Anticipating in Modelling of Social Systems Neuronets with Internal Structure and Multivaluedness

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Abstract
In proposed report we consider the principles of constructions of new models of society, their applications and further research problems. Structure of proposed models consists from elements and bonds between them. Our society models have analogies with neural network models. To account for mentality we propose to introduce the intrinsic mental models of World in elements, which represent the individuals or decision-makers. Accounting for the anticipatory aspects of individuals leads to presumable multivaluedness in models. Connections to consciousness and quantum mechanics investigations are discussed.

Keywords: Associative Memory, Internal Structure, Multivaluedness, Neuronets

1 Introduction

The physics of XX century have developed many tools, methods, and principles for investigation non-living nature, technology, micro-phenomena and Universe. It constitutes the visible mainstream of recent physics. But in parallel to this visible flow, in physics exist hidden streams, which have been connected with a desire to recognize the place and structure of mankind from the viewpoint of physics. Many prominent physicists, such as N.Bohr, E.Shrodinger, J.Jordan, D.Bohm, W.Pauly, and J. Willer had thought about such problems. Another approach to such problems is derived from investigations of brain processes and artificial intelligence. Recently, the problems of observer on micro and macro levels in quantum and classical physics are intensively derived in the frames of classical and non- classical quantum mechanics. But with the development of globalization processes, and informatisation development, the understanding of society as a complex hierarchical object has became more and more important. In proposed report the author describes a class of models and concepts, which can constitute some universal methodological background for considered systems in different space and time scales and hierarchical levels. Many ideas from different disciplines - general systems theory, cybernetics, informatics and philosophical-humanity science was incorporated into proposed methodology.

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2 Some Issues on Society Properties

First of all we concisely describe the key society property, which should be represented in models. In the last section we will consider the new issues following from our models.

2.1 Holism

Many interconnections between countries, manufactures, peoples cause the emergency of new object - the whole World as unique global systems. There was a long history of development of this concept in different area: in economics - World-system (I.Wallerstein), in culturalogy - global culture (R.Robertson) and in Sustainable Development concept.

2.2 Civilization in Social History

The notion of civilisation or economical formation, or regimes implicitly exists in all above-mentioned concepts (M.Veber, A. Toinby, and S.Huntington).

2.3 Dynamical essence of society

Evolutionary nature is another principal feature of the present state of contemporary World. So the applicability of existing theories and models of society are under question. One of the main tools for the investigation of evolution is the approach from physical and biological theories: synergetic and self-organisation theory (I.Prigogin, H.Haken, G.Nikolis). There are many achievements in using those concepts in human sciences (for example see chaotic dynamics in economics). But till now the principal difficulties in building the theory of such type has been enormous.

2.4 Interrelations and Holography Property

In philosophy and theology always have existsed the idea of interrelations of all things in the World. Almost all-famous recent sociological theories have as a central idea of social influences of different types: see social interaction by T.Parsons, D. Easton, E.Durkheim, social fields by K.Levine. Influence of surrounding environment on individual is present in psychology of small groups of peoples and implicitly in social psychology by G.Lebon, K.G.Young, G.Tard, and S.Moskovicy. Also the important property of the society is the relation between whole system and subsystems.

2.5 Space and Time Scales and Hierarchical Structure of Society

It is a common place now that there are many periodical phenomena in history. Economics have many periods: Kondratiev cycle (about 50 years), Cuznec (15-20 year) in building, Cameron (150- 300). In parallel there exist periodic processes in social and political life. The most recognised is the fashion design. It is recognised that the leading countries in recent history have been Spain – England – Germany – USA with the period of change of 150 – 300 years (I. Wallerstein). According to L.Humilev, a typical life of passionate nations is about 800 years. Much longer historical scales are the scales of development of world religions – one axis of history (about 2000 years) and second (Jaspers). Besides periodical processes many non-periodical, apparently stochastic, processes are recognised. Different space scales also are recognised in society.

