Modelling of the Natural Evolutionary Computation in the Human Society

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Abstract: Under consideration is the theoretical model of social evolution proposed in 1851 by Herbert Spencer with a slightly modified interpretation of basic evolutionary concepts: adaptation, heredity, variation and selection. Some of the new concepts belong to informatics: the model (as the most important factor in adaptation and as the core of clans and elites gathering), marshaling and unmarshaling (heredity). Others were taken from sociology: ideologies, the revolutionary process (variation and selection). The paper presents an approach to computer simulation of these processes. It may seem that in the article too much sociology, but it is necessary in order to make the model most adequate. In addition, it is easier to explain the sociological aspects to computer scientists than aspects of informatics - to sociologists.

1 INTRODUCTION

For the developing computer models of natural evolutionary computation in a society can be useful studies of mechanisms of such evolution. One of such mechanisms was postulated by social evolution theory planted by Herbert Spencer (1851, 1852).

Evolutionism was the first and remains the last more or less satisfactory explanation of some intellectual act (in this case - creating a "crown of creation" - people). The most "intellectual" modern software such as a navigator or a program for playing chess achieves the result by an exhaustive search. That is, the computer shows not so much its intelligence as its perseverance.

Social information processing mechanism is undoubtedly the intellectual and creative process that ensures the survival and development of the society in constantly changing and often critical circumstances. We have two choices - wait for the emergence of new hypotheses about the nature of the intellectual movement to the truth, or, following the principle of Occam's razor, first try to explain the entire observed facts by the only existing hypothesis – the evolutionary one.

Hypothesis 1: *The main mechanism of information processing in the society is the mechanism of social evolution.*

Most of the hypotheses underlying the consi-

dered computer model are drawn from the work (Weisband, 2010).

Structure of the paper: we discuss first the interpretation of the basic evolutionary concepts in the model: adaptation, variation, inheritance and selection (chapter 2 and 3). Further, we discuss the dynamics of clans and elites (chapter 4), because the process of birth, struggle for power, ruling and collapse of elites we consider as the essence of the evolutionary process in the society. Chapters 6 and 7 consider some important for building of the computer model sociological and historical phenomena related to elite's dynamic.

2 ADAPTATION AND CONCEPT OF MODEL

Adaptation to the environment - one of the basic concepts of Darwinian doctrine – plays an even greater role by Herbert Spencer. It is here not limited to biological objects, but provides rather the appearance of the entire structure of the universe.

Anthropologists Leslie White (1900-1975) and Julian Steward (1902-1972) laid the foundations of neoevolutionismus, considering culture as an instrument of society's adaptation to the environment. Both considered the technology component in culture as the leading one (i.e., they were close to the

ideas of modern social informatics), and if White emphasized the technology development of energy sources, Steward believed backbone is the information technology. In terms of neoevolutionismus culture is a reflection of the environment, i.e. - its model.

Definition 1: *System M is called a* **model** *of system S, if experiments on M possible to obtain new information about S* (Uyomov, 1971).

For example, a navigator is a model of the real country and even of the real future: we can put him on experiments introducing some data about the trip, and get information about the geographic points that will pass, road conditions, travel time.

Postulate 1: *Adaptation of system A to system B is only possible if the system A incorporates a model of the system B.*

Indeed, in order to adapt a subject to certain environmental factor is necessary to build, at least in the mind of the subject, a model of this factor (you cannot solve the problem, knowing nothing about it). If the level of difficulty of the problem does not allow dealing with it on individual level, for its solution must be created a certain community of people, which we will define below as "clan".

