

ARCHAEOSIMULATION: NEW SIGHT ON ANCIENT SOCIETY AND LESSONS FOR COMPUTER ERA

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Abstract

In report ancient sources of modern computer simulation are considered. The author contends that the simulation takes essentially more significant place in a human history and culture, than it was assumed so far. In light of conducted researches ancient society looks much more intelligent and informed, than it is traditionally accepted to consider. As typical examples of ancient simulation tools are presented the "life/world tree" on mammoth bone and the system of Egyptian pyramids. It may be argued that on some parameters (scale, simplicity and quality of presentation, significance for society, range and duration of effective application) the ancient models remain unsurpassed and in epoch of modern computer technologies.

Introduction

By word "archaeosimulation" in this report we shall designate ancient methods and tools for simulation. The sky was almost always one of the most complex and important objects of simulation for mankind. Therefore the term "archaeosimulation" in many respects is same to known terms "archaeoastronomy" and "astroarcheology". However we shall understand it much wider: as all tools and methods, which provide not only storage and transfer of knowledge, but also their production and clarification. The main object of ancient simulation was not only sky, but also the person as a part of the universe.

The history of modern study of archaeosimulation began from researches of Gerald S. Hawkins on Stonehenge more than 30 years ago (Hawkins 1966). Hawkins not only first of all used a modern computer for the analysis of ancient construction, but also declared existence of "stone computers". Later were investigated and described other megalithic monuments, which were probably used as an observatory and original analog computer for registration and forecasting of the astronomical events (see, for example, Wood 1978). Almost all described structures can be interpreted as simulation tools.

As well as for modern science, the various forms of analog and discrete simulation were for ancient people the most powerful means for research and understanding of complex dynamic processes of the real world.

Main new results described in given work are next:

1. Lengthening of a history of simulation in comparison with Stonehenge in some times;
2. Interpretation of some other well known ancient structures as special tools for simulation;
3. Identification of numerous traces of ancient simulation in the different forms of human culture.

Two brightest examples of archaeosimulation further in details are described.

"Life / world tree": the earliest from known models

In Hermitage in St.Petersburg a small plate from mammoth bone with spiral figures from many tens points is stored (Fig. 1). It was found in 1929 in village Malta near western part of the lake Baikal (Siberia). Age of a plate is about 25 thousand years.

During storage of a plate in Hermitage it was repeatedly investigated by scientists of various orientation. One of the first 60 years ago was German mythologist Karl Hentze. Hentze interprets spirals of a plate as symbols of the moon phases and even as a image of whole cosmos, but without any quantitative analysis.

The most careful analysis of a semantic system of a plate was made more than 10 years ago by Russian professor Larichev (Larichev 1989). His conclusions were next: on the plate advanced knowledge about the visible movements of the star sky are fixed, which are result of exact long-term observation of the sun, moon and visible planets. The precision of registration and representation of the information is quite enough for a sure prediction of the lunar and solar eclipse! Larichev has detected next main elements on the plate:

- solar year: $243+62+45+14=365$ days;
- four-year cycle:

$$(242+63+45+14+11+54+58) \times 3 = 365.242 \times 4 = 1461 \text{ days};$$

- lunar year: $243+57+54=354$ days;

- sidereal form of the saros:

$$242 \times 27,2122 = 6585.35 \text{ days} = 18.61 \text{ solaryears} = 19 \text{ sidereal years};$$

- synodic form of the saros:

$$(54+57+63+45+4) \times 29.53 = 6585.35 \text{ days};$$

- synodic cycle times for planets:

$$\text{Jupiter: } (63+45) \times 29.53 = 8 \text{ cycles};$$

$$\text{Satum: } (57+54+11) \times 29.53 = 9.5 \text{ cycles};$$

$$\text{Venus: } (54+11+14+45) \times 29.53 = 5 \text{ cycles};$$

$$\text{Mars: } (62+57) \times 29.53 = 4.5 \text{ cycles}.$$

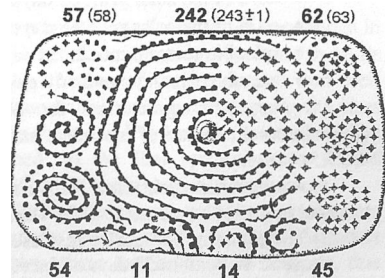


Figure 1. Malta plate with "life/world tree" and quantitative characteristics of elements of the drawing.