2.6 World Internal Pattern and Mentality of Individuals

There are many notions and problems considered in philosophy, politology, sociology and that yet haven't adequate counterparts in system theory. The examples are: reflexivity of society subject (self- referencing systems by H.Luchman), social exchange theory by G.Homans, individual model of World by J.Habermas or P.Chickland (see 'Weltanschauung' notion), individual construct by Kelley, anticipatory properties of society and many others. So it need to have possibility of description of such notion as mentality, beliefs, emotion, preferences and so on.

2.7 Scenarios of Future, Bifurcation and Decision- Making

The problem of historical processes predictability is an important issue. There exist a lot of concepts for Philosophy of History. The examples are 1) tendency from "gold age" to recent state (Plotin, Popper), 2) tendency from bad to best society (Fukuyama), 3) predictability of history and possibility of "social engineering" (Marxism, B. Banathy), 4) anti-historism and full unpredictability of history (K.Popper), 4) theological approach (Charden). Now scenarios consideration became one of the strategic planning tools in economics. But in general case, such problems hadn't yet the general solution. It follows the necessity to understand the place and role of intelligent agent with a free choice in history. One of the most prominent considerations of human place of the history was done by (Ortega -y Gasset, 1955). For example, some notes on human nature from (Ortega- y Gasset, 1955, Part VII; my translation): "At every moment of time I have many possibilities. I can make this and that choice. If I make one then at the next moment it will be A, if I make another then it will be B. The Human - is the essence, which make him. ... But the Human not only makes himself. He should define what he should do in his life. He should define whom he decide to be." And from part IX : "This life may be other, .. but it became precisely that", "Historical mind ...is what had happened with human."

3 Background for Proposed Methodology and Simplest Examples

The analysis of issues above and many others had led the author to new class of models (Makarenko, 1998, 2000). Here we describe only main points of models and stress new issues connected to anticipating, multivaluedness and quantum- mechanics.

3.1. Simplest Models

Let us take that society consists of N >> 1 individuals and each individual is characterised by vector of state $s_i = \{s_1^i,..,s_{k_i}^i, s_{k_i+1}^i,..,s_{M_i}^i\}, s_l^i \in M_i^l, l = 1,...,M_i$ where M_i^l is a set of possible values s_i. In sufficiently developed society individuals have many complex interconnections. We assume that there are connections between i and j individuals. Let J_{ij}^{pq} is the connection between p-th components of element i and q-th component of element j. Thus the set Q = ({ s_i },{ J_{ij}^{pq} } , i,j = 1,...,N) characterises state of society.

Many elements in hyerarchical society have a vast number of interconnections on upper and lower levels. Different fields of interests (political, social, educational and so on) have similar network representation and society, as a whole, is a union of such networks. The values of bonds may represent the economical, informational, control channels, nationality, family bonds and so on. Society is evolutionary system with dynamical changes in time. Further, for simplicity we will consider only discrete time models with moments of time: 0,1,2,...., n,... . Following evolutionary nature of systems considered, it is natural to have as the input of a system at moment *n* the values of parameters at *n*-th time moment, and as the output the values at the next (n+1) time moment (for n=0, 1, 2, ...).

The crucial step in new models is to take into account the global culture of the society as the collection of all material tools plus spirit notions such as moral, ethics, religion, justice, education. Global culture constitutes the basic of civilisation (A.Toinby, I.Wallerstine, and S.Huntington). The models have dynamical principles that can imitate the behaviour of global culture. The author introduced class of society models as modification of neuronet models (Makarenko 1998; 2000). A simplest model is derived from the functional called 'energy' of the form:

$$E = \sum_{i \neq j}^{N} J_{ij} s_i s_j \tag{1}$$

where s_j ={+1,-1} – state of elements, N – number of elements, J_{ij} - bonds between i-th and j-th elements. The Hopfield type models converge to one of the few stable states (attractors) which gives a minimum of the functional (1). In general case, the models have the form

$$s_i(t+1) = \varphi_i(\{s_i(t)\}. \{s_i(t-1)\},..., \{J_{ij}(t)\}, \{J_{ij}(t-1)\},..., b) \tag{2}$$

In simplest case the model takes the form of well-known Hopfield model, and dynamical equations have the form:

$$S_i(t+1) = sign(h_i); \tag{3}$$

where $h_i = \sum_{j \neq i}^{N} J_{ij} s_i s_j$ and $sign(W) = \{+1 \text{ if } W>0, -1 \text{ if } W<0\}$

In the case of hierarchical systems and symmetrical bonds between different elements and different levels, there also exists a functional – counterpart of 'energy' in (1).