Hypothesis 2: *Social evolution provides adaptation of the* humankind *as specie to the environment, creating a series of successive, more and more adequate and complete models of the main aspects of the outer and internal environment: nature, war, ideology, etc.*

3 VARIATION, SELECTION, HEREDITY AND THEIR CARRIERS

Darwinism exists today within the Synthetic Theory of Evolution (STE), where it is linked to genetics. Herbert Spencer proposed an elegant solution to the chicken or the egg causality dilemma: a hen is only an egg's way of making another egg. The STE paradigm allows rephrasing this statement: man is only a mean by which a strand of DNA generates another strand of DNA. This phrase is not as cynical as it seems at first glance: genetic and cultural code - the two most important components we pass to countless future generations. For example, life of a scientist is subordinated to writing or evaluation certain texts too, and will be finally evaluated by how the written, approved or rejected by her or him texts effect adequacy of the scientific area, to which she or he this life dedicated.

In biology, we can fairly accurately estimate the number of write cycles of DNA, allowing achieving the specific results. For example, if we take the period separating the generations, in 25 years, to achieve the changes in the human genetic code that have occurred over the last million years, it took 40,000 rewrites. This number is comparable to the number of known sources in a particular scientific field. Each source rewrites partly the model of the object studied in this scientific area.

But writing in existence for only 0.5% last the duration of this period, printing - 0.05%. Meanwhile, it is clear that the adaptation of species was at least as much through the promotion at the sociological level as at the biological one. What is the analogy of DNA on a sociological level? On what media could be repeatedly rewritten the formula not of human, but rather of human society? (In informatics we can compare it with marshaling and unmarshaling of Java-objects.) According to the ideas of neoevolutionismus - it is material and spiritual culture. But both on an intuitive level and by deeper consideration, it is impossible to separate any culture from its carriers.

Explaining the term "culture carriers" we must refer to the fact that we deal with in depth hierarchical system. The biosphere is made up of species one of which is humanity. Humanity is made up of countries. Countries do not consist of people, but of the elements that we shall call clans (parties, corporations, nations, etc.).

Definition 2: Clan *is a group of people united by a partial model of the real world they share and associate it with their identity. Using a term from informatics, we will say that the clan* **implements** *this model; and the model we name the* **bearing** *model of this clan: the model that provides clans unity.*

Clans also form a hierarchical structure. Elements of the lower level clans (families, companies) are people.

Hypothesis 3: *Medias, on which in the course of social evolution are overwritten partial models of the environment (sociological analogue of DNA) are the elements of material and spiritual culture of human communities, which we called clans.*

Countries and nations also fall under the definition of clan. Obviously, for example that Russia implements other model of the real world as Germany.

We need the terms "super-clan", "sub-clan", denoting clans of neighbouring levels. For example, considering the English aristocracy in 1455 as a clan, we call England super-clan of this clan and

sub-clans - groups of Lancaster and York, who start-ed this year's 30-year war of the Roses.

It was a war for the command. Distribution of command in the country is apparently no less essential than Marx's distribution of property of the means of production. And the subjects of command are usually elites.

Definition 3: Elite – *is a clan, claiming one type of command in its super-clan. The set of all clan members, regardless of affiliation to the elites, called a basis.*

The mention of "one type of" command due to the fact that the pursuit of totalitarian command is not so often found in history. For example, professional elites tend to dominate only in their areas of expertise. Clergy claim to another kind of command than the nobility.

Note that the term "elite" in our definition is not evaluative; it reflects only the fact of desire of a clan to command in its super-clan. However, in healthy elites this commitment is associated with a deep sense of inner rightness, dignity and chivalrous attitude towards opponents. Healthy elites are the rule rather than the exception in history, because they give their members the prerequisites for personal psychological health. But also a variety of widely corrupt elites are known, in which fear of losing privileges takes place of dignity.

Fortunately (for democracy) basis is able to recognise such elites. That's why it does not always remain politically neutral. That's why democracy is still the best kind of power.

Hypothesis 4: *In the evolutionary process, which ensures the survival and development of a society, heredity is provided mainly by clans, variability - mostly by elites, and the selection of elites mainly provided by basis.*

Traditionally, it is assumed that variation is random (for example - the random mutations of DNA); the selection is external factor for specie. Thus, the only domestic "intelligent" element of the evolutionary mechanism is the mechanism of inheritance (which is even a little ridiculous). Hypothesis 4 gives a much greater evolutionary mechanism inherent intelligence: the elites are not accidental; the basis provides internal selection before as an inadequate elite will led to the death of its super-clan. May be the biological evolutionary mechanism is also more complicated as usually assumed.

