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# PROCEEDINGS OF SCIENCE SCHOOL: 2nd INTERNATIONAL NEUROPSYCHOLOGICAL SUMMER SCHOOL NAMED AFTER A. R. LURIA "THE WORLD AFTER THE PANDEMIC: CHALLENGES AND PROSPECTS FOR NEUROSCIENCE"

August 20–22, 2020

MINISTRY OF SCIENCE AND HIGHER EDUCATION
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URAL FEDERAL UNIVERSITY
NAMED AFTER THE FIRST PRESIDENT OF RUSSIA B. N. YELTSIN

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The Proceedings of the Second Summer International Neuropsychological School n. a. A. R. Luria (20–22 August 2020) cover a wide range of issues related to the development of neuropsychology in the modern world. This international collection presents papers from specialists from 47 countries and includes the results of fundamental and practice-oriented research: an overview of practical technologies in the field of neuropsychological care for children with disabilities; development of the cultural-historical approach introduced by A. R. Luria and L. S. Vygotsky; studies in the field of neurolinguistics and the development of brain resources. Moreover, this volume reviews the current research on the possible negative impacts of SARS-CoV-2 infection on the cognitive and neurological functions of recovered people.

This book will be of interest to neuropsychologists, neurologists, psychologists and other specialists in the field of cognitive neurosciences.

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# Section 1
# HELPING CHILDREN WITH DEVELOPMENTAL DISABILITIES

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## Remediation in ADHD

*Abstract.* This paper discusses techniques of remediation used in a practical study case of an ADHD child. The major focus of this process is to enhance the development of underdeveloped functions and its main objective is to create, together with the patient, effective work methods, which would be meaningful to the child and would a part of his or her experiences in life.

The paper considers the case of a 7-year-old boy suspected of having ADHD and provides his pre- and post-neuropsychological evaluation data. The 6-month intervention process brought some significant results as the evaluation showed the development of several superior mental functions and the initial hypothesis of ADHD was refuted. Thus, the remediation process which involved an adult that respected the level of the child's development and included meaningful activities within an affective impact enhanced the child's development.

*Keywords:* neuropsychology, ADHD, remediation process, children.

*Introduction.* ADHD is a developmental condition which occurs very frequently in many people in the world. Attention difficulties mean that

 

people find it hard to concentrate and may vary from minimal difficulties to a disorder called attention deficit/hyperactivity disorder (ADHD). Solovieva and Rojas [1] argue that ADHD is one of the developmental syndromes most frequently detected at the preschool age. As Luria saw it [2], both evaluation and remediation are a part of the same process because during the evaluation, which is performed in the form of a diagnostic interview, the patient already reveals his or her strong and weak components. Evaluation and remediation are fundamental for treating children with learning disabilities in general, but especially for children with ADHD. The main goal of remediation is to engage, together with the patient, in creative work involving meaningful mediation elements [3].

*Materials and methods.* This paper discusses a practical ADHD study case in which the process of remediation was used as an intervention to enhance underdeveloped functions. Our study case is a 6-year-old boy, a first grade student of a private school in São Paulo, Brazil. He went through the whole evaluation and remediation process, which included pre- and post-neuropsychological evaluation and 6 months of weekly remediation. Both stages of the evaluation used the following neuropsychological tests that are commonly accepted in Brazil: NEPSY-II, WISC–IV, Hooper Visual Organization Test, RAVLT, ADHD questionnaire — SNAP and Complex Rey Figure. As a result of the pre-test, ADHD was suspected — this diagnosis had to be confirmed by a future medical assessment. The child passed through a 6-month remediation process with the sessions that initially were conducted twice a week and at a later stage, once a week. During the remediation sessions, we used a lot of motor and cognitive exercises. The protocol was established to attend to the client's needs and develop the following functions: voluntary attention, control, interhemispheric interactions, spatial mechanisms, auditory and visual memory and language disorders. We went twice to the school, at the beginning and end of the semester, together with his parents and speech therapist to talk to the teacher and coordinator to set goals for joint work of parents, school faculty and therapists. At the end of the semester, a post-test was conducted to evaluate the child's results and the development of all superior mental functions.

*Results.* The post-evaluation showed that the child's IQ and processing speed had increased while his attention deficit had decreased significantly.

He developed several functions, but he still needs to work on enhancing the following functions: executive function, visual synthesis, language and fine motor. Therefore, he continues attending his remediation sessions and speech therapy sessions. The remediation now focuses mainly on executive functions, helping him to deal with the control of his impulsivity as well as his planning skills.

*Conclusion.* The remediation process, as an alternative to traditional medication, is very helpful in ADHD cases. Remediation should be seen not as correction but as creation and it is never too early or too late to start a remediation process with a child diagnosed with ADHD [4]. Remediation is a highly individualized process which addresses specific impaired functions and it proved to be very successful to develop weak components of the child's mental functions based on those strong components that are preserved.

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## Lurian neuropsychological assessment at an early age

*Abstract.* The paper discusses the theoretical foundations and methods of neuropsychological assessment of 2–6-year-old preschool children and describes the potential and advantages of Luria's battery for revealing child underdevelopment or abnormal development.

*Keywords:* neuropsychological assessment; preschool children; Luria's battery; scoring.

*Introduction.* **A. R. Luria, L. S. Vygotsky and developmental neuropsychology**

L. S. Vygotsky and A. R. Luria revealed "a bifurcation in the course of a child's behavioral development into natural-psychological and cultural-psychological development" [1, p. 30]. They have proved that a defect interferes with a child's appropriation of the culture, but cultural means can be used to help the child overcome the defect. Thus, the cultural-historical approach has become a methodological basis for remediating education and developmental neuropsychology in general.

Lurian qualitative approach, that is, the qualitative analysis of different types of errors made by a child during the neuropsychological assessment and their possible correction, identifies a whole range of defects, depending on the maturity of the tested function, the zone of its proximal development as well as the state of various components in the structure of the specific mental function and other functions with common components**.**

**The main goals of the child neuropsychological assessment**

Lurian neuropsychological analysis differentiates between learning and behavior problems caused by the lack of maturation and/or individual features of brain structures caused by the maladjustment associated with poor teaching methods or pathological features of the child's personality.

Not only can a disease provoke certain biological processes that would hinder the child's development, but it may also interfere with the psycholog-

ical and social development such as personality formation, acquiring new knowledge and mastering new skills. On the other hand, a poor or belated psychological or educational action may also cause developmental delays in children or deviations in the development of their functional systems.

The up-to-date Lurian neuropsychological analysis is a poly-causal analysis aimed to determine how different biological and social causes of dysontogenesis interact and determine the type of abnormal development in each child

**Why is it important to assess preschoolers?**

Assessment of preschoolers helps reveal delayed mental functions and determine their possible impact on child learning; prevent the learning disability at school or kindergarten and its emotional consequences.

Neuropsychological assessment of preschoolers is very likely to identify the risk of possible future learning problems. Such children need a neuropsychological follow-up and dynamic evaluation of their functional state. In addition, the qualitative description of differentiated features, strengths and weaknesses in mental functioning of each particular child is essential for helping these children overcome their developmental and learning problems.

**Age differences in the neuropsychological assessment of preschoolers**

The testing material must meet the following criteria:

- It should be accessible for each age group,
- It should be familiar to each age group,
- It should attract attention and incite interest,
- It should use diverse methods and materials for each age group,
- The younger is the child, the higher is the rate of game analogies of neuropsychological tests, observations and parents interview.
- At any age, both the test or its game analogies must follow Luria's principle of polymodality — to give information about different mental functions [2].

**How to prevent exhaustibility and deal with the problem of low concentration and attention stability at a preschool age?**

- To give the child *an option to switch* to another activity after about 10–20 minutes of testing;
- To select the most informative and time-saving techniques to ensure the *compactness of methods*;

- To use *diverse tasks*;
- To present each pair of stimuli separately to *limit the volume of visual perception;*
- To subdivide the instruction in two parts to *limit the volume of acoustic perception;*
- To organize a *situation of competition to boost the child's motivation* for testing;
- To use *game-based tasks* (games are particularly important at a preschool age) [3, 4].

*Conclusions*

- Pediatric neuropsychology is a young but rapidly developing science.
- Lurian approach to neuropsychological assessment of children means a shift from the phenomenological description of the observed defects in mental functioning to revealing their mechanisms and organizing the assessment in such a way to allow the child to compensate for his or her difficulties. This is done through dialogue interaction and consecutive transfer from implementation of the test together with the neuropsychologist to an independent one.
- A neuropsychological survey should not create "a negative picture of the child" [5] but to identify the strengths of his or her mental functioning and the potential for its development.
- It is necessary to understand and overcome the impediments to the child's life in harmony and agreement with his or her environment.

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# Identifying twice-exceptionality — a case study of a gifted child with ADHD

*Abstract.* The article focuses on a case study of a gifted child with ADHD to illustrate the condition of twice-exceptionality — an association between giftedness and disability. This case study aims to shed light on this condition, and to highlight the importance of identifying and considering both exceptionalities in a remediation program.

*Keywords*: twice-exceptionality, high ability, attention deficit disorder, remediation, gifted.

Twice-exceptional people are those that have high cognitive abilities such as the potential for high achievement in one or more academic domains together with one or more disabilities, such as autism spectrum disorder (ASD), attention deficit/hyperactivity disorder (ADHD), a learning disability and so on [1]. It is important to identify both the child's high ability and disability, as usually one is more apparent than the other and each one plays a role in the treatment. This study focuses on the treatment of an 8-year-old boy, who was evaluated through a neuropsychological assessment, and the results of the proposed treatment.

The assessment consists of an interview with parents and school teachers and quantitative tests as WISC–IV; Raven Test; Five-Digit Test; Rey Complex Figures Test; attentional tests; Social Abilities, Behavior Problems and Academic Achievement Inventory for Child (SSRS); and SNAP-IV Rating scale.

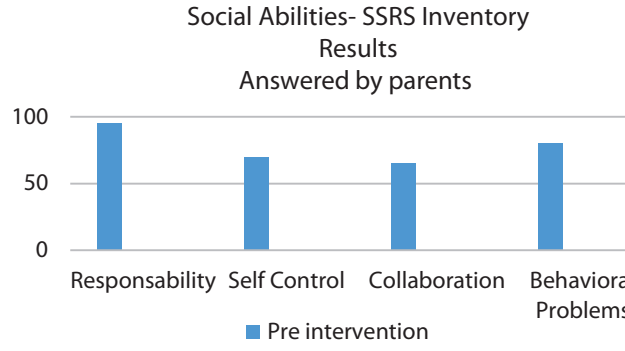
The subject was an 8-year-old adopted boy, born with syphilis from drug using parents. He was left in an orphanage when he was 2 months old where he received treatment for the disease and recovered. At the age of 1, the child was adopted by a wealthy family, received love and care. His skills were well developed, except for the language skills. After sessions with a speech therapist, which he started at the age of 3.5 and finished

at 5, his language skills significantly improved. When the boy was 7, the school suggested evaluation as he was having concentration and organization problems as well as some social issues. At that time, the parents said that he always forgot things, was disorganized, and was frequently disconnected from other people, staying in "his own dreamland", as they used to say. On the other hand, he was very good at drawing, had highly developed logical thinking skills and memory.

The results indicated that he had attention problems related to the 3rd block of Lurian theory [2, 3] as well as highly developed skills in perceptual organization, indicating high abilities (Wisc-IV, IOP 134, 99 %, which means better results than 99 % of his peers on perceptual organization skills); high development of language skills (92 %); above average results on working memory (84 %) and average results on processing speed (42 %). His Wisc-IV IQ was 125, 95 %, probably downgraded by his attention problems. The inventory filled by the parents indicated that he showed more problems than average: deficits on responsibility (95 %) and self-control behaviors (70 %), the lack of collaboration in daily activities such as good time management (65 %), and emotional problems such as self-esteem issues (80 %).

Although the parents were aware of his learning abilities, they were also concerned about his regular attention problems. The child constantly felt repressed by his faults. Although he could memorize events easily, at times he also struggled with forgetfulness, which suggested the interference of his deficits on his performance. In the case twice-exceptional people, the gift may mask the child's disabilities, or the disabilities may



mask their gifts. In the case in question, the boy's attention difficulties with regulating and monitoring his activities, his executive problems, were masking his gifts. He struggled to pay attention in class or to complete his assignments. He used to play by himself and was constantly distracted by his own hands or thinking.

To treat this patient, we chose the Lurian psychomotor and cognitive remediation protocol [3] based on the Basic Method of Compensatory Development, learned with Irina Shevchenko. The sessions were conducted twice a week for 6 months. We developed a stimulation program based on neurodynamic, control functions and interhemispheric interaction and used positive reinforcement to improve behavior. During the therapy, the boy had no difficulty understanding the instruction and was attentive when learning new exercises. Having an amazing memory, he could remember long sequences of movements from one session to another. When familiar with the exercises, he tended to lose focus, taking time to switch between the movements, sometimes shaking or dancing between the exercises. During the program, inhibition, complex and self-control exercises were always part of the sessions. In order to boost his self-esteem, we made a point of highlighting his abilities and facilities. Meanwhile, his social skills were addressed through cognitive exercises and through the relationship established with the therapist. Dancing and shaking between the exercises were discouraged and temporal challenges and strategies that included rhythm activities were added as an encouragement. After 6 months of intervention, the parents observed that he did not go daydreaming anymore, participated in conversations, asked questions about the current events, paid attention to classes and completed more tasks on time. He was also more adequate in social interactions. The therapeutic work is still in progress and the boy's rhythm in performing some tasks still needs to be better developed despite the great progress he has already made.

