovieva, & León-Carrión, 2011; Quintanar & Solovieva, 2013). These instruments included non-verbal tasks for phonemic discrimination, motor organization of praxis, and kinesthetic and visual perception of simple objects and images. The verbal tasks included items for assessing syntactic organization of sentences, word production and understanding, discrimination of sounds and syllables according to phonemic and kinesthetic analysis and synthesis, understanding of the

sense of texts, and serial speech production. All the items were created by the authors according to the Luria's theory of functional brain organization in speech (Luria, 1973). Semantic, syntactic, and phonemic features of the Spanish language were considered (Quintanar & Solovieva, 2002; Quintanar, Solovieva, & Lázaro, 2006).

The initial Neuropsychological Assessment pointed out the conservation of the following mechanisms of the patient's activity: phonemic discrimination, motor organization of praxis and speech, kinesthetic and visual perception of simple objects and images, programming and control of voluntary activity, and elementary retention in all modalities. Comprehension of common isolated sounds, syllables, words, and direct sentences, including orders with a simple structure, were preserved.

All kinds of complex tasks, which included simultaneous spatial synthesis and analysis, were especially difficult for the patient. Such difficulties were observed in the following tasks: construction (Kohs cubes); copying a Rey complex figure; comprehension of sentences and texts with a complex semantic structure (Show the picture in which the "dog is running behind the lady and in front of the car," or "Who is the brother of your mother?" and so on). All sentences with that kind of semantic structure were not accessible to the patient. The solution of mathematical problems and examples, written speech production, and understanding of sentences and texts were inaccessible. On the basis of these clinical data, the neuropsychological diagnosis of semantic aphasia was established.

Figure 1 shows the copy of Rey figure, in which the patient's severe difficulties with spatial organization can be observed.

Copy Reproduction by memory

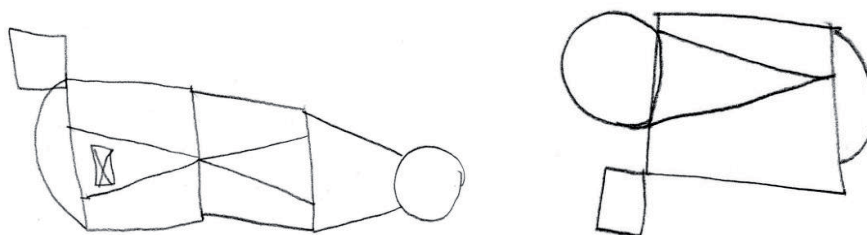


Figure 1. Task "Copy and reproduction by memory of Rey figure" before rehabilitation

The patient showed severe difficulties in comprehending literary texts (stories read by the psychologist). The task of writing a little story of her choice, on the topic "My Day," was too difficult for her (Figure 2).

me levante, desayuno.
Platiqué con mi hija

Figure 2. Task "Free writing composition"

The patient has written: "I woke up, had breakfast. Talked to my daughter," and has refused to go on.

Program for Neuropsychological Rehabilitation

The program for neuropsychological rehabilitation was designed according to the patient's needs and potential, and the clinical picture of semantic aphasia (Quintanar, Lázaro, & Solovieva, 2009; Quintanar & Solovieva, 2016). The objective of the program was to provide gradual rehabilitation of spatial functions (simultaneous analysis and synthesis) on different levels of action: material, perceptual, and verbal. The material level included actions with real objects and their images, and construction tasks with blocks and cubes; the perceptual level included actions with symbols, signs, schemes, and maps; the verbal level was directed to production and comprehension of sentences with spatial and genitive prepositions. The second stage of the program was directed to patient's production of proper texts with the help of the therapist. The final stage proposed working with arithmetic problems.

The structure of the action was always determined with respect to the patient's strong motivation for recovery, and the operations and conscious objectives of the actions which were attractive and accessible to the patient when accompanied by proper explanation and external help (Leontiev, 1983). All actions were completed with the assistance of a neuropsychologist who provided external objective, perceptual, and verbal help at all moments. Specific orientation was created for some intellectual tasks (Talizina, 2009; Solovieva, 2014). There was modification of the level of consciousness of spatial relations between material, perceptual, and verbal phenomena, according to the known practice of changing the purpose of external actions during rehabilitation (Leontiev, 2011). In the case of semantic aphasia, the actions chosen for rehabilitation should necessarily include operations with spatial relations. Automatic simultaneous subconscious operations were converted into sequential conscious step-by-step actions. All tasks were presented as joint actions with an external orientation by the neuropsychologist.

Below we show the stages of the program with examples of the tasks.

STAGE 1

Objective: Rehabilitation of the consciousness of spatial relations between objects, the patient's own body, and her verbal reflection upon them.

Tasks:

- Dialogue between the patient and therapist, including on aspects of spatial relations with objects in real space, pictures, and photographs. Constant usage of spatial prepositions: on my (your) left (right), between, in the middle, behind, after, before, in front of, outside, side by side, the first (last), the previous, the next to, the next, on, under, and so on. All prepositions were used as they are in conversational Spanish.
- Usage of signs (symbols) to indicate the direction of an action: up, down, left, right. Constant reflective usage of prepositions and other spatial grammatical constructions (verbs and phrases).
- Work with geographic maps (birth City, Country, World political map). Identification of geographic objects (names) with the use of signs for South, North, East, West, Center. Creation of the relationship between such geo-

graphic notions and directions: up (above), down (under), to the left (right), in the middle of... Production of corresponding sentences with constant observation and verification of sentences.

- Writing sentences after verification on the map. Example of such sentences translated into English: Puebla is in the center of Mexico. Chihuahua is above Durango...

