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Structures of the Cosmos and Sacred Sets on the Artefact of the Paleolithic

Abstract. The problem of the semantics of groups (sets) of signs (dots, dashes, etc.) on Paleolithic artifacts, which has not yet been solved by scientists, was studied. The disclosure of the semantics of the sets of signs helps to get deeper into the spiritual world of the Paleolithic people, to understand the specifics of the logic of their thinking. The purpose of the study was set to determine the quantities hidden behind the sets of signs, and to determine the logic of their formation. G. Kantor's idea was used as a methodological key, according to which, the operation with sets in the history of mankind preceded the operation with numbers. It was shown that many signs were associated with primitive mythology. In the reconstruction of this mythology, a structural method was applied. A number of sets were identified, their semantics was determined, and the concept of sacred sets was formed. Sacred are such sets that are often repeated and consistent with the logic of constructing a myth. It was determined that behind these sets the cycles of some luminaries (the Sun, the Moon, Mercury and Venus) and the physiological cycles of a woman (menstrual and pregnancy) have been hidden, reduced by certain numbers (5, 7, 8, 28). Sets that played a certain role in the mythology of primitive people also belonged to the category of sacred ones. The idea was expressed and traced on the artifacts, according to which the sacred sets were placed on the Body of the Goddess in a certain order. The structures and sacred sets on the images of goddesses on an artifact from Moravia (Czech Republic, 20 thousand years B.C.) and on other artifacts were analyzed. Analysis showed that they contained a number of sets that have been classified as sacred

Keywords: spheres of space, sets of signs on artifacts, numbers and sets

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INTRODUCTION

Researchers share the opinion that groups of simple signs (dots, dashes, chevrons) found on the Paleolithic and later artifacts express fixed time values. However, among the groups (sets) it was possible to identify only those that express the cycles of the Sun (365/364), the Moon (28) and the period of a woman's pregnancy (280). The meaning of the other sets of signs, which is the vast majority, remains unclear. The definition of the semantics of these sets will be important for penetration into the spiritual world of ancient people and can shed light on the process of formation of astronomical and mathematical knowledge.

The issue of the sets of signs on artifacts of the Paleolithic and later epochs has long troubled archaeologists. Their study began in the XIX century. French archaeologists Boucher de Pert (1788-1868) and Edouard Piette (1827-1907) drew attention to the repetition of five marks on Paleolithic artifacts. They associated it with the number of fingers on the hand and believed that the hand was a kind of counting tool. In the early 20th century this idea was developed and substantiated by the Czech researcher Karel Absolon (1877-1960). In the late 20th century American archaeologist A. Marshack (1918-2004) – [1] (1972) and Soviet

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scientist B. Frolov (1939-2005) [2; 3] (1981, 1974) worked on the problem. They established repeatability of numbers 5, 7, 10, 14 on artifacts. B. Frolov [3] (1981), in particular, analyzed numerous artifacts of the Paleolithic and defined graphic ways of presenting cycles of the Sun (365 characters), the Moon (28 characters) and a cycle of pregnancy of a woman (280 characters). However, such large sets as 365 and 280 on the artifacts are found rather as exceptions. The vast majority of sets, except set 28, do not go beyond a hundred. All of them are not identified (their meaning and the logic of their formation remain unclear). As a result, the semantics of sets of signs on most Paleolithic artifacts remain a mystery to scientists.

The author E.M. Prychepii, [4] put forward the concept of sacred sets, according to which sets on Paleolithic artifacts convey the cycles of some planets and a woman reduced to certain small numbers. Sacral sets also include sets transmitting certain structural formations from the pantheon of primitive gods. (For instance, if the set of 28 denotes a female goddess, then the set of 56 conveys two goddesses, the set of 84 represents three goddesses, and the set of 112 – four goddesses).

Particular attention was paid to identifying patterns that can be traced in the location of sets on the Body of the Goddess. In this regard, the structures of symbols and sacred sets of the image of the Moravian Goddess were analyzed in detail, on the example of which the proof that the ordered cosmos has been formed in the Paleolithic and not in the Mesolithic and Neolithic period, as some authors state, was searched. Thus, the famous researcher of primitive culture V.N. Toporov [5; 6] believed that the ordered cosmos arose in the Neolithic era due to the establishment of the image of the world tree.

The purpose of the article is to present the concept of sacred sets of the author and based on it, to analyze the sets of signs on some artifacts. It is committed to proving that the groups of signs on Paleolithic artifacts are not numbers. Finding numbers is a false path that does not lead to the disclosure of the semantics of the groups of signs. The goal is to show that ancient people operated not with numbers but with sets, with large sets reduced by some small numbers (3, 5, 7, 8) and the result in the form of sacred sets was fixed on artifacts. These last sets are the subject of the study of researchers.

To analyze the symbols on archeological artifacts, the structural method was applied, while structures (established order of symbols) – not individual symbols – are interpreted. Structures are correlated with the myth (verbal material in general). The interpretation of a symbol through structure significantly reduces the subjectivism. Although it has its limitations, like any method does, as it pulls objects out of the historical context, but given this shortcoming, it can help in research.

