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A reproduction of Luria' s expedition to Central Asia

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Background. About 40 years ago, Alexander Luria published in 1974 his world known book "On the historical development of cognitive processes". It describes the data of an experimental study of mental functions in illiterate people living in the peripheral parts of Uzbekistan (Central Asia). A.R. Luria together with L.S. Vygotsky worked out the design of this study, performed in 1931-1933. The study proved a significant influence of social life and literacy on the structure of logical reasoning. In the conclusion to this book Luria indicates, that his colleagues often advised him to repeat this study in 40 years, but the author did not considered it reasonable, as radical changes in cultural and educational level of Asia population must equalize the differences in cognitive processes with people from central regions. Is it so?

Study design. A group of psychologists from Moscow, Belgorod and Petropavlovsk Kamchatsky performed an integrated study of endogenous populations of the north of Kamchatka peninsula living in regional centers or nomadic herdsmen in tundra. Thirty subjects (17 men and 13 females) all with primary education in Russian schools were assessed using the same tests on classification and generalization, as Luria did, together with Luria neuropsychological battery, and projective drawing on life attitudes.

Conclusion. Life values of endogenous peoples are more nature centered than in Russians from central regions. Nomadic and settled subgroups with the same level of education differed in some neuropsychological tests, revealing the influence of social life conditions. It confirms Luria's idea about cultural determination of cognitive processes but also shows that life conditions are as important cultural factors as literacy.

***Keywords*:** cultural-historical psychology; social life; cognitive processes; life values.

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Introduction

Let us remind first the question by J. Bruner (2015): how psychology turned toward cultural explication? Upon the author, it was not migration into radically different cultures by refugees from Europe, nor the rise of more subjective anthropology in America, but "a worldwide movement in psychology against mindless, mechanistic theory" (p. 8). The role of Vygotsky in this movement was primordial because he was very sensitive to worldwide cultural change that was taking place during his life.

During the late 1920s and early 1930s, L.S. Vygotsky and A.R. Luria put the task to prove experimentally the impact of cultural factors on human cognition, theoretically exposed already in their "Studies on the history of behavior" (Vygotsky, Luria, 1930) and confirmed in developmental researches (Luria, 1929, Vygotsky, 1930/1982). Both scholars planned two expeditions to the peripheral parts of Uzbekistan (Central Asia) in 1931 and 1933 to investigate the influence of culture, and in particular, of education, on the development of higher cognitive functions (Luria, 1931, 1933, 1971, 1974, 1976). The illness did not permitted Vygotsky to go with Luria but they were in permanent correspondence, discussing all the results as well as the report of Luria in the second Moscow medical institute in June 1931. One of the major results was that illiterate people are bound in their reasoning to the concrete situations of real life. Consequently, they have difficulties in abstract reasoning, in solving problems that are beyond their personal experience. The effect of culture on cognition was not limited to verbal abilities: perceptual and spatial abilities in illiterate people were quite different than in Western people (Luria, 1971). For instance, Uzbek herdsmen living in non-urban environments were much less prone to visual illusions (remember the famous telegram sent to Vygotsky by Luria from his expedition to central Asia: "Uzbeks do not have illusions!").

It proved a significant influence of social life and literacy on the main components of human conscience.

L.S. Vygotsky highly appreciated these results, "leading our common work further and rising our previous studies (such as types of relations in the mediated memorizing and reasoning) to a higher level… This is a golden fund of our experiences that can be easily open by the theoretical key" (from the letter of Vygotsky to Luria on 20.06.1931). "I have received the Report #3 and the protocols of experiences. It was my happiest day in the last time. It is really a key to open locks of many psychological problems. This is my impression. The crucial significance of these experiences is without doubts for me. Our new approach is now achieved (by you) not only in idea, but in practice, in experience" (from the letter of Vygotsky to Luria on 11.07.1931). "In our studies it is an enormous, decisive step, turning to a new point of view. In any European study such an expedition would be an event… Nobody never did a systematic study of system relations in historical psychology, in the life phylogenies from any point of view. It is a new, (unexpected for me, I must say), happy and brilliant chapter to our clinical and developmental works (from the letter of Vygotsky to Luria on 1.8.1931 — underlined by L.S. Vygotsky) (Puzyrey, 2004). Vygotsky did such a conclusion concerning the report of Luria about the expedition in Uzbekistan: "In another cultural environment another psychology" (Vygotsky, 2017, p. 222).