4 The Models with Internal Structures and Mentality Accounting

4.1 Internal Representation of the External World

Many approaches exist for taking mentality into account. The simplest way consists in representing image of World in the individual's brain as collection of elements and bonds between elements. The representation of World pattern with internal representation of individual is displayed at Fig. 1.

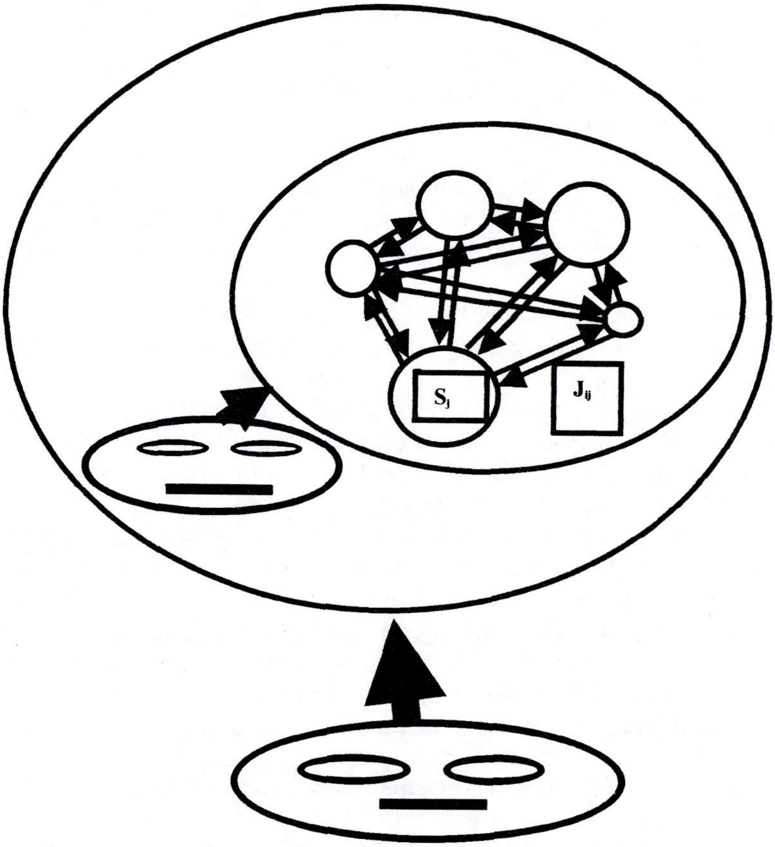

Fig. 1 Internal representation of the World in the mind of an individual

At the bottom of Fig.1 we represent an individual who has some knowledge of the World. This representation is similar to a "pattern" in models above. Essentially new here is that an individual may represent him as one of the elements from a "pattern". The mental structures of other individuals are also represented in the same manner. Thus the society as a complex system has essentially new representation. At the first level of description we have the collection of points (elements), which represents the individuals and bonds connecting them. At the second level, at all points we have an attached structure (a pattern). At this stage the construction resembles the differential manifolds from the topology.

4.2 One Possible Method for Mentality Accounting in Models

The laws for the evolution of elements should depend on representation above. Then the equation (3) from previous section should be replaced by more complicated by inserting self-representation of individual in dynamical law. There also may exist a recursion with many levels of recursions as in the theory of reflexive systems.

5 Anticipatory Property and Multivaluedness

5.1 Anticipation Property

The next step of developing models consists in accounting for the anticipatory aspects (Francois, 1998; Rosen, 1985, Ekdahl et al, 1995) of individuals. It is evident that individuals, in their decision-making processes, have prognoses of the future. In such case the states of elements in model should depend on the images of the future described in internal representation. As in the usual reflexive system, there may exist some stages of iteration in anticipating future. Following (Dubois, 1998, 2001) we call it hyper incursion.