Proto-myth as a key to the understanding of ancient symbolic and sets of signs

The concept of sacral sets proposed in the present research is based on the hypothesis about the proto-myth. The study of the symbolism of archaic artifacts, folk ornaments, primitive mythology and fairy tales led to the conclusion that in the worldview of ancient people there were some fundamental ideas inherent in all or most primitive communities. Scientists who studied archaic

symbolism, mythology, art and fairy tales – M. Eliade [7] (2000), V. Propp [8] (1996), A. Golan [9] (1994), V. Semjonov [10], P. Smith [11] etc. – noted the presence of common ideas, plots, symbols among peoples who have never contacted each other. General ideas that can be reconstructed in the worldview of ancient people is called the proto-myth. One of such ideas is the division of the Space (Cosmos) into seven spheres. The 1 sph – sphere (from Latin sphere-sphere) denoted underground waters; the 2nd sph denoted a vault; the 3rd sph - terrene, mountain; the 4th sph was the sphere of life (the terrestrial world); the 5th sph marked skies; the 6th sph – the sky (seven planets, celestial spheres); and the 7th sph meant the starry sky. Pair spheres (feminine) were main, the unpaired (masculine) were auxiliary. The latter were frequently ignored, not depicted. Therefore, the concept of division of the world into three spheres – underground, terrestrial and celestial – was spread among archaeologists and ethnologists. As an illustration, it is possible to bring this image of seven/three-membered Spaces on a Trypilia's vase from village Maidanetske (Fig.1, Ukraine, 3600-3500 BC). Here, according to the hypothesis, narrow strips designate masculine spheres and wide denote feminine (a strip, which is darker (sphere 2) denotes a vault, a tree on sph 4 – sphere of life, an empty strip on sph 6 is the sky). Such division into spheres corresponded to the status of the woman – goddess in the worldview of ancient people.

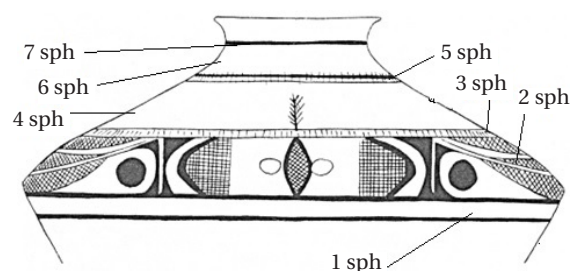


Figure 1. Vase from village Maidanetske

Source: [12]

Ancient people identified Space with the Great Goddess whose also divided into seven spheres: sph 1 – legs, sph 2 – thighs and a vulva, sph 3 – a waist, sph 4 – an abdomen and breasts, sph 5 – a neck, sph 6 – a head, sph 7 – top of a head, hair. Spheres 2, 4, 6 were female (basic), the others were masculine spheres. Division of the Body of the Goddess into seven spheres can be seen on this artefact from Sicily (Fig. 2, Italy, Neolithic stratum).

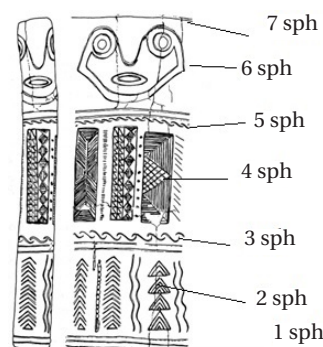


Figure 2. Probable wind instrument (Trento, Italy)

Source: [13]

The fact, that the marked parts of the Body of the Goddess (a vulva, an abdomen, a head) were frequently represented separately as independent figurants, also testifies that feminine spheres embodied goddesses. Probably, goddesses

of a vulva, an abdomen, and a head were hypostasis of the Great Goddess. (These three female deities on the Body of the Goddess can be seen on this artifact Hungarian-Finnish culture from the Volga region – Fig. 3 (Perm, VII-VIII century).



Figure 3. Artefact from the Volga region

Source: [14]

Spheres of Space and the Goddess correlated (corresponded) in the consciousness of ancient people with the seven planets-gods they knew, including the Sun and the Moon. Presumably, planets-gods were patrons of corresponding spheres of Space. They were disposed of as follows: sph 1 – Mercury, sph 2 – Venus (and the Moon with a 28-day cycle is female hypostasis of the Moon), sph 3 – the Moon in masculine hypostasis (moon – sickle). In this case the Moon designated by thirteen signs. Thirteen cycles of the Moon ($28 \times 13 = 364$) are almost equal

to a year cycle of the Sun (365); sph 4 – the Sun, sph 5 – Mars, sph 6 – the Jupiter, sph 7 Saturn. During an epoch of a cult of the Goddess Venus (the Moon with a 28-day cycle), the Sun and the Jupiter, according to an offered hypothesis, were feminine planets, the others were masculine ones.

Seven spheres of Space, seven parts of the Body of the Goddess, and seven planets stayed in correlation corresponding to each other. These correlations can be represented by the Table 1.

Table 1. Correlation of Planets, Spheres of the Goddess and Sphere of Space.

Spheres	Planets	Spheres of the Body of the Goddess	Spheres of Space
sph 7	Saturn	Hair	The starry sky
sph 6	Jupiter	Head (eyes and mouth)	Planets
sph 5	Mars	Neck	Skies
sph 4	The Sun	Abdomen (navel and breasts)	Sphere of a life
sph 3	The Moon	Waist	Mountains, earth surface
sph 2	Venus	thighs and vulva	Damp ground, dungeon
sph 1	Mercury	Legs	Underground waters

Source: compiled by the author

The correlation of the spheres of the Cosmos, the parts of the Body of the Goddess and the planets underlies the formation of the original symbolism. The detailed analysis of this problem can be seen [4]; the main goal of this research is to analyze sets of signs. Here are just a couple of examples. The correlation of Mercury and the feet of the Goddess is reflected in the symbols with a three-membered structure. These are the tripod (Fig. 4),

the three roots of the Yggdrasil tree, and others. Ancient people measured the cycles of the planets by the duration of the cycle of the Moon (28 days). Since the Mercury cycle contained approximately three lunar cycles ($28 \times 3 = 84$, actually 88 days), the three became its number. The legs of the Goddess and the roots of the Tree are the lowest sphere with which Mercury correlates. Hence three legs and three roots.