ADHD tends to decrease children's results on neuropsychological cognitive tests. When facing a case of twice exceptionality, the intervention should face the deficit while taking advantage and valuing the ability, aiming the habilitation and the emotional development. Giftedness tends to facilitate a child's progress in a habilitation program. It is important to evaluate and identify if the high ability is associated

with a disability and to address both of them properly, to achieve better and faster results.

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# Applying principles of Luria's theory to the fetal stage and integration of psycho-physiological mechanisms to optimize adaptive behavior

*Abstract.* Luria proposed that the brain is organized hierarchically and according to functional units. The functional units provide a basis of integrated experience and behavior that becomes fractionated in various psychological and behavioral disorders. Emerging research suggests that the fundamental organization of brain networks and functional connections are established in utero during the second and third trimesters of fetal development. This paper discusses the value of studying emerging fetal organization within the framework of Luria's theory. In addition, it will expand Luria's theory in emphasizing the integration of physiological and psychological mechanisms across the life-span, with the aim of developing more individualized assessment and intervention tools.

*Keywords:* Life-span development, physiology, fetal brain development, Luria.

**Introduction**. We propose an integrated model of optimal development comprising the physiological, psychological, and neurological/neuropsychological mechanisms associated with pathology that encompasses an intersection of the autonomic nervous system (ANS), central nervous system (CNS), immune system, and hypothalamic-pituitary-adrenal (HPA) axis. Luria proposes that the brain functions as a complex network of regions that communicate with each other, known as the functional connectome [1]. Our model extends Luria's principals by including physiological components in this network that

impact brain development and behavior. We will discuss applying this model in neuropsychological practice, from the fetal stage of development to adulthood. Heart Rate Variability (HRV) Biofeedback is an intervention that guides an individual's breathing patterns with the benefit of increasing heart rate variability to optimize physiological homeostasis [2]. The paper discusses the use of HRV biofeedback in two main areas; fetal development and psychotherapy. Data from an experimental procedure on maternal-fetal dyads and a psychotherapy case study will be used to highlight the use of the HRV Biofeedback protocol and provide evidence for including physiological assessments and intervention, when exploring brain-behavior relationships.

*Materials and methods.* **HRV Biofeedback.** The ANS power spectrum provides an indication of activation of ANS components. A single sharp peak around 0.1 Hz was used as an indicator of baroreceptor activation and evidence for "training" the ANS system to respond optimally to stimuli.

***Fetal.*** Thirty-three maternal-fetal dyads participated in a HRV Biofeedback session. Fetal CNS/ANS developmental indicators (fetal movement and HR), maternal psychological (self-reported), maternal HPA axis (cortisol), and maternal ANS (HRV) indices were analyzed pre, during, and post-biofeedback intervention. The current lecture will focus on fetal movement indices.

***Psychotherapy.*** The case study outlines a psychotherapy client diagnosed with Prader Willi and Autism Spectrum Disorder. Treatment included HRV Biofeedback in addition to "traditional" psychotherapy. Behavioral and physiological (ANS) measures were tracked across 13 sessions.

*Results.* **Fetal.** Preliminary data analyses reveal that maternal HRV biofeedback is associated with shifts in fetal movement, both decreased and increased fetal movement, when compared to a baseline period with fetal movement decrease reaching statistical significance. The data suggests that overall more fetuses fell into the "fetal movement decrease" group compared to the "fetal movement increase group."

**Psychotherapy.** Analysis of case study data reveals a parallel improvement in behavioral responding (parent and patient reports as well as behavioral observations during sessions) and ANS functioning (peak

around 0.1 Hz) across the sessions. By session 13, the patient described situations in which he was able to control impulsive behaviors; situations that previously resulted in a loss of control. In addition, the patient demonstrated an improved ANS response under conditions of biofeedback training from session 1 to 13.

*Conclusion.* Our findings provide preliminary evidence for the use of HRV Biofeedback to stimulate fetal neuro-motor pathways. The variability noted between fetuses under conditions of biofeedback suggests that individual differences are present early in development and necessitates further investigation.

The theory underlying the use of maternal HRV biofeedback to modulate fetal movement stemmed from the research on maternal-fetal synchrony. The goal was to stimulate the fetal neuro-motor pathways with the underlying premise of increasing the range of neurobehavioral responding. Changes in fetal general movements are sub-served by the cortical subplate, and connections to the brain stem, thalamus, and cortex via corticospinal and thalamocortical tracts. The development of fetal movements parallels fetal brain development. Fetal brain development is characterized by the interaction between transient and permanent neural structures throughout the fetal gestational period. Sensory stimulation is crucial in shaping cerebral structures and functional connections instigated by genetic factors. One of the key indices of a healthy developing nervous system is "response to stimulus" and assessment of fetal general movement provides insight into fetal development.

Findings from the psychotherapy case study provides impetus to integrate physiological and behavioral tools in mental health treatment. The correlation between physiological indices and "real-world" adaptive behavioral changes supports an integrated model of optimal functioning. Particularly in individuals with altered cognitive capacities, targeting physiological mechanisms provide an alternate route to modifying behavior as compared to "traditional" psychotherapies. Luria's emphasis on the use of "structural units" in a "functional system" [3] can be utilized with increased emphasis on the integration of physiological and psychological "units" to optimize adaptive behaviors from the fetal stage of development through to the adult.

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# Neuroscience and inclusive education: a teacher training program

*Abstract.* Inclusion is a relevant public policy for education. Nonetheless, the evaluation of its effectiveness still needs further investigation. The existing research literature shows the importance of teachers as a vital agent in this process. In the context of continuing teacher education, the theme of inclusion is often left outside of scholarly attention. This study aims to outline teacher training for inclusive education, especially regarding the inclusion of students with neurodevelopmental disorders. The survey covered 50 kindergarten and elementary private school teachers. Following the intervention, the teachers' spontaneous reports demonstrate a change in their perception of students with disabilities. Further investigation is required to systematize the methodology and results of this survey.

*Keywords:* inclusive education, teacher training, neuroscience, students with disabilities.

*Introduction.* Inclusion is an important public policy aimed to promote equity in education for students with disabilities or neurodevelopmental disorders. Studies have been conducted concerning the effectiveness of inclusive education, however, the multiplicity of factors such as the use of different terms, teaching methods, and characteristics of each institution interfere in the analysis of these results [1]. Teachers' perception of students with disabilities can positively impact on the former's expectations and attitudes towards inclusive education [2]. Literature suggests the need for a practical and theoretical teacher training for inclusive education [3]. This study aims to depict such a training program, taking into consideration the concepts of neurodevelopmental disorders, neuroscience, and functionality.

*Materials and methods.* Fifty teachers from two private kindergarten and elementary schools took part in this study. These institutions have been receiving students with disabilities but had no specific educational plan for them until that moment. The training lasted 16 hours and was conducted in the form of group sessions coordinated by a neuropsychologist. The training comprised two phases: first, dialogic classes concerning concepts of the neuroscience of learning, neurodevelopmental disorders, and the referential of functioning as described by the World Health Organization (2001) [4] and, second, practical activities linking the abovementioned concepts with the teachers' personal experience and the development of an adapted curriculum suitable for students with disabilities.

*Results.* At the beginning of the program, the teachers admitted having difficulties in designing a specific proposal for students with disabilities and tended to underestimate such students' learning skills. In the final sessions, the participants started to describe strategies that they had used considering the new knowledge they had acquired during the training. One of the strategies consisted of adapted learning assessments using the following specifications: short and direct questions and commands, keywords highlighted in texts, and focusing only on the most important learning content. Another strategy employed refers to interventions in classes to engage all students in the activities, including students with disabilities. After the application of these strategies, the teachers reported better formal assessment results and improved student motivation. Furthermore, the educators perceived themselves as better prepared for identifying learning difficulties that require specialist evaluation.

*Conclusion.* These results suggest that instruction about neurodevelopmental disorders, neuroscience, and functioning and provision of relevant methodological support can improve teachers' perceptions of students with disabilities and, consequently, improve these students' academic performance. Further studies in this field could systematize the teacher training methodology and include measurements of pre- and post-training results to provide more evidence of the factors involved in this intervention.

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# Neuropsychological indicators of the level of formation of higher mental functions in children with autism spectrum disorders

*Abstract:* This article presents the results of neuropsychological diagnostics of a group of children with autism spectrum disorders.

*Keywords:* autism spectrum disorders, neuropsychology, neuropsychological diagnostics, higher mental functions.

*Introduction.* The relevance of the study is associated with the increase in the registration of cases of autistic disorders among the child population. According to the World Health Organization, as of November 2019, one child out of 160 has an autistic spectrum disorder (ASD) [1]. Thus, our research focuses on neuropsychological indicators of the level of formation of higher mental functions in children with ASD.

According to the 10th Revision (ICD-10) of the International Statistical Classification of Diseases and Related Health Problems, autistic disorders are general developmental disorders and represent a group of disorders characterized by qualitative deviations in social interactions and indicators of sociability as well as a limited, stereotypical, repetitive set of interests and actions [2]. The neuropsychological approach to the problem of autism is aimed at understanding the connection between the functioning of the brain of autistic children with mental processes, cognitive activity, behavior, and speech. Finding the level of formation of higher mental functions in children with ASD is one of the most important stages of neuropsychological examination. Based on the identified developmental disorders, specialists can choose the most effective rehabilitation route.

*Materials and methods.* For the study, a group of 49 children (13 girls and 36 boys) aged 7–15 with ASD (diagnoses according to ICD-10: F84.0, F84.1, F84.5) was selected. Neuropsychological examination of these children was performed by using the method of neuropsychological diagnostics of J. M. Glozman et al. [3, 4], which includes assessment of social, cognitive, motor, neurodynamic and regulatory development. Neuropsychological examination of children includes the following: establishing contact with the child; the stage of examination, which takes place at the table and, if necessary, involves various game test tasks (in cases when the child is allowed to sit at the table for the prescribed age, you can continue the examination while standing at the table); a pause for rest if the child shows signs of fatigue; final conversation aimed at raising parents ' awareness of the child's problems and their causes (by joint analysis of the questionnaire filled in by parents) and probabilistic forecasts of the child's development [1, 2]. Mathematical data processing was performed using ANOVA.

*Results.* The children showed differences in the level of formation of higher mental functions in accordance with clinical diagnoses. For children diagnosed with F84.0, the most problematic areas are cognitive ($F = 2.7$, $p < 0.01$) and neurodynamic and regulatory development ($F = 4.7$, $p < 0.01$). For children with a diagnosis of F84.1, the most problematic is the sphere of motor development ($F = 07$, $p < 0.01$). For those with a diagnosis of F84.5, the most problematic is the sphere of social development ($F = 0.4$, $p < 0.01$). The problem area for all groups of children is speech development, in particular, many children cannot master speech as a means of communication or use speech as a means of meeting their needs.

*Conclusion.* For the surveyed group of children, the least formed tends to be the sphere of social development ($F = 9.07$, $p < 0.01$), which is one of the main characteristics of the manifestation of autistic disorders. The most formed is the sphere of motor development ($F = 11.04$, $p<0.01$). It is worth noting the main difficulties encountered during the neuropsychological examination of children with autism spectrum disorders: (1) holding the working position throughout the entire period of the diagnostic examination; (2) difficulties in dialogue due to the fact that many children cannot master speech as a means of communication

or use speech as a means of meeting their needs, (3) isolated hysterical manifestations and symptoms of negativism and impulsivity.

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## Qualitative neuropsychological assessment of children

*Abstract.* Qualitative assessment is an essential method of clinical neuropsychology. According to conceptual bases of historical and cultural neuropsychology, qualitative assessment should include analysis of the neuropsychological syndrome in each particular case. The paper presents the method for qualitative neuropsychological assessment created for children in Mexico for Spanish-speaking population aged 5–12 with the help of the Scheme for "Brief Neuropsychological Assessment for Children". The structure and the ways for analysis of clinical data are included. The conclusions mention the possible applications of this instrument.

*Keywords:* neuropsychological assessment, child neuropsychology, qualitative approach, brain mechanisms, Luria's approach.

*Introduction*. From the point of view of the qualitative clinical approach in neuropsychology, consideration of complex systems as a basis of brain functional representation of a psychological process is one of the key methodological principles [1, 2]. Historical-cultural neuropsychology offers functional analysis of brain mechanisms, which might help to determine the clinical features of syndrome in children of preschool and school age. Instead of traditional psychometrical interpretation of difficulties, qualitative analysis of brain cortical and subcortical mechanisms permits us to characterize the syndrome as a whole and not as isolated quantification of cognitive processes. Such information can be obtained through qualitative analysis of errors and particular features observed during the implementation of neuropsychological assessment [3, 4]. In order to evaluate the functional state of brain mechanisms, neuropsychological qualitative analysis frequently includes tasks for evaluation of programming and control, phonemic and kinesthetic integration, motor sequential organization, spatial functions of synthesis and

analyses and retention in different modalities and the phone of cortical non-specific activation. Different methods and levels of analysis might be useful for neuropsychological qualitative assessment. Specific tasks and items should be created and tested according to specific cultural and linguistic features of each population.

