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LINGUO-COMBINATORIAL SIMULATION OF UNIVERSE

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Key WORDS

Combinatorial simulation, Uncertainty, Appearance, Essence, General system theory, Physics, Astronomy, Biology, Psychology, Telemedicine, Education

ABSTRACT
This paper discusses utilization of linguo-combinatorial simulation approach for Universe modeling. When dealing with complex systems one has to consider that conditions and environment are not fully determined. In the course of this paper it is discussed how a poorly formalized system can be efficiently represented and modeled by linguo-combinatorial simulation. Lot of years ago Anaximandros put forward the hypothesis of apeiron, which penetrates everything. In this paper We try to show, that everything consists of appearances, essences and structured uncertainty, which penetrates everything how apeiron.
Today there are many different scientific organizations, but the knowledge is fragmentary and there is a big problem for applying knowledge in practice . We propose a creation of the global computer model of human knowledge for informational unification of different contemporary knowledge. We are considering the combinatorial model of everything, where the main variables are the main systems of Universe, and its application in different systems by means of computer network, special data bases and special decision making support system. The global model will allow us to investigate the different problems (for example - organism of particular patient) in any point of our planet as an integral system by means of geographically distributed specialists and integrated knowledge.

INTRODUCTION

Natural language is the main intellectual product of mankind, the structure of natural intellect is reflected in natural language. Natural language is accessible for investigation. Scientific experience can be expensive and dangerous. Simulation permit to decrease the cost of investigating of the system. The simulation must accurately reflect the characteristics of the real world. Combinatorial simulation allows studying the full set of system variant including uncertainty. Any system contain some types of uncertainty, which are determined by their existence in real world. Humans interact with both physical objects and their descriptions by natural language, mathematics or tables. Descriptions often only partially represent the essence of real processes. The inaccuracy description introduces uncertainty. More often the uncertainty of systems is, however, inherent from the real world. This study is aimed toward such types of uncertainty in different systems. Physical laws, the balance of energy and matter, and information limit the systems behavior. In boundaries of these limits, systems interact and adapt to their systems and environment, and undergo the destructive actions.

LINGUO-COMBINATORIAL SIMULATION

Frequently we have system description in natural language. We propose to transfer from natural language description to mathematical equations. For example, we have sentence

WORD1 + WORD2 + WORD3 (1)

In this sentence we assign words and only imply meaning of words, the meaning (sense) is ordinary implied but not designated. We propose to assign meaning in the following form

(WORD1)*(SENSE1) + (WORD2)*(SENSE2)+(WORD3)*(SENSE3) = 0 (2)

In this equation Ai will denote words from English Appearance and Ei will denote senses from English Essence. Then equation (2) we can represent in following form

A1*E1 + A2*E2 + A3*E3 = 0 (3)

The equations (2) and (3) are the model of sentence (1). When we have the mathematical equation in the form F(x1, x2, x3)=0, we can turn to such form by means of differentiation where the partial derivatives are the appearances and the derivatives with respect to time are the essences. This model is algebraic ring and we can resolve this equation relatively the appearances Ai or the essences Ei [1,2,3}:

$$\begin{aligned} A1 &= U1*E2 + U2*E3 \\ A2 &= - U1*E1 + U3*E3 \\ A3 &= - U2*E1 – U3*E2 \end{aligned} \quad (4)$$

Or

$$\begin{aligned} E1 &= U1*A2 + U2*A3 \\ E2 &= - U1*A1 + U3*A3 \\ E3 &= - U2*A1 – U3*A2 \end{aligned} \quad (5)$$

Where U1, U2, U3 – the arbitrary coefficients, can be use the for decisions of different task on the initial manifold (2) or (3). For example, if we would like to reach the maximum of x3, we can assign the arbitrary coefficients U2 = -b*A1, U3 = - b*A2 and we get

$$\begin{aligned} dx1/dt &= U1*A2 – b*A1*A3 \\ dx2/dt &= - U1*A1 – b*A2*A3 \\ dx3/dt &= b*(A1*A1 + A2*A2) \end{aligned} \quad (6)$$

and if b > 0 then variables x3 strive to maximum stable, for manipulation we left with one arbitrary coefficient U1.