Puebla esta en el Centro del Pais
Chihuahua esta Arriba de Durango
Sonora esta a la Izquierda de Chihuahua
Sinaloa esta abajo de Sonora
Coahuila esta Arriba de Zacatecas
Oaxaca esta al lado Izq. de Chiapas
Oaxaca esta al lado Derecho de Guerrero
Yucatan esta ~~at lado~~ arriba de Campeche
Tamaulipas esta abajo de Monterrey
Guatemala esta lado derecha de Jalisco
Estados Unidos esta al norte de Mexico

- Creation of maps working with real space and using memory (office, cabinet, home, garden).
- Symbolic analysis of the Solar System. Observation and drawing of different concrete situations, use of models and schema. Use of oral questions: What is closer to the Sun: the Earth or Saturn? The Earth is between Venus and Mars.
- Construction of objects by making models with matches. Constant verbal reflection and orientation on all aspects of the models, using all prepositions and spatial structures of the language (in Spanish).
- Construction of models with the help of Kohs Cubes. Constant analysis of all spatial details of the models.
- Constant oral reflection. Usage of red and white squares at first. Usage of black and white models at the next stage.

STAGE 2

Objective: Rehabilitation of comprehension at the level of sentences without any support of concrete context.

Tasks:

- Analysis of syntactic components of sentences: subject, predicate, and direct (indirect) object. Use of symbols and schemas for sentence construction and for each component of the sentence.
- Analysis of texts (stories).
- Patient's production of her own compositions based on detailed analysis of spatial relations and word order.

STAGE 3

Objective: Rehabilitation of the ability to solve arithmetic problems. Constant usage of conceptual orientation and a schema for analyzing the problems was ap-

plied (Luria & Tsvetkova, 1979). Analysis of the semantic conditions in each problem: sufficient or insufficient elements for answering the problem's final questions. Orientation for identifying the final and intermediate questions in the problem. Determination of the spatial direction of each operation: subtraction and division (to the left), sum and multiplication (to the right).

Tasks:

- Simple problems with a direct grammatical structure (one operation)
- Simple problems with an indirect (inverse) grammatical structure (one operation).
- Complex problems with a direct structure (more than one operation).
- Complex problems with an indirect structure (more than one operation).
- Open problems which do not have solution. Such problems require more orientation and reflection from the patient.

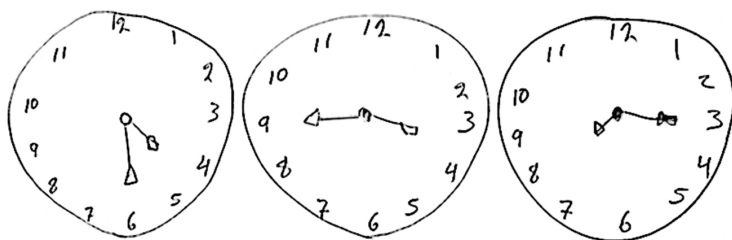
Results of the Final Neuropsychological Assessment

Significant qualitative differences were observed in the final neuropsychological assessment. The patient was able to fulfill all constructive, perceptual, and written tasks. No semantic difficulties were observed in speech production. Writing and reading became accessible to the patient in all modalities. The members of the family and the patient herself could notice positive changes in the recall process for verbal information and in day-to-day organization of life.

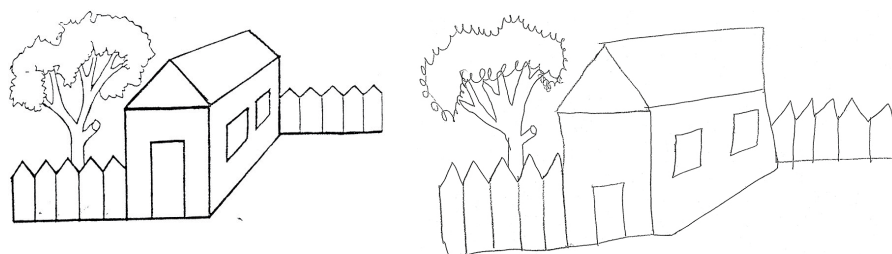
Below are some examples of tasks presented to the patient during the final neuropsychological assessment:

Task: "Draw watches by instruction."

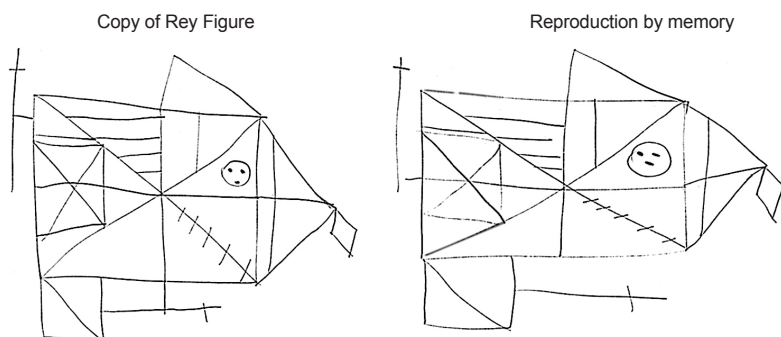
The patient had refused to fulfill this task before rehabilitation.



Task: Model of the house and its realization by the patient after rehabilitation. The patient had refused to fulfill this task before rehabilitation.



Task: Copy Rey figure.



Task: Plan and writing composition for the patient's chosen topic "My Week-end" (No translation into English is available.)

Fin de Semana

Levantarme temprano
Elaborar Huevos en el hogar
Preparar los alimentos
Salir de compras con la fam.
Regresar con la fam al hogar

Sab Me levante temprano
Salí a trabajar.

fui a visitar a mi mamá
Después fuimos de compras
Regresamos a mi casa y prepare la
Cena.