*Materials and methods.* Neuropsychological assessment was accomplished according to Luria's theory and its later development in modern child neuropsychology [3, 4]. Special instruments were developed for Spanish-speaking child population aged 5–12 [5]. The Scheme of Brief Neuropsychological Assessment for children includes special tasks for the following neuropsychological aspects (brain mechanisms related to three functional blocks according to Luria's proposal): the first functional block related to general brain cognitive and emotional activation and subcortical structures; the second functional block related to processing and conservation of information of various modalities and to cortical posterior zones; and the third functional block related to programming and control and to anterior cortical zones (anterior zones).

The objective of our Scheme for Neuropsychological Assessment is to determine a positive or negative state during action fulfillment of neuropsychological mechanisms as functional elements during execution of actions by children.

The structure of the Scheme for Assessment includes the following parts and items:

1) Kinesthetic analysis and synthesis — the 2nd functional block (tactile recognition of common objects; repetition of syllables with close articulations; poses of fingers; reproduction of poses of fingers with closed eyes);

2) Phonemic analysis and synthesis — the 2nd functional block (repetition of words with opposite phonemes; repetition of syllables with opposite phonemes; identification of opposite sounds in series);

3) Motor sequential organization of actions and movements — the 3rd functional block (alternate coordination of hands; alternate coordination of fingers; copy and continuation of a graphic sequence);

4) Spatial analyses and synthesis — the 2nd functional block (copy of a house; free drawing of girl and boy; comprehension of complex grammatical structures);

5) Visuo-verbal retention — the 2nd functional block (copy and evocation of letters; copy and evocation of complex figures);

6) Audio-verbal retention — the 2nd functional block (direct repetition of series of words and sentences; involuntary, voluntary and retarded evocation of series of words and sentences);

7) Programming and control — the 3rd functional block (verbal selective instructions presented as a game in situation with a conflict);

8) General brain tonic activation — the 1st functional block (general observation of the whole procedure of execution of all tasks; task of marking of the same word with lines in a short verbal text).

The qualitative analyses of the types of mistakes made by children during the task fulfillment, observations of the whole procedure of test application and of children's behavior enable us to show the functional positive or negative state of the above-mentioned brain mechanisms in children of pre-school and school age. The Scheme might be applied in individual sessions lasting 40–60 min. The same task may be significant not only for one but for various functional mechanisms. The objective of qualification of criteria of errors consists in finding the relation between the types of errors and features of positive or negative functioning of each brain mechanism and qualitatively compare the difficulties and success during the execution of these tasks.

*Conclusion.* We are convinced that neurological, psychiatric and psychometric assessment may not substitute qualitative neuropsychological assessment in cases of developmental difficulties and learning disabilities. The objectives of quantitative and qualitative clinic differ essentially and the psychometric approach alone in cases of attention doesn't provide the necessary information for clinical judgement from the neuropsychological point of view. For a neuropsychological analysis of a syndrome within A. R. Luria's neuropsychological tradition, weak functional mechanisms should be established as a result of analysis of errors according to the qualitative criteria. Specific errors and difficulties should be found and systematized according to their relation to each brain unit and mechanism. Such way of reasoning helps to understand the cause of difficulties, provide recommendations and create a correction program which will enhance the psychological development of a child.

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Section 2
# BRAIN RESOURCES IN A CHANGING WORLD

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## Neurocognitive functions as an indicator of subjective adaptation to involutionary processes

*Abstract.* This neuropsychological study focuses on cognitive correlates of a successful process of adaptation to involutional processes. We examined 94 elderly people without pronounced cognitive impairments. It was shown that adaptation positively correlates with cognitive functions and negatively with comorbidity; the most significant predictors of successful adaptation to involutional processes are semantic memory and the rate of anticipatory processes.

*Keywords:* adaptation, gerontology, gerontopsychology, cognitive functions, late age, neuropsychology.

*Introduction.* In our study, we define normal aging as a set of cognitive, motivational, and characterological factors that ensure satisfaction and adaptability in old age. We assume that the neuropsychological factor serves as a marker for successful adaptation to involutional processes that allows an elderly person to function at a high level, even in case of somatic health problems. Stern Research, 2009; Vance et al., 2012 show that successful adaptation is associated with a better use of compensatory

mechanisms of the neuronal substrate of the psyche and more developed neuroplasticity [1].

*Materials and methods.* The empirical research processes involved elderly people aged 60–74; 47 % were men and 53 %, women. The sample consisted of 94 people without a university degree. For our study, it was important that all its participants were members of clubs for the elderly and, therefore, were involved in some form of social activity.

The study used the following techniques:

1. Multilevel personality questionnaire "Adaptability" (MLO-AM) by AG Maklakov and SV Chermyanin;

2. Montreal Cognitive Assessment Scale (MoCa);

3. Comorbidity rating system CIRS-G (Cumulative Geriatrics Rating Scale);

4. A battery of neuropsychological tests (Balashova, Kovyazina, 2009)

Other methods include A. R. Luria's methods of memorizing 10 words, Schulte tables for assessing voluntary attention, and anticipation diagnostic technique. The latter method consists of a standardized set of 16 diagnostic cards depicting a situation, whose outcome must be predicted by the subjects (Rodionova, Abdulmanova, 2016).

*Results*. The sample comprises 3 groups: with a high or normal level of adaptation of 55 % (52 people), an average level of adaptation of 22 % (20 people) and a low level of adaptation of 24 % (22 people). All levels have their own vulnerabilities in the context of adaptation to new social positions.

Analysis of the data obtained by applying the Montreal scale for assessing cognitive functions showed that 70 % (66) of the subjects had normal cognitive functions. Subjects whose results do not correspond to the norm are 30 % (28).

Adaptation correlates positively with cognitive functions ($r = 0.429$, $p > 0.05$). The better is adaptation, the better is the cognitive ability.

Analyzing the correlations of adaptability with the help of higher mental functions, we found that adaptability is positively associated with semantic memory ($r = 0.252$, $p > 0.05$), and negatively associated with the time of solving prediction problems ($r = –0.169$, $p > 0, 05$).

No significant differences in the levels of adaptation between males and females were found, and the tendencies persist. These results are statistically confirmed by the Mann-Whitney test.

Adaptation correlates negatively with the level of comorbidity ($r = -0.271$, $p > 0.05$). The better a person adapts, the lower is the level of comorbidity. It was also revealed that the higher the cognitive abilities of a person, the lower the level of comorbidity ($r = -0.350$, $p > 0.05$).

Analysis of the data obtained using the CIRS-G comorbidity assessment system revealed that the minimum level of comorbidity or its absence is 7 %. The average level of comorbidity among elderly people is 18 %. 75 % of elderly people have diseases with a common pathogenetic mechanism, which determines a high level of comorbidity.

*Conclusion.* Older people whose cognitive abilities are normal had a high and moderate level of adaptation to involutionary processes. A high level of adaptability at an old age depends to a certain extent on the ability to remember and reproduce memories about the most important and significant events, phenomena, relationships of objects. It also depends on the neurodynamic component of the ability to predict, anticipate events and make appropriate decisions at a high speed. The better are a person's cognitive abilities, the lower is the level of comorbidity.

In the group of elderly people whose cognitive abilities do not correspond to the norm, the average level of adaptation prevails (22 %). The subjects have behavioural features that are partially compensated under usual conditions and can become more pronounced when changing activities. Therefore, the success of adaptation depends on the external environment. These individuals, as a rule, have low emotional stability.

In the group with low adaptation to involutional processes (24 %), we observed a decrease in cognitive functions. This group is characterized by low parameters of semantic memory and a low rate of anticipatory processes. Such people cannot make decisions quickly, poorly plan their activities and have difficulties making plans for the future. This may involve neuropsychic breakdowns, long-term functional disorders. People in this group have low neuropsychic stability, they are conflicted, can commit delinquent acts, often adhere to a lifestyle untypical of their age.

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# The problem of identifying cognitive and emotional factors of academic success in an online course*

*Abstract:* We studied the psychological factors associated with the efficiency of online learning by using a sample of students from a Russian university (Ural Federal University). We used as a point of departure the idea of adaptive learning, which assumes that academic success in an online course is associated with the characteristics of cognitive, emotional, volitional and other areas of a student's personality. The resulting general linear model includes such factors as internal motivation, external motivation, intelligence, personal qualities, training experience and openness to experience, which have an extremely low proportion of explained variance — 3 %. Based on the above research, the key conclusion was made that a successful student is successful in any training format. In other words, the focus of search for improving the efficiency of online learning should be not only on the psychological characteristics of those students who are successful in the online format, but also on improving the pedagogical design of the online course.

*Keywords:* Mass online courses (MOOK), Internet-course, adaptive learning, individual educational trajectory, psychological characteristics of students

*Introduction.* The massive shift to remote forms of learning due to the coronavirus pandemic has put into the spotlight the quality and effectiveness of online educational programs. In comparison with face-to-face training, an online course has a number of peculiarities and it

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requires students to have special psychological competencies. In our study, we use as a point of departure the concept of adaptive learning [1]. The research literature describes several ways to adapt online courses in terms of organization and methodology by taking into account the psychological characteristics of students. To date, a number of studies have been conducted to identify the relationship between academic success and psychological characteristics of online course participants. However, the connection between students' psychological characteristics and their willingness to study online is still not quite clear. There is evidence that an important role in this process is played by the cognitive and emotional factors [2].

*Materials and methods.* Our research relies on the following methods: the Scale of Progressive Matrices of J. Raven, the Big Five questionnaire and its modification, the Scale of Academic Motivation of T. O. Gordeeva, E. N. Osina, O. A. Sycheva, The Scale of Self-Control of T. O. Gordeeva, the Test Questionnaire of Self-Organization of Activity (OSD) adapted by E. Yu Mandrikova, Diagnostics of the Volume and Accuracy of Short-Term Verbal and Logical Memory in R. Amthauer's interpretations; diagnostics of the volume, switchability and distribution of attention of the "Schulte-Gorbov Table"; and diagnostics of the dominant perceptual modality (S. Efremtseva). At the pilot stage, a questionnaire survey was conducted to find out the views of students and faculty about the prospects for the development of online learning format. The following methods of mathematical statistics were used: correlation analysis (Pearson's method), comparative analysis (student's t-test), factor analysis by the principal component method, and a general linear model. The study, which covered a total of 860 respondents, was conducted over three years in several stages. At each stage we adjusted the hypotheses and methodology, depending on the results obtained.

*Results.* Based on the results of data processing, a general linear model was obtained, which included psychological predictors of successful learning in an online course. However, the proportion of explained variance is only 3 %. Despite this modest result, it is mathematically reliable and can be taken into account as indicating the main trends in the manifestation of the mental characteristics of successful and unsuccessful students of online courses. Therefore, exploratory factor analysis has shown that

six factors can be determined (see the table below). The first factor (F1) can be called the internal motivation factor. The second factor (F2) can be defined as an intelligence factor, a classic predictor of learning. High positive loads for the third factor (F3) demonstrate components of external motivation associated with orientation towards public opinion, a sense of duty and guilt about a bad result. The fourth factor (F4) can be defined as personal qualities proper: the tendency to cooperate and agree with other people (benevolence), a strong-willed component of behavior (conscientiousness) as well as emotional sensitivity, anxiety and insecurity. The fifth factor (F5) was the factor of academic experience. Since most learning experience is obtained by respondents in the face-to-face format, those who have attended two or more online courses can be considered experienced. The participants in our sample received fairly high scores on online courses, so we can consider their experience a success. Finally, the sixth factor (F6) can be defined as a factor of openness to experience. All three sensory-perceptual modalities (auditory, visual, and kinesthetic) are included in one factor, which indicates that there is no priority for online learning among them. Openness to experience is a personal trait that integrates and directs all sensory-perceptual modalities. This remarkable psychological factor — "openness to experience" — revealed by the results of psycho-diagnostics of successful online students also confirms the feasibility of innovative technologies in higher education.

