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Digital Communication in Neuropsychology

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Дигитальная коммуникация в нейропсихологии

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Abstract. Situation of pandemic is a challenge for specialists. The paper shares the experience of the Research Center of Developmental Neuropsychology named after A. R. Luria in meeting this challenge and organizing specific forms of digital neuropsychological assessment and remediation of learning disable children. Positive and negative aspects of this form of neuropsychological work are analyzed.

Keywords: *COVID-19; Luria Research Center of Developmental Neuropsychology; digital neuropsychological assessment; digital remediation*

Аннотация. Ситуация пандемии — серьезный вызов для специалистов. В статье представлен опыт организации дигитального (с использованием цифровых технологий) нейропсихологического обследования и дигитальной коррекции детей с трудностями обучения в Научно-исследовательском центре детской нейропсихологии им. А. Р. Лурия. Анализируются позитивные и негативные аспекты этой формы нейропсихологической работы.

Ключевые слова: *COVID-19; Научно-исследовательский центр детской нейропсихологии им. А. Р. Лурия; дигитальное нейропсихологическое обследование; дигитальная коррекция*

Introduction

I will speak about digitalization, which is not natural, because all of us, we live now in a very unusual and awful situation of COVID, of pandemic in all countries all over the world. On March 28th, 2020, all our 4 offices of Moscow Research Center of Developmental Neuropsychology (*Fig. 1*) were locked for 3 months as well as all other educational institutions in Russia. And it was a very stressful situation for the administration of our Center. How to pay salaries to 57 stuff members? How to pay rent fees? How to pay bills?

Figure 1. The stuff of Research Center of Developmental Neuropsychology named after A. R. Luria

But we remember that we work in the Center named after A. R. Luria, officially named, and this honor was given for our Center after 15 years of work by the great-granddaughter-in-law of Luria officially. And at this moment we remembered that the slogan of our Center after Luria were his words: "Problems must be surmounted, and we do it" (*Fig. 2*).

Figure 2. Yu. P. Zinchenko, the dean of Psychology department of Moscow University, and Alyona Radkovskaya, the great-granddaughter of Luria, open the plate with words by Luria, which is now the slogan of our Center

And how to do it? Luria taught us how to do it. He taught that neuropsychological assessment can be done in any situation: at a patient's bed or in central Asia where he did the expedition at the years of 30s to study the influence of culture, and in particular, of education, on the development of higher cognitive functions. I have repeated this expedition in 2016 in Kamchatka which is Russian Far East (Glozman, 2018). It is the territory which is almost inaccessible (only with helicopters or armored carrier) regional centers or nomadic herdsmen in tundra (*Fig. 3*).

Figure 3. Lurian neuropsychological assessment in 2016 of nomadic herdsmen in Kamchatka tundra

So, as I said, on 28th of March the Center was locked till June, 30th, 2020. But on March, 31st, 2020 the first remediation session online with a learning disabled child took place. On 1st of April, 2020, remediation sessions online became frequent and normative in our Center. On 8th of April, 2020, the first neuropsychological assessments started online. On 17th of April, 2020, was the beginning of the online courses of postgraduate education in neuropsychology.

You see that the work in our Center includes 3 types of work: assessment, remediation, education, that are all based on the same Lurian theoretical foundations. Luria kept repeating that nothing could be more practical than a good theory.

Digital Assessment

From April 8th, 2020, to June 30th, 2020, 253 neuropsychological assessments were performed online. From July 2020 to August 2020, we conducted 60 % of assessments offline, 40 % of assessments online. From August 2020 till now 15 % of assessments are conducted online.

So, why this decrease? Because an assessment online has its advantages and difficulties.

The advantages:

- no geographic limitation for assessment;
- possibilities of assessment in a country house during holidays;
- saving time for child's transportation; protecting child, examiner and parents from heavy traffic fatigue;
- save space in the offices;
- many children (especially preschoolers) feel more quit at home;
- some objects or pets at home can help to organize communication with autistic or speechless child.