This is also the basis for Luria's neuropsychology. "For Luria the brain was an instrument for making culture accessible to mind. … for him the "internal-

ization of culture" was a mastering of possible worlds" (J. Bruner, 2005, p. XII). With any doubts, Vygotsky and Luria were the pioneers in cross-cultural studies that became very popular from the 1950th. For instance, it was shown that different languages conceptualize the world in a different way (Whorf, 1956). Significant variations in the patterns of cognitive abilities across national and cultural groups have been described in psychology, anthropology, and neuropsychology (Koshmanova, 2007; Kan, Wicherts, Dolan, & van der Maas, 2013; Gangestad & Simpson, 2016; Matsumoto & Juang, 2016). Ecological conditions and cultural practices are significantly associated with the development of perceptual, spatial, and constructional skills (Cole & Means, 1986). For instance, Rosenqvist, J. et al. (2017) examined language, face memory, emotions recognition, theory of mind, and visuospatial processing in 3-to 15-year-old children from three countries: Finland, Italy, and the United States. The authors revealed significant differences in performance on the tasks between the countries. The differences were more pronounced in the younger than in older children. Furthermore, some subtests showed greater country effects than others. One can expect larger differences with non-western cultures. The study by Polyakov, V.M., Kolesnikov, S.I., Rychkova, L.V. (2017) found periods of sensibilization in child development to environment influence. Such an influence proved to be related with interhemispheric interaction (Nikolayeva, Grekova, 2017) Tikhomirova, T.N., Lysenkova, I.A &, Malykh, S.B. (2017) revealed specific interrelations between cognitive functioning and academic success in schoolchildren in different countries. With this, schooled subjects significantly outperform illiterate individuals in cognitive testing, and schooling can be regarded as a sub-culture itself (Berry, 1979; Ardila, 1995, 2016). Cornelious, S. and Caspi, A. (1987) found that educational level has a substantial relationship with performance on verbal meaning tests but is not systematically related to everyday problem solving

All these data of contemporary cross-cultural studies confirm the statement of Vygotsky that " in the process of historical development the social man [obshchestvenny chelovek] changes the methods and devices of his behavior, transforms natural instincts and functions, and develops and creates new forms of behavior — specifically cultural" (Vygotsky, 1997, p. 18).

Luria wrote in his book: "Our study was performed in the peripheral parts of Uzbekistan: in kishlaks (small Asian villages) and djailau (mountain pastures). The similar results could be received in peripheral villages of Russia, in northern minorities or in herdsmen of the northeast of Siberia" (Luria, 1974, p.3). The last was exactly the task of our study.

Methods

A group of psychologists from Moscow, Belgorod and Petropavlovsk Kamchatsky Universities performed an integrated psychological study of endogenous populations of the north of Kamchatka peninsula living in almost inaccessible (only with helicopter or armored carrier) regional centers or nomadic herdsmen in tundra. The *aims* of the expedition were to compare cognitive functions and life attitudes by nomadic and settled subgroups of endogenous peoples from the point of view of social nature of human mentality and conscience.

Kamchatka is a polyethnic region and all inhabitants of Kamchatka have a long historical experience to live in a polyethnic environment. The figure 1 illustrates the ethnic distribution in the studied population of subjects.

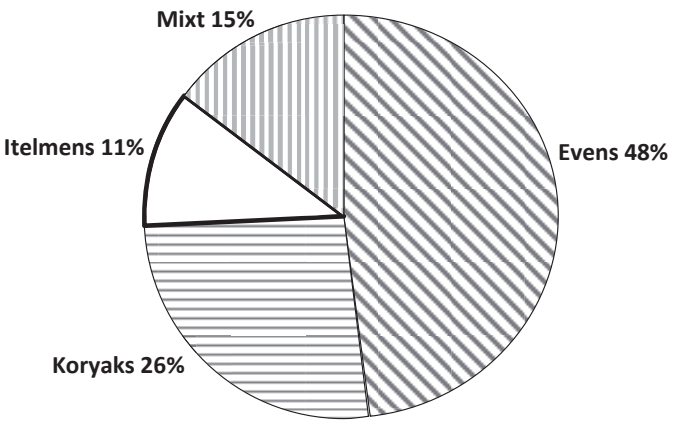

Figure 1. Ethnic distribution in the studied population of subjects

Thirty *subjects* (17 men and 13 females) (10 nomadic herdsmen and 20 inhabitants of villages) were assessed using the same tests on classification and generalization, as Luria did, together with Luria neuropsychological battery, and projective drawings. All subjects (both nomadic and settled) had primary education in Russian schools.

The Table 1 shows gender and age distribution of subjects.