Dom. Me levante temprano
de mañana —
me prepare para ir a la Iglesia
Después a ~~la~~ mi casa prepare la comida
posteriormente prepare mis cosas para
el día siguiente — Cene y dormí.

Discussion

It is practically impossible to find published neuropsychological studies of the syndrome of semantic aphasia in Spanish-speaking patients. Head (1926) was the first to use this designation. Similar kinds of semantic difficulties can be found in the literature, but in relation to other clinical pictures. For example, León-Carrión (2006) mentions patients who have lost spatial orientation after brain injury; these patients lost recognition of objects; forgot places and other people; and manifested confusion in their understanding of the time code and details of calendars. Other authors refer to semantic aphasia as speech difficulties, which include grammatical problems understanding spatial relations in passive phrases, subordinated phrases,

and inverse constructions. Nevertheless, no studies on specific cases of patients which included early and final assessment, and implementation of rehabilitation programs, could be found (Benson & Ardila, 1996; Ardila & Ostrosky, 1991). In later publications, spatial difficulties were frequently presented without any reference to semantic aphasia; language and spatial orientation were presented in different chapters as isolated functions (Ostrosky & Ardila, 2010).

Our study shows the importance of elaborating original tasks for neuropsychological assessment according to the specific features of syntactic organization of each language (Spanish, in our case). We believe that it is no use to directly translate the items in neuropsychological tests for aphasia from other languages into Spanish. We insist on the necessity of a proper understanding and study of Luria's classification of types of aphasia and the method for their identification (Luria, 1999; Quintanar, 1999). Correct determination of the patient's central difficulties permits the doctor to establish a precise diagnosis and, consequently, to prepare the content of the concrete tasks for neuropsychological rehabilitation.

Future neuropsychological studies might help the researcher get a precise clinical picture of semantic aphasia, and establish more kinds of typical difficulties of syntactic organization in the patients' oral and writing production, and comprehension of speech. Our study doesn't mention specific difficulties with word selection, and we consider that future work with the other clinical cases of patients with semantic aphasia would help researchers find out if this is really a problem in Spanish-speaking patients. It is also important to stress that similar clinical studies might be suggested for Spanish-speaking patients not only in Mexico, but also in other countries using the Spanish language.

In our study, the Program of Neuropsychological Rehabilitation was useful for the patient and has permitted her to re-establish functions of spatial orientation in verbal and non-verbal tasks and day-to-day life. We consider that the results obtained after application of the rehabilitation program allowed us to verify or to reject the hypothesis (what caused the alterations) on which the rehabilitation program was based. In other words, the success of the rehabilitation confirmed the neuropsychological diagnosis established during the initial assessment.

Our results show that the effectiveness of assessment directly leads to effectiveness of the whole process of elaboration and realization of rehabilitation. It is important to take into account the strong motivation on the level of the patient's personality. We might add that the process of rehabilitation became a purpose of life for the patient during this joint activity (Frankl, 2013). Rehabilitation occurred as a shared activity between the psychologist and the patient, in which the patient was directed and oriented through all steps of the process. The final neuropsychological assessment pointed out significant qualitative evidence of improvement in spatial orientation and organization of information in all levels: material, perceptual, and verbal. The global and complex consideration of the clinical picture in cases of brain injury is more useful than the traditional separation of syndromes of aphasia, from problems of spatial orientation and tasks with building of blocks, which traditionally are more related to executive functions.

The tasks were always presented as actions, and not as simple exercises or training operations. This meant that the patient always knew at a conscious level the

elements of the action: “what to do, why to do, and how to do.” The elements of “what to do” and “why to do” might be included as part of the motivational sphere of activity, and were essential for the whole process of rehabilitation. We might comment that the patient was afraid to work with Kohs Cubes at the beginning, but she was really happy and lit up a lot while achieving all the tasks at the end of her rehabilitation.

We might add that we also included “how to correct,” and we might say that the three functional parts of any human activity were represented in the program by “how to do”: orientation, execution, and verification (Galperin, 2009). External orientation was essential for the fulfillment of complex constructive tasks. The inclusion of different kinds of material, perceptual, and verbal tasks permitted us to follow the levels of formation of actions with spatial orientation, starting from the most concrete level, and passing up to a more general, abstract level (Talizina, 2009; Solovieva, 2014; Solovieva & Quintanar, 2016).

Conclusions

1. The neuropsychological syndrome of semantic aphasia can be established in Spanish-speaking patients.
2. Neuropsychological assessment and rehabilitation together make up a unique process.
3. Motivational support and intellectual involvement of the patients are fundamental for successful rehabilitation in adults.
4. External orientation and inclusion of self-consciousness for all operations with spatial orientation can be a useful strategy in cases of semantic aphasia.

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Gender schemas in perception of gender-neutral images

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Background: Gender stereotypes are still a social problem. They display themselves in the process of perception by activating a gender schema as well as androcentrism and gender polarization lenses.

Objective: This paper addresses the dependence of perception on social stereotypes and schemas. The research aimed at understanding how a gender-neutral image of a cat is perceived, and checking such factors as gender schema, gender-stereotyped context, the animal's weight, the identification of participants with an animal on basis of their own gender.

Design: A Female Cat or Male Cat Test, consisting of 12 pictures, was constructed for this research. We also used the Masculinity, Femininity and Gender Type of Personality Inventory, the Russian version of the Male Attitude Norms Inventory. Tests were conducted on 197 students in Saint-Petersburg and Moscow.

Results: A cat was perceived as male 6.4 times more often than as a female, when each case of perception was counted. It was seen as male 7.2 times more often than as a female when we analyzed how the cat was seen in general by each participant. A gender-stereotyped context influenced perception for some participants. There was no influence of the animal's weight or identification of participants with an animal on basis of their own gender.