In general if we have n variables and m manifolds, restrictions, then the number of arbitrary coefficients will be defined as the number of combinations from n to m+1 [Ignatiev (1963)] - see Table 1. The number of arbitrary coefficients is the measure of uncertainty. Usually when solving mathematical systems the number of variables equals to number of equations. On practice frequently we do not know many constrains on our variables. Combinatorial simulation permits to simulate and study the systems with uncertainty on the base of incomplete information. It is important that we describe a system with a full sum of combinations and have the all variants of decisions. The linguo-combinatorial simulation is the useful heuristic approach for investigation of complex, poor formalized systems.

Natural language is the main intellectual product of mankind, the structure of natural language reflect the structure of natural intellect of mankind and his separate representatives on the level of consciousness and unconscious. Linguo-combinatorial simulation is the calculation, which permit to extract the senses from texts. Wittgenstein want to have the calculation of senses [Morick (1967), Morrison (1968)].

In our calculation we have the three groups of variables : the first group – the words of natural language , the appearances Ai, the second group – the essences Ei, which can be the internal language of brain [Augustinus (1864)]; we can have the different natural languages, but we have only one internal language of brain; this hypothesis open the new way for experimental investigation; the third group of variables –the arbitrary coefficients, structured uncertainty in our model, which we can use for adaptation in translation processes and etc

Combinatorial model of atoms

For example we considere the problem of atom simulation. For Hydrogen we have the key words

Atom + Proton + Electron **(7)**

Then the equivalent equation will be (3), where A1- characteristic of Hydrogen atom in particular his specrtral characteristic, E1 – variation of this characteristic, A2 – characteristic of proton, E2 – variation of this characteristic, A3 – characteristic of electron, E3 – variation of this characteristic.
For simulation of Deuterium we will have the key words

Atom + proton + electron + neutron **(8)**

Then equivalent equations will be

$$\begin{aligned} E1 &= U1*A2 + U2*A3 + U3*A4 \\ E2 &= - U1*A1 + U4*A3 + U5*A4 \\ E3 &= - U2*A1 – U4*A2 + U6*A4 \\ E4 &= - U3*A1 – U5*A2 – U6*A3 \end{aligned} \qquad (9)$$

Where U1, U2, U3, U4, U5, U6 – the arbitrary coefficients, A1- characteristic of Deuterium atom, E1- variation of this characteristic, A2-characteristic of proton, E2 – variation of this characteristic, A3- characteristic of electron, E3- variation of this characteristic, A4- characteristic of neutron, E4 – variation of this characteristic. In case of nuclear reaction it is possible to conversion of Deuterium in Hydrogen by means of transformation of equations (9) to (4).
The same way it is possible to create the combinatorial models of all atoms from Mendeleev table. The structure of atoms and molecules gets over the structure of brain and determines the uncertainty of mental processes.

STRUCTURE OF GENERAL MODEL OF MENTAL PROCESSES

If we have the kay words – Perception, Attention, Memory, Thinking, Language, Emotion, Motion for simulation of mental processes, then the equivalent equation of our model will be

$$\begin{aligned} E1 &= U1*A2 + U2*A3 + U3*A4 + U4*A5 + U5*A6 + U6*A7 \\ E2 &= - U1*A1 + U7*A3 + U8*A4 + U9*A5 + U10*A6 + U11*A7 \\ E3 &= - U2*A1 – U7*A2 + U12*A4 + U13*A5 + U14*A6 + U15*A7 \\ E4 &= - U3*A1 – U8*A2 – U12*A3 + U16*A5 + U17*A6 + U18*A7 \\ E5 &= - U4*A1 – U9*A2 – U13*A3 – U16*A4 + U19*A6 + U20*A7 \\ E6 &= - U5*A1 – U10*A2 – U14*A3 – U17*A4 – U19*A5 + U21*A7 \\ E7 &= - U6*A1 – U11*A2 – U15*A3 – U18*A4 – U20*A5 – U21*A6 \end{aligned} \qquad (10)$$

where A1 – characteristic of perception, E1 variation of this characteristic, A2 – characteristic of attention, E2 – variation of this characteristic, A3 – characteristic of memory, E3 – variation of this characteristic, A4 – characteristic of thinking, E4 – variation of this characteristic, A5 – characteristic of language, E5=-variation of this characteristic, A6 – characteristic of emotion, E6 variation of this characteristic, A7 – characteristic of motion, E7 – variation of this characteristic, U1, U2, . . . U21 – arbitrary coefficients, which compose the block of control our mental structure.
The equations (10) determinate the interactions between different parts of our mental structure in the boundaries our model. From this model we have the necessity in control block, which can manipulate the arbitrary coefficients This control block is the analog of the high psychology structure – Personality. The mental processes are the part of whole organism.