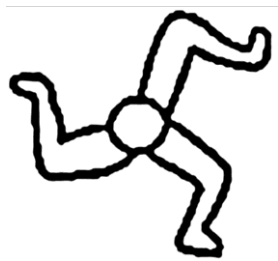


Figure 4. Tripod

Source: [9]

Conformity of Venus, vulva, and dungeon is represented in the fact that goddess of the Venus for many peoples embodied carnal love (vulva). The vulva, in its turn, corresponds to a dungeon: 'The tomb is womb' [13]. Therefore, tombs were shaped like vulvas.

The image of a tree on the belly of the Neolithic goddesses conveys the convergence of the abdomen of the Goddess with the sphere of life of the Cosmos. An example of the convergence of the head of the Goddess and the celestial spheres can be this image on the ceiling from the South of France (Fig. 5, the Neolithic).



Figure 5. The convergence of the head of Goddess and celestial spheres

Source: [13]

The stripes (about seven of them), placed around the head, transmit the seven planets. This is evidenced by the alternation of rows of chevrons and rhombuses, which on archaic artifacts, in particular on the famous Paleolithic bracelet from Mizin, Ukraine (Fig. 6), transmitted cycles of the Moon. The presence of several rhombuses on the branches indicates that the cycles of the planets were measured by the cycle of the moon. The head in the "halo" of the planets symbolizes their convergence. Hence, the basic statements of hypothesis about "proto-myth" concerning the problem of sets (numbers) on archeologic artefacts have been briefly stated.

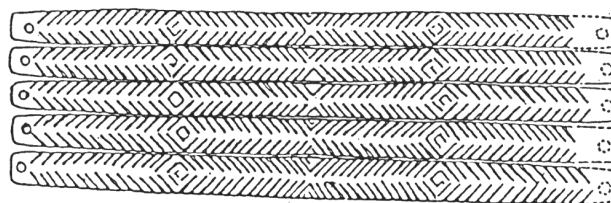


Figure 6. Bracelet from Mizin

Source: [15]

The problem of sets and numbers on the Paleolithic artefacts

The same signs (dots, hatchings, chevrons and other simple signs) grouped in unity in a particular way could be considered as a set. Such sets are frequently met on archeologic artefacts and in folk ornaments. Investigating these sets, special attention was paid to their repeatability. Sets with an identical quantity of signs are met frequently enough, and the amount of such sets is limited. It has been assumed that these sets were related to sustainable time cycles – first of all to cycles of the Sun and the Moon and (it is possible) to some planets, and to a cycle of pregnancy and a physiological cycle of the woman. Last sets are connected to the domination of a cult of the Great Goddess during the epoch of Late Paleolithic.

It is necessary to understand why ancient people used the sets and how to understand their meaning. To decide the problem, it is necessary to understand the ratio of sets and numbers in primitive thinking. Great German mathematician G. Kantor [16] claimed that in the history of the human development of quantitative values the sets preceded the number. It is thought by numbers, and the number assumes a place in a number series (units, tens, hundreds). In case a series is not formed, or it is very short and not capable of containing the certain quantity, the primitive consciousness used a set. It does not assume the presence of a number series. Though, the occurrence of sets is caused by the necessity of measuring the time – an annual cycle of nature, the term of a birth of a child, etc., sets used on archeologic artifacts were playing mostly a cult role. Not having a writing system to designate the Moon, the Sun, Venus (and the gods connected to them), they designated these stars by sets of signs that fixed the duration of their cycles. The process of formation of sets can be presented in such way. The longest or the shortest day of a solar cycle was fixed in the length of a shadow or in a different way. Further, a certain sign (a hatching, chevron, etc.) denoted each next day before reiteration of the same day on a bone or a tree. Therefore, not having a certain number, ancient people could receive a set of signs corresponding to the number of days in one year. Cycles of the Moon or other stars defined similarly.

Numbers – proportions. Sets of signs denoting the cycles of the sun (365), pregnancy (280), and others, were very large. They were difficult for comprehending, difficult to operate. Therefore, they can be rarely seen on artifacts. To make these sets more tactile and operable, ancient "mathematicians" and "astronomers" created an ingenious course – they reduced the big sets in the certain proportion, i.e., conveyed them into proportionally smaller sets. As a proportion according to which the big

sets were reduced, the most known numbers and sets were accepted. Such were the numbers related to the numbers of the gods. (Unfortunately, ancient people did not have one number – proportion, which considerably complicated understanding of this procedure). They were the seven, the eight (the last one was seldomly used), the set of 28, and the 5. Replacement of the seven with the one (reduction of set in the proportion of seven) is caused by the fact that the Goddess (1) is the seven (7) gods. Her body (Space) consists of seven parts (spheres). From here $1=7$. (The Seven in the minds of ancient people, according to author's concept, embodied seven planets, seven spheres of the Cosmos and seven parts of the Body of the Goddess. The seven embodies number of gods (planets), spheres of Space and parts of the Body of the Goddess [4]. It caused specific secrecy of the Seven.

Replacement of the one with the eight resulted from that that all ancient pantheon compiled the eight – apart from the seven gods, it also included the Great Goddess. As appears from symbolics, the Goddess is the seven and the eight. From here $7=8$. This surprising equation resulted from that the seven gods (parts of the Body of the Goddess), taken together, form the eighth member – the Goddess. Hence, where there is the seven, there is the Goddess – the eighth member of a pantheon, i.e., $7=8$. (In Ukrainian, eight (вісім, ві-сім) means «in seven», that is, “eight” is present in “seven”). Besides the numbers seven and eight, the set of the 28 also figured as a reduction ration designating a cycle of the Moon and a physiological cycle of the Goddess. The Goddess (1) identified with the set of the 28, from here $1=28$. Accordingly, the one (one sign) could replace 7 (8) and 28. A bit separately from these numbers-proportions, there was the five used as a proportion for reduction of great varieties from ancient times. It was sacralized as well, and the images of a hand with five fingers prove it. However, this sacralization originated not from “theology,” but from the convenience of operating by this number. The hand (the unit that consisted of five fingers – $1=5$) always was available (“ready at hand”).

