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The World after the Pandemic: Challenges and Prospects for Neuroscience (Based on the Materials of the II Summer International School named after A. R. Luria)

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Мир после пандемии: вызовы и перспективы для нейронауки (по материалам II Летней международной школы имени А. Р. Лурия)

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Abstract. In August 2020, Moscow State University named after M. V. Lomonosov and Ural Federal University named after the first President of Russia B. N. Yeltsin held the II Summer International School named after A. R. Luria. Thirteen well-known experts in the world scientific community, as well as 246 listeners from 47 countries took part in it as speakers. Each speaker presented his report, and also took part in one of two panel discussions on current topics. Research findings by young scientists were presented in the format of an e-poster session. This article is a final report on the thematic areas of the School's work, which included

not only the results of the presented studies, but also the judgments of experts in the field of neuroscience about the new coronavirus reality. The event was supported by the Russian Science Foundation for Basic Research.

Keywords: *neurosciences; Luria approach; youth science; cross-cultural studies; neuropsychology; integrative approach; integrated research*

Аннотация. В августе 2020 г. Московский государственный университет имени М. В. Ломоносова и Уральский федеральный университет имени первого Президента России Б. Н. Ельцина провели II Летнюю международную школу имени А. Р. Лурия. В качестве докладчиков в ней приняли участие тринадцать известных экспертов мирового научного сообщества, а также 246 слушателей из 47 стран. Каждый докладчик представил свой доклад, а также принял участие в одной из двух панельных дискуссий по актуальным темам. Результаты исследований молодых ученых были представлены в формате электронной стендовой сессии. Данная статья представляет собой итоговый отчет по тематическим направлениям работы школы, в который вошли не только результаты представленных исследований, но и суждения специалистов в области нейробиологии о новой коронавирусной реальности. Мероприятие прошло при поддержке Российского научного фонда фундаментальных исследований.

Ключевые слова: *нейронауки; нейропсихологический подход Лурия; молодежная наука; кросс-культурные исследования; нейропсихология; интегративный подход; интегрированные исследования*

The II Summer International Neuropsychological School named after A. R. Luria was held in August 2020 on the basis of Ural Federal University named after the first President of Russia B. N. Yeltsin. The school was held in English. The online format was chosen as the only possible one due to the difficult epidemiological situation in the world. It should be noted that an increase in the number of participants and their geography was a positive result of the online event. In total, the event was attended by over 240 listeners — students, post-graduate students, young scientists from 47 countries of the world. The work went on for three days for 6 hours. The experts' lectures were interspersed with communication with the audience, which was moderated in the school's chat room. The final events of the first two days were panel discussions, where eminent speakers and students of the School discussed the current trends in the development of neurosciences, including the impact of the coronavirus pandemic. In general, the interactive part of the event, despite the remote format, turned out to be bright and meaningful. So, over three days of work, the chat received more than 500 questions and replies from listeners. The best ones were awarded special prizes and certificates from the organizers.

Given a key task of the School to create a communicative cross-cultural platform for interaction between the renowned and novice scientists, an e-poster session for young people became a separate landmark event. It presented research cases from eight research groups, most of which are undergraduate and graduate students of various universities and research centres of the world.

The feedback received by young scientists will help bring their research to a new qualitative level.

Most of the experts' reports were related to studies that were carried out within the framework of the paradigm developed by the founder of Russian neuropsychology A. R. Luria. Scientific reports were organized into several topics: *Brain Resources in a Changing World, The Value of a Cultural-Historical Approach in a Changing World, Neuro-Linguistics: Ways to Search for New Meanings, Neuropsychological Approach in Helping Children with Developmental Delays*. From the global problematics of cultural dominants of cognition, the conceptual and categorical apparatus of the approach of A. R. Luria and the neuropsychological analysis of the consequences of the pandemic, the focus of the participants' attention shifted to the format of discussing urgent practical problems. Among them were the problems of the modern child population (risks in the formation of children rejection revealed in their speech development, neuropsychological support for typical and atypical children of different ages, etc.), neuropsychological support for people of mature and older age who experience difficulties in the conditions of radical environmental changes, total digitalization, information overloads, etc.

The School focused on a fundamental scientific problem related to understanding the connection between the brain and human behaviour. Achievements in solving this scientific problem make it possible to develop scientifically based and effective mechanisms for human adaptation to a new reality, to reveal and develop the resources of the brain to overcome the challenges that arise in modern civilization associated with changing environmental conditions, for example, such as the coronavirus pandemic. This topic has been presented across the entire age range: from the birth to the "silver" age.

The integrative potential of neurosciences has contributed to the variety of topics discussed. Thanks to this, the educational content of the event was distinguished by interdisciplinarity, it also comprised new data on various levels of brain activity — from the cellular to the social. The paradigm and approach developed within the framework of the teachings of A. R. Luria, allowed the participants of the event to analyse the risks and opportunities of human development in contemporary world from comprehensive and holistic perspective, taking into account modern knowledge about the work of the brain.