Another important part of anticipation is the selection procedure (Francois, 1998, p.45): " It should be observed that the course of events seems always determined ... after the events." and "at the individual level." The French biologist P.Vendryes established (1942) an interesting concept of autonomy, distinguishing living systems as those having an aptitude to "determine their own laws", by self-regulation within limits. According to his view, the present is the crucial moment of decision. This means that at the present moment a choice is made, or a decision is taken, which select one possibility, and only that one, excluding all other options." The dynamic for element with internal structure is determined by two components. An external mean field as in the section 3 determines first component. Second component is connected with internal dynamics of an individual.

5.2 One Approach to Modeling of Anticipation in Proposed Models

Let us name the pattern of society $Q^{(1)}(t)$ as ' an image of real world ' in discrete moment of time t. We also introduce the $Q_{wish}(t)$ - a ' desirable image of world in moment t by first individual' as the set of element states and bonds wished by first individual at moment t.

$$Q^{(1)}{}_{wish}(t) = (\{s_I{}^{wish}(t)\}, J_{ij}{}^{wish}(t)\}). \quad (4)$$

Then we assume that in the case of pure isolated dynamical law the change of individual state depends on difference between real and desirable image of the world:

$$D^{(1)}(t) = [[\ Q^{(1)}{}_{wish}(t) - Q^{(1)}(t)\ ]], \quad (5)$$

here [[*]] - some norm. So we represent in formulas the "deformed" vision of the World by an individual. Precisely the same type of representation has the desirable ("ideal") pattern of the World. Only pattern of real World is unique for all individuals (in such models) but perception and "ideals" are different for different individuals. Thus schematically the society in proposed representation looks like Figure 2.

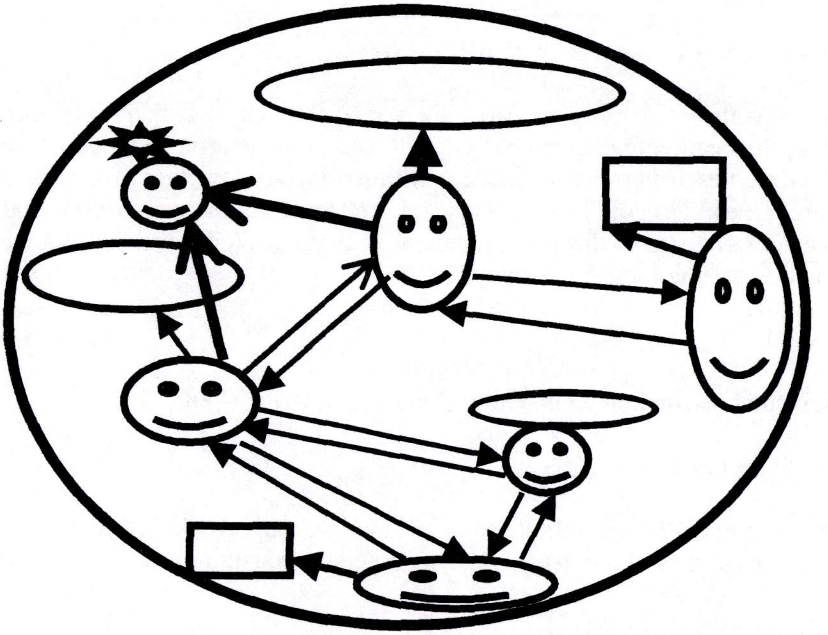

Fig. 2 The society as the collection of individuals.