STRUCTURE OF GENERAL MODEL OF ORGANISM

Now the medical treatment is determination of illnes symptom and generation of corresponding actions. This methodology is based on the physician education and support by means of telemedicine. Computer has big possibilities for complex system simulation, but physicians do not use these possibilities now.
The main idea of global computer model of organism has three parts:

1. It is necessary to create the integral model of generalized organism of man on the basis of biology and medical science;

2. Physician must have the possibility to tune the generalized model of organism on the concrete parameters of patient;
3. Physician must have the possibility to simulate the different variants of treatment and to select the best treatment way by means of model.

Since Aristoteles, there have been a lot of attempts in this direction, but now we have computer for investigations of complex systems. We can use the combinatorial simulation method, which demonstrated good results for simulation of different problems - city simulation, technical systems simulation, living cell simulation.

We have different levels of description of organism - organ level, cell level, molecular level, but for physician the organ level is useful and suitable. We can use the traditional system of organs :

1.The system of motion organs (bones, muscles, fasciae)
2. The digestive system
3.The respiratory system
4.. The urogental system
5. The blood vascular and limphatic systems
6. The central nervous system
7. The peripheral nervous system -
8. The ductless glands
9. The skin and sensory organs.

We can increase the number of organ systems, but for illustration of our approach we will use nine systems, which interact among themselves. The organism equation will consist nine variables:

$$A1*E1 + A2*E2 + \ldots + A9*E9 = 0 \quad (11)$$

where:
A1 - characteristic of motion organs, E1 - variation of this characteristic,
A2 - characteristic of digestive system, E2 - variation of this characteristic,
A3 - characteristic of respiratory system, E3 - variation of this characteristic,
A4 - characteristic of urogental system, E4 - variation of this characteristic,
A5 - characteristic of blood vascular and limphatic systems, E5 - variation of this characteristic,
A6 - characteristic of central nervous system, E6-variation of this characteristic,
A7 - characteristic of peripheral nervous system, E7-variation of this characteristic,
A8 - characteristic of dustless glands, E8 - variation of this characteristic,
A9 - characteristic of skin and sensory organs, E9 - variation of this characteristic.
The structure of equivalent equations of organism model will be (12)

$$E1 = U1*A2 + U2*A3 + U3*A4 + U4*A5 + U5*A6 + U6*A7 + U7*A8 + U8*A9$$

$$E2 = -U1*A1+U9*A3+U10*A4+U11*A5+ +U12*A6+U13*A7+U14*A8+U15*A9$$

$$E3 = - U2*A1-U9*A2+U16*A4+U17*A5+ +U18*A6 +U19*A7+U20*A8+U21*A9$$

$$E4 = - U3*A1-U10*A2-U16*A3+ +U22*A5+U23*A6+U24*A7+U25*A8+U26*A9$$

$$E5 = - U4*A1-U11*A2-U17*A3-U22*A4 +U27*A6+U28*A7+U29*A8+U30*A9$$

$$E6 = - U5*A1-U12*A2-U18*A3-U23*A4-U27*A5+U31*A7+U32*A8+U33*A9$$

$$E7 = - U6*A1-U13*A2-U19*A3-U24*A4-U28*A5-U31*A6+U34*A8+U35*A9$$

$$E8 = - U7*A1-U14*A2-U20*A3-U25*A4-U29*A5-U32*A6-U34*A7+U36*A9$$

$$E9 = - U8*A1-U15*A2-U21*A3-U26*A4-U30*A5-U33*A6-U35*A7-U36*A8$$

where U1, U2, . . . ,U36 - the arbitrary coefficients, which can be used for tuning of the model. System of equations (12) is full, this system covers all combination of interaction between different organs of organism.

In general we have the representative point of organism in parameters space, each organism has the zone of health, where the parameters correspond the health of concrete man. During illness the

representative point of organism is found in another zone of parameters - in illnes zone. The process of treatment is the movement of the representative point from illness zone to health zone.
In our example the equation of illness organism will be

$$(X1 - X10)^2 + (X2 - X11)^2 + (X3 - X12)^2 + (X4-X13)^2 + (X5 - X14)^2 + (X6-X15)^2 +$$

$$+(X7 - X16)^2 + (X8 - X17)^2 + (X9 - X18)^2 = (X19)^2 \qquad (13)$$

where X1,X2, . . ,X9 - characteristics of health organism, X10, X11, . . , X18 - characteristics of illness organism, X19 - the distance between health zone and illness zone. For system (13) we can create the equivalent equations system according to type (2) and can use the arbitrary coefficients for simulation of physician actions. The physician actions must decrease the variable X19 and return the representative point from illness zone to health zone.
In Fig.1 we can see the scheme of interaction between scientific organizations for creation of general model of organism and interaction between particular patients and physicians during process of treatment. Models of concrete patients are imbedded in general model of organism. Famous medical and biological specialists must check, control and inspect the parameters of each organ in general model [Ignatyev, Makina,…(2000)]. It is way to decrease the number of mistakes made by physicians.