The II Summer International Neuropsychological School became an online educational platform, where experts in different areas of the global neuropsychological scientific movement worked productively together with young Russian and foreign scientists. On the one hand, the School showed the possibility of further development and expansion of Luria's approach in solving the fundamental problem of the relationship between the brain and the psyche. In particular, it was shown how modern advances in neuroscience can be used to understand how the brain provides the psyche and human behaviour within the framework of the theory of systemic dynamic localization of functions in the brain, as well as the theory of functional brain blocks (report by J. Peña-Casanova from Spain). On the other hand, there was an extension of the paradigm to an early age,

including the infant period of brain development (report by G. Lazarus from the USA). It was shown that the use of the paradigm of Luria contributes to high efficiency in neuropsychological diagnostics, neuro-correction and neurorehabilitation (reports by K. Anauate, J. Glozman, S. Kiselev, Yu. Solovieva). The School showed the importance of the integrative trend in neurosciences, as well as a focus on the implementation of research and the search for technologies for unlocking and optimizing brain resources in a rapidly changing world. Such a constructive combination of the fundamental nature and practical orientation of neurosciences, in particular, finds its expression in new technological solutions for various spheres of human social life.

A more in-depth review of the studies presented is as follows. One of the first posters to go on was from the University of San Paulo. Carolina Magre presented her study on the neuroscience and inclusive education — a teacher training program. She emphasized the relevance of inclusion in public policy for education. The study aimed to incorporate inclusive education to teacher training policy. 50 teachers were recruited from elementary schools and private kindergartens. The teachers received a total of 16 hours of training based on neuroscience of learning and neurodevelopmental disorder. The study concluded that a better understanding of neurodevelopment disorders helps create better more focused educational plans.

Olga I. Dorogina, Elena V. Khlystova and Julia V. Burmistrova from Ural Federal University presented their study on the neurocognitive functions as an indication of subjective adaptation to involuntary processes. The establishment of a marker which could indicate the functional level of the elderly people is quite significant. The involuntary functions are vital for a good functional level and it was assumed that the neurocognitive functions are associated with the former. Ninety-four elderly participants, without higher education, were recruited, aged between 60 and 74 years. Five different tests were used: Multilevel personality questionnaires, Montreal Cognitive Assessment Scale, Comorbidity rating system, 10-words Test by Luria, Schulte Tables. The sample was divided in high (55 %), average (22 %) and low (24 %) level of involuntary functions. Montreal Cognitive Assessment Scale showed that 70 % of the participants had normal cognitive functions. Data analysis showed that high level of involuntary functions was positively correlated with cognitive functions ($r = .429$, $p > .05$) and negatively with solving prediction problems ($r = .169$, $p > .05$) and the level of comorbidity ($r = .271$, $p = .05$). In conclusion, the level of involuntary functions is associated with the level of cognitive functions such as memory and decision-making. Also, high cognitive functions are negatively associated with comorbidity.

The research of Marina Halpern Chalomon *Identifying Twice Exceptionality* is based on the case study of a gifted child with ADHD. The study defined twice exceptionality as a person that shows immense potential in high achievement in one or two academic spheres connected to one or more disabilities (LD, ADHD, ASD). The study's methodology is as follows: the primary focus of the study is based on an 8-year-old boy facing attentional issues. Multiple assessment tools and scales are used. The Lurian psychomotor and cognitive remediation protocol founded on the Methodology of Compensatory

Development was carried out for 6 months twice a week. A stimulation program was used with a positive behaviour reinforcement in mind. In addition. The program also included self-control exercises. Social skills were trained through cognitive exercises. Marina identified, based on the Lurian theory, that the child faced attention problems related to the 3rd block. The study concludes that with twice exceptionality, intervention strategies should take into account deficits and while taking advantage of the ability and looking to help with emotional development. In the case of the 8-year-old his attentional problems were concealing his gifts.

Master Students from the Psychology Department of Ural Federal University (Hajar Ayed and Hareen Kaur) presented a cross cultural study on the effects of diet and mindful eating on emotional intelligence. The authors looked at two paradigms: the relationship between a diet and emotional intelligence and mindful eating and emotional intelligence among 3 different cultural groups. The study recruited 90 participants (30 Moroccans, 30 Iraqis, and 30 Indians). Questionnaires were used to measure emotional intelligence and mindful eating. The study concluded that mindful eating is positively correlated to emotional intelligence.

Tomsk State University Researchers Alina V. Pustovaya and Evgenia N. Pustovaya presented their findings on the topic of neuropsychological indicators of the level of formation of higher mental functions in children with Autism Spectrum Disorders. The authors emphasized the importance of examining the higher mental functions of children with ASD in the neuropsychological assessment process. The study recruited a total of 49 children aged between 7 to 15 years with ASD diagnosis. The survey covered cognitive, social, neurodynamic and regulatory development. The results indicated that the least formed aspects were in the sphere of social development whereas the most formed ones were in the sphere of motor development.