Ellipses, rectangles, stars represent the internal representation of external world in the manner analogues to Fig. 1. The individual with star-representation corresponds to child and arrows directed to him – represent the teaching influence (for example from parents). Then we can assume the dynamical law for element as

$$s1(t+1) = F1(h1(t), D(1)(t)) \quad (6)$$

In the formula (6) h1(t) represents the environment influence as in the formulas (3) and D(1)(t) represents "internal representation" part.
The next step consist in comparison of wished images of the world with the real images of the world at moments of time t, (t+1), (t+2), ..., (t+g(i)), that is, anticipating at such moments. In simplest case g(i) = g(1). The parameters {g(i)} define the horizons of anticipation. The models with internal structures corresponding to Fig.2 has the form

$$S_i(t+1) = F_i(h_i(t), D^{(1)}(t), D^{(1)}(t+1), \dots, D^{(1)}(t+g(i))); \qquad i= 1,2, \dots, \tag{7}$$

Substitution into the system of all components follows to equivalent system:

$$S_I(t+1) = G_I(\{s_I(t)\}, \{s_I(t+1)\}, \dots, \{s_I(t+g(I))\}, R), \tag{8}$$

where R is the set of remaining (control, structural, environmental) parameters. This form is opposed to delay equations. The structure of (8) coincides with anticipatory systems investigated by D.Dubois. This follows possible similarity in properties.

5.3 Anticipation as the source of Multivaluedness

The models with anticipating property are rather complex and their investigation is currently at the beginning phase. Thus we will discuss some principal moments of their possible properties using simple models with analogous structure. For this purpose useful are researches of D. Dubois and colleagues (Dubois, 1998, 2001) on hyperincursion systems. A discrete dynamical system is called a system with recursion if the equation has the form (in simple case)

$$x(t+1) = f\,[x(t-1), x(t)] \tag{9}$$

and with incursion (implicit recursion) if (Dubois, 1998. Pp. 6-7)

$$x(t+1) = f\,[x(t), x(t+1)] \tag{10}$$

When the equation (10) has multiple solutions than we will talk about hyperincursion.
The simplest examples of incursive and hyperincursive equations are

$$x(t+1) = a\,x(t)\,[1 - x(t+1)] \tag{11}$$

$$x(t) = a\,x(t+1)\,[1 - x(t+1)] \tag{12}$$

The equation (11) can be transformed to equation

$$x(t+1) = a\,x(t)/[1+x(t)]$$

with unique solution.

Equation (12) is transformed to the system with two solutions

$$x(t+1) = 1/2\ [1 \pm \sqrt{}\ [1 - 4\ x(t)\ /\ a] \qquad (13)$$

"Such anticipatory system shows successive bifurcations. Each bifurcation presents two potential future branches and if the system selects itself a branch of the bifurcation, a self-organizing anticipatory system is defined. If the system possesses a selection rule at each time moment, the set of potential solutions collapses to one realized solution. This is selected by environment for externalist evolutionary systems, or by the system itself for internalist self-organizing systems. Without selection, this system will cumulate in itself all potential solutions": (Dubois, 1998; p.7). The next example of a familiar behavior is a unique neuron, in which the state depends on output (Dubois, 2000).

Following the direction of anticipatory systems investigations we propose to pose such properties as leading principles (at list at first approximation). **Thus we assume as the first principle that our models above may have multivalued solutions.**

In works of D.Dubois we can find the recipe for excluding such multivaluedness, for example by using the catastrophe theory (Dubois & Sabatier, 2000). Remark that the selection procedure also presents in another papers on multivalued equations.

Thus we may take as the second principle that in each moment of time we have the possibility of selection of unique solution.

If we have a "solver" (or "selector" of solution) in a model then the situation looks just like in the Figure 3.

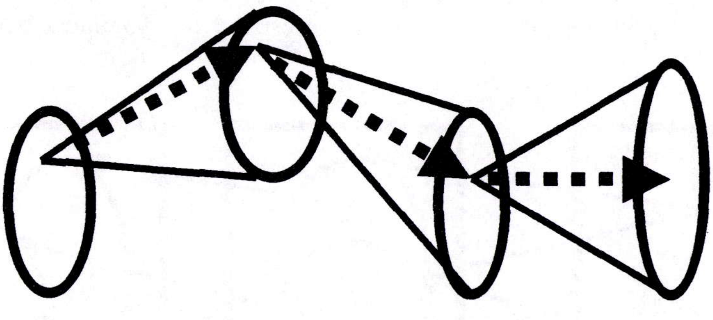

Fig. 3 Set of possible solutions and selected trajectory

The 'funnels' at Fig.3 corresponds to the possibilities accepted at each discrete moment of time. Punctuated arrows correspond to selected trajectory. At this figure the foundation of each cone consist from the point of some space X, where each point $x \in X$ corresponds to the state of a system. Such funnel corresponds to an integral funnel and arrows correspond to the selectors of multivalued map in the theory of set-valued maps.

