Man and environment in the Palaeolithic
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The increasing complexity of the cultural environment

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Abstract

The concept of "cultural environment" is used usually as an intuitive one and various authors include their own sense in it. It would be useful to try to formulate this concept systematically for the possibility of comparing materials and ideas and for interpreting them. I propose to construct this concept on the basis of a new, multilevel approach to the evolutionary processes. The first step may be by dividing the cultural environment into two parts: the material artefacts (such as nests, burrows, etc. of animals and shelters, tools, graves of humans) and spiritual artefacts (such as the behavioural patterns of animals that are not innate and translated by learning and taboos, traditions, etc. of humans).

The main changes in the cultural environment happened in the spiritual part. The artefacts of it are not saved and that creates a special difficulty and necessity for an interdisciplinary investigation of the problem of man and environment in the Palaeolithic.

The earliest fossil remains of anatomically modern *Homo sapiens* that can be accurately dated to about 100,000 years ago are from Israel. These early humans had modern supralaryngeal vocal tracts and brain mechanisms that are necessary to produce human speech and syntax. They probably had a language that made use of a complex syntax and reasoning ability.

The main complication of the cultural environment during the Palaeolithic was caused by the accumulation of a spiritual construction within certain human societies, improvement of syntax that was possible thanks the usage of language and the origin of specific human altruism, as one pillar of human morality.

Key words: Evolution, multilevel approach, speech, syntax, culture

One of the most significant moments of human evolution was the origin and complication of cultural environment. This concept has been usually described as intuitively obvious and various authors have included their own sense into it.

I think that it will be useful to try to formulate this concept systematically for the possibility of comparing materials and ideas as well as for interpreting them. I propose to construct the concept of cultural environment on the basis of a new understanding of evolutionary processes as multilevel ones.

The theory of evolution has changed during several last decades, thanks to a new stage of biological knowledge, especially on the processes of development (ontogenesis) and behaviour, its mechanisms, regularities and evolution. A new synthesis had been formulated by Wilson (1975) as an attempt to synthize Neo-Darwinism and new knowledge on behaviour. The necessity for a reconstruction of Neo-Darwinian theory of evolution has been noted by many authors (Brandon 1988; Eldridge 1985; Eldridge & Salthe 1984; Krassilov 1986; Leonovičová 1985; Lovtrup 1984; Odling-Smee & Plotkin 1984; Piaget 1979; Plotkin 1988; Plotkin & Odling-Smee 1981; Stearns & Roelle 1986; Vrba & Eldridge 1984; Wilson 1975; Wolsky & Issekutz-Wolsky 1976).

One of the most interesting and suitable approaches for understanding human evolution is the multilevel one on evolutionary processes. There are three levels of the evolutionary processes and each of them has its own means of coding, collecting and translating of information. These three levels are the results of evolution and appeared step by step with the increasing complexity of living systems. The first basic level is genetic, and Neo-Darwinian theory of evolution is practically

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the reflection of its regularities and mechanisms.

Second is the epigenetic level that appeared with the origin of multicellular organisms that begin their existence from one cell and during ontogenesis developed into a multicellular complex system. This level is limited by the rules of the basic genetical level, but has its own relatively independent regularities. The main characterictic of these regularities is that two levels of determination have influenced the direction and the results of ontogenetical development of organisms: these are the genom and the environment. For example, the sex of individuals is determined genetically, but there are some species for with this determination is influenced also by environment. The science that studies ontogeny or "developmental biology" is one that has very quickly progressed and now many specialists in the field write about the necessity to reconstruct the Neo-Darwinian theory of evolution (see, e.g. Lovtrup 1984). This level of the evolutionary processes has limited value because it is valid for the multicellular species only. If, on the basic genetic level, the supra-individual system is the population, for this level of evolutionary processes the supra-individual system is the family group. Sexual selection is the form of selection on this level of evolution.