Sacral sets. It was easier to operate with relatively small sets of signs obtained from dividing the hourly cycles by the number-proportions. As these sets appear in an archaic symbolics (on archeologic artefacts), in ornaments and folklore (fairy tales), they can legitimately be called sacred sets. Among them, it is possible to allocate three groups. One concerned cycles of planets, another – the woman-goddess. It is managed to establish sets that transferred cycles of the Moon, the Sun, Venus, and Mercury. As for the other planets, due to their long duration, their cycles were apparently not fixed on artefacts. Sets that transferred cycles of the Moon and the Sun were: 28 – the cycle of the Moon, 52 – the cycle of the Sun ($52 \times 7 = 364$), 73 – the cycle of the Sun ($73 \times 5 = 365$), 13 – annual cycle of the Moon and cycle of the Sun ($13 \times 28 = 364$).

It is more difficult to identify the sets of Mercury and Venus since sidereal and synodic cycles are inherent to them. The attempt to reconcile the sets with the synodic cycles of these planets did not bring positive results. The sidereal cycles easily agree with these sets. (There is information that the ancient Indian and Chinese astronomers B.C. operated with sidereal cycles of wandering luminaries). Further, this hypothesis will be proceeded, as

long as the basis thereof is pretty weak. Considering the above-stated, Mercury, the sidereal cycle of which is 88 days, might be designated by numbers (sets) 3 ($88:28=3$ approximately), 11 ($88:8=11$), 17 ($88:5=17$ approximately), or the set 88. The sidereal cycle of Venus (224 days) was conveyed by the set of 32 ($224:7=32$) characters. These sets are often encountered in correlations with the spheres to which the corresponding planets belong. (If the expressed opinions here are correct, then the beginning of astronomy should be sought not in the civilizations of the Middle East, as B. Van der Waerden [17], A. Klimishyn [18] and others believe, but in the sets of paleolithic signs.)

The Goddess as the woman is connected with the sets of 28, 40, 10. The set of 28 caused by both a physiological cycle of the woman and a cycle of the Moon, played an extremely important role in consciousness (religion) of primitive people. Therefore, the woman became a Cosmos essence, and this set achieved the character structure (model) of Cosmos. It designated not only the Goddess but also Cosmos. The 28-member structure of Cosmos was formed based on a seven-member structure. Accepting three feminine spheres (2, 4, 6) of a seven-member Space structure for 7(8), (sph 2, 4, 6 goddesses as the incarnations of the Great Goddess could be divided into their own seven/eight), then it is received: $1+7(8)+1+7(8)+1+7(8)+1=28$. The 28-member Cosmos can be interpreted in such a way that the celestial, earthly and underground worlds are copies of the seven-member macrocosm, i.e., seven/eight-member structures. A set of 40 signs indicates the cycle of pregnancy – $40 \times 7 = 280$. Very rarely in this capacity, there is a set (or rather a number) $10=(280:28)$.

Other sets (112, 84, 56, 24, 21) are probably due to mythology: the set of 112 denoted 4 goddesses ($4 \times 28 = 112$). These four include the three goddesses of the feminine spheres of the Cosmos along with the Great Goddess. The set of 84 denotes three goddesses ($3 \times 28 = 84$). The set of 56 was formed by doubling the set of 28 ($28 \times 2 = 56$). It could designate two goddesses. It could act as an auxiliary set. When the set of groups consisting of four and five characters are available next to it, they can be interpreted as $56 \times 4 = 224$ (the Venus cycle) and $56 \times 5 = 280$ (cycle of pregnancy). Sets of 24 and 21 are not clearly identified. They are assumably formed in the following way: $8 \times 3 = 24$ and $7 \times 3 = 21$, i.e. denote three goddesses. One can only say unequivocally that the set of 21 correlates with the sky/head.

The set 88, apart from the Mercury cycle, could also be presented as the 88-member structure of the Cosmos (and presumably the set of Great Goddess). This structure is formed under the condition that the feminine spheres of the seven-member Cosmos (sphs 2, 4, 6) are accepted for 28 (the Woman – the Goddess is $1=7(8)=28$). In this case, masculine spheres are accepted for 1, and feminine for 28: $1+28+1+28+1+28+1=88$. If masculine spheres are ignored, 88 turns into 84. The last set is also found on artifacts. Formed in the depths of the Paleolithic, the numbers and sets of 3, 7, 8, 11, 13, 17, 21, 28, 32, 40, 52, 56, 73(72), 88(84), 112 and some others appear not only on archaeological artifacts. They play a huge role in ornaments, the construction of which in many cases is based on accounting sacred sets. (See this in Prychepii, Ye [4] p. 122-124, 174-189). They were also kept in mythological

and religious thinking and folklore (especially in fairy tales). (For example: V. Zhaivoronok [19], a researcher of Ukrainian folklore, cites a number of sayings and proverbs in which the number “forty” is used. He sees the source of the prevalence of this number in the biblical “forty saints”, although in fact the set “forty” has been used to indicate the period of pregnancy of a woman since the Paleolithic era. There it acquired the status of sacred and this is what led to the spread of the number “forty” in sayings in later times).

In addition to the sacred sets, a few sets can be defined as supplementary on archeologic artifacts. These are relatively small sets (up to 20), summing which in different variations, one can get a relatively large number of sacral sets. Examples of sets of this type will be given below.