*Table*. Factor matrix of predictors of e-learning

| | Factorp 1 | Factorp 2 | Factorp 3 | Factorp 4 | Factorp 5 | Factorp 6 |
|---|---|---|---|---|---|---|
| Age | 0,03 | 0,00 | –0,14 | –0,21 | 0,79 | 0,13 |
| Course | –0,03 | –0,04 | –0,11 | 0,29 | 0,71 | 0,15 |
| Average Score | 0,29 | 0,16 | –0,05 | 0,08 | 0,19 | 0,29 |
| Number of Items | 0,07 | –0,01 | 0,12 | 0,22 | 0,62 | 0,00 |
| Extroversion | 0,08 | –0,21 | –0,02 | 0,42 | –0,26 | 0,42 |
| Benevolence | 0,09 | –0,01 | 0,06 | 0,73 | 0,09 | 0,07 |
| Good faith | –0,06 | –0,01 | 0,01 | 0,68 | 0,16 | 0,14 |

*End of table*

| | Factorp 1 | Factorp 2 | Factorp 3 | Factorp 4 | Factorp 5 | Factorp 6 |
|---|---|---|---|---|---|---|
| Neuroticism | –0,12 | 0,02 | 0,29 | –0,54 | –0,07 | 0,25 |
| Openness to Experience | 0,04 | –0,07 | –0,09 | 0,39 | –0,26 | 0,57 |
| Visual | 0,08 | 0,02 | –0,05 | 0,09 | 0,08 | 0,74 |
| Audial | 0,05 | –0,08 | 0,11 | –0,13 | 0,14 | 0,67 |
| Kinesthetic | 0,21 | –0,04 | 0,14 | –0,10 | 0,18 | 0,57 |
| Cognitive Motivation | 0,83 | 0,10 | –0,35 | 0,02 | –0,01 | 0,02 |
| Motivation Achievements | 0,85 | 0,07 | –0,16 | 0,10 | 0,01 | 0,12 |
| Self-Development Motivation | 0,71 | 0,01 | 0,36 | 0,16 | –0,02 | 0,20 |
| Self-Esteem Motivation | –0,05 | –0,06 | 0,84 | –0,02 | –0,03 | 0,08 |
| Introjected Motivation | –0,11 | –0,02 | 0,82 | 0,07 | –0,08 | 0,09 |
| External Motivation | –0,20 | 0,02 | 0,84 | –0,02 | 0,01 | –0,07 |
| Motivation | 0,82 | 0,06 | –0,27 | –0,07 | 0,05 | 0,12 |
| Self-control | 0,13 | –0,01 | –0,47 | 0,44 | –0,03 | 0,01 |
| Serie A test Ravena | 0,03 | 0,37 | 0,21 | 0,47 | 0,07 | –0,18 |
| Serie B test Ravena | –0,15 | 0,57 | 0,13 | 0,31 | 0,03 | 0,02 |
| Serie C test Ravena | 0,20 | 0,70 | –0,11 | –0,32 | –0,02 | –0,13 |
| Serie D test Ravena | 0,06 | 0,76 | 0,06 | 0,01 | 0,08 | –0,01 |
| Serie E test Ravena | 0,08 | 0,78 | –0,16 | –0,06 | –0,13 | 0,03 |
| Raven's overall test score | 0,10 | 0,99 | –0,03 | 0,02 | –0,02 | –0,06 |

*Conclusion.* Our research has led us to the following conclusions. First, a viable strategy is to focus on the final score students receive for an online course. On average, it turned out to be higher than the score for an offline course. This may be explained by the ease of success achievement rather than by the benefits of the online format. Secondly, the relevant psychological characteristics identified in research literature may need to be revised and supplemented. As social reality is rapidly transforming and there is a growing need to study the psychological characteristics of people by applying objective (hardware, psycho-physiological) methods, this

leads us to question the relevance of classical psycho-diagnostic tools. Third, the discrepancy between the results of this study and international data may be caused by the peculiarities of using online courses in Russia. When imposed in a top-down manner, online learning loses its advantages while its disadvantages become much more pronounced. Therefore, an important task of education in Russia is to preserve online learning in its most productive form, without turning it into 'window-dressing'. The latter tendency causes concerns on the part of students and faculty. The key conclusion of this study is that a successful student is successful in any learning format. Probably, the search for ways to improve the efficiency of online learning should be focused not on the psychological characteristics of students who are successful in the online format, but on improving the pedagogical design of an online course.

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## SARS-CoV-2 infection and neuropsychological outcomes

*Abstract.* The entire world is currently confronted with the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a novel betacoronavirus causing the deadly pandemic of coronavirus disease 2019 (COVID-19). Since there is now increasing reports of neurological and cognitive problems, the impact of COVID-19 on neuropsychological functioning is unknown but is likely to leave residual problems.

*Keywords:* Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2); Coronavirus Disease COVID-19; hypoxia; neurological; neuropsychological; cognitive; behaviour.

*Introduction.* The last pandemic was documented about a century ago (1918). Following that pandemic, Parkinson's Disease emerged as a major neurological disease that posed significant neurological and neuropsychological morbidity until the discovery of first-generation anti-Parkinsonian medication in the late 1940's, providing management of the disease. In the current pandemic, patients with comorbid health problems of all ages are at risk for serious health problems or sadly, have succumbed to COVID-19. Isolated case studies of pregnant women such as that of Hosier et al. [1] recently reported two cases suggesting that the SARS-CoV-2 virus may cross the placental barrier, infecting the fetus. IN Texas' Nucces County in the USA, 85 infants under the age of 1 year have tested positive for the novel coronavirus. In adults in particular, the impact of the virus has been varied with acute changes in breathing and hypoxia to blood clots and strokes, and microbleeds [2], in many instances, requiring ICU management and ventilation. The delayed effects of COVID-19 on neuropsychological functioning are unknown. Although the significant death-rate worldwide has triggered alarm and

anxiety as well as fear of impending death particularly in the absence of a vaccine, psychological distress and other cerebral effects are reported. The impact on cerebral functioning is anticipated in view of two possible effects. Since SARS-CoV-2 uses the angiotensin converting enzyme 2 (**ACE2**) **receptor** [3] as an access portal to the lungs, the indirect effects of low blood oxygen saturation levels or hypoxia may on cerebral functioning is unknown. On the other hand, ACE2 and its receptors are also found in the brain especially in CNS neurons and glial cells thus making it a potential target for possible direct infiltration by SARS-CoV-2 virus. Individuals infected with SARS-CoV-2 virus have complained of loss of taste and smell with infection of the olfactory bulb suspected to be pathway of entry into the cerebral structures. Since the medical management of COVID-19 is improving with ventilation, corticosteroids and other supportive measures, a large proportion of these patients is expected to recover from the disease. For patients who recover, the possibility of lingering cognitive and behavioural effects are unknown although they are likely to be present. Therefore, the post-acute and long-term effects of COVID-19 on the cognitive and behavioural functioning of individuals are expected to constitute an important area of neuropsychological research and clinical practice in coming months and years.

*Materials and Methods.* As cases of COVID-19 increase, and with decreasing medical management burden in the post-acute and chronic phase of treatment, patients will likely form a large pool of surviving cases that require neuropsychological assessment and treatment and possibly, long-term rehabilitation. These interventions will be dependent on individual recovery outcomes from the disease. Hence, using Luria's Neuropsychological Assessment methods [4] and those using this framework [5] forms an appropriate serial monitoring method of cognitive and behavioural progress after COVID-19 infection. Therefore, forming a case series of COVID-19 patients from various medical clinics (using multisite protocols) is an appropriate clinical research protocol that should be urgently initiated.

*Results.* The investigation of individual cases of patients who recovered from COVID-19 should be analyzed individually to portray the sociocultural impacts of the disease and, from a group perspective, general

trends of cognitive and behavioural trajectories post-recovery may be tracked.

*Conclusions.* Using Luria's Syndrome Analysis [4, 5] to study the neuropsychological profiles of individual COVID-19 patients, ranging in age from infancy to late adulthood, affords a unique opportunity to track the neuropsychological changes of patients recovering from the disease, identify areas of the brain that are susceptible to hypoxic brain damage, predict their outcomes and contribute to the development of future neuropsychological rehabilitation and medical control of long-term sequelae of future viral pandemics impacting the brain.

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# The structure of the relationship between physical activity and psychosocial functioning of women and men during the COVID-19 epidemic in Poland

*Abstract:* Since the COVID-19 pandemic is a serious crisis in many countries around the world, it is important to conduct empirical research aimed at identifying risks and factors protecting the functioning of people affected by it [1, 2]. For this reason, the goal of this research is to determine the structure of the relationship between physical activity and psychosocial functioning of 226 women and 226 men during the COVID-19 epidemic in Poland by looking at connections between physical activity, mental health disorders and cognitive processes and their significance for the quality of social relations. Methodologically, the research relies on *IPAQ Questionnaire* [3], *GHQ-28 Questionnaires* [4], *TUS Test — 6/9 version* [5] and the original *SFS Scale*. The structural model indicates that physical activity weakens the relationship between mental health disorders and cognitive processes, and gender is the moderator of these relationships. This suggests that physical activity adapted to the condition of health may be an important component of gender-individualized psycho-preventive interventions.

*Keywords:* physical activity, psychosocial functioning, gender, COVID-19 epidemic

*Introduction.* The COVID-19 pandemic is a serious health and social problem in many countries around the world. Preliminary empirical evidence suggests that symptoms typical of mental disorders, which are often associated with impaired cognitive functioning, are relatively common psychological responses to this kind of crisis. These types of symptoms may disrupt the social functioning of many people [1]. The literature indicates that regular physical activity may alleviate this risk: by increasing the metabolism of kynurenine and the expression of kynurenine aminotransferase in skeletal muscles, it minimizes the consequences of environ-

mental stress as well as the symptoms characteristic of neuropsychiatric disorders. Consequently, it improves the quality of social interactions [2]. However, the publications devoted to this issue have appeared only in a few countries affected by the pandemic. As a result, they may not fully reflect the experiences of people living in other parts of the world. Hence, the subject of this research is the structure of the relationship of physical activity and psychosocial functioning of women and men during the COVID-19 epidemic in Poland.

*Material and methods.* The research was carried out during the COVID-19 epidemic in Poland. The sample consisted of 226 women and 226 men. The following methods were administered: *IPAQ* Questionnaire [3], *GHQ-28 Questionnaires* [4], *TUS Test — 6/9 version* [5] and *SFS Scale*, created for this research. Statistical calculations were performed with the help of IBM SPSS 25 with AMOS software.

*Results.* The structural model explains 51.0 % of the variance in the quality of women's and 41.0 % in men's social functioning. Regular physical activity weakens the negative impact of mental health disorders and cognitive processes on the social functioning of our respondents. Moreover, in the population of women the key determinant of the quality of social interactions is the condition of mental health, shaped to a greater extent by cognitive processes related to physical effort than by physical activity alone. On the other hand, the social functioning of men results from the relationship of mental health and the severity of cognitive disorders, moderated by physical effort. In the group of women, physical activity is less important for mental health and cognitive functioning than for men, but mental health is more important for the quality of women's social relationships. In turn, the functioning of cognitive processes determines family, interpersonal and professional interactions of men to a greater extent than of women.

*Conclusions.* In the estimation of the structural model of the relationship between physical activity and selected aspects of psychosocial functioning, the interactions between physical activity and mental health disorders and cognitive processes were confirmed. Their importance for the quality of social relationships of women and men during the COVID-19 epidemic in Poland was verified.

- The data indicate that, in the absence of health contraindications, an essential element of interdisciplinary programs supporting psychosocial functioning of adults during an epidemic may be regular physical activity, adjusted to the needs and capabilities of the body.
- The differences between women and men indicate that the psychopreventive interventions should be individualized depending on their gender.

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## Genetics and psychophysiology of ADHD and autism

*Abstract.* The paper discusses the brain mechanisms of autism and attention deficit hyperactivity disorder. It is shown that these disorders are associated with different genetic causes that create certain psychophysiological mechanisms. Nevertheless, their diagnosis is interrelated. Moreover, a child is often first diagnosed with ADHD, and then the diagnosis is changed to "autism spectrum disease".

Among the most common causes of the disease is the behavior of retrotransposons. Retrotransposons (also called transposons via intermediate RNA) are genetic elements that can amplify themselves in the genome. These DNA sequences use a "copy and paste" mechanism, whereby they are first transcribed into RNA and then converted back to identical DNA sequences via reverse transcription, and these sequences are then inserted into the genome at target sites. In humans, retro elements take up 42 % of the DNA.

The conclusion is made that for the formation of an individual profile of gene expression in the neuron, the most important is the phenomenon of somatic mosaicism, due to the process of L1 retrotransposition, in addition to the classical described mechanisms of differentiation. The number of such events and their localization is significant as they are likely to contribute to the development of both autism and ADHD.

*Keywords:* autism, attention deficit hyperactivity disorder, retrotransposons, reverse transcription

The two diseases -autism and attention deficit hyperactivity disorder (ADHD) — are related to amazing fact, namely, the significant increase in the number of cases was connected to the discovery of penicillin by A. Fleming in the 20th century. Penicillin irreversibly changed the structure of morbidity and mortality in children. In the late 19th century in Russia up to 85 % of infants died in summer from intestinal infections, in the 20th century the mortality rate in civilized countries rarely exceeded

5–7 % [1]. Weak children, who have various genetic and innate features, have more chances to survive and their number increases every day.

There is a special picture for two diseases: ADHD and autism. Now both diseases are associated with different genetic causes that lead to certain psychophysiological mechanisms, but nevertheless, their diagnosis is interrelated. Moreover, very often the child is first diagnosed with ADHD, and then change it to "autism spectrum disease".