Table 1. Subjects characteristics

Gender distribution		**Age distribution**			
Male	Female	5–12	21–30	33–48	49–55
17	13	20%	26.7%	23.3%	30%

The assessment included the following *methods*:

- Comprehensive Luria's neuropsychological assessment, including Schulte's test (or proof test for preschoolers) to measure level of brain activity and of attention; motor tests (dynamic, kinesthetic, spatial, regulatory praxis, reciprocal coordination and drawing); tests on visual and spatial gnosis; tests on visual and motor memory; tests on expressive and impressive speech and writing; intellectual tests (understanding of verbal and pictured stories, tests on generalization, arithmetic problems solving) (Luria, 1973);
- Profile of hemispheric lateralization (Annett, 1970);
- Verbal fluency test (Benton et al., 1983);
- Pictures classification test (Luria, 1974);
- Luria's test of free questions (Luria, 1974)

- Projective drawing (free drawing — "what do you want to share with me" and "your representations of happiness (joy), grief, friend, enemy»). We did not analyze the quality of the drawings but only the titles given to each drawing.

Results

Let's analyze first the main results of neuropsychological assessment (Table 2).

Table 2. Significant differences in neuropsychological tests between nomadic herdsmen and villages inhabitants (% of symptoms in each subgroup)

Symptom	Inhabitants of villages	Nomadic herdsmen
Instability of brain activity	33%	25%
Defects of dynamic praxis (perseverations, stereotypes)	10%	100 %
Defects of reciprocal coordination of movements	0	25%
Deficiency of visual memory	33%	75%
Deficiency of motor memory	22%	75%
Difficult story successive retelling while its good comprehension	37%	50%
Situational generalization instead of categorical	0	25%

We can see that in general, the results of neuropsychological assessment were worse in the subgroup of nomadic people to compare with village inhabitants with one exception for the symptom of instability of brain activity. In both subgroups, the subjects had good space representation, kinesthetic functions, and all gnostic functions. Nevertheless all subjects were bilingual; there were no defects of naming.

I all subjects we have determined the profile of *hemispheric lateralization*. The distribution was normative: 29 right handed and 1 left handed. However, it was shown in our previous studies (Danilova et al., 2016), that human laterality — a preference or higher locomotive or sensor performance — is a multidimensional trait, and crossed laterality, especially intermodal (sensor-motor) has negative effect on cognitive functioning.

Table 3. Types of crossed laterality (% of subjects in each subgroup)

Inhabitants of villages		Nomadic herdsmen	
Intermodal crossed laterality	**Intramodal crossed laterality**	**Intermodal crossed laterality**	**Intramodal crossed laterality**
37%	63%	25%	75%

Intermodal crossed laterality was more frequent in village inhabitants than in nomadic herdsmen: so, in the last ones the lateral differentiation of mental functions was more definite (Table 3).

Verbal fluency test revealed a predominance of semantically mediated verbal associations (plants) on general verbal activity in both subgroups of inhabitants of Kamchatka. With this, the verbal fluency was greater in village inhabitants than in nomadic herdsmen (Table 4). Both facts are a very evident evidence of social life conditions on cognitive functioning.

Table 4. Verbal fluency differences (middle number of verbal associations per minute)

Inhabitants of villages		**Nomadic herdsmen**	
General verbal activity	**Semantically mediated verbal associations**	**General verbal activity**	**Semantically mediated verbal associations**
27	32	22	25

The results of *pictures classification test* were very similar to those described by A.R. Luria (1974). As well as illiterate inhabitants of Central Asia, the nomadic herdsmen with primary school education did situation-based generalization instead of categorical one. For instance, a picture of a hat is in the same group with a man and a dog, because "a man wears a hat, which is done from a dog". A man is put together with the objects, that are fabricated by him or with domestic animals, while wild animals are excluded from this group. A thermometer is unified with a baby, a book with a table, or a horse with a physician, because it can be a veterinary which treats the horse. It reminds the example of Luria: "You can't put together a bottle and glasses, because they rust. You have to cover them with paper" (Luria, 1976, p.64).

This tendency for situation-based generalization was more pronounced in nomadic herdsmen, than in village inhabitants with the same level of education. So, the practical life conditions are more important for reasoning functioning than the level of education.

The results in Luria's *test of free questions* ("Ask me any 3 questions") were quite different from Luria's data. The illiterate people living in the peripheral parts of Uzbekistan refused to put any questions or asked only practical questions (like: "My horse is stolen, how to get for long distances?"), without motivation to receive some new knowledge. The nomadic inhabitants of the peripheral parts of Kamchatka put different questions: "Does the monument to Lenin in Moscow still exist?", "What is new in clubs?", "Are the old buildings repaired in the city?" and so on. These data reflect the radical changes in cultural and educational level of people of Kamchatka.