Conclusions: The research supports the hypotheses that perception of a picture of a gender-neutral animal can be explained mainly by gender schema and the interplay between "lenses" of gender polarization and androcentrism. When the last one was activated, the cat was seen as male. Most of cases when the animal was seen as a female can be explained by the influence of polarization lenses (through gender-stereotyped context in the pictures).

Keywords: gender neutral image, gender schema, androcentrism, polarization lens, male, female, perception

Introduction

Although people are usually convinced that they have an objective picture of the world around them, their perception is profoundly subjective and highly influenced by their cognitive schemas and preconceptions.

One source of distortion is the gender schema described by Sandra Bem (1981, 2004) in her Lenses of Gender theory. People are prone to misperceive objective facts because of polarization and androcentric lenses.

The gender polarization lens works through creating concepts of femininity and masculinity and seeing them as polar opposites. For example, activity can be seen as masculine and passivity as feminine (Bem, 2004). The androcentric lens shows men as superior to women and male experience as the norm while female experience is the “other”. Moreover, due to androcentrism, social attention is focused on men, so women are invisible (their needs, presence, achievements, etc.) (Bem, 2004).

Gender schema and lenses are embedded in social institutions, cultural discourse, individual psyches. They display themselves through gender stereotypes and are reasons for gender discrimination. For example, Bian, Leslie, and Cimpian (2017) found that “6-year-old girls are less likely than boys to believe that members of their gender are ‘really, really smart’”. Also “at age 6, girls begin to avoid intellectually challenging activities”.

The interplay of androcentrism and polarization lenses can also be seen in the work of Brescoll (2016), showing that gender stereotypes of emotion create problems for women-leaders. On the one hand, they are not allowed to show emotions, but on the other, they are penalized for “being emotionally unexpressive”. Gender stereotypes also influence on women in the field of math. For example, Franceschini, Galli, Chiesi, and Primi (2014) found that female students who had an “implicit gender-math stereotype” were sensitive to a stereotype threat and Fleischmann, Sieverding, Hespenheide, Weiß, and Koch (2016) found that the same woman is perceived as less professional in computer skills if she is wearing feminine clothing than if she is dressed in a neutral outfit.

There is a small number studies of perception of gender-neutral animal images in the English-language literature, but as far as we know, our research is the first in Russia.

Foreign studies have mainly involved parenting or children. For example, they investigate how parents assign gender to animal characters in a picture while reading books to children (DeLoache, Deborah, & Carpenter, 1987). Some researchers have concentrated on children’s perception of gender-neutral images (Karniol, Reichman, & Fund, 2000).

Methods

We investigated how gender schema and lenses are exhibited in the process of perception through labeling gender-neutral animal pictures. Our research does not involve children, because we see speaking only about issues of parenting as a limitation.

To check whether gender lenses are still very influential in Russia, we investigated perception of gender-neutral images of an animal. We chose a cat for our analysis for linguistic reasons: Russian is a grammatically gendered language, with gender assigned to every noun. For animals, masculine and feminine forms often exist, but for most species one form is dominant in the language.

In the case of a cat, there are two grammatical forms, which are used equally often: *kot* [male cat] and *koshka* [female cat]. Domestic cats are very popular, and

animals of both sexes are seen in everyday life in equal proportions. With respect to grammatical features, it should be added that the species name is *koshka* [female cat], so there is a scientific context in which only one form of the word is used. Still, this particular usage is not grounded in everyday practice, so we don't take it into account.

If people saw the world objectively, a gender-neutral image of a cat would be perceived as just a cat. People don't have special reason to see a cat as male or female, if they are not asked about it and the situation is not connected with breeding. It can be reasonably argued that in Russian we are forced to assign a sex, because there is no gender-neutral form of the word "cat" (as in English). So it must be either *koshka* or *kot*, and the grammar of the language is to blame. But any language reflects its culture, so the situation only clarifies that gender-based schematic processing is embedded on the macro level in Russian culture.

Our first hypothesis was that a gender schema influences perception and, as a result, there will be a strong tendency to assign a particular sex to a gender-neutral animal image (*Hypothesis 1*).

Next, if people perceived only that one artifact and were relatively objective, the image could be perceived as a female cat in about 50% of cases and as a male cat in 50%. When this balance is broken, we need to analyze what influences perception. There could be various reasons, such as:

- 1) a gender-stereotyped context, if the cat is seen as female in a traditionally feminine context and as male in a traditionally masculine one (*Hypothesis 2*);
- 2) the cat's body weight, if there is a significant difference in perceiving a "heavy" cat as male and a "light" cat as female¹ (*Hypothesis 3*);
- 3) identification with the animal (on the basis of participants' gender), if men label the cat as male and women label it as female or if there is a parallel between the person's gender and their perception of the animal's sex (*Hypothesis 4*);

Participants

Data were collected from 197 people (165 men, 32 women) in 2015–2016. Their age ranged from 17 to 57 years ($M=24.76$, $SD=8.16$). They were mainly students at Saint Petersburg Institute of Psychology and Social Work ($N=168$) majoring in psychology ($N=97$), social work ($N=47$), or taking a one-year evening course in general psychology ($N=24$). Other participants were visitors to Gender Studies in the Psychology Section of the Lomonosov International Conference for Students and Young Scientists conducted at Moscow State University in 2016 ($N=29$). 19.3% of participants ($N=38$) had a bachelor's degree or higher educational level; 14.2% ($N=28$) had secondary professional education; 23.4 % ($N=46$) had graduated from high school, and the educational level of the first two groups tested was not recorded (43.1 %, $N=85$).

All participants were assured of procedure anonymity. There were eight groups tested separately, with some variations in procedures that will be clarified later on.

¹ Some participants insisted they perceived the cat as male, because "it was heavy and male cats are fat".