If not in order to proof, then in order to explain the hypotheses 3 and 4, we must give a few examples of current or historical clans and elites, revealing their bearing models. These examples can be made more meaningful if first say a few words about the dynamics of clans and elites.

4 DYNAMICS OF CLANS AND ELITES

Vilfredo Pareto was talking about constant cycling and change of elites; he called history the "graveyard of aristocracies" (Pareto, 1923). He strove for purely descriptive interpretation of the term "elite" not making it evaluative. But, on the one hand, he characterizes the elite members as the most capable and skilled in a particular activity as a result of some sort of natural selection. On the other hand, in his "Tractate" there are allegations that people can wear "label" of elite, lacking the respective qualities (Hoffman, 2001).

One assumption about the true and seeming elites - that we are talking about different phases of the life cycle of an elite: young and growing in the first case, and dying, weakening - in the second. Indeed, we find many examples in history when selfishness and quarrelsomeness once cohesive and effective elites led to the fall they headed clans.

It can be said of the Polish gentry XVIII-th century, when after three sections of an independent Poland was nothing left. Russian aristocracy beginning of XX-th century split over the question of Rasputin and actively assisted the various forces to nail nails in the coffin of its own.

But did it a manifestation of the natural aging and dying of relevant elites? No, if the mechanism of elites functioning is not biology-related, but informatics-related, it is not so.

Hypothesis 5: *We highlight in the life of the elite four phases (Weisband, 2010): emergence of an idea (hypothesis, model) and the elite around it (N); elite struggle for public acceptance (F); rise to power and the introduction of the bearing model of the elite in the life of society (S); institutionalization of this model and embedding it into the existing system of public institutions (read-discovered earlier models, T).*

We shall call the described here cycle and its phase's evolutionary cycle and evolutionary phases. Letter designations of phases here please accept without explanation, which would lead us away from the topic. Evolutionary cycle is no life cycle, in the sense that it does not end with the death of elite. There are several examples showing that good clans and elites in general are immortal - experiencing an unlimited number of revolutions of the cycle. And bad ones can die, unable to withstand the require-

ments of that evolutionary phase, to which they are not prepared enough (violation of the Ashby's Law of Requisite Variety (Ashby, 1956)).

At the core of any clan is an idea. Idea is some cognitive structure, which is a model of the current reality or of the desired state. For example, the basic idea of Marx: "The bourgeoisie exploits the proletariat." When Georgy Plekhanov translated "Communist Manifesto" in Russian language and established in 1883 a group of "Emancipation of Labour" (the early years consisted of four or five people), it was a typical N-elite, implementing this idea. Social Democrats quarrelled hoarse, then shook hands and went home. Then came a time when the Mensheviks and the Bolsheviks ceased bowing in the streets of Geneva and met, crossed to the opposite sidewalk. They no longer spend time trying to prove something to each other, but actively promoted their ideas among the masses. This meant that these elites moved into "emotional" F-phase. By October 1917, the Bolsheviks were turned by Lenin into a cohesive fighting S-elite. They seized power and not just avoided to say hello with their opponents, but killed them. Stalin then turned Communists in oiled machine - T-elite, and the elite of this elite became nomenclature - the ruling elite of the Soviet state. Behind the bipolar view of the world (the USSR and Warsaw Pact countries against the U.S. and NATO) was hidden possibly the confrontation between two T-elites: nomenclature and "gentlemen".

Last elite was born in Britain, showed its power by insisting its language and its principles in the Babel of North America, Australia. (Multinational U.S. residents seem almost more Anglo-Saxon than the British themselves.) Until today, this elite has no equal for authenticity - gentleman is usually really a gentleman, and not only pretending to be a gentleman. And authenticity is the main combat performance of any elite, which basis sees and evaluates very well. Was the result of the confrontation predetermined?