An *analysis of projective drawings* revealed some common features and some age differences. A common feature for all age groups was a feeling of unity with nature. All free drawings included nature with a very positive attitude to it. A friend is tundra, river, a wild animal from tundra or a good hunter. Small children who live permanently in villages draw as a friend a computer or a schoolmate. An enemy is

an enemy of nature, technical means (for adults), alcohol, drugs, smoking, war, a lazy person, a week person, a hunter on a helicopter, a fire in tundra. If the inhabitants of the central regions of Russia associated happiness with money (Obukhova et al., 2017), no one from Kamchatka actualized happiness as financial values, even more, some of inhabitants of Kamchatka considered money (credit) to be a grief, in the same line as an illness of a relative, a fire, death, war, aggression, solitude. By contrast, the happiness is the life; "to lay on the grass in the forest, looking the stars on the sky, in silence and peace"; the birth of the child; family, harmony; sun.

We compared free drawings of 5–12 years old children from Kamchatka villages with drawings of urban children from central regions of Russia, matched by age and gender (Obukhova et al., 2017):

- Urban children have larger social experience, than rural Siberian children do: such topics as roller skates, a cruise with mam, a visit to delphinium, TV heroes, animals from tales and so on.
- The attitude to nature of Kamchatka children is positive, that of urban children is more negative, for instance, the volcanos were present in many drawings by Kamchatka children, but only a boy from Moscow drew an erupting volcano.
- The urban children do more polychromic drawings with more details than rural children do.
- The rural children unlike urban ones did not represent humans in their drawings.
- The animals in rural children drawings are realistic, those from urban children drawings are anthropomorphic (in human clothes, on two legs, in human situations, like a New Year party).
- Urban children from central regions of Russia often draw different arms (bomb, tank, gun), not represented in any rural drawing. It indicates a greater aggressivity of urban children.
- Urban children drawings are more introspective than in rural children: often the titles of drawings include such words as "I want…", "I love…", "I will be …"

So, we see the influence of social conditions on cognitive functions and life attitudes and values both in adults and in children.

Conclusions

The cultural-historical approach forces us to reconsider the concept of the social brain as a social and cultural determinant and regulator of brain functioning (Glozman & Krukov, 2013).

The cooperation of outstanding psychologists L.S. Vygotsky and A.R. Luria on theoretical, experimental, and clinical work was an historic event, a scientific phenomenon, and a turning point in the development of psychological science (Glozman, 2016)/

"The pioneer research proposed and carried out by Luria and Vygotsky in Uzbekistan, over 70 years ago, and the concept of extracortical organization of higher

mental functions, has become particularly important in the understanding of cultural differences in cognition" (Kotik-Friedgut & Ardila, 2005, p. 57). It was proved first by research in Central Asia and in 85 years later by the described expedition in Kamchatka.

In the conclusion to his book Luria (1974) indicates, that his colleagues often advised him to repeat this study in 40 years, but the author did not considered it reasonable, as radical changes in cultural and educational level of Asia population must equalize the differences in cognitive processes with people from central regions. However, in the 1930th Luria's neuropsychological battery still did not exist. The comprehensive Luria's neuropsychological assessment permits to reveal socially determined differences of cognitive functioning between nomadic herdsmen and rural inhabitants with the same level of education, such as: successive organization of movements and actions, vocabulary, visual images, generalization processes and more. It correlates with Peter Tulviste finding that the effects of schooling decreased over the years (Tulviste, 1978).

The life attitudes and values of inhabitants of Kamchatka, living in specific and difficult life conditions, differ from those in people from central regions of Russia. Namely, they realize the unique character of own culture, national values and common interests of own ethnic group with others living at the same place.

"It is already a challenge to understand the past while living in a different world …This is also a framework in which Vygotsky's time and theory are to be understood as hermeneutic tools for understanding ourselves, our scientific theories and, most importantly, our societies and cultures that shape us as we shape them" (Jovanović, 2015, p.29-30). "And, again not surprisingly, we became newly aware of the subtle and powerful relationship between mind and culture" (Bruner, 2015, p. 9).

Limitations

In our expedition there were a limited number of independent study samples with a wide variation in the methodologies used across studies. These findings can inform future studies and prove the validity of cross-cultural studies nevertheless the changes in cultural and educational level of national minorities.

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