Most of specialists prefer to do the assessment offline due to *difficulties*:

- technical problems of not qualified internet users;
- not efficient internet communication in some distant regions;
- some tests (like tactile gnosis, stereognosis) are impossible online; some other tests need special online apps;
- it is difficult to assess online small children before 4 years old;
- it is not always possible to provide privacy and to exclude distractive influences.

Assessment online requires *special organization*:

- using Zoom or Skype, with communication with parents through WhatsApp and e-mail;
- parents must be present together with children;
- digital version of diagnostic material is needed;
- parents fill up and send the questionary of early development and Conner's scale before assessment;
- parents print some materials for assessment, sent by the examiner, like Proof test, Schulte's table, Benton's test and others;
- it is also necessary to organize the place of assessment: computer or notebook with comments application for drawing on the screen, mobile camera to see better the child movements;
- light and noise protected room;
- child's table cover should not be fragile (children should not be allowed to exercise at the glass table, they can break it); examiner's table cover should be dark;
- no external distractors in the room;
- parents should not be too close to the child and not interfere with the assessment;
- parents send the child's drawings or the filled test forms to the specialist.

The process of digital assessment online should be dynamic, include precise and short instructions, breaks for rest and qualification of symptoms, and, of course, communication with parents.

The main theoretical foundations of Lurian neuropsychological assessment are that "neuropsychological assessment must not be limited to a simple statement that one or another form of mental activity as affected. The investigation must be a qualitative (structural) analysis of the symptoms under study, specifying the observed defect and the factors causing it" (Luria, 1969, p. 306).

Also, we should not forget about Lurian cultural-historical approach to the neuropsychological assessment. The mono-causal approach is replaced now by a poly-causal analysis in the way to determine how different biological and social causes of dysontogenesis interact and determine the type of abnormal development in each child (Glozman, 2020).

A disease provokes first a trouble in the biological line of development, but it also interferes with the psychological and social child development: achievement of knowledge and skills, formation of personality. From the other side, a wrong or tardy psychological or educational action provokes a retardation or deviation of child functional systems.

It should be underlined that both online and offline neuropsychological assessments have preventive orientation, because we need to reveal children at risk of future disorders and to start the remediation program as soon as possible. It is never too early, never too late.

We can start by assessing young children or preschool children, using toys analogues of Lurian tests (*Fig. 4*). The older is the child, the more original Lurian tests we can conduct. But both (original Lurian tests and their toys analogues) preserve the great merit of Lurian tests — their polymodality. For example, with the help of this pyramid, we can study the child's movements, hand movements, color perception and size concept.

a

b

c

Figure 4. Toys analogues of Lurian tests: *a* — hand movements, color perception and size concept; *b* — visual memory; *c* — hand movements, naming, speech understanding (the child must name or show, who is going now to own house)

These tests for preschoolers were published by Airis-Press in *Neuropsychological Assessment of Preschool Children* (Glozman, Soboleva, & Titova, 2019) and translated into Portuguese language. Non-verbal behavior can also be investigated during an online assessment. The data obtained as a result of an online or offline assessment does not differ much, and are perfectly competitive with corporate research, it all depends on how much tests we have done.

The neuropsychologist's musts during digital assessment:

- time control;
- to structure the parents complains (needs for psychotherapist, neurologist, speech therapist, neuropsychologist help);
- to explain the parents their child's problems, its nature and causes;
- to determine child's week and strong mental abilities;
- to make a plan of complex remediation;
- to give the prognostics of remediation efficiency;
- to give recommendations for parent's interaction with the child at home.

All this can be done by a qualified specialist with equal success both online and offline.

Quality of a neuropsychological assessment includes mastery in neuropsychological tests, qualified analysis and description of results, good communication with parents. It is very important, because the child's assessment is not possible without communication with parents. First, you give emotional support to parents; also, you help the parents to realize own child's problems and to review own complains; third, to motivate the parents to make efforts in helping own child; to form a certitude in good perspectives of neuropsychological remediation.