The ancients relatively easily oriented in time having sacred sets. Seven days formed a “week”, four “weeks” made a “month”, 13 “months” comprised a “year”. It was enough to have numbers 4, 7 and 13 (a number series from 1 to 13) to navigate in the annual solar cycle. They could deal without numbers more than 13. They replaced them with sets “month” (four weeks) and “year” (thirteen months).

A particular pattern in the placement of sets on the Body of the Goddess can be noted. Thus, the sets of the Mercury cycle (3, 11, 17) were often located in the area of the legs, the sets 28, 32, 40 in 2 sph, 13 – 3 sph, 73, 56, 40 – 4 sph, 21, 88 – 6 sph. This arrangement indicates the correlation of luminaries and parts of the Body of the Goddess and the designation of the goddesses of the 4 sph and 6 sph by the sets of 56, 21 and 88.

To demonstrate the “application” of the proposed hypothesis of interpretation of sets of signs on Paleolithic artifacts, a few examples should be considered. The figure of the goddess is submitted rather schematically on the artifact from the south of France (Fig. 7, Late Magdalen, Dordogne).

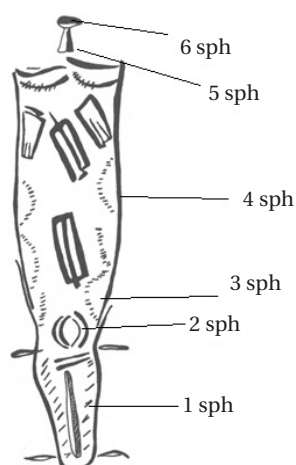


Figure 7. The abstract female image from Dordogne
Source: [13]

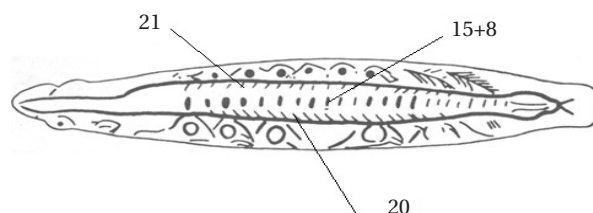
Apparently, the ancient artist was more focused on the transfer of sets than on the image. Legs (sph 1), vulva (sph 2), navel and breasts (sph 4), neck (sph 5) and head (sph 6) are submitted rather precisely. There is no symbol of a waist. It must be symbolized by the set of 13 located above the vulva on the right side. In figure 7, the main

interest there is in sets. Oval form of the sph 1 – legs (Mercury) – probably shows the idea of a cycle of the planet. It can be assumed that the sets placed here which are 11 (on the left side) and 8 (on the right) are related to the cycle of this planet. Their multiplication (11x8) gives the sacral set of 88 – Mercury cycle. So, the correlation between the legs of the Goddess and the planet of Mercury is expressed in sph 1.

The next sets are located in a body of the Goddess. As it was already noted, between the vulva and the conditional navel on the right side is located the set of 13, which can be identified with the god of the sph 3. Above the set of 13, there are the sets of 12 and 14, and on the left side (from the bottom up) – sets of 9, 14, 11. In themselves, they (except of 11 and 13) are not sacred, but in sum (13+12+14+9+14+11=73) they form a sacred set that denotes the cycle of the Sun.

This is one example of the correlation between the sun and the belly Goddess (sph 4) it is paid special attention to. If the sets located in the belly are considered as auxiliary, then from their combinations one can obtain a number of other sacral sets: **28**=(14+14); **32**=(9+11+12); **40**=(12+14+14); **52**=(11+13+14+14); **21**=(12+9). The use of auxiliary sets proves to be very expedient: with the help of the minimum number of characters (73), the maximum possible number of sacral units is transferred.

Above the nominal breasts, 7 (on the left) and 8 (on the right) signs are located on two arcs. 7+8=15. The sum of these (15) signs and 73 gives the sacral set **88**. Probably such placement of two sets 88 – one is below near the feet, and another is above in the abdominal area – emphasizes their two meanings. One relates to the Mercury cycle, the other to the 88-member structure of the Cosmos (and the Goddess). The latter structure, as already mentioned, is formed when in the seven-member structure of the Cosmos the female spheres are accepted for 28. Sacral sets are also traced on the artefact from France (Fig. 8, 12000 B.C.).



Source: [13]

Perhaps composition transmits the structure of the Cosmos vertically. Snake in the middle of the picture apparently symbolizes the goddess of sph 4; the heads-eyes below symbolize sph 3 (reptiles) or sph 2, the heads of birds at the top (feathers on the right side indicate birds) – the 6 sph goddess. The sets of symbols in this figure are the series of strokes on the image of a snake. At the bottom, there are 20 strokes, at the top – 21, on the middle line – 15 (signs in bold) and 8 (usual). The set 21 is probably correlated with sph 6 goddess, 20 lower signs together with 8 form the set 28. The sum of the sets 21+20 15 gives the sacral set 56. It is also possible to admit such operations: 56x4 (heads-eyes below) =224 (the cycle of Venus) and

56x5 (heads of birds at the top) =280 (cycle of pregnancy). It is remarkable that the sum of all sets of this artefact, as well as the previous one, is a set that expresses the cycle of the sun: $21+15+8+20+4+5=73$. Even if not to take into account all said about other sets, the very coincidence of these two sets of different artifacts should cause interest. An artifact from Bilche-Zolote (Fig. 9, Ukraine, Eneolithic) will be considered in the study as well.