Autism spectrum disorder (ASD) comprises a continuum of heterogeneous neurodevelopmental disorders with early onset, persistent social deficits, and restricted as well as repetitive behavioral patterns. Attention-deficit and hyperactivity disorder (ADHD) is characterized by patterns of inattention, hyperactivity, and impulsivity and very often constitutes the most-frequently diagnosed co-occurring disorder in children with autism [2] and. Although according to current diagnostic practices a co-occurring presentation would permit the concurrence.

In version 4 of the Diagnostic and Statistical Manual of Mental Disorders (4th ed., text Rev.; DSM–IV-TR; APA, 2000), it was not possible to combine ASD and ADHD. Now this has become possible due to numerous studies. 2,212 subjects (1,009 adults and 1,126 children) were analyzed. 770 (35.3 %) of the sample were women. The subjects were taken from the Netherlands Autism Register (NAR) [4]. It was shown that autism is often masked by ADHD symptoms. Since only one diagnosis is possible, autism was diagnosed on average 1.8 months later (the age is 1.5 for boys and 2.6 for girls).

The common causes of the disease include the behavior of retrotransposons. Retrotransposons (also called transposons via intermediate RNA) are genetic elements that can amplify themselves in the genome. These DNA sequences use a "copy and paste" mechanism, whereby they are first transcribed into RNA and then converted back to identical DNA sequences via reverse transcription, and these sequences are then inserted into the genome at target sites. In humans, retro elements take up 42 % of the DNA.

Retroelements (RE) make up a significant part (up to 50 %) of the human genome. RE carry a large number of different regulatory elements and are able to move through the genome using retrotransposition.

Retro elements can influence both the expression of nearby genes and the functioning of the genome as a whole.

All retro elements can be divided into 2 large groups: LTR not containing and LTR containing retrotransposons. These groups differ both in terms of structure and the mechanism of reproduction. The first group includes Autonomous LINE and non-Autonomous SINE elements.

Full-size LINE elements (Long Interspersed Nuclear Elements) have a length of 4–6 thousand p. o. and contain two open reading frames (ORF — Open Reading Frame) and a poly a sequence at the 3' end. The full-size LINE nucleotide sequence encodes the enzymes necessary for their reproduction, so this class of elements is considered Autonomous. Along the edges of the LINE elements, there is a short straight repeat of 7–20 p. o., which is a duplication of the target site.

Full-size LINE elements (Long Interspersed Nuclear Elements) have a length of 4–6 thousand p. o. and contain two open reading frames (ORF — Open Reading Frame) and a poly a sequence at the 3' end. The full-size LINE nucleotide sequence encodes the enzymes necessary for their reproduction, so this class of elements is considered Autonomous. Along the edges of the LINE elements, there is a short straight repeat of 7–20 p. o., which is a duplication of the target site.

We found that in humans, out of 516 thousand L1 sequences, only 150 are currently active (able to move independently) [3].

On average, 80 cases of L1 integration occur per neuron / Mobile elements of the genome were first described in the 40s of the last century by Barbara McClintock, who received the Nobel prize in medicine in 1983 [4].

To sum up, for the formation of an individual profile of gene expression in the neuron, in addition to the classical described mechanisms of differentiation, the most important is the phenomenon of somatic mosaicism due to the process of L1 retrotransposition. The number of such events and their localization is significant as they can contribute to the development of both autism and ADHD.

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# Study of pregnant women's emotional state*

*Abstract*. The article discusses how the emotional state of pregnant women is influenced by their previous experience of pregnancy. The study relies on the following methods: 'Test of Pregnant Woman's Relations' by I.V Dobryakova; 'Self-Assessment of Emotional States' by A. Wessman and D. Ricks; "Self-Estimate" by T. Dembo and S. Ya. Rubinshtein (modified by P. V. Yanshin); "Test of Meaningful Life Orientations" by D. Krambo and L. Makholikh (adapted by D. A. Leontyev). The study has shown that in the presence of complications and pathologies — in the form of a history of miscarriage — the emotional sphere of a woman will be characterized by emotional instability, increased anxiety and low self-esteem. Emotional instability is typical of pregnancy in general and it often is accompanied by dependence on others, distrustfulness, fatigue, vulnerability, impressionability combined with excitement, anxiety, and some fear.

*Keywords:* emotions, emotional state, pregnancy, self-esteem, life-meaning orientations

*Introduction*. One of the fundamental tasks facing society today is the need to maintain the good health and well-being of mothers and children. This task is essential for solving the demographic, psychological and social problems.

The whole spectrum of problems affecting a woman's reproductive attitudes is most clearly manifested during pregnancy, given that it is a major life change, riddled with difficulties and contradictions. This

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can contribute to an increase in the expectant mother's anxiety in relation to childbirth and even her unwillingness to have and raise the child in the future [1, 2, 3, 4, 5].

Thus, it is significant to identify and describe the features of the emotional sphere of a pregnant woman to develop support and prevention programs, especially for cases of complications and pathologies such as a miscarriage in the woman's history.

*Materials and methods.* The study was conducted from October to December 2017 in Ekaterinburg at the City Perinatal Center, MBU of the Central City Hospital No. 20, MBU of the Ekaterinburg Clinical Perinatal Center, where women were prepared for childbirth or during pregnancy maintenance.

The survey three groups of respondents:

- 12 pregnant women with the first pregnancy (PB);
- 16 pregnant women with a history of miscarriage (NB);
- 15 pregnant women with second and third pregnancies (PovtB)

'Test of Pregnant Woman's Relations (TOB)' by I.V Dobryakov; "Self-Assessment of Emotional States" by A. Wessman and D. Ricks; "Self-Estimate" by T. Dembo and S. Ya. Rubinshtein (modified by P.V. Yanshin); "Test of Meaningful Life Orientations" by D. Krambo and L. Makholikh (adapted by D. A. Leontyev).

*Results.* We applied the TOB method and identified the following types of pregnancy experience: for example, in women of the first group, the optimal type (67 %) and euphoric type prevail — in 33 %; in the second group, the anxious (37 %) and the optimal types of experience (32 %) prevail; in the group of women with positive pregnancy experience, 80 % of the respondents have the optimal type, and 20 % have the optimal euphoric type.

Only those women who have previously experienced a miscarriages manifested anxiety, since they could predict an unfavourable outcome of pregnancy in the future. They strove for constant control of themselves and the situation, which lead to psychological and physiological stress.

The results were analyzed by using the $\varphi^*$ angular Fisher transformation to identify significant differences in the type of gestational dominant ($\varphi^* > \varphi^*$ cr, $p < 0.05$). We confirmed the assumption that an incomplete pregnancy experience affects the experience of repeated pregnancy as it is a powerful and destructive stress factor in every woman's life.

Emotional self-assessment based on the method of A. Wessman and D. Ricks brought the following results. During their first pregnancy, women showed calmness, poise, energy, mobility, determination and firmness of character. Women who experienced miscarriage, on the contrary, demonstrated signs of increased anxiety, fatigue, lethargy, apathy, depression, helplessness and weakness. Women in their second, third, etc pregnancy demonstrated such emotions as equanimity, elation, perseverance, firmness, determination, and energy.

Using the Mann-Whitney U-test, statistically significant differences were established between the first and second groups. The differences between the second and third groups were shown in the following indicators: "calmness-anxiety", "energy-fatigue", "elation-depression", "confidence — helplessness", "overall assessment of the emotional state." Thus, the general emotional state in women with a history of miscarriage is lower in comparison with other groups; and levels of anxiety, fatigue, depression, and feelings of helplessness are higher.

The study of the level of self-esteem and the level of aspirations in pregnant women based on the method of T. Dembo and S. Ya. Rubinstein showed that women with a previous history of miscarriages show a lack of confidence, they doubt their maternal competence, have low self-esteem, experience feelings of guilt, are more dependent on others. The study revealed significant differences between the first and second groups in the following scales: "appearance"; "self-confidence"; "happiness"; "success"; "general self-esteem." Thus, confidence, happiness, self-esteem, which includes body image, are lower in women with a history of miscarriages. They have a conscious desire to have a child, but they lack confidence, they doubt their ability to give birth and become mother due to previous negative experiences.

In such indicators as "appearance", "self-confidence" "happiness", "success" in the second and third groups, we have not found any statistically significant differences. Women with repeated pregnancy often have changes in appearance — changes in shape, weight, skin, hair, which affects the emotional sphere, and the understanding of success as a professional also affects the emergence of self-doubt.

Thus, women with a history of miscarriages suffer from a sense of loss and failure, which is central to their self-esteem and grows stronger with

time. They find it difficult to overcome their fears and disturbing memories and to cope with the problem of low self-esteem.

The discrepancy between the level of self-esteem and ambition in the first, second, third groups is normal, which means that pregnant women set goals for themselves that they can actually achieve in a given period of time. Ambition is largely based on their assessment of their capabilities and serve as an incentive for further successful development of their personality.

The "Test of Life-Meaning Orientations" showed how pregnancy affected life goals. We found statistically significant differences between the first and second groups, between the second and third groups in the following subtests: "Goals in Life" (pregnant women with previous miscarriages have specific goals in the future, which give life meaning, focus and perspective, despite their past difficulties); "The Process of Life or Emotional Saturation of Life" (pregnant women with previous miscarriages perceive this period of time as filled with new meaning); "Effectiveness of Life or Satisfaction with Self-Realization" (women with previous miscarriages are rather dissatisfied with their life, due to their past experience).

*Conclusion.* Miscarriage in a woman's history may be connected to emotional instability, increased anxiety and low self-esteem in her following pregnancies. A woman develops a fear that this time she will not be able to give birth to a child, fears for the unborn baby, is afraid of complications of pregnancy. Such women have increased sensitivity to external stimuli, the feel dependent on others, distrustful, tired, vulnerable, and anxious. They may also get more impressionable and experience excitement.

These data require further research to reveal the influence of the emotional sphere of a pregnant woman on the psychological characteristics of the unborn child.

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Section 3

# NEURO-LINGUISTICS: WAYS TO FIND NEW MEANINGS

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## The emotional effects of positive and negative news through the default mode network

*Abstract.* News media can have a powerful effect on people's physiology, thinking, and emotions. This study aims was to examine the effects of positive and negative news on optimism, pessimism, self-esteem, and depression. The survey covered students from the Department of Journalism of the University of Istanbul and involved 61 participants — 35 women and 26 men. While people from the first group were asked to read positive news, the second group read negative news. In order to measure the level of optimism and pessimism of our participants, they were asked then to choose at least four optimistic and pessimistic adjectives. Rosenberg Self-Esteem scale was used to determine changes in self-esteem and depression. Results suggested that people who read positive news were more optimistic about their future (M optimism = 5.92, SD = 1.75), and less pessimistic (M pessimism = .88, SD= 1.5). When people read negative news, they chose more pessimistic adjectives (M pessimism= 4.36, SD= 2.44), and fewer pessimistic ones (M optimism = 1.88, SD = 1.94). Moreovere, when people read positive news, they showed less signs of depression (M depression = 1.6, SD = .70) than when people read negative news (M depression = 3.06, SD = 1.37).

Finally, we found no significant differences in the level of self-esteem when participants were exposed to positive and negative news.

*Keywords:* Positive news, negative news, self-esteem, optimism, pessimism, depression, self-esteem, positive psychology

*Introduction.* We can distinguish between positive, neutral and negative news. Positive news contains inspiring stories about hope and cooperation that incite positive emotions, whereas negative news includes dramatic, traumatic, hopeless, gloomy, and criminal stories, which are associated with negative emotions. Negative news exacerbates the negative mood in individuals while positive news, on the contrary, makes them feel more optimistic [1]. Negative and positive news changes the emotion, and emotions shape cognition. A survey of 4,675 adults indicated that exposure to traumatic news might be as effective as real traumatic exposure [2].

Emotion, cognition, and physiological reactions to different news may affect people's vision of their future. When people read stories, their Default Mood Network (DMN) is activated. DMN consists of the medial prefrontal cortex, posterior cingulate cortex, hippocampus, and orbitofrontal cortex [3], which are connected with daydreaming, imagining, planning, retrieval of personal memories, personal meaning-making, monitoring of one`s emotional state, and reflective compassion.

*Materials and Method.* In the Turkish version of Rosenberg Self-Esteem Scale [4], [5] with the sub-scale of self-esteem and depression and 9 optimistic/pessimistic adjectives, was used in this study. Our survey covered 61 undergraduate students from the University of Istanbul (35 females, 26 male) aged 18–26. While people from the first group were asked to read positive news, the second group read negative news. Individuals who read positive news were asked to imagine that they had received a positive feedback from social media, while people who read negative news were asked to think that they had received negative feedback from social media for one minute. This was done in order to activate their Default Mode Network. In order to measure the level of optimism and pessimism of our participants, they were asked to choose at least four optimistic and pessimistic adjectives and to complete their self-esteem and depression sub-scales. Statistical analysis was implemented by using the Pearson correlation test and paired t-test.