Simulation of Solar System

For simulation of Solar System we can use 10 keys words – Sun, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto. In our equivalent equations system we will have 10 variables - 10 appearances, 10 essences and 45 arbitrary coefficients, which are the structured uncertainty:

E1=U1*A2+U2*A3+U3*A4+U4*A5+U5*A6+U6*A7+U7*A8+U8*A9+U9*A10
E2=-U1*A1+U10*A3+U11*A4+U12*A5+U13*A6+U14*A7+U15*A8+U16*A9+U17*A10
E3=-U2*A1-U10*A2+U18*A4+U19*A5+U20*A6+U21*A7+U22*A8+U23*A9+U24*A10
E4=-U3*A1-U11*A2-U18*A3+U25*A5+U26*A6+U27*A7*+U28*A8+U29*A9+U30*A10
E5=-U4*A1-U12*A2-U19*A3-U25*A4+U31*A6+U32*A7+U33*A8+U34*A9+U35*A10
E6=-U5*A1-U13*A2-U20*A3-U26*A4-U31*A5+U36*A7+U37*A8+U38*A9+U39*A10
E7=-U6*A1-U14*A2-U21*A3-U27*A4-U32*A5-U36*A6+U40*A8+U41*A9+U42*A10
E8=-U7*A1-U15*A2-U22*A3-U28*A4-U33*A5-U37*A6-U40*A7+U43*A9+U44*A10
E9=-U8*A1-U16*A2-U23*A3-U29*A4-U34*A5-U38*A6-U41*A7-U43*A8+U45*A10
E10=-U9*A1-U17*A2-U24*A3-U30*A4-U35*A5-U39*A6-U42*A7-U44*A8-U45*A9

In this system of equations A1 – Sun characteristic, E1 – variations of this characteristic, A2 – characteristic of Mercury, E2 – variations of this characteristic,…, U1,U2…U45 – arbitrary coefficients, which carry the control possibility. This system of equation is inverse task, we can have a lot of structure for generation of the same motion of planet.
The same way we can create the equivalent equations system for Galaxy.

Apeiron hypothesis

Linguo-combinatorial simulation is the way for everything simulation. The structure of this model consists of 3 blocks of variables: Appearances block, Essences block and block of the structured uncertainty. The structured uncertainty is the substance U, which is apeiron, which penetrate to different structures – atoms, minds, organisms, planets, galaxy etc. and permit to control. It is hypothesis with good perspective of investigation. May be this apeiron is the physical vacuum, superfluid vacuum. The apeiron can be basement for creation of living universe model.
If we enunciate the word “system”, we share some structure out of the whole world and this structure becomes the opposition of the all remaining, which we can consider as the environment. The system is interacting with environment, which is some more then system. So the first operation is to confine the system from the environment. The second operation is the orientation of system, for example across determination of keys words. The third operation is the definition of structure with arbitrary coefficients. We show this method on

several examples and it is possible to use it for investigation of different astronomical objects. In our models we have several instruments for evolution : Firstly – the variations of arbitrary coefficients (turning or self-turning), Secondly – the covering of the new restrictions (learning or self-learning), Thirdly- the growth of our system, the increasing of the number of system variables, appearances, Fourthly – the association of the systems in collective, which can have the better possibilities for adaptation. The best possibility of adaptation will be in adaptation maximum zone, where we have the maximum of the arbitrary coefficients number (see Table 1). This Table is the basement for rhythmology of Sun and other astronomical systems. A lot of astronomical systems can describe and investigate by means of linguo-combinatorial models.

Conclusion

Combinatorial simulation is the universal method for simulation&modeling and permit to create the new model in different areas – in physics, chemistry, astronomy, biology , psychology etc. The universality of this method is determined the linguistic basement of simulation – natural language is the universal sign system. By means of our model we introduce the control phenomenon in physics and astronomy. We try the show the different level of models. It is necessary the varification of these models, but its structure is interesting for understanding of everything.