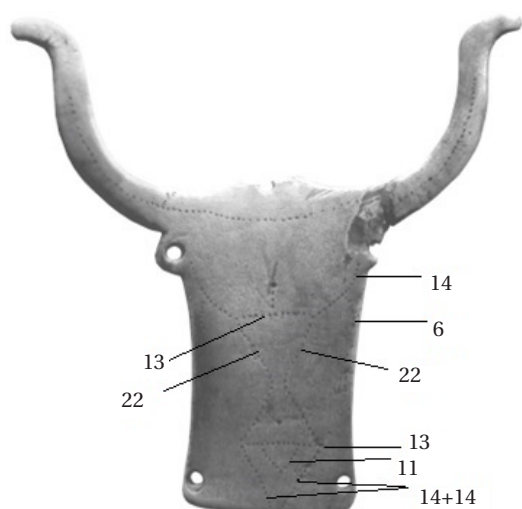


Figure 9. The sets on the bone plate in the form of the head of the bull from Bilche-Zolote

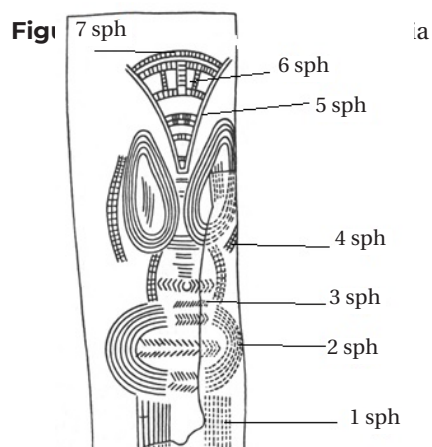
Source: [12]

Although it belongs to a later era, but it is a striking example that demonstrates the order of placement of sets of signs on the Body of the Goddess. It depicts the head of a bull, on the background of which many signs (dots) outline the contour of the goddess with raised hands. The bull's head might symbolize the god of the starry sky (7 sph), and the figure – the Great Goddess. It was a pair of deities, the parents of six goddesses and gods of the primitive pantheon (1, 2, 3, 4, 5, 6 sph). The bull, like snakes in fairy tales, could embody all four male deities of the pantheon. The conclusion that the bull's head symbolizes the god of the 7 sph (father of the gods) is based on the fact that the sets available in the contour of the goddess symbolize a number of deities denoting the spheres of the Cosmos. The image, therefore, can be seen as an image of a pantheon of gods born from the God of heaven (7 sph) and the Great Goddess. Thus, the sets on which the image of the Goddess is formed from the bottom will be considered. The two sides of the triangle (conditional thighs of the Goddess) comprise the set of $28=14+14$. The two sides of the smaller triangle represent the set of 11, the upper side of the larger triangle is the set of 13 representing the conditional belt. The last set is not clearly identified. However, a number of other artifacts containing this set in the belt (3 sph) can be exemplary. It is also interesting that the sum of all these sets – $(28+11+13=52)$ – is the set that transmits the cycle of the Sun ($52 \times 7=364$). It is important that these sets relate to 1 sph (11 – Mercury), 2 sph (28 – the Moon with a 28-day cycle, or the female incarnation of the Moon), 3 sph ($13 \cdot 13 \cdot 28=364$) – the crescent moon, the male incarnation of the moon transmitting its annual

cycle. The set of 52 is only a derivative of the other sets. The next set is formed from the sum of the sets of the upper contour of the Goddess. This contour (without arms) contains: 22 characters on the left side from the waist to the shoulder line, 13 characters in the shoulder line, 22 characters from the shoulder line to the belt on the right side, 13 characters in the belt line, and 3 characters represent the conditional neck. Together $(22+13+22+13+3)$ they make up the set of 73, which transmits the cycle of the Sun ($73 \times 5=365$). It is the contour of the sphere of the goddess's abdomen (4 sph). Thus, here it is the convergence of the belly of the Goddess and the Sun. Another sacred set is formed from the sum of the signs that transmit the hand (along with the 6 signs that depart from it) and the side profile of the Goddess. The hand $(14+6)$ together with 22 characters on the side line and 14 characters at the bottom give the set of 56. On the right side this set is not fixed so clearly due to the damage to the plate near the belt, but it is also close to this set $(14+6+22+14=56)$. Together they form the sacred set of 112, which conveys the four goddesses – the female composition of the pantheon. Without the lower set of $14+14$, there will be 84 – the set of three goddesses. The sum of $14+6+14+6=40$ – (the set of pregnancy).

The composition of two sets, stretching in the horns, due to damage to the artifact, cannot be established. The artifact contains sets 52 and 26. It can be assumed that these were sets 56 and 32, the sum of which gives the set 88, which was always located at the top of the Body of the Goddess. But it's purely hypothetical thought. In general, it can be stated that the artifact contains the following sacred sets – 11, 13, 28, 40, 52, 56, 73, 84, 112. Unfortunately, Ukrainian archaeologists who study the astronomical ideas of Trypilians [20; 21] do not pay attention to the multitude of signs on artifacts.

An intellectual masterpiece of the Paleolithic, in which sacred sets organically connected with the mythological concept of the Cosmos, is as well an image of the Goddess from Moravia (Fig. 10, 20 000 BC) engraved on bones of the mammoth. Part of the artifact is lost, which makes it difficult to identify sets and to some extent puts conclusions into doubt. However, it seems that sometimes the logic of the concept can compensate for the inferiority of facts. The image of the Goddess is an embodiment of Space.



Source: [13].

