European Journal of Geography Volume 9, Number 4:51-61, December 2018

EXPLORATION OF GEOGRAPHICAL SPACE-TIME AS A FACTOR OF THE EVOLUTION OF NATURE AND CULTURE

Alina N. PARANINA
Herzen State Pedagogical University of Russia, Department of Geography, St. Petersburg, Russia
galina_paranina@mail.ru

Roman V. PARANIN
Herzen State Pedagogical University of Russia, Department of Geography, St. Petersburg, Russia
paranin.roman@yandex.ru

Abstract

On the basis of field and cameral studies of objects of prehistoric cultural heritage, the authors analyzed the influence of navigation (movement and navigation in geographical space-time) on the processes of biological and over-biological adaptation in anthropogenic (2.62 million years). The article presents some results of the research. It is shown that instrumental astronomical navigation distinguishes human from other biological species. The cold and changeable climate of the anthropogen forced a human to move, to go beyond the limits of the developed landscape, to improve the technologies of navigation in space-time. The first tools of astronomical observations could be sustainable elements of the landscape, created by the energy of nature: mountains, rocks, large rock cracks. The human energy was later added to these objects: man-made additions, artificial objects, graphic signs. The most advanced ancient technology was the shadow of the gnomon of a sundial-calendar (object or own figure). Astronomical signs are abstract in shape (points, lines, circles), but are specific in content (as they perform the function of changing space-time). Continuous use of abstract signs in the life support system could improve the thinking of the ancient human. The navigation concept and new research methods can be applied to solving problems of archeology, anthropology, semiotics, and paleo-linguistics. For example, in explaining the cosmic content of traditional cultures, to clarify the semantics of ancient signs and images, the selection of the invariant of Nostratic languages.

***Keywords**: information, geographical space, cultural heritage, culture geography, anthropogenesis*

1. INTRODUCTION

The geography of culture considers all forms of suprabiological human adaptation and geocultural space as an integral system of "man-nature", where two lines of connection are inseparable: "man in nature" and "nature in man" [Streletsky, 2005]. This direction of research is developed by the authors of the navigation concept of information modeling of the world, which reveals the algorithms and principles of coding information of natural processes in signs and knowledge [Paranina, 2011-2017; Paranina and Paranin, 2009-2017]. All this contributes to the improvement of the modern scientific worldview [Barkova, 2017].

Knowledge of the genesis of the system of "man-nature" is the fundamental basis for strategic thinking [González and Pascual, 2016]

It is known that the evolution of the organic world proceeded in the direction of mastering the geographical space, and in the system of adaptation, the navigation in space-time is of paramount importance. The mechanisms of navigation reactions are studied in detail in biology: in plants, photoperiodism, photo- and geotropism; in animals – navigation by the Sun and Moon, the stars, the magnetic field and the field of gravity of the Earth. Since the birth of the biosphere, organisms have been guided by planetary-cosmic cycles, since landscapes are very dynamic, therefore, are not reliable. The authors of the article state that the specific feature of human is that he first used tools in astronomical navigation. The purpose of the article is to show that instrumental navigation in geographical space-time could serve as a basis for the development of intelligence and all achievements of culture.

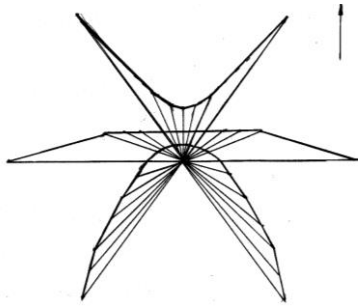
2. BACKGROUND

2.1 Navigation in space-time is the basis of signs-knowledge

In the 20th century, archeologists proved the correlation between the azimuths of the abstract geometric signs of the Onega petroglyphs (6000 years old, the North-West of Russia, the Republic of Karelia) and the azimuths of the uprises/descents of the Sun and the Moon forming the basis of the calendar. The authors of the article succeeded in developing an algorithm for accurate marking of these images using the shadow of a vertical gnomon (a gnomon is any object whose shadow is used to observe cosmic light sources) [Paranina and Paranin, 2017a, 2017b].