Another study from Ural Federal University was presented by Ludmila V. Tokarskaya, Anastasia V. Kolchurina, and Valeria V. Lapteva who studied the emotional state of pregnant women. The authors argued that an increase in emotional issues of the pregnant women, such as anxiety, is associated to various social factors. Thus, a detailed analysis of pregnant women's emotional state is paramount to build an effective supportive and preventive program. Forty-three women were recruited from the Yekaterinburg Clinical Perinatal Center during 2017 and they were separated into three groups: first time pregnant, pregnant with miscarriage history, and second or third time pregnant. Data collection was performed using four tools: Test of Relations of a Pregnant Woman by Dobryakov, Self-Assessment of Emotional States by Wessman and Ricks, Self-Estimate by Dembo and Rubinstein, Test of Meaningful Life Orientation by Krambo and Makholikh. Data analysis, via Fisher transformation and Mann-Whitney U-test, found that the second group showed statistically significant higher negative emotions such as anxiety, low self-esteem, low life satisfaction while the first and third groups showed more positive emotions such as happiness, self-confidence and meaning in life.

The Department of Psychology from the University of Social Sciences and Humanities (Warsaw, Poland) presented a poster on the *Effect of News on Optimism Pessimism*

Depression Mood and Self-Esteem by Activating DMN. The author, Emrullah Ecer, investigated the possible association between reading positive/negative news and optimism/pessimism, depressed mood and self-esteem. Reading activates the Default Mode Network which consists of distant parts in the brain linking medial temporal lobe with posterior cingulate cortex/precuneus and anterior cingulate cortex. The participants read positive and negative news and the investigators measured their optimism/pessimism, depressed mood, and self-esteem. They found a connection between reading positive news with optimism, low depressed mood while reading negative news was connected with pessimism, increased depressed mood. No connection was found between the type of news and self-esteem.

Another research was presented by the Laboratory of Neurotechnology and Department of Information Technology from Ural Federal University. It was a study on the reproducibility of foreign words in their memorizing by artificial bilinguals under various visual accompaniment in virtual reality. The authors made the case that nowadays virtual reality finds more use in education which provides an abundant audio-visual environment. These features can improve the reproduction of memorized foreign words. The present study attempted to investigate the role of virtual environment in foreign word memorization and hypothesized that visual aid would be associated with the correct word reproduction. Sixteen people were recruited, 5 of them were from a high educational level while 11 of them were from a low educational level. They were subjected to 45 virtual reality scenes with 3 different types of background (empty, neutral and associative). Word reproduction was measured once after the session and then one day later. Virtual reality system based on a personal computer was used. No difference was found between the amount or reproduced words right after the session and one day later. However, Wilcoxon's test showed a statistically significant difference between reproduced words with blank and associative backgrounds ($p = .042$) and with associative and neutral background ($p = .022$) right after the session. Also, Mann–Whitney *U*-test showed a statistically significant difference between the reproduced words with neutral background right after the session by the high and low educational level group. Thus, the proposed hypothesis was confirmed regarding the role of visual aid in word memorization.

From the of Ibero-American University Puebla, Mexico, María Alejandra Morales González presented a paper on the professional motives in primary school teacher. The author postulated that people's actions are driven by an internal force coming from the motivational sphere which is an important factor in personality development. According to the activity theory by Leontiev the object of psychological analysis is the action, and its elements can be either materialistic/external or psychic/internal. Contemporary researchers have been studying new domains of activity such as professional work. Professional motivation is a hierarchical system of motives driving the educator's teaching activity. The teaching/learning activity is considered to be an active process and needs a connected activity between the teacher and the student. The present qualitative study is to analyze the hierarchy of motives of primary school teacher. The investigators recruited 6 sixth grade students and a teacher. Data collection was performed via semi-structured inter-

views, written narratives and class video recording. The types of motives were divided into cognitive or internal, positive external, neutral external and negative external. Data analysis showed two cases of student's internal positive motivation, similarly with the teacher as he showed a strong calling towards teaching activity, continuous training.

From the University of Economics and Innovation, Poland, Anna Mazur presented her paper on the structure of the relationship between physical activity and psychosocial functioning of women and men during the COVID-19 epidemic in Poland. The author highlighted the importance of conducting empirical research aimed at identifying risk and protective factors in the affected population as the COVID-19 pandemic is becoming a serious problem all over the world. The goal of the present study is to determine the relationship between physical activity, mental health, cognitive and social functioning. Four-hundred-fifty-two Polish men and women were recruited, aged between 18 and 65 years. Four different tools were used for data collection: Physical Activity Questionnaire, General Heath Questionnaire-28, Attention and Perceptiveness Scale, Social Functioning Scale. Data analysis showed that individualized physical activity may be an important factor for the psychosocial support of people affected by the novel coronavirus.

The organizers received a lot of positive feedback about the event. Most of the participants and students of the II Summer School expressed their readiness to take part in this project next year and suggested using a mixed (modern full-time and remote work format) to expand the geography and increase the availability of modern scientific knowledge. The annual conference held in Ekaterinburg has become an event that in many ways embedded itself within the scientific community here in the Urals and Internationally! The forum provides an opportunity for both novice and expert researchers to communicate and develop network. It creates a platform to exchange ideas and boost scientific discourse in different areas and fields. We hope to see this tradition continue as we look forward to the 2021 forum by Ural Federal University.

Special Circumstances

The full text of the materials is presented:

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