A seven-member structure can be seen in it: sph 1 (nominal feet) – vertical lines at the bottom; sph 2 (vulva) – seven concentric ellipses; sph 3 (waist) presented by a group of strokes on the boundary between vulva-ellipses and abdomen; sph 4 – three ellipses and four “ladders” (belly and chest); sph 5 (neck) – an empty strip on the sides of the head and the neck; sph 6 – head-sector; sph 7 is the the uppermost arc of the head arch of the head. At the same time, the Goddess is a 28-member structure of the Cosmos. Her hypostases – goddesses of feminine spheres (sph 2, 4, 6) – also divided into seven spheres. Sph 2 is represented by seven ellipses, sph 4 – by three ellipses (stomach and deuce breasts – female symbols) and four “ladders.” The latter, based on the place in the structure (sph 1, 3, 5, 7), appear as masculine symbols. It is more difficult to single out the seven in the head-sector, which symbolizes the sky. In concentric rings, masculine and feminine spheres are usually expressed by the width of the band: feminine – wider, masculine – narrower. Besides, simple signs – strokes, chevrons – are usually applied to masculine spheres. Based on these rules, a narrow arc with signs (“ladder”) at the bottom will be sph 1 – Mercury. (Here sph designates planetary spheres, instead of Space spheres. However, there is a correlation between them – gods of celestial spheres “own” corresponding space spheres). The wide empty arch located above denotes sph 2 (Venus and the Moon in female hypostasis). The narrow arc with signs (“ladder”) is sph 3 (the Moon in masculine hypostasis). Wide arc without signs is sph 4 (the Sun). Two narrow arcs – “ladders” – are sph 5 (Mars, the most militant god who became the god Jupiter later, probably that is why he was designated by two “ladders”). The empty sphere above is sph 6 (the goddess of Jupiter). “Crown” from “ladders” (Saturn) is sph 7. (Are not they the rings of Saturn?). Perhaps, the uppermost narrow strip located above planetary spheres symbolizes the god of the starry sky (Space, the god of sph 7).

The presence of seven-member structures in feminine spheres is the basis for the conclusion that the Goddess models the 28-member structure of the Cosmos. If it is assumed that $7=8$, then $1+8+1+8+1+8+1=28$. At the same time, this structure can be treated as a 32-member structure, i.e., one that conveys a cycle of Venus ($32 \times 7 = 224$). The basis for such conclusion is the symbolics in sph 4 (an abdomen and breasts). Four “ladders” and three ovals (breasts and a belly) can be interpreted as seven symbols of the goddess of sph 4, which was the Sun in the Paleolithic. However, if it is taken into account that each of the breasts consists of five ovals and two “ladders” on each side, each of the breasts becomes the seven, symbol of the goddess, and two of the breasts - the symbols of two goddesses – $(7+7)$. This conclusion is based on the fact that in figures from concentric circles, ovals or rhombs, the last are both “masculine” and “feminine” symbols. (With this reading, the symbols of the abdomen – “ladders” pass to the breasts). If regarding symbols of the sph 4 as two goddesses $(7+7)$, then the image of the Goddess as a whole (from the legs to the head) appears as $1+7+1+(7+7)+1+7+1=32$. There may be a question: what lies behind these symbols in sph 4, which in one case are “read” as one goddess-seven (three “feminine” symbols - ovals and four “ladders”), and in another case as two goddesses-seven

(two breasts, each of which includes seven characters – five ovals and two “ladders”)? Since sph 4 is the sphere of the goddess of the sun, then an explanation for this should be sought in the understanding of its cycle by the ancient people. Ethnographic data [9] show that many peoples of antiquity divided the cycle of the Sun into summer and winter. Perhaps in the case when the symbols “are read” as a single seven, they denote the annual cycle of the Sun, and when they “are read” as two sevens (two goddesses), they designate two half cycles (reproduce the phenomenon of two suns). Although it is possible to assume the reverse movement in the creation of symbols: two breasts, like two goddesses, caused the phenomenon of two suns.

In addition to the symbols that relate to structures, on the image of the Moravian Goddesses, there are many signs to be supposedly concealed behind sacred sets. Sph 2 (seven lower ellipses) contains three such sets (groups of chevrons: a large group is located in the middle of the ellipses, two smaller – are higher and lower. Some of the signs are lost. Seven chevrons left below, 11 chevrons left in the middle, and 7 at the top). Considering the fact that sph 2 at large contained the set of 28 (see fig. 9), it is possible to assume that here the seven symbols representing the vulva contain the set of 28 as well. This is partly due to the figure. A clearly marked seven at the bottom gives reason to believe that the exact seven was located at the top. It is logical to assume that 14 signs are placed in the middle. (The vulva Goddess, like the Goddess herself, is marked by the seven below (seven ellipses), the seven above (head) and two sevens (two breasts) in the abdomen sphere. Hence: $7+14+7=28$).

On sph 3 (between the abdomen and ellipses of the vulva) there are seven signs, to which the restorer added five more, so their total number became 12. It is supposed that the number of signs here should be equal to 13 – the number of year cycles of the Moon: $13 \times 28 = 364$, usually located on sph 3. The moon on the 3 sph correlated with the belt of the Goddess. The belt of the image of the Goddess from Bilche Zolote (Fig. 9) has 13 points. The same set is present in Figure 6.

The sets of the abdomen and breasts belong to the fourth sphere. There are five chevrons on the belly on the left of the navel (center of Cosmos). It can be assumed that the same number of chevrons was on the right side. Ten chevrons on the abdomen should be understood as the set indicating pregnancy – $28 \times 10 = 280$. Apparently, the set of 28 (vulva) was multiplied by these numbers located above to obtain an annual cycle ($28 \times 13 = 364$) and the cycle of pregnancy ($28 \times 10 = 280$). If on the right breast as well as on the left one there are four signs, then the Venus cycle should also be added here ($28 \times 8 = 224$). In addition to the marked sets, on the belly and between the breasts of the Goddess there are 14 horizontal lines (signs). Their assignment becomes understandable if it is summarized the number of all the characters contained in the 2, 3 and 4 sph: $28+13+10+14+8$ (signs on two breasts) $=73$. It is a set of the Sun cycle, which has met on previous artefacts (Figs. 7, 8) as a general sum of sets. The set 73 can be a serious argument in the correct identification of the sets 28, 13 and 10.