At the beginning of the 21st century independent research got evidence of primary astronomical designation for the labyrinths of the Stone and Bronze Age (stone structures and images) of different regions of Europe: Yu.A. Chekmenev – in the Voronezh region (on the Don River, between the villages of Kostenki and Divnogorje), T.N. Khetagurov in North Ossetia-Alania (Machchesk village), S. Galovart in Portugal (Mogor, Galicia), the authors of the article - on the coasts of the White Sea [Paranina and Paranin, 2009]. A detailed calendar, which decodes the pattern of labyrinths, also provides a shadow of the vertical gnomon.

Modeling has shown that the shadow of gnomon forms the geometric basis (matrix) of modern sign systems – alphabets, figures, signs and images (Fig. 1).



A - winter solstice: the shadows lie in the northern sector of the site, because sunrises/sunsets occur in the southern half of the horizon;

B - spring and autumn equinox: the shadows form a line W-E;

C - summer solstice: shadows cover the southern sector of the site

Figure 1. Schemes of areas covered with a shadow (gnomon - the point in the center)

The diagram shows that the chart of the shadow of one day can be the basis of zoomorphic images: the tail fin of fish (the line of shadows is the rays), the wings (lines are feathers), horns (lines – annual increment). In the days of solstices and equinoxes, the geometric basis of solar signs (radial and triangular) and six-armed Shiva is created; a more frequent drawing

(for example, once a month) gives the image of the multi-armed Shiva or the shape of the open lotus. During the year, the shadow covers an area in the form of a labrys (two-sided, two-legged ax). It is worth mentioning that the diagram of the shadow of the T- and L-shaped objects provides solar signs in the form of a swastika and once a day forms a straight line (on a polar day – two times). When installing such items crossbar along the meridian (similar to Christian crosses), the direct shape of the shadow indicates north and noon. In ancient times, the functions of the gnomon could be performed by T-shaped megaliths and staffs with a L-shaped top, for example: the taula of Minorca Island in the arch, the Bolero Islands, aged about 3000 years; T-shaped stele of Gebekli-Tepe in Turkey, 11,500 years; curved tops of the staffs of Olenostrovsky burial grounds of Karelia and Murmansk region, aged from 3000 to 10,000 years. Thus, the navigation in the geographical space-time by the Sun creates *geometric signs – abstract in shape but specific in content.* Since the periodic repeatability of the connection "light signal – sign" and reinforcement (including food) shape a stable connection (reflex), the question of the influence of navigation technologies on the processes of sapientation – the development of abstract thinking and the formation of *Homo sapiens* – is logical [Paranina and Paranin, 2017c].

2.2 The development of navigation technologies and the evolution of geocultural space

Based on the research of cultural multilayered prehistoric heritage objects, the authors of the article developed a reconstruction of the stages of the development of navigation technologies [Paranina, 2017]. The selected stages differ in the level of development of the geographical space, the nature of the tools and the degree of change in the natural substrate: *the landscape stage* (astronomical tools – stable natural objects, technologies – direct sighting, i.e. observation of the intersection of astronomical objects of the horizon line), *the stage of local networks* (tools – large artificial objects, technologies of direct and reverse sighting), *the stage of regional networks* (tool – gnomon, reverse sighting technology, i.e. observation of the movement of the shadow of an object or a focused ray), *the historical stage* (the creation of portable navigation tools, the development of modeling), *the modern stage* (new technologies of navigation and communication).

It is obvious that the study of navigational capabilities of prehistoric objects of cultural heritage makes it possible to obtain information about nature (relief of the surface, the position of the tropics and polar circles, the tilt of the Earth's axis) and culture (the development of technologies, communications, etc.) at the time of creation of these objects. In addition, the development of navigation technologies could affect the development of intelligence.

3. NAVIGATION CRITERION OF ANTHROPOGENESIS AND SAPIENTATION

3.1 Instrumental navigation as the basis for human biological evolution

We will compare two models – the development of navigation technologies and the main stages of anthropogenesis (Table 1). The landscape stage of development of navigation technologies can be correlated with representatives of *Homo gabilis*. This will make it possible to distinguish between the levels of development of the earliest man, *the Australopithecus* (who is also characterized by erectness) and modern monkeys that create tools that are identical to *the choppers* of Olduvai archeological culture (artificial plates made of stone for digging roots, breaking nuts, etc. [Paranina and Paranin, 2017b]).