5 EVOLUTIONARY CLASSIFICATION OF HISTORIC PERIODS

Are evolutionary cycles endogenous - determined only by internal conditions of each elite, or exogenous - defined by some external factors? In favour of the second assumption would indicate confirmation of the following hypothesis:

Hypothesis 6: *There are historical periods when one or another evolutionary phase dominated in different countries or even worldwide ("Zeitgeist").*

For example, between the American Revolution of 1775 and the Europe-wide revolution of 1848 was the most profound revolutionary upheaval period (F-period), completely changed the face of our planet (Hobsbawm, 2004). Here was the French Revolution of 1789 and a series of revolutions in each of the countries: Greece, Spain, Italy and other, the industrial revolution. This period was dominated by the masses, forcing the ruling elites in all countries go on the defensive.

As a counter-example can be considered the period from 1914 to 1945, when in Germany, Russia, Italy, Japan was formed authoritarian regimes. The main activity was generated not from below - by masses, but rather from top - by cohesive elites seizing power, and then by they themselves - already as the ruling regimes. This period was followed by the bloodiest in the entire previous history wars, the horrendous human rights violations. It says not against the elites in general, but rather against those specific elites, as well as for the fact that people have to keep the elites under control.

6 CYCLING HYPOTHESIS

There are hypotheses (also owned by the author) that the historical process has not just a cyclical nature, but even the regular cyclical nature - with constant and accurately expressed periods. We do not consider these hypotheses in all cases wrong, but believe their premature for the following reasons: a) works in this area affect too often by their scientific dishonesty and disrespect of the natural-scientific approach; b)causes of uniform cycles in most approaches remain completely unknown – will be presented only unconvincing coincidence of dates.

But we cannot abandon the presentation in this paper the results of one of our experiments, because it indirectly confirms the existence of four phases of the evolutionary cycle. (This fact is important for computer simulation of this process.) Namely, it can be demonstrated for the cycle with a period of 12 years.

One hypothesis suggests that the occurrence of revolutions more likely during the first two phases of the cycle (N and F), that is to say - in the first half of the period. Problem to prove this hypothesis is the selection of an objective test set of revolutions. To eliminate arbitrariness of researcher, we decided to form this collection of several independent sources.

We used:

1) The events referred to in the Russian- and
2) German-language article "Revolution" of Wikipedia.
3) Lists of revolutions given in English- (http://en. wikipedia.org/wiki/List_of_revolutions_and_re bellions),

4) Czech- (http://cs.wikipedia.org/wiki/Seznam_po vst%C3%A1n%C3%AD_a_revoluc%C3%AD)
5) and German language (http://de.wikipedia. org/wiki/Bauernkrieg) Wikipedia.
6) List of revolutions on the site http://www. agitclu b.ru/museum/revolution1/revolution1.htm.

Table 1: Revolutions mentioned not less than by 4 from 6 used sources.