Remediation

So, the next type of neuropsychological work done in our Center is remediation. Each remediation is preceded with a complex neuropsychological assessment. From April 2020 to August 2020 4750 sessions of neuropsychological remediation were conducted online. From August 2020 — August 2021 — 7560 sessions of neuropsychological remediation online. About 20 % of the whole number of remediation sessions were conducted at this period.

The same advantages and difficulties for the assessment which I have mentioned exist for the remediation.

The advantages:

- no geographic limitation for remediation;
- possibilities of remediation in a country house during holidays;
- saving time for child's transportation; protecting child, examiner and parents from heavy traffic fatigue;
- save space in the offices;

- many children (especially preschoolers) feel more quit at home;
- some objects or pets at home can help to organize communication with autistic or speechless child.

The *difficulties*:

- technical problems of not qualified internet users;
- not efficient internet communication in some distant regions;
- it is not always possible to provide privacy and to exclude distractive influences;
- limitation for sensory integration;
- lack of body contacts with a child during remediation, which is very important;
- lack of didactic means; mother's competence and readiness to help the teacher.

It should be underlined that both digital and offline remediation follow the same *principles of neuropsychological remediation*:

(1) Neuropsychological qualification of child's problems.
(2) Complex remediation (motor, cognitive, respiratory, and emotional) at each remediation session.
(3) Systemic remediation (remediation of all mental functions in spite of an isolated one: memory, speech, motility or knowledge acquisition).
(4) Emotional involvement and motivation of the child in the remediation process.
(5) Individualized remediation of each one child.
(6) At the beginning of remediation, the teacher performs himself the functions of the weak components, and then gradually transfers them to the child following the rules of interiorization: from common activity to an independent one, from an action mediated with external means to an internal one, from step-by-step analytic action to a global automatized one (Akhutina & Pylayeva, 2008).
(7) Mediated methods instead of direct training of underdeveloped functions.
(8) Interaction with the child's parents.
(9) Team approach in remediation.
(10) Play remediation.

Let me give some examples of digital complex (including respiratory) remediation. Teacher's icon when he gives instructions is on the picture (*Fig. 5*).

Of course, there is *lack of didactic means in digital remediation*. We try to surmount it. Parents can do didactic means themselves. For example, with plasticine or paper. You can also use a child's body to train letters images. The teacher gives instructions, the child follows (*Fig. 6*).

Possibilities of *remediation in a country house* during holidays — in order not to interrupt the remediation process open new options of sensory stimulation (*Fig. 7*).

Remediation together with mum: help and competition (*Fig. 8*).