*Table 1*. Contents of negative news

| |
|---|
| Camera images of a murdered student |
| Panic attack increases among adolescents |
| A suicide story: Madison Halleron |
| Water in Turkey may be unsafe for drinking |
| Unemployed journalist |
| A scientist warns about a severe earthquake |

*Table 2*. Contents of positive news

| |
|---|
| Aziz Sancar: The way to the Nobel Prize |
| Lifespan is getting longer |
| Story of a one-armed 7-year-old professional athlete |
| Young people with autism have hope |
| A library is established with the help of social media |
| A photographer shows that the humankind is not dead |

*Results.*

**1. Optimism and Pessimism Mean After Exposure to Positive and Negative News**

Our results showed that people who read positive news were more optimistic about their future (M optimism = 5.92, SD = 1.75), and were less pessimistic (M pessimism = .88, SD = 1.5), while participants who were exposed to negative news demonstrated opposite emotions. When people read negative news, they chose more pessimistic adjectives (M pessimism= 4.36, SD= 2.44) and fewer optimistic ones (M optimism = 1.88, SD = 1.94). When the data were computed, paired t-test significant differences were obtained between the groups. In pair one, the levels of pessimism and optimism were compared for people who read negative news, conditions — $t(24) = 5.96$, $p = 0.001$. Then the same procedure was conducted for people who read positive news and their optimism levels were measured, conditions — $t(24) = -7.65$, $p = 0.001$.

**2. Effect of News on Self-Esteem**

In the second hypotheses to examine differences in self-esteem of participants who read positive and negative news. The Pearson correlation test was used. Results suggested that there was no significant correlation in the self-esteem level when people read positive and negative news

(r = –.12, p = . 58). When people read positive news, they showed a slightly higher self-esteem level (M self-esteem = 1.02, SD = .83) than when people read negative news (M self-esteem = 1.44, SD = .87). The score evaluation is as follows: 0–1 = High self-esteem, 2–4 = Moderate self-esteem, 5–6 = Low self-esteem.

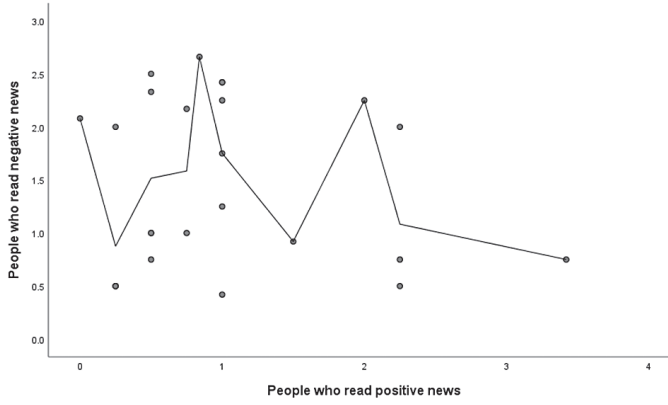
*Table 3.* Descriptive characteristics for the participants who read positive news, score (N = 25)

| **Variable** | ***M*** | ***SD*** | ***Min*** | ***Max*** |
|---|---|---|---|---|
| Self-Esteem | 1,02 | 0,827 | 0 | 4 |
| Depression | 1,60 | 0,707 | 1 | 6 |
| Pessimism | 0,8800 | 1,50886 | 0,00 | 6,00 |
| Optimism | 5,9200 | 1,75404 | 1,00 | 9,00 |

*Table 4.* Descriptive characteristics for the participants who read negative news, score (N = 36)

| **Variables** | ***Mean*** | ***SD*** | ***Minimum*** | ***Maximum*** |
|---|---|---|---|---|
| Self-Esteem | 1,44 | 0,870 | 0 | 4 |
| Depression Mood | 3,06 | 1,372 | 1 | 6 |
| Pessimism | 4,4722 | 2,36022 | 0,00 | 9,00 |
| Optimism | 1,8611 | 2,01640 | 0,00 | 7,00 |

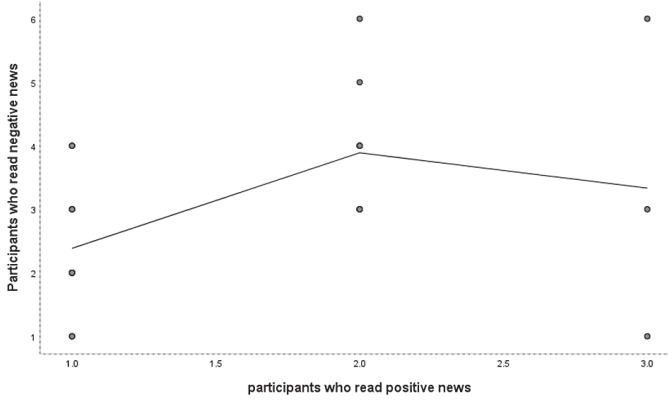
*Table 5.* Scatter plot for the self-esteem score



**3. Effect of News on Depression**

In the third hypotheses to compute the effect of positive and negative news on depression, the Pearson correlation test was implemented. The results indicated that there were significant differences in depression in people exposed to negative and positive news (r = .41, p = 0.04). When people read positive news, they were less prone to depression (M depression = 1.6, SD = .70) than when they read positive news (M depression = 3.06, SD = 1.37). The score evaluation is as follows: 0 = No depression mood, 1–2 = Low depression mood, 3–4 = Moderate depression mood, 5–6 = High depression mood.

*Table 6.* Scatter plot for the depression score




*Conclusion.* When people are exposed to negative news, they tend see their future in a pessimistic light and be more prone to depression, whereas as people read positive news stories, they have an optimistic outlook and are less likely to suffer from depression.

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## The embodied brain: cultural aspects of cognition

*Abstract.* Our thinking is grounded in our sensory, motor, affective, and interpersonal experience. Recent psychological studies confirmed that our cognition is not only embodied but also embedded since it arises from interactions with its social and cultural environments, which makes it possible to create image schemas and conceptual metaphors. Those schemas facilitate acting in everyday, routine situations, but make it difficult to depart from them since they are frames that limit our ability to see the alternatives. They are intricately linked to our world view and, therefore, resistant to changes because the latter threaten the feeling of security.

This paper is aimed at evaluating people's ability to change the existing schema. In the study, participants were asked to create a completely new story based on two well-known stories in which they had previously inserted the missing words. It was found that most participants exhibited considerable difficulties in departing from the formerly established schemas. Moreover, the emotionally loaded story proved to be more difficult to change.

*Keywords***:** cognitive schemas, bodily underpinning, cultural roots, schemas rigidity

*Introduction.* The rationalist tradition has dominated philosophy and psychology from the very beginning, which was closely linked to understanding cognition as processing of abstract symbols. However, recent studies have revealed that the ability of abstract reasoning, for example, solving logical problems is not an inborn capacity, and people rely on their mundane everyday experience in their reasoning. [1]. The inability to solve formal operation tasks was also observed in well-known experiments of Vygotsky and Luria [2] performed in Central Asia. It was shown that the reasoning of Asian nomads was based on their everyday experience. Our study also revealed that students are much better at solving mathematical and logical problems if they describe situations that are

close to life events [3]. Johnson [1] argues that all our cognition is underpinned by our sensory, motor, affective, and interpersonal experience and cognitive capacities that enable us to create image schemas and conceptual metaphors. Moreover, Tucker [4] posits that complex psychological functions arise from patterns of neural networks linked to bodily control end emotional networks. The work of those networks is subconscious and primary to cognitive processes and they are believed to be responsible for the formation of schemas of thought. These schemas or patterns form our mental habits in the way similar to such skills as speaking a given language or driving a car. In other words, our cognition depends on how our brain and body works and on patterns of our bodily interplay with the social and cultural milieu. The contemporary neurobiological studies confirm Luria and Vygotsky's assumption of social and cultural roots of cognitive functions. Since the above-mentioned schemas are a kind of mental habits, they are resistant to changes, which may create considerable difficulties in adopting to entirely new circumstances§ . Hence, this study is aimed at evaluating whether previously established schema could be changed or not.

*Materials and methods.* The study comprised 175 students of secondary and tertiary education levels. Two well-known stories were used: a gospel story of *The Woman Caught in Adultery* and Aesop's fable *The Fox and the Goat.* The participants were asked to insert missing words in these stories. Afterwards, they were asked to create a completely new story by filling in the same slots as in the former stories. On their part, it requires a capability to depart from the preformed schema. In addition, the Raven Test was administered to evaluate the level of abstract thinking of the examined subjects.

*Results.* A significant correlation between the ability to depart from the schema and the level of abstract thinking was found for the whole group. Yet all participants had considerable difficulties when trying to depart from the once formed schema regardless of their education level, age, and gender. At the same time, the emotionally loaded gospel story turned out to be more resistant to changes.

*Conclusion.* Schemas tend to remain invariable despite our conscious efforts to change them due to their habitual nature and due to the fact that they serve us well enabling efficient and effortless action. On the other

hand, well-established schemas often make it impossible to change our routines, attitudes, and beliefs to adapt to the changing external conditions. People tend to adhere to the once established schemas since these schemas constitute a significant part of their world view, which is deeply rooted in their culture. Moreover, cognitive schemas are not only 'flavored' but also underpinned by emotions that arise from bodily sensations [5]. Therefore, any changes violate our sense of order and threaten the very integrity of our environment and the self.

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# Psychological traits of author's style of writing: ways to find new meanings*

*Abstract.* The study is based on the corpus of texts of Russian classical prose of the XIX century. It is shown, how by means of the comparative statistical analysis of creativity of different authors it is possible to reveal the specificity of individual style. By the example of the specific cases of use of the word «лицо» (in English, «a face») in Anton P. Chekhov's work are presented features of psychological narration. The conclusions about the interdisciplinary perspectives of the corpus methodology were made.

*Keywords:* lexical statistics, text corpus, individual style, lexical compatibility, Anton P. Chekhov.

*Introduction.* New ways of finding new meanings in modern philology include corpus-based technologies based on the analysis of big data. An important growth that they have given researchers is the ability to find material in voluminous texts that the traditional reading perception of a literary work cannot disclose. For example, the author's features in terms of combinations of words are hard to study, as the number of elementary word combinations in a large novel can be counted in tens of millions.

*Materials and methods.* The interdisciplinary method to be discussed here is to compare the creativity of different authors to distinguish the use of words that are often used by everyone: *человек (a human), лицо (a face), опять (again), говорить (to talk), жизнь (life), один (one),* etc. At the same time, in the work of each writer, these words find themselves in a special contextual environment typical to the author's style. Besides,

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some of them are especially active and show the author's interest in the use of this very word, which may not be conscious, deliberate.

We have a large corpus of texts of literary classics of the XIX century, which include the works of Fyodor M. Dostoevsky, Leo N. Tolstoy, Anton P. Chekhov, Ivan A. Goncharov, Ivan S. Turgenev (about 4 million words). Using a comparative-statistical analysis, frequency words with a relatively larger number of original contextual partners in each writer's work were extracted from the corpus. For more information about the corpus and methodology, see [1, 2]. For instance, Anton P. Chekhov's list includes such words as *глаз (an eye), лицо (a face), говорить (to talk), глядеть (to look), рука (a hand), сидеть (to sit), голова (a head), нога (a leg), большой (big), спать (to sleep), голос (a voice), стоять (to stand), выходить (to go out),* etc. These lexemes belong to the general frequency fund. We are not just focused on frequency, but their specific activity in terms of compatibility with context partners: «It is clear that if the language means themselves and their use in artistic speech is conventional, the combination of conventional means in an artistic text has an occasional nature, since in the area of language means combination the author's originality, individual skill in the area of language means use is manifested» [3]. Besides, we suppose to show the result of comparative-statistical analysis of the text on psychological features of the author's narration.

*Results.* Let us present the results of the research on the example of Anton Chekhov's use of the word *лицо (a face).* First of all, *лицо (a face, a figure, a person, a party)* is a polysemic word. In the texts of the XIX century, we observe it mainly in two meanings: 1. The front part of a human head; 3. A person, an individual [4]. At the same time, among the cases of using this word in Anton P. Chekhov's texts, we have not found a single context in which this word is used in the third meaning. In this sense, Leo N. Tolstoy takes the lead: *исторические лица (historical figures), знакомые лица (familiar faces), значительные лица (significant persons), третьи лица (third parties)* and even *патриотические лица (patriotic persons); лица, обладающие властью (persons with power)* are found in its texts much more often than in other authors' texts.

The original compatibility of the lexeme *лицо (a face)* in Anton P. Chekhov's texts in comparison with other authors of the XIX century is presented by the following list: *заплаканное лицо (crying face),*

*капризное лицо (moody face), колючее лицо (thorny face), насмешливое лицо (mocking face), негодующее лицо (furious face), лицо поморщилось (a face that winced), поношенное лицо (worn face), смеющееся лицо (laughing face), томное лицо (languorous face), умоляющее лицо (begging face),* etc. First of all, the bright emotional expressiveness of the «face» attracts attention. On the one hand, this distribution is quite trivial and easily explained. On the other hand, let us turn to other authors for comparison. Four writers, with whom we compare Anton Chekhov's works, use very few original words adjacent to the word *лицо (a face, etc.)*. In Fyodor M. Dostoevsky the verb *перекосилось (skewed) is repeatedly used.* Ivan A. Goncharov has combinations *ворочать лицо (to shift the face) and меняться в лице (change in face)*. Heroes of Ivan S. Turgenev can *уткнуть лицо в батистовый платок (duck a face in a batiste handkerchief), поднести батистовый платок к лицу (bring the batiste handkerchief to the face)*. Leo N. Tolstoy is characterized by heterogeneous contexts such as *лицо, высунувшееся (из кареты) — a face leant out (from a carriage)*; *лицо, изуродованное (эмоцией или раной) — a face disfigured (by an emotion or a wound)*; *правдивое лицо — a true face*; *установиться на лице (об эмоции или выражении лица) — to prevail on a face (about an emotion or facial expression)*.