Fixation of astronomically significant directions resistant to destruction and movement of material requires considerable effort – this problem corresponds to the growth and posture of *Homo erectus*. Archaeological evidence of ubiquitous distribution, the possibility of movement on rafts along the coast, the development of anatomical features associated with the physical development of the aquatic environment (the structure of the nasopharynx) – have a direct link to navigation. The considerable mobility of man explains the need for artificial marking of the landscape. The use of large material is dictated by the tasks of visualization and secure attachment of the sighting points. In the near-horizon observatories (landscape and artificial), time is marked by the intersection of certain horizon points with astronomical objects. The first astronomical tools – the natural elements of the landscape, resistant to destruction and movement, and man-made introductions, distinguished the working area, the sight points and lines. These technologies are simple, like topographical marking of a straight line using three poles or a targeting system „barrel sight – bead".

Table 1. Navigation technologies as anthropogenesis factor

Ancestors of modern people	Age and main characteristics of the discoveries	Archaeological, biological evidence		Stages of development of navigation technologies
		General culture	Navigation practice	
Anthropoid apes (Australopithecus)	5-3 mln years – 900-400 thousand years Height 120-140 cm, skull volume 500-600 cm³	Monkeys use stone tools	**Biological clock, photoperiodism, nomadic instinct is a manifestation of genetic memory ***	Marking of the territory (introduction): artificial violations, traces of life
Homo habilis *(Homo gabilis)*	about 2 mln years Skull volume 680 cm³	Stone tools	*Allocation of information-significant objects in the landscape and space* **	Landscape tool: relief forms, geological structures
Archanthropes. Homo erectus *(Pithecanthropus, Sinanthropus)*	600-400 thousand years From 2 mln to 200 thousand years. Height 170 см, brain volume 900-1100 cm³, arch of foot, differences of hands	Used fire, speech appeared	**Settlement of continents, development of the aquatic environment, construction of rafts.** *Megalithic culture*	Creation of large tools, markers of geo-territory and local networks (observatories)
Neanderthals - *Homo nean-derthallensis*	300-150 thousand years Height 155-158 cm, brain volume 1400 см³, developed hand	Made fire	**Calendar, goods exchange**	Development of reverse sighting technologies
Cro-Magnon *(Homo sapiens)*	≈50 thousand years Height 180 cm, brain volume 1600 cm³	Modern type	**Calendar, "shamanism"**	Gnomon, regional networks

Text selection: * in bold - modern data ** in italics - author's reconstruction

Observations are accompanied by a count of days between the onset of astronomical events (cycles of the sun, the moon, planets, constellations). Implementation of megalithic technologies could be facilitated by a periodic increase in the rate of axial rotation of the Earth, when the mass of organisms is larger, and the weight of stones is less than modern ones. It is important to take into account that in this case the mode of illumination of the surface also changes (the polar circle moves to the pole, and the tropic to the equator) and the duration of the year (the annual cycle takes place in a shorter time).

The bedrock (surface planes and structures, cracks) and relief (linear forms, inhomogeneities of the physical horizon) can serve for the long-term fulfillment of information functions in the Earth's space. The simple *level of technology*, the *worldview of creators* who economically spend their energy and spare the natural substrate (they react subtly to any change in the landscape and realize the power of subtle natural processes capable of creating and destroying the great), as well as the age of the tools, all this explains the paradox that modern human does not distinguish these objects in the landscape. In anthropomorphic and zoomorphic rocks, unstable boulders (seid) and other well-marked landscapes, we see the play of nature, and numerous facts of the fulfillment of objects (often, revered) of calendar functions are perceived as an accident.

At the stages of instrumental use of large natural and artificial objects, local astronomical and geodetic networks are created, coordination with astronomical landmarks of human life cycles and feeding populations is carried out, correlation of phenological stages and astronomical seasons. Perhaps this technology of using the calendar goes back to the custom of meeting the sunrise on the main calendar holidays of the year. Minor findings of the calendar appointment relating to this period were not noted, probably because the information was transmitted orally or recorded on the body, clothes / objects of everyday life and was not preserved (and, if preserved, is perceived by the researchers as an ornament).