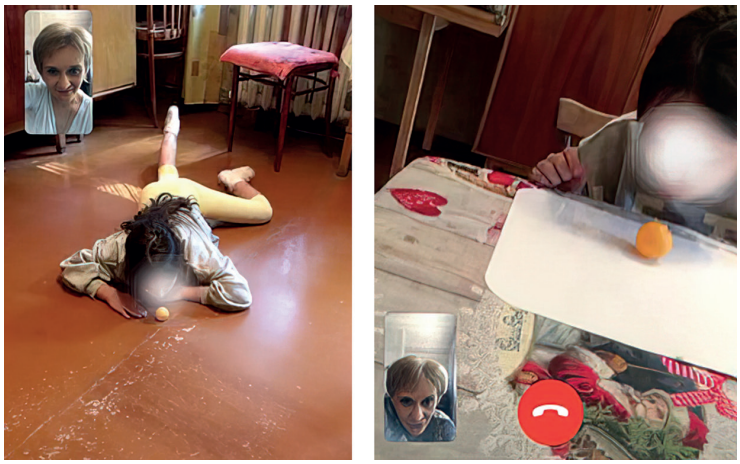


Figure 5. Digital respiratory remediation

Figure 6. Digital remediation of objects and letters images

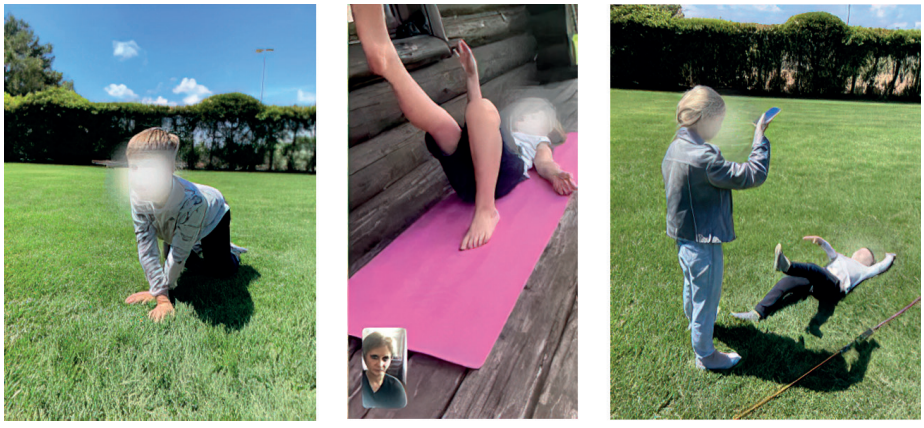


Figure 7. Remediation in a country house

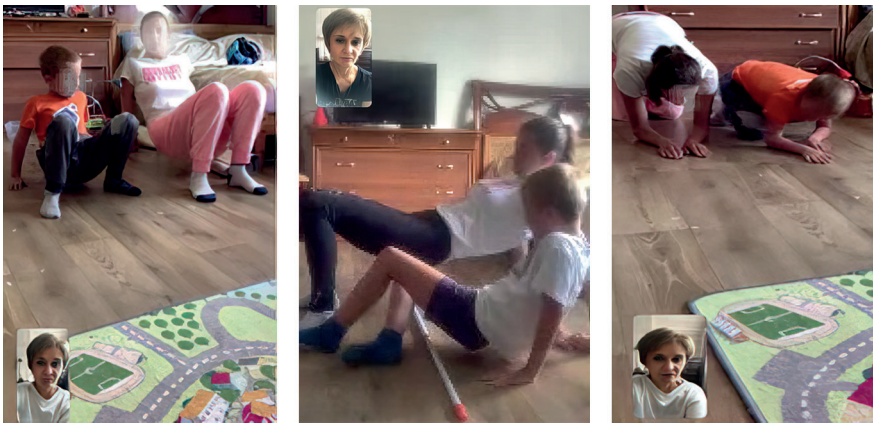


Figure 8. Remediation together with mum

Interaction with the child's parents in remediation online:

- we provide emotional support to parents;
- we help the parents to realize the positive changes in their child after remediation and to accept "the new child";
- we stimulate the parents to participate in remediation process;
- we create and maintain an active and optimistic life attitude of parents and the family unity.

Each remediation moment is a communication with an adult in order to make the child to understand the task and to motivate him to perform it. A. R. Luria said:

> If these motives are nonexistent, then the individual will not produce any thought, and there will not be any consecutive stages in shaping the thought into an unfolded utterance. In these cases, speech is limited to either affective exclamations (interjections) or to the echolalic repetition of utterances received, and the understanding of the perceived speech would not go far beyond the limits of the passive internalization of individual words or phrases being completely void and without the active searches which are but a necessary condition for the decoding of the message. (Luria, 1975, p. 53)

Parents should be prepared to remediation tasks. "I am your eyes; you are my hands." Before remediation parents must answer*:*

(1) Who from family can be always present at remediation sessions?
(2) Mother's competence in helping the neuropsychologist?
(3) Mother's responsibility in helping the neuropsychologist?
(4) Mother's ability to sustain the child's attention?
(5) Mother's contacts with the child?
(6) Mother's motility?
(7) Possibility to find necessary objects (carpet, toys and more).

The specialist must give the parent the necessary information about the exercises and plays and the rules of their performance. The parent must follow step by step the specialist's instructions, to follow all his comments, to control child's behavior during the session. If it is a play, it includes *the rewards*: offline it may be objects, but how can we reward the child online? This is possible:

- digital pictures or short movies, sent to parents;
- child's preferences are discussed with parents;
- if the exercise trained is performed with mistakes, the child receives 1/2 of the picture.

