TOWARD INTEGRATION OF SOCIAL MENTAL AND INSTITUTIONAL MODELS: SYSTEMIC APPROACH[1]

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JEL Classification: B 24; B 25; P 20; P 51;
Review
Received: May 07, 2012
Accepted: February 21, 2013

Abstract
An attempt to synthesize the results of psychological and economic-sociological research on the basis of systemic multidisciplinary approach is shown in the paper. Interdependence of subjective experience's structures, social attitudes (mental models) and social macro-institutional structures (institutional models) for western and non-western societies is analyzed. The interdependence is explained by both their embeddedness in the social consciousness and social practice and the similarity of the mechanisms for mental and institutional structures' folding.
Key words*: systemic methodology, non-western and western mentality, institutional Matrices*

1. Introduction

Our comparative study presents results of two research projects in different scientific disciplines: a) in Psychology and Cognitive Neuroscience (supervised by Y. Alexandrov); b) in Economics and Sociology (supervised by S. Kirdina). Systemic methodology has been used as a base to explain and synthesize the results of these two independently carried out research projects:

- Theory of functional systems and concept of system genesis (Anokhin, 1963) in the psychological research project;
- Systemic paradigm in economic theory (Kornai, 1998) and systemic approach for the analysis of complex social phenomena (Zaslavskaya T. I., works of 1970-1980th, in Russian) in the economic and sociological research project.

2. Types of mentality (mental models) in societies

An idea that every nation has its own collective mental characteristics distinguishing them from the other nations is "as old, as nations themselves" (Hofstede, McCrae, 2010, p. 10). Anthropologists, and then psychologists, and neuropsychologists suggest that it is possible to aggregate variations of individual social attitudes and mental features in two types of mentality or social mental models. To highlight the idea of cultural identity, these two types are often called as "non-western" and "western" ones (Table 1).

As seen from the table the social mental models reflect particular perceptions of the social reality that is characteristic for the individual belonging to the given culture, from the point of view of its "dimension", unity and the way of solving problems (decision making) specific to this perception. They are different for people from western and non-western countries.

[1] This work is supported by the Russian Foundation for Humanities (№ 11-02-00088a) and the Grants Council of the President of the Russian Federation for the Major Scientific Schools of Russia (№ 3010.2012.6).
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Table 1: Characteristics of "non-western" and "western" types of mentality (mental models)

Characteristics	*"Non-western" type of mentality*	*"Western" type of mentality*
"Dimension" of the world	Continuity	Discontinuity
Perception of the world	Holistic and interrelatedness	Analyticity and atomicity
Type of decision making	Intuitive type	Rational type
Dominating among the population of countries	Latin American, Eastern countries and Russia	Europe and Western offshoots

R. Nisbett et all. (2001) after the comparison of particularities of cognitive processes of people that belong to the eastern (non-western) and western cultures, made the next conclusion. For the first type of culture continuity is considered as a key property of the world, whereas for the second type of culture a discontinuity is more typical "dimension" of the world which is considered as consisting of isolated objects.

Non-western mental models relatively rarely use the formal logic. Instead, they rely on *holistic approach* and *"dialectical" argumentation.* It leads to more *tolerance to contradictions.* Western mental models are characterized by a*nalytical* thinking and pay *more attention to the separate objects then to their integrity*. The "behavior" of the object can be explained by its belonging to the particular category and its own properties. In contrast, in non-western mental models *nothing in nature could not be seen as isolated object - everything is interconnected, that's why the isolation of elements from the whole can lead only to confusion.* It is emphasized that the action always takes place in the area of interacting forces. These differences can be seen by comparing ancient China as a representative of non-western nations and Greece as a representative of western nations (VIII – III centuries B.C.). They persist to our days, describing the characteristics of modern China and other Asian countries as opposed to North America and Europe.

Kühnen et al. (2001) showed that in accordance to the criterion of "holistic – analytic perception" Russian citizen's fall into the "non-western"[4] group together with the participants from Malaysia and other Asian countries. Russians are not very different from them, but significantly different from the "western" participants from the U.S. and Europe. That's why it does not seem so surprising that the Americans, describing the scientific approach of Soviet researchers have noted the relatively greater attention to the interaction of the individual and the environment as an important aspect of their approaches (Holden, 1978).

As noted by R. Nelson and S. Winter, "*...cognitive structures and paradigms are known as sources of long-term impact and sustainability, whether it is a scientific discipline or production technologies*" (Nelson and Winter, 2002, p. 69). In other words, the dominant type of mentality is reflected in the specific research activities of scientists of the concerned countries. Other authors also note the presence of a significant (in many cases prevailing) "non-western" component in the Russian culture and thinking (see Aleksandrov, Aleksandrova, 2009), which confirms the already noted correlation between culture and mentality in a number of studies (Nisbett et al., 2001; Nisbett, Masuda, 2003; Henrich et al., 2010).