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Biographical notes

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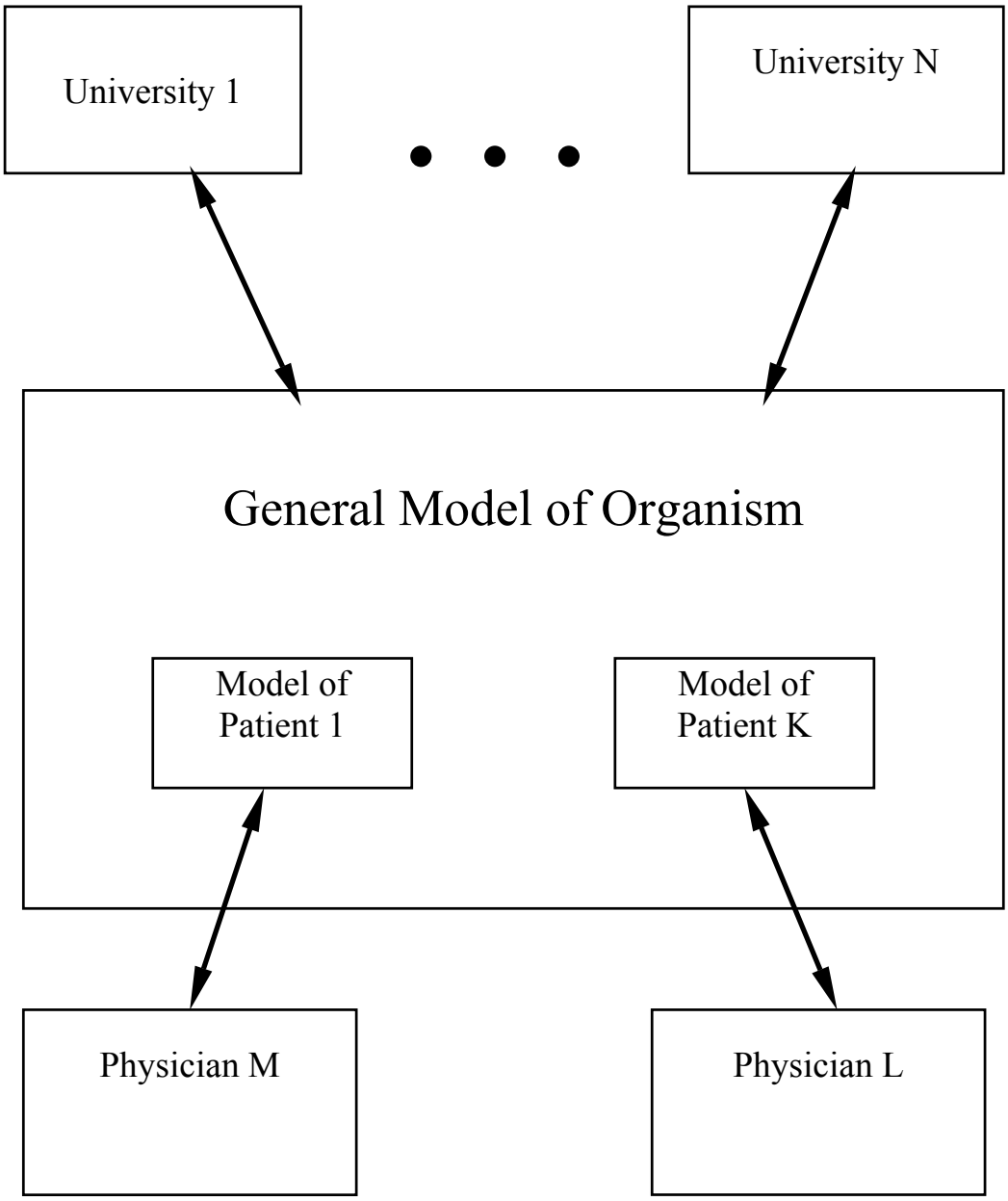

Fig.1. Interaction between scientific organization (University 1,... University N) and General Model of Organism.
Interaction between models of particular patients and physicians.

TABLE 1

m n\	1	2	3	4	5	6	7	8
2	1							
3	3	1						
4	6	4	1					
5	10	10	5	1				
6	15	20	15	6	1			
7	21	35	35	21	7	1		
8	28	56	70	56	28	8	1	
9	36	84	126	126	84	36	9	1