Also, there should be not only rewards for a child, but also rewards for his parent. Remediation session is often stressful for his parent. He can be unsure of himself. Our task is to support him.

We need to say to the parents that each child needs to be accepted, respected and protected. A child with a chronic unsuccess at school must experience a feeling of success to increase own self-estimation and self-credit.

Pets at home are a new and efficient option of online remediation. Pets can help to motivate communication of the child, for example, cats and dogs that live with a child or with a teacher. How to meet each other? The *Figure 9* shows the moment of meeting, for example, the teacher's dog and the child's cat. You can ask the name of the pet and child answers. This is especially important for children with autism.

Figure 9. Meeting a pet

All motor tasks can be *evaluated by both teacher and pet*. If we do the exercise with a dog, it is much more effective. Dogs are your helpers in this case, the same goes for cats. You can also involve toys in the exercise (*Fig. 10*).

Dogs are very efficient for motor tasks. For example, when the dog is down, we look at it and think what should I do to make my stomach looking down as in my dog? See *Figure 11*.

Figure 10. Formation of space representations up-down

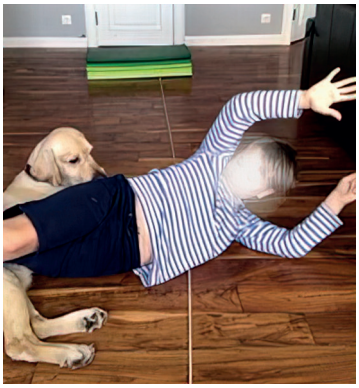


Figure 11. Counting: how many legs we have together?

Online remediation always follows *the principle of play remediation:* play remediation assures the emotional inclusion of the child in the interaction and increases his motivation; in a play the child's attention is oriented to a game rule instead of trained cognitive and motor skills. It permits not to fix difficulties and to avoid tension and fear not to be successful; a game increases child's general activity, positive emotions protect the child from mental surcharges (play makes never tiered) and gives the impression that learning is easy, that is forms finally the unity of affections and intelligence, upon L. S. Vygotsky.

Here are some examples of games in digital remediation. We can use the digital format of games, but we can also create games ourselves (*Fig. 12*).

For emotional perception, we can attach wings to a cow, this is a moment of surprise.

Another example is "Who is hiding there?" (*Fig. 13*). The child must propose different letters to guess.

As for the *complex remediation of babies* (*Fig. 14*), also at home we conduct respiratory remediation, successive activity training, development of graphic skills, training of tactile perception.

Figure 12. Who is there? Visual perception training (we take off one tablet after other until the child recognizes the toy)

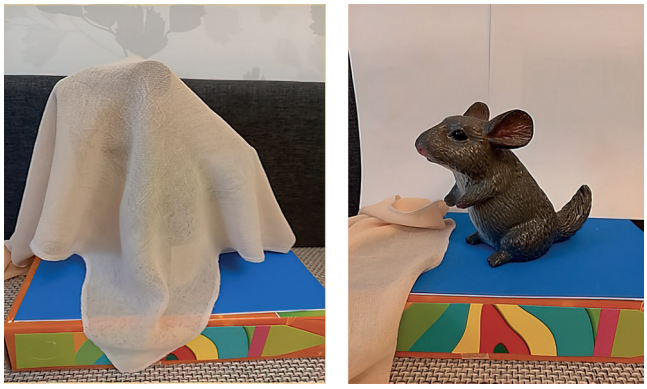
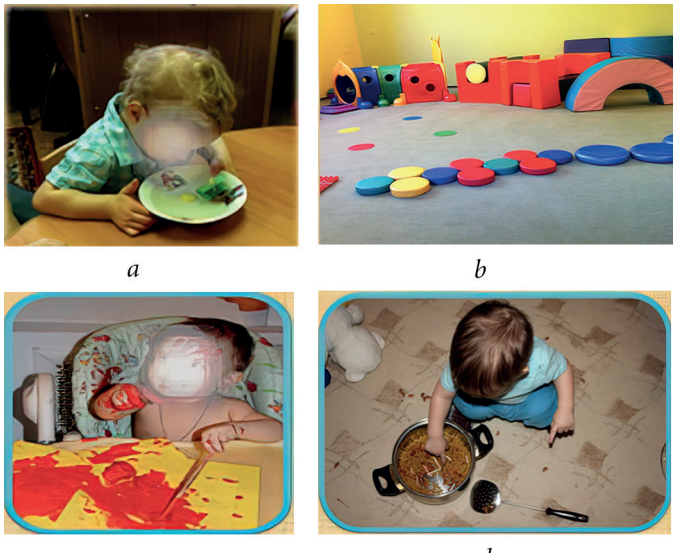