Measures and Procedure

In all cases, the Female Cat or Male Cat Test (Zizevskaia, 2016) was administered at the beginning. Other tests were given right after it, using a *counterbalanced* measures design. Participants were not aware of the aim of the testing before their debriefing.

Female Cat or Male Cat Test. This test was constructed specially for this research. The stimulus materials consisted of black and white pictures of a cat in different contexts. The cat had no biological sexual features and no clothing, decoration etc., so it was an absolutely gender neutral image. The pictures were very schematic and drawn in the Microsoft Paint program by simple lines and circles.

There were 3 types of context shown. Some pictures showed the cat in situations that could be perceived as masculine or feminine by people holding gender stereotypes, and some were planned to be gender neutral.

Female-stereotype pictures included: “cat near baby carriage” (Fig. 2); “ironing” (cat near ironing board, with iron plugged into a socket); “watering flowers”; “embroidering” (cat near embroidery on a frame and a needle with thread); “cooking fish” (cat near a frying pan with fish).

Male-stereotype pictures were: “cat near car” (Fig. 3); “building wall” (cat near a brick wall and a trowel); “smoking pipe”; “fishing” (cat near a fishing rod and pond with two fish in it); “changing a lightbulb” (cat near a lightbulb and chandelier with one empty socket).

Neutral pictures included: “cat near open book” (Fig. 1); “cat near trousers”; “cat near aquarium with fish”; “drawing” (cat near easel with fish, palette, and brush); and “washing dishes” (cat near an open water tap and a sink full of dishes).

The first version of the test, presented to the first group of participants (N=24), consisted of the 15 pictures mentioned above (Zizevskaia, 2016). Later only 12 pictures were used and 3 pictures were taken out of the test due to their unclarity for participants (“cooking”, “changing lightbulb”, “washing dishes”). The short version of the test was used for one group (N=29, visitors to the International Conference at Moscow State University) and included: “cat near book” (neutral); “cat building wall” (masculine stereotype); “cat near baby carriage” (feminine stereotype).

There were some modifications in the sequence of pictures for the different groups, but only the difference in the first picture turned out to influence the results. So we differentiate only two conditions: “cat near book” (79.2%, N=156) and “cat near baby carriage” as the first image (20.8%, N=41).

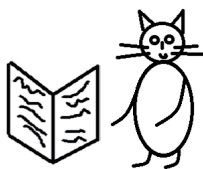


Figure 1. “Cat near book”
(heavy)



Figure 2. “Cat near baby carriage”
(light)



Figure 3. “Cat near car”
(light)

During debriefing, some people claimed they perceived the cat as a male “because it is heavy”. Therefore, we drew a thinner (lighter) version of the cat (the head was left the same, but the trunk was made thinner), to check if the weight or body size influences perception. The heavy cat (Figure 1) was shown to 75.6% (N=149), and the thin (light) cat (Figure 2, 3) was shown to 24.4% (N=48).

The majority of participants (87%) were tested in groups (from 21 to 29 people) by showing the pictures on a screen. Only the first group (13%) was tested by showing printed pictures and one by one or in small groups (2–4 people).

All participants were told the “cover story” that we were studying perception of black and white images, and that they are not connected with each other. The instruction was to describe “who is doing what in the picture”.

Russian version of the Male Attitude Norms Inventory (RMANI). The RMANI (Kletsina, Ioffe, 2013) is based on The Male Attitude Norms Inventory II (Luyt, 2005), but was partly adapted and its first phase, for testing, was used with Russian participants. It is composed of 40 items referring to participants’ attitudes toward masculinity stereotypes. It helps to distinguish participants who deny conventional norms of masculinity from those who accept such norms. RMANI has five scales: “toughness”, “self-reliance”, “success”, “unemotional sexuality”, and “homophobia”.

All items were statements to which participants responded on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*).

As in the first phase of testing (Kletsina et al., 2013) internal reliability was good for the overall test, but low for some scales, we decided to indicate Cronbach’s alphas for all scales in both cases. Cronbach’s alphas were as follows: .93 for the overall test in our research (.7 in the testing phase), .82 for the “toughness” scale (.45 in the testing phase), .8 for the “self-reliance” scale (.33 in the testing phase), .78 for the “success” scale (.66 in the testing phase), .43 for the “unemotional sexuality” scale (.08 in the testing phase), and .87 for the “homophobia” scale (.11 in the testing phase). Although the overall test results’ reliability is good in both cases, the scale results can be mentioned with the proviso that they are just a starting point for further research.

Masculinity, Femininity and Gender Type of Personality Inventory (MFGTPI). The MFGTPI (Lopuhova, 2013) is the Russian analog of the Bem Sex Role Inventory (Bem, 1974), which was adapted to the local context and gender norms. The MFGTPI is composed of 27 items, with a scale of femininity and a scale of masculinity, and makes it possible to identify the type of personality (masculine, feminine, androgynous, unidentified). The MFGTPI asks participants to indicate how well each of the 27 masculine, feminine, and neutral personality characteristics describes them. The scale ranges from 1 (*Never true*) to 5 (*Always true*).

Results

Assigning Sex to an Animal Image

To check our Hypothesis 1, that a gender schema causes a tendency to assign a particular sex to an animal image, we analyzed the words used for naming the cat.

The answers were sorted into three main groups 1) seeing the animal as a male, 2) perceiving it as a female, 3) providing no information about the cat's sex (e.g., when there were impersonal sentences).

The "female cat" group included the further words: *koshka* [female cat], with number of cases=224; *kysia* [a diminutive form of *koshka*] with n=12; "housewife" with n=2; "mother cat" with n=5; "cat wife" with n=1; *kisa* [a diminutive] with n=5; "aunt cat" with n=1; "grandmother cat" with n=1; and *kiska* [another diminutive] with n=14.