From the moment of the origin of life living systems have evolved and at the same time the regularities of the processes of evolution evolved with them. Step by step the new, more complicated living system could adapt themselves towards the environment by new means. It is possible to divide all adaptation into three forms accordingly to the temporal characteristics of environmental factors. Towards stabile factors, such as gravitation, organisms are adapted by morphology; towards the regularly changed factors, such as seasons or circadian rhythms, by function (physiology) and towards fast and unregularly changed factors by behaviour. Only a relatively small group of ogranisms can adapt themselves towards their environment by behaviour. The descendants of two branches of animals have behaviour as an effective part of their adaptive system, and both of them live in societies. There are: descendants of *Protostomia - Insects - Hymenopthera* and *Isoptera* (ants, bees, wasps and termites) and descendants of *Deuterostomia - Mammals and Birds*.

With the origin of animal societies the new behavioural level of evolution has originated. The supra-individual system of this level of evolution is society. It is necessary to note that asociety of animals is not the same as a population, in spite of the fact that in many cases the members of these two systems are the same. But, population is the system on the basis of a commom genofond, and society is the system on the basis of behaviour. For this level of evolutionary processes, group selection is the special form of selection that supports the evolution of society.

All three levels of the evolutionary processes have their own means for coding, collecting and translating of information.

The possibility of adaptation by behaviour needs first of all the ability to actively move in space "to" comfort, and "from" dangerous situations, and the ability of central nervous regulation for effecting mobility, as well as the ability of perceiving characters of the environment and recognizing change in the environment.

Behaviour became the reliable form of adaptation in two cases:

(1) For the organisms with a short life-time, these evolved a complicated system of hormonal regulation of ontogenesis, where each individual organism developed according to the actual needs of the society and is well adaptad morphologically for certain form of behaviour (such as soldiers of ants, or workers of bees, etc.). But this case is not the subject of our interest, because it is different from the behavioural adaptation of high vertebrates (included man).

(2) The second case of behavioural adaptation is the behaviour of higher vertebrates (mammals and birds) that is the main interest of mine in this paper, because of its close connection with the origin and evolution of human society. Warm-blooded vertebrates can use behaviour as an effective part of their adaptive system because the stable inner temperature of the body provides the reliability of behavioural patterns (low vertebrates are able to reason - see Krushinsky 1986), but the speed of nervous processes is not stable because it is determined by the temperature of the body and could not be the means of survival).

Human society originated as a continuation of the societies of pre-human ape-like ancestors and the specifity of these societies can be reconstructed by the study of societies of primates, especially the closer relatives of man-apes.

On this level of evolutionary processes the information is coded by means of symbolic signals and a society of animals can collect the

common experiences and all members of the groups can use the new behavioural patterns by imitation (and other ways of learning). This warehouse of infor-mation can exist and grows as long as this society exists. If all members of a certain society died this pool of information becomes extinct.

For the systematic definition of the concept of "cultural environment" the first step may be the dividing of the cultural environment into two parts: (i) The material artefacts of animals and human activity (such as the nests, burrows, beavers' buildings, etc. of animals and shelters, tools, graves of human), and (ii) the spiritual artefacts, such as behavioural patterns of animals, that are not innate, but could be learned and human traditions, taboos, myths, tales, etc.

The process of the cultural environment becoming more complex during the Palaeolithic was realized on the sphere of the spiritual part of culture much more than in the materials part of it. By the way, the body of Palaeolithic man had undergone few morphological changes until more recently with one exception - his brain.

The process of the origin of the human mind with its specific characters reflected the complication of the cultural environment. Moreover, we can tell about the processes of the origin of human mind as about one side of the process of complication of cultural environment (Leonovičová 1991).

Two parts of the human mind (as well as the minds of other mammals) - cognitive and affective (or emotional) provide the regulation of behaviour of an individual. For the social species, especially for human beings the adaptation to the life in the society is the main precondition of survival of individuals. All societies of mammals are based on the special regulation of behaviour of their members in order to save the social group, that provide the survival of individuals. Cognitive abilities are not necessary for each member of society, because new behavioural pattern that are found by the individual with high intellectual abilities can be used by all others by means of learning and imitation. On the contrary, the affective (emotional) mechanisms of the regulation of behaviour are absolutly necessary for each individual because they determine the possibility of adaptation to the social way of life and consequently the survival of individuals.