Nr	Revolution	Cou-ntry	Start	Phase year 12[1]	1-st half	2-nd half	1-st half %
1	Jacquerie a peasant revolt in France (1356–1358)[2]	FR	1356	4	1		
2	Wat Tiler peasants' Revolt (England, 1381)[2]	GB	1381	5	1		
3	German Peasants' War (1524–1525)[2]	DE	1524	4	1		
4	Eighty Years' War, or Dutch War of Independence	NL	1568	0	1		
5	English Revolution (1642–1660, Oliver Cromwell)	GB	1642	2	1		
6	Glorios Revolution in England (1688)	GB	1688	0	1		
7	Pugachev's Rebellion in Russia (1773–1775)[2]	RU	1773	1	1		
8	American Revolution (1775–1783)[3]	US	1775	3	1		
9	French Revolution (1789)[2]	FR	1789	5	1		
10	Dos de Mayo Uprising (Madrid, 1808)	ES	1808	0	1		
11	French Revolution of 1848	FR	1848	4	1		
12	Revolutions of 1848 in the German states[2]	DE	1848	4	1		
13	Hungarian Revolution of 1848	HU	1848	4	1		
14	Revolutions of 1848 in the Italian states	IT	1848	4	1		
15	American Civil War	US	1861	5	1		
16	Revolution of 1905 in Russian Empire	RU	1905	1	1		
17	Xinhai Revolution in Chine	CN	1911	7		1	
18	February Revolution 1917 in Russia[2]	RU	1917	1	1		
19	October Revolution 1917 in Russia[2]	RU	1917	1	1		
20	German Revolution of 1918–19[2]	DE	1918	2	1		
21	Spanish Civil War	ES	1936	8		1	
22	Vietnamese Revolution 1945 (Ho Chi Minh)	VN	1945	5	1		
23	Egyptian Revolution of 1952 (Gamal Abdel Nasser)	EG	1952	0	1		
24	Iranian Revolution of 1979[2]	IR	1979	3	1		
25	Rose Revolution of 2003 in Georgia	GE	2003	3	1		
26	Orange Revolution of 2004 in Ukraine	UA	2004	4	1		
27	Tulip Revolution of 2005 in Kyrgyzstan	KG	2005	5	1		
	Total, by 704 events mentioned in some of used sources				401	303	56,96
	Total, by 27 revolutions (at least 4 sources)				25	2	92.59
	Total, by 10 revolutions (at least 5 sources)				10	0	100.00

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[1] Phase-year of a certain event for a given cycle is defined as the remainder of dividing the distance of the event date (in years) from a year taken as the initial (we used the 1400-th) by the period of the cycle (in this case - 12).

[2] Revolution is mentioned not less than in 5 sources.

In these sources appeared 1024 records that reflect 704 historical events.

We were interested in the preponderance of the number of revolutions that began in the first half of the 12-year cycle period over occurred during the second half-cycle. It was relative insignificant: 401 events vs. 303 events.

But we noticed that the studied regularities appear the more clearly, the more powerful and meaningful revolutions considered (it happens when a powerful main factor will be shaded by full of random and secondary factors).To exclude local and random artefacts and take into account only the most powerful and significant revolutions, we have used only those events that are mentioned in at least two, three or more of these sources. With the increasing of rigidity of restrictions the preponderance of the first half period grew. Of 27 revolutions mentioned no less than in four of listed sources, in the first half of the 12-year cycle occurred 25 (92%).

The t-test (criterion of Student) showed that this result is statistically significant. This set of revolutions is shown in Table 1. With five sources (10 revolutions, they are marked in the table with a footnote) test indicator reaches 100%. This result suggests that the 12-year cycle can really exist as an evolutionary cycle.

The fact that it coincides with the cycle used in the eastern horoscope shows that even a hypothesis that has not found its proof for thousands of years may be finally correct.

7 MODELING APPROACH

We are currently exploring the possibility of computer simulation of the above hypothetical mechanism. The following questions are to be decided.

We must create an artificial community of multiple agents having the capacity of cooperative as well as conflict behaviour.

We have to simulate an artificial aggressive environment. Community of agents can adapt to this environment, only advancing hypotheses about its character. To test these hypotheses agents must combine into larger groups.

We need to develop cognitive apparatus for constructing of hypotheses and models concerning the selected artificial external environment. This apparatus should allow agents to exchange models and hypotheses, evaluate them, and join groups (clan's, elites) for their joint support.

We need to develop cognitive apparatus for evaluating the nature of existing elites. This apparatus is

designed to allow the bulk of agents, without delving into the specifics of the different models, to support or reject this or that elites.

8 CONCLUSIONS

We proposed a system of hypotheses about the mechanism of information processing in the human society. It seems to be quite robust to serve as a working hypothesis for the computer modelling and other studies.

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