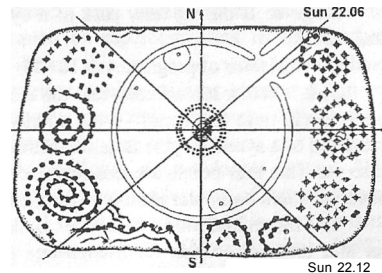


Figure 2. Parallels and analogies: Malta plate and Stonehenge-II: main solar directions.

Additional analysis of a plate as simulation tools has allowed determine following:

1) The Malta plate model permits except exact "scientific" simulation of the dynamics of the sky sphere also simplified "calendar" simulation for wide use:

- «1/6 of the solar year: 62 days;
- «1/8 of the solar year: 45 days;
- «double sidereal month: 54 days;
- «double sinodic month: 58 days;
- «synodic cycle time for Mercury (four internal points of an element "14"): $4 \times 29.5 = 116$ days;
- «synodic cycle time for Venus (ten external points of an element "14"): $10 \times 29.5 = 295$ days.

2) The element "14" can be easy used for observation of the female reproductive cycle:

Stage 1: 10 "external" days of barren period followed by menstruation.

Stage 2: (4+4) "internal" days of fertilizable period, followed by ovulation.

Stage 3: 10 "external" days of barren period before menstruation.

Stage 4: If menstruation has not come in time, then it is necessary to make testy pass of the whole cycle (10+4+4+10).

Stage 5: On case of delay of the menstruation the cycle must be corrected.

Stage 6: If during testy pass of a cycle the menstruation was away, then go to central spiral "242".

General term of pregnancy is $10+28+242=280$ days.

3) It is rather remarkable, that the ten external points of an element "14" correspond to a synodic cycle time for Venus — the goddess of love! Four internal points of an element "14" correspond to a synodic cycle time for Mercury — the messenger of the gods, god of gain, profit and so on! This four points are also image of seed for the "life tree" "242". Then, Malta plate is probably ancient computer prototype for the famous mythological concept.

4) This model was interactive. Baikal located on same latitude as Stonehenge. Main solar and lunar directions for Stonehenge and for the "mammoth plate" coincide. The plate could be used also as "personal Stonehenge" or microobservatory (Fig. 2,3).

5) Such form of fixing and transfer of the information has allowed at a initial stage of a history of a civilization (25000 years ago!) to accumulate, apply and transmit knowledge without alphabet and writing. This plate is not unique such model. Are known and other, age of which only a little less. Similar subjects, the purpose of which by the modern researchers frequently was determined incorrectly, are known and for other, essentially later, civilizations. There are two good examples. First is the famous Phaistos disk, which can be easily entered in the system of the Malta plate as structuralized spiral "243" (Fig. 4).

Second is so named "Boomerang of Tutanhamen" (big baton on Fig. 5). The ancient prototype of such "boomerang" (small baton on Fig. 5) was found there, where described above

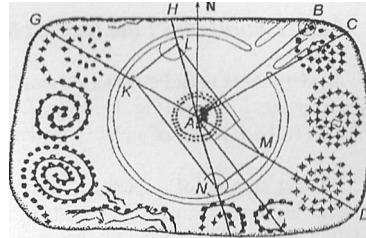


Figure 3. Parallels and analogies: Malta plate and Stonehenge-II: main lunar directions (extreme rise directions for the "high" and "low"

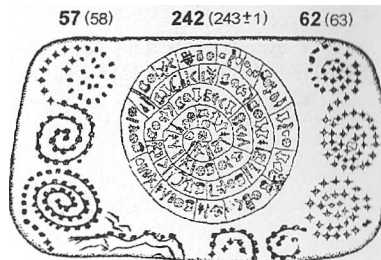


Figure 4. Parallels and analogies: Malta plate and the Phaistos disk as element "243".

plate was found earlier (Larichev 1993). Such measuring tool was, probably, important part of the equipment of ancient observatory. Difficulty to believe that a temporary distance between two presented on Fig. 5 tools is more than 20 thousand years!

Ancient system of pyramids: the greatest from known models

It is possible to assume, that long history of accumulation and analysis of knowledge in the form of refined computing models have allowed (long before invention of writing in all its forms) to define real parameters of the cosmos. By creation of various models and their coordination long before beginnings of the Greek antique science such parameters, as the sizes of the earth, moon and sun, as well as distance between them and five known planets could be

determined. In the first approximation it was made before the beginning of pyramids era.