Transition to the backsight by the shadow can be presented in two stages: *at the first stage*, the sighting lines of the objects, tuned to observe the holy point on the horizon, begin to work in a way of mutual covering the shadow – this is easier for the eyes and more accurate; *at the second stage*, it becomes obvious that to obtain a shadow, a mono-tool (including its own figure) is sufficient and the marking of the surrounding space (or, anthropometric measurement system) is enough.

Observation of the shadow provides fixation of the entire trajectory of astronomical landmarks – from sunrise to sunset; exact definition of the culmination – the measured middle: dividing the day into parts – hours. This inevitably forms an idea of the basic properties of a rectangular triangle, the sphericity of the Earth, and geographical latitude, which makes it possible to create regional navigation networks and mini-tools, leading to the development of applied geometry and the widespread practical use of astronomical signs (the dissemination of new more accurate measurement technologies in mass culture).

The development of reverse sighting technologies in terms of the amount of new knowledge can be compared with an "information explosion", so the processing by an *ancient human - Neanderthal* and late representatives of *Homo erectus* of an increased volume of navigational information well explains another leap in the development of abstract thinking that formed a man of the modern type *H. sapiens.* Existing archaeological evidence are sufficient to justify the value of navigation at this stage (Table 1): 1. Finds of perfect calendars, the creation of which must be preceded by a long evolution of navigation technologies; 2. Evidence of the development of commodity exchange, which is due to the sufficient reliability of regional communication systems; 3. Signs of shamanism, as a manifestation of specialization in the performance of information function in conditions of significant accumulation of knowledge.

3.2 The role of the navigation concept

3.2.1 Additional marker of anthropogenesis

The navigation criterion helps to solve the ***problem of insufficiency of the existing markers of anthropogenesis.*** The shortage of arguments is most acute for the explanation of two key points of anthropogenesis: 1 - the formation of the genus Homo and 2 - the appearance of the species *Homo sapiens*.

First of all, the classical triad "upright position – free upper limbs - the creation of tools", on which the basis for the emergence of the phenomenon of abstract thinking was based, is now considered not quite sufficient – based on data on the ascent of Australopithecus and observations of the instrumental activity and intelligence of modern monkeys. Adopting navigation technologies as the main factor of success in interspecific and intraspecific competition frees researchers and from temptation to seek for such exotic factors as cannibalism, in the search of an evolutionary factor. In parallel, other problems are solved: the inconsistency of new archaeological finds of ancient and ancient artifacts of calendar appointment with the existing characteristics of the stages of anthropogenesis; the scarcity of the source base in the presence of unexplored factual material (primarily in the landscape), etc.

The navigational criterion of sapientation also removes the contradictions of the model of evolution carried out within the framework of the Marxist tradition to justify the social functions of labor and capital. Anthropologists rightly point out that the formula "labor created man" is fulfilled only if the australopithecines (anthropoid apes) worked, but labor appears much later – in a developed human society. In addition, the economic concept of anthropogenesis does not explain, for example, the motivations (necessity) of transition to abstract forms of information – it is known that the person is dominated by figurative thinking, and for the transfer of useful information, there are many ways described in social life forms.

3.2.1 Reconstruction of sign systems "from below" – from the semiotic of nature

On the basis of the navigation concept of anthropogenesis, an equally acute interdisciplinary problem formulated in linguistics is solved: ***the problem of the nostratic relationship of languages***. *The invariant of the sign system can be justified by the global invariant* of relations in the "Earth-to-Cosmos" system, and the basis for reconstructions can be the semiotics of light, which is both a source of energy and information. This way of reconstruction "from below" – from the sources of the sign system, can essentially supplement the methods of reconstruction "from above", based on a statistical analysis of the vertices of the branched "tree of languages".

The process of speech formation (glottogenesis) can be considered as a result of the development of abstract thinking based on navigation in space-time. In this case, the first signs and concepts were formed as a result of measurement and designation of astronomical events, and subsequently found wide application to the surrounding reality. Since the first tool was a landscape, and the second was a gnomon figure, the first layer of concepts could be the basis for designating the sides of the horizon and major toponyms, and the second – for body parts, universal tools (such as a spear and rope) and clothing elements.