The "male cat" group included the further words: *kot* [male cat] with n=1,470; *kotik* [a diminutive form of *kot*] with n=198; *kote* [a form of male cat] with n=12; the name of a profession in masculine grammatical gender form with n=5; "father cat" with n=3; "he" with n=2; *koteika* [a diminutive] with n=2; "teenage male cat" with n=1; "grandfather cat" with n=1; "husband" with n=1; and "son cat" with n=1.

There were two cases that couldn't be put into any of the groups. Once the cat was called "an animal", so it was considered neuter (because the grammatical gender of the word is neuter). And there was one answer "*mama-kot*" [mother male cat], which presumably displayed inner dissonance on the part of the participant.

In analysis, most of cases were coded as "male cat" or "female cat" and these two groups were used for testing hypotheses.

We analyzed the information in two ways:

1. Counting every picture as one perception (Figure 4)
2. It turned out that despite their instructions, participants perceived all the pictures as a connected story. This can be explained by the gestalt Principle of Closure: that objects grouped together are perceived as a whole. And here the pictures are close to each other in time, since they are shown sequentially. The character remains identical in all pictures for each participant, reinforcing the effect of continuity.

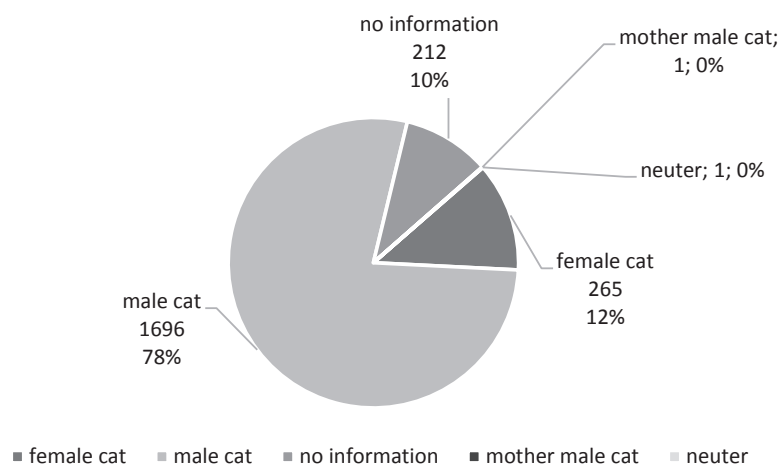


Figure 4. Perception of each picture (N of pictures=2,175, N of participants=197)

Qualitative analysis of the answers confirmed this continuous perception of the pictures. Participants used such constructions as "the same cat", "after that", "and",

“then”, etc. Moreover, they mentioned previous pictures in their descriptions (e.g., “the cat is going to press the trousers from picture number 2”), and developed a story relying on previous images (e.g., “the cat felt tired and decided to smoke”). One participant even invented a story about the cat and his friend the squirrel. Since there was strong evidence of continuous perception, for each participant we counted how the cat was seen generally — as male or female (Figure 5).

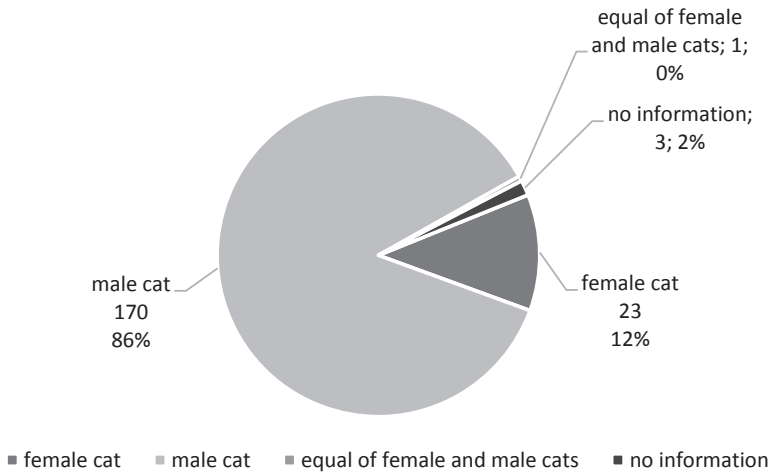


Figure 5. Perception of the cat's sex by each participant (N=197)

Figure 4 shows that the picture was perceived as showing a male cat 1,696 times, whereas a female cat was perceived only 265 times. Figure 5 illustrates the fact that 86% of participants (n=170) generally saw a male cat, while only 12% (n=23) saw a female cat.

Thus, the cat was perceived as a male 6.4 times more often than as a female, when we count each case of perception, and as a male 7.2 times more often than as a female when we analyze how the cat was generally seen by each participant.

Influence of Context on Perception of Animal's Sex

We used two ways to analyze the influence of feminine, masculine, or neutral context on labeling sex (Hypothesis 2): 1) we analyzed the influence of the first stimulus; 2) we made a qualitative analysis of cases when continuous perception was interrupted.

Influence of the first stimulus on perception of animal's sex. There were two pictures used as the first stimuli: “cat near baby carriage” (feminine stereotype picture) and “cat near book” (neutral one). We hypothesized that a lens of polarization could be activated by the “baby carriage” image, so there would be a significant difference between people in groups with different first stimuli.

The results showed that the influence of the first stimulus was different for female and male participants (Figure 6). For females, the frequencies were not significantly different $X^2(1)=1.44$, $p=.23$, and the majority perceived the cat as male. On the contrary, the first stimulus turned out to be connected with how men

saw the animal and the relation between variables was significant, $X^2(1)=12.87$, $p<.000$.

We also checked if there was an influence of the first stimulus on calling the animal female at least once. The results were quite similar. The difference was not significant for women, $X^2(1)=0.56$, $p=.813$, and but it was significant for men, $X^2(1)=6.73$, $p=.009$.