An analogy may be proposed with topics from quantum physics. Selection is similar to the measurement process of quantum state. Other analogies may exist with entirely different concept from quantum mechanics - namely with many-worlds interpretation of quantum mechanics (Everett, 1957). In the concept by Everett a global distribution function describes the system of many parallel worlds. At each moment of time the system with observer is exposed to branching. In our case existence of one "solver" corresponds to some unique "integral" solver. But if we consider the model for N>1 individual then the problem of N independent (or partially independent) "solvers" arises. In case of individual "agents with internal structure" we can consider "solver" as the "decision- maker" and the problem corresponds to the decision-making problem. If the dynamical law for evolution of one element is taken in the form of evolution of one neural element (presumably multivalued) then we have

$$S(t+1) = F(P\,R\,[S(t), J]) \; ; \qquad t = 0, 1, 2, \ldots \tag{14}$$

In (14) S(t) represent collection of all elements values at moment t, J- collection of all bonds, F- nonlinear operator of system, P - operator which select unique solution from the set of possibilities, R corresponds to "multivaluedness generator" in the system. That is $R: X \rightarrow MX$, $S \in X$, MX - the space of all non-empty sets of X defined above.
But in case where unique "solver" cannot fix all parameters in the system (but only part of parameters), the number of possibilities may exist. First, the integral funnel may survive for non-selected parameters in the part of phase space. If selected parameters are leading then non-uniqueness should be removed. But if it is not the case, then non-uniqueness should be conserved. If there are some decision- makers ("solvers") then we have a number of possible variants depending on the power of "solvers". Figure 4 illustrates some aspects of situation. It may correspond to two interactive Everett spaces.

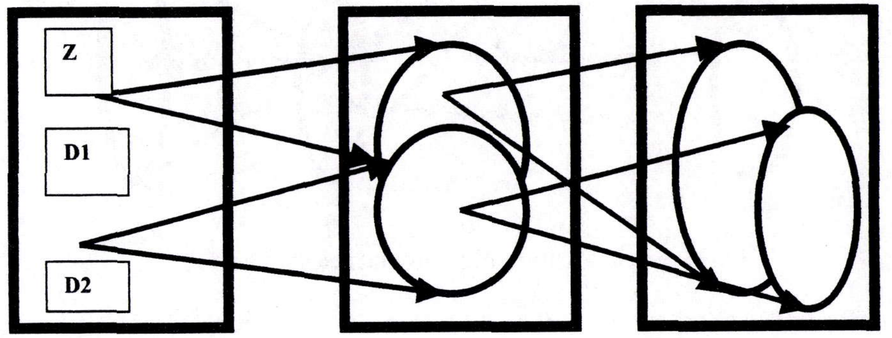

Fig.4 The case of two decision- makers ("solvers").

The rectangle represents the phase space of the system (Z). The space Z may be divided on different parts (two ellipses). D1 and D2 display two decision- makers. Their part of responsibility partially overlapped.

5.4 Some interpretation of possible multi-valuedness in proposed models

In preceding subsections we proposed some drafts of possible general behavior of models. At first glance the main property is the possible multiplicity of variants and selection of unique variant from them. Remembering the description of society properties in section 2, we can propose that multiplicity property in our models correspond to scenarios, trajectories of development and alternative history multiplicity. Unique variant selection corresponds to choosing and decision- making in any moment of time. The discussions by Ortega - I - Gasset, Francois and others follow directly to proposed frames of modeling. The synergetic concept receives some new possibilities.
For example in such case we can speak not only on attractors bifurcations, but on bifurcations of the "patterns" at the moment of decision making. In quantum mechanics, there exists a collapse of wave- function (reduction) at the moment of measurement. In our case the procedure of "pattern" selection reminds such reduction. Thus it is evident that the possibility of such interpretation in proposed models follows to new background of decision-making processes with human participants. The novelty of approach creates many new interesting problems of mathematical nature as well as in interpretation.