Modern archeological, historical, ethnographic data and models of evolutionary geography are consistent with this assumption: 1. The time from the appearance of the first human (about 2.5 million years ago) to the modern human (60-100 thousand years ago) refers to the Pleistocene – the cold period of the anthropogen, when the decline in productivity and the continuous restructuring of landscapes prompted the human ancestors to actively explore the

geographical space; 2. Paleolithic, the period before settling, occupies 99% of the time of anthropogenesis, and in the conditions of the movement, navigation methods inevitably develop (finds of sticks and spears in peat bogs of Western Europe refer to the period of 300 thousand years ago, therefore, technologies of reverse sighting are mastered); 3. The ancient names of rivers and regions indicate the position / direction in the spatial system – east, west, north, south [Paranin, 1990, 1998]. It is worth mentioning that two systems of measurement converge on the growth of a person: anthropometric (average human height, fathom, is divided by 2, 4, etc.) and astronomical (the tablets of Babylon retained the calculation of the shadow of a person's figure, measured by foot / feet for 7 climates northern hemisphere, according to oral testimonies of residents of Karelia, Leningrad and Ryazan region, this technology was used until the middle of the twentieth century).

3.2.3 Deepening the structure of the geocultural space

The navigation concept deepens the notion of a geocultural space in two aspects: in the temporal to the origins, and in the functional, - revealing the ways of communication.

It is well known that revered stones, legends, traditional clothing and decorations preserved the notion of a symbolic connection with the Cosmos. However, *in the geography of culture, symbolism is seen as the result of a wide practice connected with the problems of maintenance of life.* Today, more and more sacred objects of ancient culture are revealed as tools for navigation. The solar calendar was located, as a rule, on the head: for example, a shawl with a 12-ray pattern was deciphered by ethnographers as an annual circle; hornets (including, three-legged) in our interpretation – a solar calendar clock. The active lunar calendar could be executed as a breast ornament. The stability of the arrangement of jewelry instruments described in ethnographic studies was reflected in the fairy tales ("The crescent under the scythe glitters, and in the forehead – the star burns"), and undoubtedly conveys the subordination of astronomical objects that provide order in space, the surrounding landscape and human life.

A number of plots of the Mari epos related to navigation were noted by I.A. Kulyazheva, the collector of the private ethnographic collection "The Museum on Ileti" in Zvenigovo district of Mari El: 1. The handkerchief left on the tree / pole symbolizes the end of the life path (and indicates the burial place); 2. Embroidery around the edges of the handkerchief given by the bride and a gold needle – show the chosen one a way home (like a camp and a map); 3. The legend that the history of the people was written on towels (embroidery as the first letter) [Kaliev, 2003]. In this case, the tree, the pole and the golden needle represent the solar gnomon, and the embroidery on the scarf is an archaic analogue of the limb / dial marking.

In Alanya, the epic hero of Ouistyrzhi, the patron of travelers, is associated with the summer solstice and reflects in his name the connection with astronomy (-*aster*-). The preservation of the mental connection with the cosmos reflects the contemporary art of Ossetia: *"The whole world is my temple, love is my shrine, the universe is my homeland ..."* (K. Khetagurov). However, here again the symbolism is based on the practice of astronomical navigation: according to the researcher of the Ossetian culture, T.N. Khetagurov preserved the *customs* to follow the sunrise / sunset points associated with the holidays (Dargavs village), the *names* of geographical objects (for example, the mountain "Solntsevorot") and various *astronomical tools*, including labyrinth calendar in Makhchesk [Khetagurov, 2004].