Figure 13. Remediation of dysgraphia



a *b*

c *d*

Figure 14. Complex remediation of babies: *a* — respiratory remediation; *b* — successive activity training; *c* — development of graphic skills; *d* — training of tactile perception

Neuropsychological remediation online is our new reality — a challenge for all specialists of our Center. It was a challenge to acquire new professional competences, new techniques. Online form made remediation accessible for a greater quantity of children if their parents had no time to come to the Center or lived far from Moscow.

We could surmount summer break when children could lose the received knowledge and skills. Many parents considered digital remediation less efficient. They were afraid by own poor neuropsychological competence, by necessity to retain the child at the screen. But the practice with creative approach proved the high efficiency of digital remediation, confirmed by parents.

The lockdown period was a creative period for our specialists. We needed to change the forms of work, to use new means of motivation and rewards, to use objects present at home or to make the necessary objects ourselves. The best animators of neuropsychological remediation online proved to be the pets (cats and dogs) living at home of teacher and that of children.

There are two opinions: external causes act through the prism of internal conditions (Rubinstein, 1973) and the internal (the subject) acts through the external and in doing so changes himself (Leontiev, 1977). The digital communication proves this second theoretical statement.

Education

Research Center of Development Neuropsychology named after A. R. Luria does a lot for postgraduate education of neuropsychologists and we finally went from offline to online:

- up to 2017 — only offline;
- 2017–2019 — theoretical webinars (many students complained that they could not come to Moscow);
- 2019 — March 2020 — theoretical webinars + practical "intensives" — only 42 students could attend offline, because they had to come to Moscow and study all day long, from morning to evening;
- April 2020 till now — education only online (40 hours course). We had 229 students from 11 countries and 82 cities in Russia.

Now we prefer the online form. Nevertheless, it has also difficulties.

Advantages for students: no geographic limitations for participation; education online does not interfere with the main job; saving time for transportation; saving money; supplementary means for learning (videos).

Advantages for teachers: saving time and efforts for transportation; save space in the offices; increased number of students.

Difficulties: technical problems in not qualified internet users; not efficient internet communication in some distant regions; time zones; reorganization of teaching process (mobile camera, a new system of exams, to switch off all microphones, communication with students via chat). Now the exams are conducted online, it is easy, but in practice we

sometimes cannot qualify a student clearly enough. For this we use a video assessment session, I interrupt and comment on it, and my examinee must describe the child and give quantitative and qualitative assessment and recommendations to the parents. This video session also includes a discussion with parents. In digital lectures, we turn off the microphones so that there is less noise, and we communicate in chat; it is not always possible to exclude distractive influences and noises; high challenge for teacher's creativity and experience.

What online courses do our Center have? Firstly, neuropsychological assessment of children (Janna Glozman) — 7 groups during the pandemic period; secondly, neuropsychological remediation of children (Svetlana Karepanova) — 7 groups during the pandemic period; third, neuropsychological assessment of preschoolers (Julia Titova) — 3 groups during the pandemic period.

And now I pass to the **Conclusion**. The last International School of Neuropsychology is called *Digitalization of Personality*, but it is actually not about the digitalization of personality but about a personality's challenge in digitalization.

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