Such assumptions and the hypothesizes early already stated (see, for example, Saunders 1980). Now there are the basis to approve, that the majority known today megalithics were scale computing models, which not only continued a tradition of ancient knowledge fixing, but also were a tools of further researches. The significance of megalithics in ancient civilizations was about such, as well as significance of supercomputers in the modern world. From this point of view the whole number other similar ancient structures can be productively analyzed, not only Stonehenge. Most interesting is an analysis of ancient pyramids in Egypt as simulation system. We have now a large collection of hypothesizes, majority of which are unacceptable for a modern science and society (Mendelsohn 1993). Consideration pyramids as scale computing model permits many to explain: why them built in general and why them built just so.

On the basis of the analysis of a initial period of ancient Egypt in context of archeosimulation the folk-wing hypothesis can be formulated:

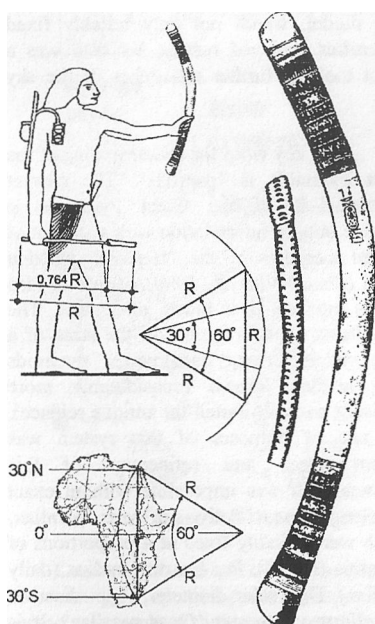


Figure 5. Ancient measuring tools for supervision of sectors 30 and 60 degrees.

1) In ancient civilization, as well as now, leading role in development of society played exact knowledge and means for their production and distributions. Myths, symbols and the religions (minimum partly) occurred in popularization process of intelligent achievement in the field of exact sciences. A typical example is so-called "lunar man": the anthropomorphous image on the moon surface become a source for many legends, but for informed persons it serves first of all as a reminder that radius of the moon about in million time exceeds growth of the person (Fig.6). As such characteristic example can serve also pyramids.

2) The idea of sectoring of an earthly surface according to star patterns of the sky not

only has deep philosophical and religious sense, but also is rather practical: each night a map at all before eyes! Already was rather convincingly proved, that the mutual arrangement of the Great Pyramids and the ancient city Iliopolis corresponds to constellation Orion and star Sirius (Bauval and Gilbert 1994). From the archeosimulation point of view the "star map" of ancient Egypt can be essentially specified (Fig.7). The most interesting and important elements on this map are the center of precession and ecliptic. Thus system of pyramid can be interpreted as scale computing model, which not only reliably fixed major of earlier achieved results, but also was a magnificent tool for further researches of the sky dynamics.

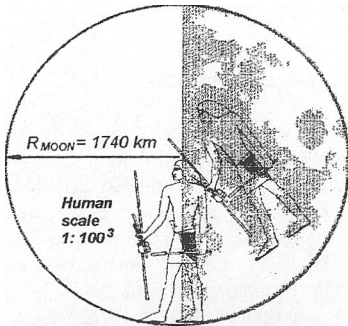


Figure 6. Moon and man.

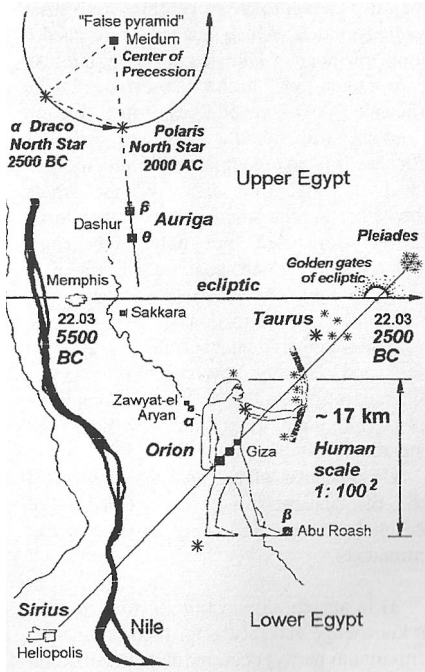


Figure 7. "That is on the sky, is also on the ground".