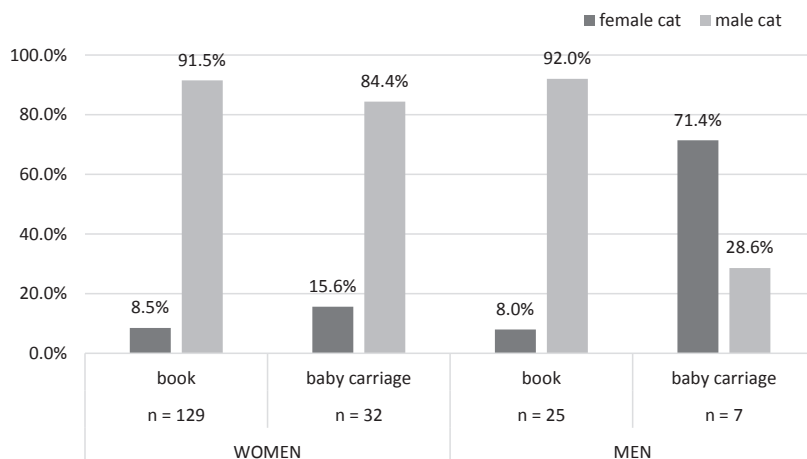


Figure 6. Perception of animal's sex by men and women in groups with a different first stimulus (N=193).

Qualitative Analysis of Cases with Interruption of Continuous Perception and Other Displays of Polarization Lens in Participants' Answers

We examined how stereotyped context causes interruption in continuous perception of the cat's sex. 25 participants (12.7% of the total number) assigned a different sex to the cat in different answers. Among them, there were four participants in whose description we didn't find any influence of stereotyped context on perception. But there were three cases that had other features (not changing of sex) which showed the influence of polarization lens. Thus we distinguished 24 participants (12.2% of the total number) that had a linguistically displayed polarization lens and 21 of them (10.7% of the total number) were doing it by changing the animal's sex in perception.

We observed different patterns of the manifestation of polarization lenses. Sometimes, it looked like an influence of female stereotypes. For example, 11 of participants (10 women and 1 man) generally called the animal a "male cat", but only for "cat with baby carriage" image did they use "female cat" (e.g., "*koshka* has kids", "*koshka* walking with a baby"). One participant (a woman) used the word "maternity" for the first "baby carriage" picture and then saw an animal as a "male cat". And another seemed to have dissonance, reacting to the same stimulus by writing "mother *kot* [male cat] walking with a kitten".

The embroidery context influenced two answers. Participants were writing about a male cat, but in one case (a man) it was temporally changed into "grand-mother cat", and in the other (a woman) into "the wife female cat is embroidering a pillow".

The picture with ironing made one person (a man) write that “the male cat is satisfied with his wife”. So there was passiveness-activeness that showed the existence of a polarization lens.

Sometimes male stereotypes played the main role. For example, three participants (women) reacted to the “cat near a car” image and changed the animal from “female cat” to “male cat” temporarily or permanently.

The fishing context influenced one person (a woman) to call the animal a “male cat”.

And one participant (a woman) changed the perception of “building a brick wall” so as to save her “female cat” story by changing it to “*kysia* [a diminutive form of female cat] is walking along the Kremlin Wall” (changing “building” to “walking”).

Four participants’ answers showed an influence of both types of stereotypes and two or more pictures. One participant (a woman) reacted to almost all the images as activating stereotypes. Her male cat was fishing, smoking, building a wall and “choosing a car”, and the female cat was “taking a kid for a walk”, “ironing”, “embroidering”, “taking care of flowers”. Two participants switched from describing the cat predominantly as male to female for just two pictures in each case: 1) the cat near a baby carriage and the cat watering flowers (a man); 2) ironing and watering (a woman). The other person (male) was writing about a male cat and reacted quite emotionally when he saw it in the “ironing” context, “It’s not a *kotik* [a diminutive form of male cat], it’s somebody’s housewife!” And he continued this idea with the next picture, with trousers, “...is going to press her husband’s trousers”.

To validate the idea that the participants really showed the effect of a polarization lens, we hypothesized that people chosen through qualitative analysis will have more gender stereotypes than people whose gender stereotypes were not strong enough to cause interruption of continuous perception. An independent-sample t-test was conducted on the results of RMANI (N=90). There was a significant difference in total scores for the group with a strong influence of a polarization lens, $n=8$, ($M=145.5$, $SD=11.7$) and the group without such influence, $n=82$, ($M=128.3$, $SD=23.2$), $t(88)=2$, $p=.042$. Thus, people with a strong polarization lens had more stereotypes about masculinity. This group also showed a significantly higher score ($M=33$, $SD=4.1$) on the RMANI self-reliance subscale than the others ($M=28$, $SD=6.4$), $t(88)=2$, $p=.043$; and they had higher scores on the RMANI homophobia subscale ($M=21.9$, $SD=6.9$), $t(88)=3$, $p=.003$.

Influence of cat’s body weight on perception of animal’s sex. We analyzed whether the cat’s body weight can change the perception of an animal’s sex (Hypothesis 3). Due to the influence of the first stimulus, participants who were shown the baby carriage as the first image were excluded from this analysis¹. We explored how the cat’s sex was generally perceived by each participant, and didn’t find significant difference between “heavy cat group” and “light cat group”, $X^2(1, N=154)=0.001$, $p=1$. There was also no difference between men and wom-

¹ We could not provide separate analyses because we did not have a group with a light cat and a baby carriage as the first stimulus.

en when counted separately. To sum up, it showed that the cat's heaviness was not the reason participants saw it as a male. So the claim of some participants that they perceived the cat as a male "because it is heavy" didn't have statistical confirmation.