A widespread practice of navigation is well explained by the well-known fact that *autochthonous peoples and ancient philosophical systems derive their origins from the Space.* Often, the relationship of epic heroes fits into the framework of the technology of navigation in space-time: in Mari, the unity of brothers Yumo and Keremet can be understood as the

relations of inseparable phenomena of light and shadow: the first is *universal* good, cosmic energy, the second is *unmanifested* good, the inhabitant of sacred groves, the intermediary in the reference to Space. According to legend, the heartsick lover Keremet eternally follows Yumo's daughter, *Yumin udyr*, who descended to Earth through the top of the birch on the silk ribbon of the sunbeam-swing (the world tree can perform the function of a gnomon, together with Yumo and Keremet they represent the elements of a sundial-calendar , in which the ray of the sun seems to "swing" to the top of the vertical instrument). Similarly, the Egyptian triangle, known as the union of Osiris, Isis and their son Gore (or, time) can be represented.

The antagonistic elements of myths can reflect the stage of struggle and the replacement of technology (the victory of Apollo the prophet of paths over the Python mountain, the choice of Isis in favor of Osiris, but not Set, embodying the technologies preceding the gnomon). At the same time, the ancient worldview emphasizes the unity of opposing elements, complementing each other. In the philosophy of yin-yang: yang – dynamic, yin – static; yang – begets, yin – nurtures; yang – vertical, yin – horizontal. Probably, in this concept there is a reflection of solar technology: *yang – gnomon, yin –shadow*, whose form is "*information*" (*shape of yin or shadow shape).*

It can be noted that in the oldest cosmogonic myths of the peoples of the world, planetary-cosmic-scale forces appear, but the description is given through a natural or social model-association. For example, creating a world out of an egg or with the participation of birds, fish, animals reflects the relationship of space and landscape conditions. This layer of ideas could be formed on the basis of technologies related to the *observation* of space objects. And as the moment of ethnic (or supraethnic) consolidation of the legend, the birth of the World from Chaos is often indicated, which, in essence, means the establishment of boundaries and the status of a center based on *measurement*, i.e. creation of a regional network. Such possibilities are provided only by the technology of the gnomon.

The elements of navigation technologies and regional systems of different time and coverage preserved in culture show that the *processes of territorial organization proceeded everywhere, dynamically, repeatedly.* Traces of the ancient civilizations have been preserved in the form of sacral centers (natural and man-made), ancient marking of communications.

4. DISCUSSION OF RESULTS: THE ROLE OF SPATIAL THINKING IN SUSTAINABLE DEVELOPMENT

The main annual holiday of the Mari "All-Mari Prayers" can give an understanding of the cosmic essence of the ancient faith, uniting ecological ethics and scientific knowledge. The holiday takes place in the autumn after the completion of all economic activities, in the sacred grove. *Sacred groves* are described by many peoples of the world. There are historical data on the groves of India, Babylon, Egypt and Lebanon, the Indians of America and the Aborigines of Australia, Strabo described such groves in the Hyperborean peoples (i.e., dwelling to the North-East from Ancient Greece). Some peoples of Europe, Siberia and the Caucasus have preserved a living tradition – a grove is a place where they come for collective communication to the sky. In the center of the Mari grove there can be a group of trees marking the sides of the world, and at the central tree, - the symbol of the world pillar, there can be a flat stone – a table for gifts.

It is gifts, not sacrifices, which people bring for a collective meal in honor of the powerful forces of nature. It is typical that ancient beliefs (the so-called pagan, and in fact, ecological or natural) are attributed to the current market stereotype of relations (according to the scheme "give-and-take"), while archaic folk cultures represent an example of cooperative relations in the system "man-society-nature" [Lavonen, 2000; Paranina and Paranin, 2017c].

For example, in Mari it is customary: together with *the Sun* to get up and work, and in autumn – *to share with it a crop*; therefore the products brought into the sacred groves are called *gifts*. It is also important to take into account the rational component of this ritual – on fresh, autumn air (sometimes, already frosty), people gathering from neighboring villages need to warm up and reinforce their strength.

They bring pastry with them, and the poultry and meat are cooked on fire. The sacred meaning of the gifts is important: legends, the bird and the horse, which on that day fed the people, will rise to heaven and help the forces of nature. Geese will travel along the Milky Way and will scatter their fluff so that travelers on Earth can well distinguish this important landmark in the sky. A strong young horse will replace his comrade, who for a whole year is tired of raising the chariot of the Sun to a high sky, exactly 40 days after the day of prayers - at the winter solstice ... Thus, at this celebration a person helps the Cosmos to maintain the world order! The cosmic meaning is filled with all the main holidays of the year: the day of the origin of the universe, the days of the birth of the Earth and the Sun, the birth of Life.