New features of the human brain, determined by its size and numbers of cells, were the basis for the origin of human language and that became the qualitatively new tool for coding, collecting and translating information (common experiences or memory of society). This memory includes the usual patterns of social behaviour, such as the social roles determined by such natural differentiation among the individuals, as age and sex of the individuals. Structure of the human society is determined by the peculiarities of its members, such as alignment of genders and the correlation of age groups, as well as by the numbers of individuals with high level of cognitive abilities and the last experiences of certain social groups. Such social structure has changed time to time. Each member of a social group has changed his place and social role in society with the change of his age and accordingly to his individual characters (such as intellectual abilities, the level of strength, skillful in the use and preparation of tools, memory, participation in events of social life, ability as leader, place in social hierarchy of their parents, etc.). The spiritual part of the social life of human society (in the forms of traditions, taboos, legends, tails, morality, etc.) was the main means of the evolution of human society from its primitive form to the industrial society and contemporary human society with its problems, successes and troubles.

What evolutionary events provide the existence of such complicated social structure? As Lieberman (1991) wrote in his excellent book "Uniquely human": "human language is a comparatively recent evolutionary innovation that added two powerful devices, speech and syntax to older communication systems. Evolution of human speech, complex syntax, creative thought, and some aspects of morality is linked and ... driving force that produced modern human beings in the last 200,000 years or so, was the evolution of speech adapted for rapid communication" (p. 2). The very special characters of human speech provide our vocal communication at a rate that is ten times faster than our predecessor. In other cases we are limited by the constraints of the mammalian auditory system. The new quality of the symbolic system - syntax of human language - overcome the constraints of memory and provides the possibility "to keep track of complex relationship between words within frame of sentence" and in additional enchances the speed of communication.

Lieberman supposes that "the brain mechanisms that control speech production probably derive from ones that facilitated precise one-handed

manual tasks. Through a series of perhaps chance events they eventually evolved to allow us to learn and use the complex rules that govern the syntax of human language".

With the possibility to learn the rules of syntax each human could use creative thought, as a tool of cognition, independent on his own innate intellectual ability. Surely, not all humans could use these tools of cognition in the same way, its being determined by the differentiation of innate faculties, but all normal human (without any malformation of brain) could do it with various degree of success.

All of these peculiarities of humans could be formed only in the condition of social groups and had had the spiritual part of cultural environment as their basis and results at the same time.

If speech is the main species specifity determined by morpho-functional organization, its origin had been stimulated by human society. The existence of effective social group needs effective tools for communication and at the same time the cooperation in activities of its members. The fundamental and fascinating book of Lieberman discussed in detail the processes of the formation of the ability of early *Homo sapiens* to use the vocal speech and formation of human language as a tool of communication and thought, but it almost ignored the role of the environment (especially the cultural one) in this processes.

If a modern child can learn syntax of any language without "learning" (in the direct sense of this word) and use it as a tool of communication and thought, it means that during the period of an earlier stage of cultural development of society the spiritual part of the cultural environment had formed more intensively and more rapidly than the material one. According to Chomsky (1986), the principles that allow a child to acquire syntax are built into a child's brain in the form of a hypothetical *Universal Grammar*, which may be regarded as a characterization of the genetically determined language ability. Accoeding to Chomsky, this faculty is a "language acquisition device", an innate component of the human mind that yields a particular language through interaction with presented experience" (p. 3) , "language must be largely or completely deductive from general principles, because relevant information is unavailable to the language learner." (p. 105).

The formation of such principles and rules of Universal Grammar required a long time for development, not only in the human brain, but also in the human society because such principles and rules are the results of the improvement and increased complexity of cultural environment, particularly its spiritual part. The Universal Grammar could be seen as a result of common experiences of society, that have been formated during a long period (probably the Palaeolithic time) and is in some sense a reflection of the improvement of human society, in the form of the spiritual part of thecultural environment.

Beyond all doubt the long period of human existence includes the Palaeolithic one. The precondition of the formation of human cultural environment had been presented in the form of "the presence of a functionally modern human vocal tract 125,000 years ago and its subsequent retention and elaboration are consistent with the presence in this period of brain mechanisms allowing automatized speech motor activity, vocal tract normalization, and the decoding of encoded speech" (Lieberman 1991, 77). As many authors have shown, languages worldwide are based on common rules, and this knowledge has developed during thelong period of the existence of early *Homo sapiens*.

The principal foundation of contemporary computer technics were laid down during the Palaeolithic when the early humans had collected the common knowledge on the world and the way of its cultivation in the form of words and syntax of languages.