5.5 Difficulties and some research problems

Although the models are new, we should exploit usual tools for investigation. We should obtain some standard mathematical constructions as the result of formalization. So we will discuss some possible classes of mathematical issues.
First class of problems concerned the processes of obtaining dynamical laws. In single-valued (classical) models in many cases there exist some minimization principle:

To search the minimum of functional W(s(t), J). (15)

Frequently the functional is represented by integral representation

$$W = \int Z(s, J)\, dt\,, \tag{16}$$

where Z(s, J) is a "cost function". It is known from variational calculus that necessary conditions of functional minimum take the form of Lagrange-Euler equations. It would be natural goal to introduce the equations above in the same way. But in our case it is more difficult to introduce (and moreover to interpret the functional) for proposed models. This is because the functions should include the "ideal" and anticipated patterns. In such case the functional should depend also on the discrepancy between "real" and "ideal" patterns:

$$W = \int Z(s, J, D)\, dt\,, \tag{17}$$

where D represents the discrepancy between "ideal" and "real" patterns in future moments of time. But in this case the derivation of equations similar to Lagrange-Euler equations is much more complicated. It may be supposed that in such case the variational calculus in multivalued case (Young, 1969) and Feynman integral's approach take place. As the result we should receive the equations with multivalued solutions. Many problems are interesting in such case: stable points of multi-valued maps, modeling of physical processes with multivaluednes.

It is interesting to discuss the possible role of stochasticity in proposed approach. First of all there are many problems with chaos in recursive and hyperincursive systems. In the works by Dubois and co-authors there are examples on such topics. Another difficult problem is the correspondence between anticipation and causality. Moreover, it is known that causality violation can change the classical frames of probability theory. Another aspect connected with stochasticity is the probability interpretation of wave function. Considering ensembles of neural net type models may be useful for such goal. The problems of scenario stability by perturbations are also of interest.

6 Possible analogies with quantum mechanics approach

Describing the models above, we mentioned the quantum mechanics. Here we pose a list of some issues for discussion on quantum mechanical aspects.

6.1 General Levels of Hierarchy

It is well known from system analysis of living systems since J.Miller that there exist many (about ten) hierarchical levels in nature - from bottom level of elementary particles to the top level of global Universe. Quantum mechanical description is recognized as background for top and bottom levels. For intermediate state the development of quantum approach is only at the first stages. Main successes and surprising results had been received in investigation of DNA, cells, ensembles of sells and presumably of brain (Hammeroff S., R.Penrose, P.Marser, W.Shempp, and M.Perus). But there are many another levels in hierarchy including individual, organization, society and noosphera. Remark that relations to quantum phenomenon on individual level were remembered (brain operation and paranormal phenomenon). But the society considerations have been almost out of such methodology. The author supposes that proposed class of models can fill existing gap. The possible reason follows from assumption that quantum- mechanical concept is one of the universal form of nature representation at all levels of hierarchy (see also (von Lukadou, 1998) where biological and psychological phenomenon had been remembered). Common feature of many complex systems is evident: the measurement changes the state of object.

6.2 Some Analogies in Description

First of all we should again remark the analogies from the section 5 for hyperincursive systems. We already mentioned that it is similar to at least two interpretation of quantum mechanics - Copenhagen's and many-worlds.
Also, following R.Feynman, we can discuss analogy with the integrals on trajectories. In his approach the probability amplitude is calculated as integral on action functional by all possible trajectories. Our models in presumable hyperincursion case astonishingly resemble such objects. Moreover, the measurement interpretation exists in quantum mechanic as the Feinman's integral on reduced set of trajectories. Such reduction corresponds to the reduction of wave function under measurement in quantum mechanic. It is interesting to note that quantum holography also is connected to Feynman integrals (Marcer, 1998). Then we may propose to consider the selection processes in our models with the help of integrals.