First, we can state that Anton P. Chekhov has a quantitative advantage over the original contextual partners of this lexeme. Secondly, we see that in the texts of writers of the XIX century, unlike Anton P. Chekhov, emotion is expressed probably by other means. The *face* and words denoting body parts Chekhov's works are invariably used as psychological elements reflecting human emotions. It cannot be said that this is purely a Chekhov's trait: a description of the face as «mirrors of the soul» is a typical literary technique. However, it is important for us that the author finds special means of expression that are not typical for other writers, and there are indeed many original means.

It should be noted that more often than not Chekhov's characters express emotions of a negative character on their faces or those associated with an external negative assessment (*thorny, worn, mocking, moody, furious face*). Even a *смеющееся лицо (a laughing face)* is not always a marker of a positive emotion: «Возбужденный борьбою, поручик глядел на *смеющееся, наглое лицо* Сусанны, на жующий рот, тяжело

дышащую грудь и становился смелее и дерзче» («Excited by the struggle, the lieutenant looked at Susanna's laughing, cheeky face, chewing mouth, heavy breathing breasts and became braver and daring») (a story «Mire»). Unfortunately, the format of this publication does not allow us to give many contexts for discussing other psychological details of the use of this word in Anton P. Chekhov's prose.

*Conclusion.* Thus, against the background of the text volume of more than a million words, in the work of such a studied classic writer, as Anton P. Chekhov, the author's psychological features are manifested. The starting point for identifying these features is a corpus statistical analysis that involves comparing different authors and different texts of each of them. In this case, the analysis is related to artistic works, but such methods, attached to texts of different styles, have good prospects for the development of interdisciplinary directions, including psycholinguistics and lingvopsychology.

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## Narrative therapeutic approach in the care for patients with dementia and psychosis

*Abstract.* Dementia and psychosis can arise from a trauma in patients' life history. Behavioral difficulties of the afflicted individual can lead to bad memories triggered by an event or an encounter. Attempts to bring such patients back to reality can destroy their awareness of the self and the world. A narrative therapeutic approach can help them reconstruct their life story and enhance their sense of wellbeing. With dementia, it is necessary to open the book of the afflicted individual's life at the right page in order to help them get back to reading it in the present. With psychosis, stories must be detached from the personal life history and from reality. An empathetic therapist allows the patient to bypass the obstacles to link their fictional and real life and to recover the necessary minimum of self-awareness.

*Keywords*: dementia, psychosis, behavioral difficulties, art-therapy

The clinical history of Mr. HB illustrates the capacity of individuals with dementia to be able to partially reconstruct the meaning of what they experience, to transcribe and express it in words. In his case, writing was the primary means of expression, although other modalities are also possible, such as painting, modeling, etc. The recovery of meaning was done by drafting a fictional narrative while keeping the links with the reality of the present.

I. Method: Analysis of the clinical case of Mr. HB

Mr. HB is 72 years old. He suffers from Lewy body dementia, whose symptoms include memory loss with a Parkinsonian syndrome and sudden hallucinations. They are accompanied by agitation, screaming, verbal and physical violence. Mr. HB has a moderate cognitive impairment (Folstein's MMSE: 18/30). He is disoriented in time and space and gets lost in the retirement home. He is usually quiet and calm except for the cases when he is hallucinating.

Mr. HB has a habit of writing sequences of words, not always meaningful and of dubious spelling, comprising lots of incomplete sentences, sometimes without a verb and without a complement, avoiding "I", using "he": "he eats in…"; "the cat is on the…"; "the girl plays…", "he runs… baker".

His childhood was exceedingly difficult. At twelve, he lost his father and his mother had to go back to work. Young HB then attended a boarding school, several kilometers from home. Thus, in a few weeks, he experienced the loss of his father and was separated from home. He refused to talk about this time.

One day, the psychologist of the retirement home asked him: "Why don't you write a story?" Mr. HB then started to write a story about a lonely young boy. He was in a courtyard. On a beautiful sunny day, the door of the courtyard opened, and a young girl appeared. She held out her hand, and his life filled with joy… In these writings, the words are linked, and although the sentences are short, they are also well constructed and completed. The ideas succeed in an ordered manner in time and space. Mr. HB sometimes uses "I" in his writings. He gives the young boy an active voice: "I remember the young girl. I am happy … ". For the most part, proper spelling was restored. There were sometimes errors, but they were much fewer than in the previous writings. The psychologist asked: "What is the title of this text?": "The Big Book of Eternity". Mr. HB was also keen on reading his story out loud to other pensioners and carers.

II. Result: Comments regarding the study

Mr. HB enjoyed thinking again and getting out of the chaos of his internal representations. When he tells his new story, he rediscovers the present, he is once again immersed in life. He had some sudden, unexpected, bad experiences in his youth that changed the course of his life. This raises the question of a connection between a trauma in patients' life history and the emergence of dementia [1]. The grief from his childhood trauma was certainly only partial. Being placed in a retirement home must have rekindled bad memories for Mr. HB. He left his home and his spouse to stay in a restrictive environment. In his writings, the patient resumes the preceding path, but in a different way. The descriptions of the courtyard and the door that opened, in his account, a glimpse at the painful path that he had traveled previously. As he adopted the narrative persona of a child, he was able to let go of what impeded his daily actions,

already limited by the dementia. He could see himself again in a broader perspective and gain the necessary motivation [2]. His story describes a beautiful sunshine, which is a symbol referring to the euphoric dimension that he has entered.

In his new writings, he makes fewer spelling mistakes as he improves his access to semantic libraries. He gains a renewed sense of well-being, and his coherent enunciation corresponds to the self-representation partially reconstituted.

The position chosen by Mr. HB in his writings is not his own, of a 72-year-old man, unwell, and with little to look forward to. He gives the voice to a young boy, with a broad perspective on life. His position in the story has a degree of ambiguity, however, at times he allows the young boy to be the voice, while at other times he uses the pronoun "I". This way he makes his presence known in the text.

II. Discussion: Prerequisites for proper functioning of psychotherapy workshops

The psychologist was able to help the patient reconcile his past with the present, the fictitious world with the real one. The change of the narrative persona we observed does not create a brand new narrative but resumes the narrative of life that until now was inaccessible and inexpressible.

The time of the narrative is not that of the present, which the patient shuns. In his story, he alludes to the present and to the past. According to Bergson [3], the timing of the story, the time of the dream, is the time of duration for Mr. HB, and he entitles his text as 'The Book of Eternity'. Using comparable methodology to study and treat psychosis requires us to move away from reality. The psychologist has to be empathic and gentle to encourage the patients and to validate what they are expressing [4].

*Conclusion.* The narrative dimension in care encompasses the history of the patient and the history of their disease as well as their interactions. "Time becomes human, in so far as it is articulated in a narrative manner" [5], which means that the subject appropriates the transformation of the previous traumatic experience.

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Section 4

# THE VALUE OF THE CULTURAL-HISTORICAL APPROACH IN A CHANGING WORLD

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## Luria's aphasiology in the 21st century

*Abstract.* Luria's interpretation of brain organization for language and aphasia is analyzed. He published two major books and a myriad of papers devoted to this topic. Luria is one of the major founders of contemporary aphasiology, as from the fundamental point of view as from the clinical perspective. His significant influence has continued during the 21st century. Many of Luria's ideas have been integrated into contemporary aphasiology. His aphasia classification, however, remains partially controversial.

*Keywords:* Aphasia; cognitive neurosciences; functional system

*Introduction.* Luria published two major books on brain organization of language and aphasia: "Traumatic Aphasia", initially published in Russian in 1947 and translated to English in 1970 [1]. This was his initial interpretation of aphasia and included his extensive experience with war-wounded patients during WWII. Almost 30 years later and towards the end of his life, he published "Basic Problems of Neurolinguistics" [2], in which he presented a much more elaborated interpretation of the brain organization of language in normal and abnormal condition.

*Materials and methods*. These two books are initially analyzed. Later, contemporary developments are reviewed [3.4]

**Results**. Luria's initial proposal includes three major points: (a) theoretical interpretation of aphasia, (b) classification of aphasia; and (c) an attempt to establish clinical/ anatomical correlation using the method of superimposing the lesion drawings.

Luria considered language to be a "complex functional system", requiring many different steps to achieve both comprehension and production; simultaneous participation of multiple cortical areas are required for normal language processing. Each cortical area performs a specific process, but it also participates in different functional systems. Thus, the first left temporal gyrus participates in phoneme discrimination, and its damage causes difficulty in all functional systems requiring phoneme discrimination. Different types of language impairments are associated with damage in specific brain areas. Luria considers that certain brain areas are more directly related to some others and consequently impairment in one of them will be associated with disturbances in the other. He refers to "syndrome analysis" as a fundamental approach in aphasia analysis: based on systemic structure of language. Luria identified the primarily impaired component (primary defect), the secondary systemic consequences of the primary defect, and tertiary compensatory reorganizations as parts of the syndrome.

The major differences in aphasia interpretation between his original proposals (1947) and his final proposals (1976) involved (a) a critical analysis of some contemporary western interpretations of aphasia, basically derived from Wernicke's ideas; (b) Luria seems to suggest that the original semantic aphasia is partially separated into two different aphasia syndromes; (c) a significant emphasis in linguistic issues is observed in his last publication.

Half of Luria's book (the whole Second Section) is devoted to analysis of conduction aphasia, transcortical motor aphasia, and amnesic (nominal) aphasia. He points out that conduction aphasia does not exist in a pure form, and the repetition defects are associated with an extended group of impairments. In particular, Luria emphasizes that repetition requires analysis not only of auditory (phonemic analysis) but also of verbal articulatory ability. Consequently, Luria states that repetition defects are

found not only in so-called conduction aphasia, but also in acoustic-mnesic aphasia; or more exactly, that two different subtypes of conduction aphasia should be separated: one of them associated with the afferent (kinesthetic) motor aphasia, and the other with acoustic-mnesic aphasia.

In his "Basic Problems of Neurolinguistics" the analysis of verbal communication is guided by this basic distinction between syntagmatic and paradigmatic elements of language. However, in his analysis he refers to five subgroups of syntagmatic disorders and five subgroups of paradigmatic disorders.

The fundamental and clinical understanding of brain organization of language was further advanced during the last decades after Luria's publications. Many of his ideas have been maintained and developed; some other proposals have been forgotten or remain controversial.

The idea that the language and in general, psychological processes represent brain functional systems has been integrated in contemporary cognitive neurosciences. Today it is considered as a basic idea, not as a specific author's proposal. Contemporary brain research has emphasized that cognitive processes are supported by brain systems or brain circuits.

Some Luria's interpretations in aphasia have been clearly supported in contemporary research, but some other ideas remain polemic. For instance, his point of view that language understanding defects in cases of left temporal damage are due to phoneme discrimination disturbances, verbal memory defects, and impairments in semantic associations represents today a kind of basic knowledge in aphasia. By the same token, his interpretation of dynamic aphasia as a disturbance in planning expressive language, and hence, close to a prefrontal (dysexecutive) syndrome affecting the language activity has been supported by different authors. On the other hand, his interpretation of other aphasia syndromes remains polemic; for instance, should the language defects observed in cases of left parietal damage be interpreted as a segmentary ideomotor apraxia or a disconnection syndrome? This question remains controversial. Similarly, a clear definition of semantic aphasia is required in the area.

*Conclusion.* The fundamental and clinical understanding of brain organization of language was further advanced during the last decades after Luria's publications. Many of his ideas have been maintained and

developed; some other proposals have been forgotten or remain controversial. There are two additional Luria's contributions to our understanding of aphasia, namely, assessment and rehabilitation of aphasia, but they are beyond the scope of this paper.

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# The effect of diet and mindful eating on emotional intelligence: a cross-cultural study

*Abstract.* This research investigates the effect of diet and mindful eating on emotional intelligence. Our first hypothesis states that vegetarian and non-vegetarian diets can influence emotional intelligence differently. The second hypothesis states that mindful eating affects emotional intelligence. Our sample consisted of 90 participants divided into three groups depending on their country of origin — Moroccan, Indian and Iraqi. The results demonstrated that the influence of diet on emotional intelligence was not statistically significant. We found a positive correlation between mindful eating and emotional intelligence in all the groups.

*Keywords:* Cross-cultural study, vegetarian, non-vegetarian, mindful eating, emotional intelligence.

*Introduction.* Behavioural effects of food is a topic that has for a long time attracted much scholarly interest. However, only recently, researchers have started exploring the relationship between nutrition and people's mental functioning and emotions [1]. It is known that certain foods and nutrients can produce specific chemical changes in the brain. Moreover, recent studies suggest that diets and meals should be taken in consideration when preparing to perform this or that task. For example, a low-protein, high-carbohydrate meal might not be the best idea before doing a complicated job that requires concentration and alertness. Food is a big part of our everyday life and our relationship with it is a never-ending story. It is also one of the keys to understanding our mental and emotional state.