The other side of the spiritual part of the cultural environment concerns laws and regularities of social behaviour, and these, through the human society, could help to save the human species. On the basis of such behaviour is laid down the ability of the individual to suppress that own aggressivity in the relation to the members of the same group, the ability called "altruistic behaviour". This type of behaviour has been one of the miraculous question of the theory of evolution founded on the idea of fitness and survival of better adapted individuals.

Only the new multilevel approaches to the processes of evolution can help to understand this problem. On the behavioural level of evolutionary processes the object of selection became the social group. The kind of selective process supported the social group and helped with the survival of its members, and determined the improvement of social structure and special mechanisms for the regulation of social behaviour.

The process of the origin of human society

was one of the important factors of hominization and we cannot explain altruistic behaviour just on the basis of genetics. Human behaviour is not determined by the genes directly. The genetic basis creates only a necessary precondition for the possibility of complicated social behaviour of human beings. The human mind is the main regulator of the behaviour of individuals and this mind could be divided into two parts: cognitive and emotive ones. The cognitive ability is strongly individualistic and there are not two individuals alike. A high level of intellectual cognitive abilities is not found very often, but it could be enough if only a few members of social group could find a new way of defence, making tools, etc. All others could learn these new patterns of behaviour by imitation and other forms of learning. But the emotional part of the human mind that is based on the regulation of behaviour is absolutly necessary for each individual and its defects determined a social, destructive behaviour and society has usually supressed it by various kinds of social regulation. But it is an abnormal situation and for the successful existence of each society it is necessary that all members can supress their asocial behaviour by inner mechanisms of selfregulation. The human mind has such mechanisms in the form of the norms of behaviour that was socialized during an early stage of ontogenesis, and is determined by the spiritual part of the cultural environment and changes with the development of society. At the beginning there were taboos against such forms of behaviour that could destroy the social group, and there are many ethnographic data that can illustrate this. Usually strong emotional feelings support the choise of the behaviour, especially in the extreme situation, conflicts, etc. The processes of the formation of such phenomena of the spiritual part of the cultural environment as a religion, art and ethics had their roots on the Palaeolithic society and were doubtless close connected with the formation of language. But at the same time they were relatively independent on it.

The earliest art appearances are approximately 15,000 to 20,000 years old (Bordes 1968), or according to another author ore even older, about 40,000 years ago (Marschack 1990).

Religious thought and moral rules are evidently close connected with cognitive ability and language. Ritual burials are evidence of their existence. In spite of fact that they are relatively recent (about 35,000 years ago), the first such burials occur with anatomically modern humans who lived 100,00 years ago.

The continuity of evolution allows us to suppose that the mind of early human beings was similar with our mind in the way of thought, as well in the kind of feelings. During the evolution of social behaviour of high vertebrates the special patterns of infant behaviour were saved in the repertory of adult individuals and served as a signal for suppressing aggressivity. By the way, in human behaviour just as in morphology, the so called certain traits appear in the adult stage that are present in the fetal stage. In spite of this it seems that altruistic behaviour of childern is determined by innate genetic components. This is supported by early experience and fixed later by learning. In some observations, children before two years of age (the same as a puppy of dogs) showed empathy towards other people and pets (Zahn-Waxler et al. 1984). By these researchers "altruism is a learned behaviour that builds on this genetically transmitted base. Cognitive development is not enough; altruism must be taught and is in no sense an automatic consequence or simple exposure to abstract principles or isolated examples of altruistic behaviour". Altruistic behaviour needs the training of a special kind of feelings and formation of the pure human feeling complex.

In spite of the intensive rapid improvement of social structure of human society and the intensive formation of the spiritual part of the cultural environment during the Palaeolithic when the main basic principles were formated, "the remains of brains within ourselves still generate the rage, anger, the violence that dominate human affairs". The researches of the mechanisms of social regulation of human behaviour could help us to prevent the manipulation of people and to prevent such events as the civil war, genocide, national and religious conflicts, etc. Unfortunatly, human beings save their heritage in full complexity and actual behaviour of individuals as well the social groups could be manipulated on the basis of this heritage.

The study of the Palaeolithic period in the history of human society could bring some new knowledge that can be used for the prevention of such undesirable events.

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