The quantitative information can also be contained by “ladders” marked by nominal arms and an abdomen area under the condition that the original image was correctly

reproduced. If “windows” in the “ladders” count as a unit, then the number of units on the “ladder” framing the belly on the left side is $8 \times 2 = 16$. If the number of “windows” is also the same on the right side, then the set of the Venus cycle is formed ($16 + 16 = 32$). On the nominal hand, the quantity of “windows” is $20 \times 2 = 40$ (cycle of pregnancy). The sum of the “windows” in the “ladders” is $40 + 16 = 56$ on the one side. The number of “windows” around both breasts is $40 + 40$, together with eight lines on the breasts they form a set of **88**. Besides, the quantity of all “windows” on “ladders” is $40 + 40 + 32 = 112$ – a set denoting four goddesses ($28 \times 4 = 112$).

This set is characteristically formed from the signs placed on the “arms” and the contour of the abdomen. A similar arrangement of this set is in Figure 9.

The sets contained in the nominal head of the Goddess, on which the spheres of the planets are modelled, will not be analyzed in detail. It should be noted that the total number of “windows” on the arcs is 87. (There is a large probability that there were 88 of them on the artefact). It should also be noted that on the uppermost arc there are **21** “windows” – a sacred set, which correlates with the head (sph 6) of the Goddess. (See Goddess from Mezhyrich (Fig.11), whose head is marked with seven spheres and 21 cuts. Spheres expressed by numbers – $4 + 2 + 4 + 1 + 4 + 2 + 4$, of which fours indicate spheres of gods, twos and a unit of indicated spheres of goddesses. Seven groups of signs symbolize the seven heavenly spheres).



Figure 11. The Goddess from Mezhyrich

Source: [15]

The Moravian Goddess is believed to be an intellectual masterpiece of the Paleolithic, a kind of encyclopedia of its time. Its creator embodied in the image the idea of the identity of the Goddess with the Cosmos, as well as the idea of correlations of sacred sets with spheres

of the Cosmos and parts of the Goddess's Body. In this case, the number of sacred sets on this artefact exceeds their number on many others.

CONCLUSIONS

Summing up the analysis of sacred sets on the Paleolithic artefacts, it can be noted that they played an extremely important role in mythology (or religion) of ancient people. First, in the absence of a letter, the set could appear as written notation of deities – celestial bodies. All the sets that convey cycles of stars – 11, 13, 28, 32, 52, 73, can be considered as such. Secondly, they fixed the physiological cycles of the woman-goddess. Thirdly, they expressed the structure of the Cosmos – 7, 28, 32, 88 and the grouping of the goddesses (56, 84, 112). In the transmission of information, the sets played the same role as symbols.

The constant reproduction (repetition) of sacred sets on artefacts was a prerequisite for their functioning as time tracking tools. Sacred sets were peculiar multiplication tables, which one should know for measuring the time. It is important to note one more point. Using sets for religious and practical purposes, the ancient people felt the harmony concealed behind the cycles of celestial bodies (planets). The multiplicity of cycles of the 7 and 28, in particular, indicate such harmony. It is possible to state with certainty that the idea of harmony (music) of celestial spheres appeared many millennia before the Pythagoreans. In general, it seems that the ancient people played with these sets and felt quantitative harmony hidden behind them.

It appears, in particular, while using auxiliary sets, when a larger number of sacred sets is formed from a small number of such sets. The significance of this phenomenon for the spiritual (at least aesthetic) and mathematical development of humanity has yet to be comprehended. It is obvious that Pythagoreans had worthy predecessors. Sets placed on several Paleolithic artefacts were researched only. It is clear that on this basis it is impossible to draw a conclusion about whether the proposed concept of sacred sets is rightful or not. However, being confirmed by many facts raises its level to a scientific hypothesis, which is a formation that deserves discussion.

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Структури Космосу і сакральні множини на артефактах палеоліту

Анотація. Досліджено проблему семантики груп (множин) знаків (крапок, рисок та ін.) на артефактах палеоліту, яка досі не розв'язана науковцями. Розкриття семантики множин знаків дозволяє глибше досягнути духовний світ людей палеоліту, зрозуміти специфіку логіки первісного мислення. Поставлено мету роботи – визначити, які величини приховуються за множинами знаків, і встановити логіку їх формування. В якості методологічного ключа використано ідею Г. Кантора, згідно з якою оперування множинами в історії людства передувало оперуванню числами. Встановлено, що множини знаків пов'язані з первісною міфологією. При реконструкції цієї міфології задіяно структурний метод. Ідентифіковано ряд множин, встановлено їх семантику, сформовано концепцію сакральних множин. До сакральних множин віднесені такі, які часто повторялись і вписувались у логіку побудови міфу. Було з'ясовано, що за цими множинами приховані цикли деяких світил (Сонця, Місяця, Меркурія і Венери) і фізіологічні цикли жінки (менструальний і вагітності), скорочені на певні числа (5, 7, 8, 28). До розряду сакральних належали також множини, що відігравали певну роль в міфології первісних людей. Висловлено і простежено на артефактах ідею, згідно з якою сакральні множини розташовували на Тілі Богині у певному порядку. Проаналізовано структури і сакральні множини на образах богинь на артефакті з Моравії (Чеська республіка, 20 тис. рр. до н.е.) та на інших артефактах. Аналіз показав, що вони містять ряд множин, які було віднесено до розряду сакральних

Ключові слова: сфери космосу, множини знаків на артефактах, числа і множини