Influence of identification with the animal on perception of animal's sex. In order to check influence of identification (Hypothesis 4) we analyzed:

- 1) if men perceive a male cat while women see a female cat (Hypothesis 4);
- 2) if there is a parallel connection between the person's gender and the animal's sex (Hypothesis 4)

First, we checked correlations between the participant's and animal's sex. As there was a difference between women and men in being influenced by the first stimulus when it was female-stereotyped ("cat with baby carriage"), we excluded those cases from statistical analysis. In all the other cases, perception of a male cat was equally distributed between men and women, $\chi^2(1, N=154)=0.008$, $p=1$. Thus, there was no influence of identification with the animal (on basis of sex).

In order to understand the influence of gender type of personality (defined by the Masculinity, Femininity and Gender Type of Personality Inventory), we checked whether there were significant differences between masculine ($n=6$), feminine ($n=20$), androgynous ($n=45$), and unidentified ($n=5$) people in seeing a male or female cat. The relation between variables was not significant, $\chi^2(3, N=76)=1.59$, $p=.662$, so gender type of personality was not connected with perception of the cat's sex.

In order to check if there were separate influences of femininity or masculinity in gender structure on perception, we conducted an independent-sample t-test for the femininity scale and the Mann-Whitney Test for the masculinity scale ($N=76$).

There was no significant difference in the femininity level for the group that perceived the cat as female, $n=11$, ($M=32.8$, $SD=6.1$) or for those who perceived the cat as male, $n=65$ ($M=33.8$, $SD=5.4$), $t(88)=-.53$, $p>.05$. The same two groups did not differ significantly in masculinity, with $U=241.5$, $Z=-1.7$, $p=.086$. No difference was found on either scale when we analyzed men and women separately. All things considered, there was no connection between the participants' gender type or gender structure of personality and their perception of the cat's sex.

Conclusion

We found out that people, when perceiving a gender-neutral animal, did not reflect objective reality, but automatically transformed it through a gender schema and assigned a particular gender to an image.

We tried to find factors influencing perception of the cat and tested a variety of hypotheses. The cat's weight (heaviness or lightness) and the participant's own gender type and structure turned out to have no influence on perception.

It seems quite intriguing that our results about gender influence are contrary to the study on perception of gender-neutral pictures conducted in Israel (Karniol et. al., 2000). Their research showed that female participants saw gender-neutral pictures more often as female, while masculine, androgynous, and gender-uniden-

tified children saw them more often as male. We hypothesize that the difference in findings could be caused by one of two reasons: 1) the Israeli study tested children aged 9–12, whereas we tested adults, so self-identification might work differently; 2) the children were asked about the masculinity or femininity of the pictured character, so their answers were less automatic.

Next, there was no direct influence of the participant's sex on the perception of the cat as male or female, through identification with the pictured character. But there was one particular situation when men and women reacted differently, to be discussed below. We assume that people's perception of gender-neutral images is influenced by a lens of polarization and a lens of androcentrism interacting with each other (Bem, 2004).

The lens of polarization showed itself in the fact that a neutral image was generally perceived as male. Although an equal proportion of male and female cats live with people, there were 7.2 male cats to 1 female cat in the answers.

On the other hand, when we turn to cases when the cat was seen as female, we find it was mainly caused by activation of a polarization lens when stereotyped pictures were shown. But the interplay between the two lenses caused different answers for men and women when they were shown "cat with baby carriage" as the first stimulus experimental condition. While the lens of androcentrism remained dominant for women, men were more influenced by the lens of polarization, presumably because, as Bem (2004) noticed, penalties for violation of gender norms were stricter for men.

Further analysis could help to understand how the lens of androcentrism and the lens of polarization can reinforce each other and influence the perception of gender-neutral animals. It is quite possible that initially the lens of polarization assigns activeness as a trait to masculinity and passiveness as a trait to femininity, so when an animal is seen as a main character in a story (every story implies acting by its nature), it is perceived as active. Then the link between two types of activeness (masculinity-activeness and main character-activeness) can make people see the cat as male.

Butler (2004) has stated that gender is not something stable, but a process. Gender lenses are processes as well. They don't only influence perception, but they are constructed again in every act of perception. From this point of view, choices made by participants can be seen as working to maintain gender lenses and, as a result, gender inequality. Furthermore, following this pattern, women remain invisible and secondary to themselves.

The question is how to escape from patterns that create gender discrimination, using our knowledge of the gender schema's influence. In our opinion, the problem can be partly solved through raising people's awareness of automatic gender labeling. Since this is a linguistic case, we need to start a discussion about gender-neutral language. There can be two ways to achieve language gender equality. First, through adding to a language more feminine forms. Now we can observe this trend in the creation and widespread use of new feminine forms for many words indicating professions (e.g., *avtorka* [female author]). We can also use both grammatical forms together (e.g., *skazal_a* ["said" with two verbal endings]). But to make our perception absolutely free, not only from particular lenses, but from gender

schema in general, we should create new neutral gender forms in language. We cannot simply use the male form as a neutral one, because, as Gygax, Gabriel, Sarasin, Oakhill, & Garnham (2008) showed, people automatically think only about a man in this case, so we just enforce the lens of androcentrism. We can create new linguistic forms that are gender neutral, as has been done in English, when “they” is used as a singular, gender-neutral pronoun (or new words are created, such as “ze”). So it seems that we need a new word for cat, a new way to speak about cats and – most important – a new way to think about cats.

Limitations

The research was conducted on the basis of the Russian language and in Russia, so there may be linguistic and cultural difference with other countries. We chose one particular animal for analysis, so the results cannot be extrapolated to perception of all animals (or creatures) without considering other factors.

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