6.3 Second quantization formalism

In the background of Hopfield model lies the Ising model but with special bonds between elements. Such bonds had been received in the learning processes (Haykin. 1994). It is known from quantum physics of the fields that such models allow formalism of second quantization (Raimes, 1972). That is the numbers of particles in given state (occupation number) is introduced. At second stage the birth and death operators are introduced. It is supposed that neural net models allow such description. But if it is so then the solutions of neural net models may be interpreted in quantum terms. This may be important for modeling the processes in society with change of generations. Such approach may help in considering symmetry in proposed models (including gauge symmetry). The symmetry breaking in such models may be interpreted in terms of society properties as "condensation" (origin of rumors, financial panics, and fashion).

6.4 Some remarks on the theory of direct interaction in physics

It is necessary to pose comments on another part of physical description, which is close to proposed models. Usually the physical theory is local ((Rydel, 1985)). Since Newton there exists another concept - long distance influence. Remark that the origin of Feynman path integral also was in the theory of direct interactions. Usually neural network is represented by the long-distance theories because bonds connect all elements. So both systems (neural and quantum mechanic) are long - distance and the interpretation may be similar. And the logic corresponding to these theories may be essentially non-classical.
Such considerations resemble the theories of physical symmetries by Yu.Kulakov, A. Michalichenko. Such description is similar to semantic (relational) nets. This follows to the hypothesis that the physical laws are of such type description. Moreover the physical laws have been developed with removal from moment of Universe origin.

Then non- symmetry of the bonds between objects may follow to origin of probability on Universe. This is related to possibility of physical constants being variable.

6.5 Conscious per se

Understanding consciousness is one of the oldest human-related problems. A number of concepts have been proposed but all of them were mostly phenomenological. However, it seems that recently such problems have been received strong background for considering. Some approaches to considering consciousness are connected with coherent states in quantum mechanics: microtubules (Hammerof&Penrose, 1996)); wave- function of Universe (D.Bohm and others (Marser, 2001; Perus, 2001)). In many cases the consciousness phenomenon is connected partially with collapse of wave-function. We may search for interesting analogies in the case of hyperincursion with multivaluedness. In such case the selection problem should be considered. So we may assume that multivalued models can serve as the background for representing consciousness. Then we may pose further questions about "collective consciousness of society" phenomenonon on the base of proposed models. Moreover, following the concept of universal description, the questions on consciousness for highest levels in hierarchy (Universe) may be considered. Then the ideas about living nature of noosphere by V.Vernadsky and J.Lovelock may receive physical background.

6.6 Quantum computation

The concept of quantum computations has many sources including quantum mechanics (Feynman, 1986; Lloyd, 1996). It is recognized that advantages of quantum computer are as follows: 1) non-locality, 2) new logical calculations possibilities connected to informational unit "qubit", 3) parallel computation in quantum ensembles (Lloyd, 1996; Shempp, 1998). Usually it assumes the parallel computations in independent elements followed by averaging on ensemble procedure. The new possibilities for considerations of quantum computation presumably follow from proposed approach. In our models system is a non-local object. Such non-locality allows to propose as the information elements the states of N-element system (hobit = holonic bit). So may be the better way for quantum computation lies in attempts to make computations directly with hobits. We should remark also the problem of logical operations. It is known that quantum calculus allows non-standard logic. We may suppose that exploiting hobits as information units plus "selection" process will lead to general quantum logic.

7 Conclusion

In this paper we had developed the approach to modeling the processes in social systems. As the result we had received new models, which take into account the mentality properties of individual. We found some analogs to the methodology of quantum mechanics. At the final part of paper we described some such possible analogies. In the process of preparing the paper the author mainly tried to answer the question: How does physical (and particular quantum mechanical) concepts can contribute in understanding and interpretation of proposed model? But if we accept some proposed analogies then we can pose another question: How does proposed models can contribute to understanding traditional physical problems? The quantum computer is one of the examples.

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