It is interesting that the Mari preserved the rituals that Strabo described in the Hyperborean peoples: the voluntary departure of the elderly who were "fed up with life", burial in the trees, jokes and laughter during the rite of remembrance.

In 2016, the priests (or „karts") of the Mari people (priests elected by voting) appealed to the presidents of the three countries with a proposal to create a TV channel and a series of television programs for those who are looking for a way out of the impasse called the ecological and spiritual crisis ... But what can this archaic faith do today, in the age of computer and space technology? To answer this question, one should understand - what prevents people from feeling happy and why people from different regions of the world turn to the religions of India, Tibet, go to the North in search of signs of ancient Hyperborea. Perhaps, the reason is the fatigue with narrow professional specialization, the discrepancy between scientific knowledge and religious beliefs, disagreement with the surrounding world and with oneself? Probably the energy of a person is spent on overcoming these contradictions, barriers, and the person forgets about their greatness and great destiny - to give happiness and be happy?

The national culture of the Mari preserved for us an aboriginal, originally inherent in man, a *non-antagonistic* world view. The unity of significant parts, living and inert, winter and summer, bright success and hard lessons of destiny, is integrity. If "every person is a part of Yumo, that is, part of the perfect divine Nature, "then such a person will not bow down, betray and humiliate himself and others, he will not forget about dignity in the face of the most difficult trials. Ancient culture suggests to remember that every person is beautiful and repeat to all people the parting words that the Mari say to each young couple: "Live like Gods!". Guests from different regions of Russia come to the republic for the holidays, many people recall that similar traditions existed on neighboring and remote lands, but were destroyed recently - along with the way of rural life.

Thus, folk traditions, rooted in the astronomical achievements of the Stone Age and preserving a living connection with the Space, are the key to the origins of modern culture, based on the highest values of Nature and Life. This is an invaluable experience of respectful attitude to oneself, to our ancestors and the whole surrounding world - a time-tested and, maybe, the only reliable basis for sustainable development.

In the geographic research, modeling of the future relies on global development trends and regional differences [Jakobi, 2014; Battisti, 2017]. However, most modern models do not take into account that in an integrated system, each element performs its rational function, and "a world without borders" means the diversity and free connection of all elements. Diversity protects against resonances, while external and internal connections provide flowage. Therefore, the open free world is more stable [Paranina and Paranin, 2017c].

The results of our research show that the global invariant of connections in the nature-man system, which is the basis of biological evolution and cultural tradition, should also be taken into account. A person without tradition in perspective can align with artificial intelligence and it is impossible to predict who will win the competition.

5. CONCLUSIONS

Interdisciplinary research in the geography of culture fills the blanks in the modern scientific picture of the world, reveals the rational origins of ancient culture and, as a consequence, deprives the basis of outdated interpretations that have come out of the Middle Ages and aimed at hoaxing, ideologizing and politicizing the results of humanitarian research.

The theoretical position of the navigation concept of information modeling of the world can be the theoretical basis for research in the field of semiotics, cultural studies, geopolitics:

1. The information process "light signal – the sign – the image – the myth" fills these concepts with a new meaning based on the performed function (sign – the graphic model of the process, the image – the artistic interpretation of the sign, the myth – the plot description of the natural process and the technology of its cognition).

2. The algorithm of actions "astronomical navigation – an abstract geometric sign – practical application" explains the cosmic origins of culture: the primary navigational purpose of old and ancient objects of cultural heritage, the astronomical basis of sign systems and cosmism of thought, originally inherent in man and preserved in traditional folk culture.

3. The navigation concept of information modeling of the world showed that the flow of solar energy, through the system of navigation, measurement and designation, formed a traditional culture throughout the history of mankind. Consequently, the negentropic role of culture can be understood by analogy with the photosynthesis of green plants, which nourishes life and creates reserves of solar energy on the Earth.

Geographical knowledge in ancient times became the basis of the bio-social evolution of human and did not lose its relevance today – they provide navigation in the information space, allow to organize and expand it.