This research focuses on the relationship between diet and emotional intelligence, on the one hand, and the relationship between mindful eating and emotional intelligence, on the other. Our first hypothesis states that vegetarian and non-vegetarian diets can have a different influence on emotional intelligence. The second hypothesis states that mindful eating affects emotional intelligence.

*Materials and methods.* To test the first hypothesis, we presented participants with an EQ test (Questionnaire modified by Suzanne Farmer et al. (c. 2013) UT Southwestern's Office of Development and Training) in order to measure their emotional intelligence. This test was given to two groups of participants, vegetarians and non-vegetarians. To find the influence of these two diets on emotional intelligence, we used the statistical method of one-way ANOVA. To test the second hypothesis, we used the mindful eating questionnaire [2]. To study the correlation of mindful eating with emotional intelligence, we used the method of Spearman's coefficient. Since our sample included people from different cultures, we were able to study the influence of the independent variables in a cross-cultural context.

Our sample consisted of 90 participants from three countries of origin — 30 Moroccans, 30 Indians and 30 Iraqi — aged 18–30. Each group was divided into two groups, 15 vegetarians and 15 non-vegetarians, in order to establish the comparison and study the first hypothesis. For the second hypothesis, we tested the difference on a cross-cultural basis without dividing the sample into smaller groups.

*Results.* We found that the influence of diet on emotional intelligence in all groups, contrary to our predictions, was not statistically significant. As for the second hypothesis, we found a positive correlation between mindful eating and emotional intelligence. The stability of results for this correlation was determined.

*Conclusion.* The results of this study can be used in further studies on mindful eating: for example, further research can be done to show the effect of mindful eating on cognitive processes. The influence of vegetarian and non-vegetarian diets on emotional intelligence can also be reinvestigated on larger groups. Moreover, the results of this study can be used to help people develop their emotional intelligence through mindful eating practices.

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# Using Luria's neuropsychological approach to functional brain organization to understanding epilepsy

*Abstract:* Seizures and epilepsy comprise disorders of the brain in which there are abnormal discharges of the brain cells (neurons) resulting in various observable behavioural disorders. Whilst the basic underlying neuropathology of these disorders is the same in all individuals, the manifestations in cognition, intellect, emotion, socialization and behaviour have variations across individuals.

*Keywords:* Epilepsy; Luria; Seizures; Neuron; Abnormal discharge; Behavioural, Cognitive and Emotional Disorders

*Introduction.* Seizures and epilepsies result from abnormal discharges of the brain. The abnormal neuronal discharge may be localized to one area of the brain or may generalize to the entire brain within and across hemispheres, provoking a varied pattern of cognitive and behavioural disturbances. Seizure classification systems were developed by the International League Against Epilepsy [1] and are generally distinguished as focal or generalized in nature. Behavioral symptoms may be localized to a specific area and generally fit into a partial or generalized category involving various patterns of behavioural, cognitive and motor symptoms. The behavioural manifestations which are usually observed, first by family or other people close to the patient, form a critical part or the diagnostic process in arriving at a specific type of epilepsy type. The advancement in neuroimaging, genetics and molecular biology is incorporated into identifying the seizure and epilepsy types and syndromes. Social and cultural contributions to describing and understanding of seizure phenomena play an important role in managing these problems. Therefore, the approach to neuropsychology of epilepsy proposed by Luria [2] in his

Syndrome Analysis, as articulated by Glozman [3] and Zinchenko & Pervichko [4], focuses on observing and analyzing the structure of each administered psychological task, the types of errors that are produced, and the anticipation of conditions that minimize or overcome the identified deficits. Such approach affords a useful way of discussing and managing individual cases of epilepsy.

*Materials and Methods.* The patient of interest is a young woman, a nursing sister 28 years of age, initially diagnosed with pulmonary sarcoma that later metastasized to the right cerebral hemisphere. Sarcoidosis is a chronic inflammatory disorder. A Magnetic Resonance Imaging investigation revealed evidence of generalized cerebral atrophy that was especially pronounced in relation to temporal lobes with bilateral multiple white matter hyper-intensities noted bilaterally and prominence of 4$^{th}$ and supratentorial ventricular system that was consistent with cerebral atrophy. In addition, a degree of cerebellar atrophy was found. Apart from complaints of muscle weakness and headaches, as well optic disturbances, the patient was diagnosed with epileptic seizures that required management with **Levetiracetam** (trade name Keppra, 500mg taken twice daily). The patient reported cognitive problems that affected her work and daily living. Since the cognitive effects of neurosarcoidosis are poorly understood with limited research reported [5], the patient underwent comprehensive neuropsychological assessment that included the Luria Neuropsychological Assessment and Syndrome Analysis.

*Results.* Neuropsychological testing revealed overall low intellectual function, a probably decline from the estimated premorbid average range of intellectual functioning that was obtained from previous educational records. Significant syndrome inefficiencies were found in the domains of information processing speed, executive function (forming concepts, tracking and in verbal and visual abstraction abilities), auditory and visual memory (both words and narrative information), fluent language and in visuospatial organization of information. These findings are concordant with those reported by Pruter, Kunert, & Hoff [5]. However, the findings suggesting emotional disinhibition with irritability and anger may form another Luria Syndrome relating to Frontal Disinhibition [2]. Most important were the breakthrough seizures that the patient's spouse observed nocturnally with teeth biting, mild head jerking, mild

groaning sounds and amnesia for the events when she was questioned the next morning.

*Conclusions.* The findings of this case study, using Luria's Syndrome Analysis, highlight the usefulness of this assessment approach when investigating seizure and epilepsy patients with a positive medical history for neuropathology when making decisions for medical control and for recommendations in regard to self-care and work activities. Luria's Syndrome Analysis makes possible an analysis of underlying cognitive and emotional-behavioural problems that are unique to the patient's sociocultural history and therefore provides a basis for sound recommendations in the management of seizures and epilepsy and for daily activities.

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## Professional motives in primary school teachers

*Abstract.* The purpose of this study was to analyze the professional motives of primary school teachers and their relation to the teaching/learning process. This research relies on the historic-cultural paradigm and the activity theory, especially the categories of motives proposed by A. Leontiev and N. Talizina. The study was based on semi-structured interviews with a teacher and six students of the 6th grade of a private urban primary school. It also included analysis of their written narratives and a video recording of a class session. Our findings suggest a relationship between the teacher's motives and the students' learning process.

*Keywords:* motives, activity theory, historic-cultural approach, learning, primary school.

*Introduction.* The aim of this study was to analyze the hierarchy of motives in primary school teachers, given that motivations form an essential part of the daily activities of any educator. Teaching/learning is a rather complex process because human beings' actions are driven by an inner force coming from the motivational sphere, that is, any cognitive action has a motivational and affective component. Motivation constitutes the central core of personality. According to the activity theory, action is the object of psychological analysis and its elements can be either materialistic/external or psychic/internal. This theory is based on an integrative approach to motivated behaviour as an expression of personality, one's needs and motivations. What any activity is aimed at is defined as motivations [1]: in other words, motivation always comes from necessity. Starting from the 1970s, "new domains of activity, including professional activity, were accessed for further investigation" [2]. As a result, labor

 

activity began to be seen as a prototypical human activity. From the psychological perspective, professional motivation is a hierarchical system of motives behind the educator's behavior during teaching.

*Material and methods.* We conducted a qualitative study based on the application of five instruments: a semi-structured interview with a student; a semi-structured interview with a teacher; a student's written narrative; a teacher's writer narrative; and a video recording of a class session. Our analysis was based on the categories proposed by A. N. Leontiev and N. F. Talizina, which in turn refer to internal or cognitive motives (included in the teaching-learning activity), positive external motives (motives supporting this activity), neutral external motives (motives that do not significantly affect the teaching-learning activity) and external negative motives (motives that affect the activity negatively or disrupt it). A fundamental aspect of our study, from the perspective of the activity theory [3], is that the teaching/learning process is seen as an active process, involving both the teacher and the student. This is a dynamic, recursive and dialectic process, meaning that both the teacher and student are being formed and transformed in the course of their interactions.

Our study focused on the teacher and six students of the 6$^{th}$ grade of an urban private school, which uses an educational model based on the historic-cultural paradigm and activity theory. By applying the instruments described above, we sought to identify the motives (internal and external) that played the key role in shaping the teacher's and students' behavior and the teaching-learning process as a whole.

*Results.* When analyzing the student information, we observed two cases which exhibited inner positive motivation; nevertheless, given the developmental periodization, the guiding activity development is switched towards social interactions.

As for the teacher, our findings show a consolidated internal motive, as the teacher exhibited a strong commitment to teaching as a professional activity. The teacher also showed a proactive research capacity realized through continuous training. The teacher's positive emotions inspired his students, colleagues and the administration of the school.

*Conclusion.* As shown by Talizina, Solovieva and Quintanar [4], the activity theory in psychology opens new perspectives for studying education and development. However, to apply this model in an educational

environment is a challenging task. Our findings suggest a relationship between the teacher's motives and the students' learning process.

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# Biographical reflection and readiness to master age-related changes at a senior age*

*Abstract.* The article presents the results of an empirical study of psychological readiness to master age-related changes and biographical reflection in the elderly in the context of professional employment. A comparison of the level of biographical reflection and readiness for age-related changes in working and non-working pensioners was carried out, and the nature of the relationship between these phenomena was described.

*Keywords:* old age, biographical reflection, readiness to master age-related changes, professional employment.

*Introduction.* When studying mobility and professional health in seniors, the problem of the ratio of various components of psychological readiness for mobile behaviour is of great importance [1]. In this article, we will focus on the following question: what is the nature of the relationship between readiness to master age-related changes and biographical reflection in older people, if their level depends on professional employment. The readiness to master age-related changes is understood as an integrative mental formation which determines the person's awareness of the fact of their own aging and its acceptance, resulting in an active search for productive adaptation strategies [2]. Biographical reflection is defined as awareness and analysis of an individual's life path [3].

*Materials and methods.* The empirical study involved 272 residents of the city of Ekaterinburg and Sverdlovsk region (Russia) aged 55–80,

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who participated in the study on a voluntary basis. Two groups were singled out for comparison: non-working pensioners (144 people aged 55–80, average age: 67), working pensioners (128 people aged 55–74, average age: 61). The two key methods were used: M. V. Klementyeva's method for assessing the level of biographical reflection development [4] and the "Readiness to Master Age-Related Changes" questionnaire by N. S. Glukhanyuk and T. B. Sergeeva [2]. We also conducted a comparative analysis by applying the Mann-Whitney U-test and correlation analysis by using Spearman's Rank Correlation Coefficient as statistical methods.

*Results.* When we applied professional employment as a criterion for comparison of older people, we found a number of differences in their biographical reflection. For example, working pensioners demonstrate higher indicators of reflection on the life of others ($U = 10\,627$, $p = 0.047$) and their own life ($U = 11\,428$, $p = 0.001$), in particular in cognitive ($U = 10\,982$, $p = 0.011$) and personal components ($U = 11\,085.5$, $p = 0.007$). They are more inclined to evaluate their life events from an "impersonal" position, focusing on the existential criteria communicated by society and culture. Working pensioners are more prone to analyzing their lives, rethinking life objectives, and evaluating life events.

The readiness to master age-related changes among working and non-working pensioners is at the same level. Differences were found only in two out of twenty indicators of readiness — the cognitive aspect of the social component and the motivational aspect of the professional component. Non-working older people are more aware of age-related changes associated with the changes in their social status and attitudes of others. Continuing professional activity slows down this process and at the same time stimulates the search for strategies for adapting to the changes that occur in labour activities and professional roles due to retirement. In general, it can be concluded that at an old age, professional employment is no longer a factor that has a decisive impact on the level of psychological readiness to master age-related roles and tasks. Development of such readiness can be considered a normative objective for elderly people. Continuing or completing one's career contributes only to certain professionally significant components of readiness.

The analysis of the relationship between biographical reflection and readiness for age-related changes showed a similar picture in subsa-

mples of working and non-working pensioners. Therefore, the results of the correlation analysis will be described using the general sample. The main result is a positive correlation between the motivational level of readiness and the personal component of biographical reflection ($r = 0.176$, $p = 0.004$). Elderly people able to understand the meaning of life events, influence their life path, independently and responsibly formulate life objectives are more active in looking for ways to cope with age-related changes: physiological ($r = 0.264$, $p = 0.000$), social ($r = 0.138$, $p = 0.034$), personality-psychological ($r = 0.184$, $p = 0.004$), and professional ($r = 0.267$, $p = 0.000$).

*Conclusion.* The study showed that still-working seniors are more likely to analyze their own life events and life paths of others. At the same time, the psychological readiness to master age-related changes at an old age does not significantly depend on professional employment. Regardless of professional employment, motivational readiness to seek and use strategies for mastering age-related changes positively correlates with the personal component of biographical reflection, which manifests itself in the analysis of life goals and meanings of events in one's life.

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