3) A key word for understanding of the Great Pyramids is "parallax". The correct understanding of the Great Pyramids is possible only in interrelation with a system of ancient measures of the "Hesi-Ra" wooden plates (Shevelev et al. 1990), which is also can be interpreted as model of cosmos. The main items of information on the sizes of a solar system during construction pyramids were already known (considerably more precisely, as is attributed for antique science), and one of purposes of this system was current check and refinement of this parameters. It was impossible without exact knowledge about daily and year parallax, which were reliably fixed at a proportions of pyramids (Fig. 8): R_{ji} - ear(hly radius (daily parallax), D_s - solar diameter, R_{ra} - distance from Earth up to sun (year parallax). It is necessary to note, that factors 1.08 and V5 have acquired in ancient world a sacral significance.

4) Interestingly to note the also following fact. The time of the pyramids construction fixed in especial moment of evolution of the sky: the point of the sunrise during spring equinox was on the one of the most remarkable situations of ecliptic in region of so-called gold "gates". Moreover,

world has acquired a visible axis of rotation in shape of the star α Draco. Present period of a history is also "axial".

5) The construction of pyramids was the first great effort of mankind in creation of objects, commensurable and real comparable with cosmos scales. The pyramids were for ancient society not only important part of human scales in universe (Fig. 9), but also a real tool of development of universe on the way of intelligent development of mankind.

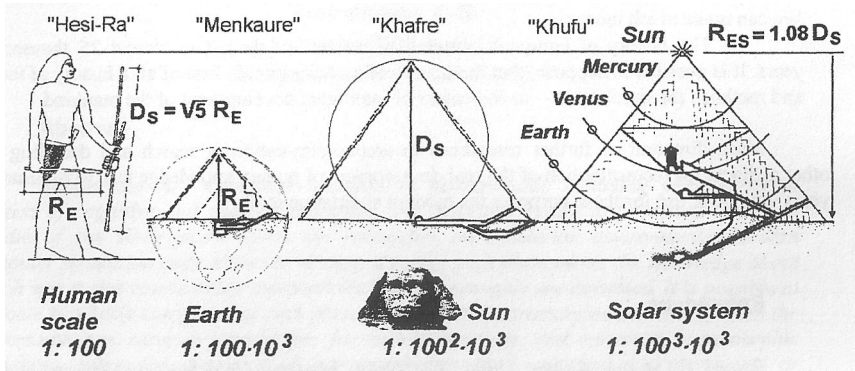


Figure 8. Great Pyramids as "model of universe".

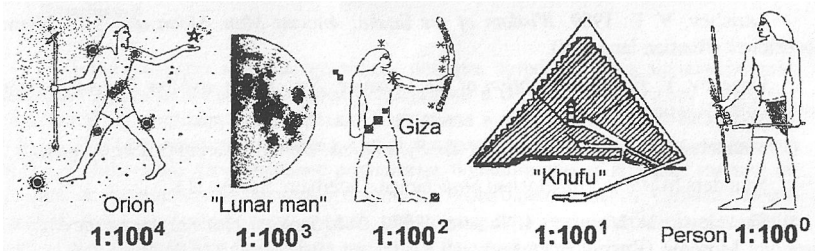


Figure 9. "The person is a measure for all things in the universe".

Can be indicated and other examples, which show, that the system of pyramids in Egypt was not unique "supercomputer for supermodels" of ancient world. The items of information received as a result of their use were practically unknown to main weight of mankind, but their vestiges can be found in all subsequent culture. It is possible to note, in particular, their influence to architecture and main sizes the most known churches.

Conclusions and further research

- A chaos of the star sky during almost all history of a mankind was a major intelligent challenge for the persons, which searched in this chaos order and stability. Archaeosimulation was one of the most efficient answers to this challenge. It is possible to generalize, that the computing simulation was used as one of major tools for intellectual and cultural development of mankind during all history of a civilization.

- Moreover, some of ancient models for a variety of characteristics (scales, significance for society, universality...) have remained unsurpassed and in an epoch of modern computer technologies. The main lesson for the computer era is next: having huge computer superiority (in comparison with ancient) modern simulation has too little impressive results and too inconsiderable influence on the daily life of the majority of the people. We can make much more.

- The history of computer simulation can be lengthened to almost 25 thousand years. It is possible to suppose, that the history of a civilization is first of all a history of tools and methods for simulation — as indicators of intelligent development of mankind.

Main direction of further researches in archaeosimulation is search and decoding of other artifacts for reconstruction of the real development of human knowledge last 30 thousand years with wide use for these purposes of the modern simulation tools.

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