REFERENCES

Barkova, E.V. 2017. Relation to the world as an ecophilosophical problem. *Journal Law and practice*: 2: 135-142.

Battisti, G. 2017. Iconographies of globalisation. *European Journal of Geography*: 8 (2): 121-131.

González, M., Pascual, M. 2016. Strategic spatial thinking and change. *European Journal of Geography*: 7 (1): 24-35.

Grigoriev, A.A., Paranina, G.N. 2012. Cultural geography: step to the basics? *Journal Izvestia of the St. Petersburg State University. Series Geology-Geography*: 7: 50-64.

Jakobi, A. 2014. Determining geographical inequalities of information accessibiliti and usage: the case of Hungar. *European Journal of Geography*: 5 (1): 48-61.

Kaliev, Yu.A. 2003. *Mythological consciousness of the Mari. Phenomenology of the traditional world view*. Yoshkar-Ola: Mari State University.

Lavonen, N.A. 2000. *Table in the beliefs of the Karelians*. Petrozavodsk: Periodicals.

Paranin, V.I. 1990. *Historical Geography of the chronicle of Russia*. Petrozavodsk: Kareliya.

Paranin, V.I. 1998. *The history of the barbarians*. St. Petersburg: Publishing House of the Russian Geographical Society (RGO).

Paranina, G.N. 2011. Northern Labirinths – gnomon and models of geographical space. *Elsevier. Procedia. Social and Behavioral Sciences*: 19: 593-601.

Paranina, G.N. 2012. Northern Labyrinths in North Europe: A Key to Time and Space. *In Environment and Ecology in the Mediterranean Region*, ed. R. Efe, 393-408. Newcastle upon Tyne: Cambridge Scholars Publishing.

Paranina, A.N. 2014. Navigation in Space-Time as the Basis for Information Modeling. *Journal Scientific Research Publishing, Archaeological Discovery*: 3 (2): 83-89.

Paranina, A. 2015. Gnomon as sours of information on planet rhythms. *Intern. Journal Geomate*: 10: 1815-1821.

Paranina, A. 2017. Archaeological objects as elements informational life support system and as sources of information about evolution of environment. *Intern. Journal Geomate*: 35: 100-107.

Paranina, G.N., Paranin, R.V. 2009. Northern labyrinths as astronomical tool in the in-relation to samples of mythology and cultural symbols. *Journal Society. Environment. Development*: 13 (4): 120-134.

Paranina, A.N., Paranin, R.V. 2015. Navigation in geographical space as a factor of development of civilizations. *Proceedings ICAE-2015, 7-10 May, 2015*: 211-215. Tbilisi-Batumi: Tbilisi State University.

Paranina, A.N., Paranin, R.V. 2016. Sign as a mapping of geographical space-time: the possibilities of interdisciplinary research. *Journal Society. Environment. Development*: 40 (3): 95-101.

Paranina, A.N., Paranin, R.V. 2017a. Information in geographical space as the basis of crossdisciplinary researches in culture geography *European Journal of Geography*: 8 (3): 67-77.

Paranina, A.N., Paranin, R.V. 2017b. Primary navigation purpose of petroglyphs: reconstruction on the basis of the gnomon. O*ALib Journal is an all-in-one open access journal*: 4: 1-13

Paranina, A.N., Paranin, R.V. 2017c. Space measurement of mankind – a basis of interaction of geography and an ekofilosofa. *Journal Law and Practice*: 52 (3): 191-197.

Streletsky, V.N. 2005. Geo-space in cultural geography. Humanitarian geography. *Journal Scientific and cultural and educational almanac*: 2: 330-332.

Khetagurov, T.N. 2004. Archeoastronomical properties of the Mach labyrinth. Rhythms of history. *Proceedings archeology, ethnography, folklore*. 2.1: 113-126. Vladikavkaz: North Ossetian State University.

https://www.nkj.ru/news/29791/. Science and Life. Monkeys make tools, like ancient people. (October 22, 2016)

https://doi.org/10.1016/j.jhevol.2016.05.002, Journal of Human Evolution,Vol. 96, Archaeological excavation of wild macaque stone tools. (July, 2016)