The tradition of logic-rational and intuitive decisions can be compared with analytical and holistic types of mentality (Buchtel, Norenzayan, 2009). Experiments show that participants belonging to the "western" culture, more frequently choose rational, logical based decisions than individuals belonging to the "non-western" culture. According to it there is also social desirability of appropriate ways in the cultures under comparison: if necessary to approve one of them, the first (western) ones approve a rational, and the second – an intuitive way more often (Buchtel, Norenzayan, 2008).

The analysis of individual's cognitive acts leads to conclusions that holistic and analytic modes should not be taken separately, as unique dichotomy. Ch. Foard and N.D. Kemler (1984) propose to consider a continuum of these modes. Psychologists identify the following distribution of countries in the "analytic-holistic continuum": the United States as an "analytical pole" → Western Europe → Cen-

[4] Note, that we like other authors recognize the relativity of the "western – non-western" classification. For example, the holistic thinking in German culture is famous phenomena (Toomela, 2007; Ash, 1998; Harrington, 1995), although this feature is expressed less than in Russia (Grossmann, Varnum, 2011). At the same time the Latin America countries by the number of their psychological indicators fall into the "non-western" group (the additional clarification on this subject, see Aleksandrov, Aleksandrova, 2010 and Henrich et al., 2010).

tral and Eastern Europe (including Russia) → South-East Asian Nations as "a holistic pole" (Varnum et al., 2008). We have to clarify that the different proportions of holistic and analytical views among population are observed, but not holism or analytics in their pure forms in "western" and "non-western" problem-solving strategies.

The same can be said about intuition and rationality. On the basis of extensive review of literature J. Henrich et al. (2010) make the conclusion that although any adult individual has "both cognitive systems", but depending on characteristic of culture he/she can use one over another, which leads to distinctions in probability a strategy choice in the solution of identical problems revealed at population level[5].

Thus, M. Bunge (1967) is right, when claiming that every country has both types – "intuitionalists" and people with rationalist, formal-logical mentality as well. But it is important to bear in mind that these types are distributed unevenly across countries. For example, using the Keirsey questionnaire it is shown (Овчинников et al., 1994), that psychological type, which includes the "intuition", is met several times more frequently in collectivistic and "holistic" Russia (see e.g., Aleksandrov, Aleksandrova, 2009; Tower et al., 1997; Grossmann, Varnum, 2011), than in a "super-individualist", "super-analytical" (Henrich et al., 2010; Grossmann, Varnum, 2011) country such as the U.S On the other hand, the psychological type which includes quality opposed to intuition – "judiciousness" (realness, a practicality), can be observed in the U.S. much more frequently than in Russia.

Analysis of brain activity shows that the implementation of holistic modes of thinking, compared with the analytical (and intuitive compared rational) models is supported by different patterns of brain activity (Henrich et al., 2010; Kitayama, Uskul, 2011). It is also shown that when the representatives of different cultures solve problems that are more or less preferred appropriate to a given culture (e. g absolute vs relative dimensions tasks) brain activities, which provide solutions are significantly different (Rotenberg, Arshavskiy, 1997; Hedden et al., 2008; and others).

M. E. W. Varnum et al. (2008), and A. K. Uskul et al. (2008; see also Kitayama, Uskul, 2011) note that the analytic abilities are associated primarily with individualism, while the holistic ones with collectivism. The latter requires the consideration of the relatively larger (than individualism) number of *rules and restrictions* that govern the social interactions and influence the individual behavior. Complex and multi-valued social relationships, as these authors believe, contribute to the formation of holistic thinking. In recent years, there is a growing number of studies that make the arguments in favor of the connection of the dominant in society, holistic or analytical cognitive models with the type of economy formed in it (Uskul et al., 2008; Kitayama, Uskul, 2011). We develop this idea and will show that not only economic institutions but also political and ideological ones correspond to the types of social mental models.

3. Types of institutional structures (institutional models) in societies

A variety of institutional structures of ancient and modern nations can also be aggregated in two types of so-called "institutional matrices", those are described in detail in the scientific literature, dictionaries and encyclopedias, available mostly in Russian. Here we recall only the main points in respect of this concept.

The theory of institutional matrices, or X-Y-theory, has been developed in Russia since the late 1990s. Although the term "institutional matrix" was introduced for the first time in the works of K. Polanyi (1977) and D. North (1990), the institutional matrices theory was created within the framework of Russian Novosibirsk Economic-Sociological scientific School, (Ivanov, 2003, p. 59: Davydova, 1997) by S. Kirdina (2001; 2000; 2010; 2012). An institutional matrix (lat. matrix – the uterus, the primary model) is a historically stable complex of interrelated basic institutions, which is regulating the functioning of key public areas: economy, politics and ideology. Basic institutions, retaining their inherent content, are "deployed" and manifest themselves in a variety of historically developing institutional forms, and its specificity depends on the civilization context of societies.

[5] We have to note that even if the culture with low probability of choosing the intuitive strategy the last one is being implemented (selected), it is - not the same intuition that in countries with a high probability of choosing this strategy: intuition is culture specific. This applies both to the role of intuition in the formation of common-sense knowledge, and in the construction of philosophical concepts (Stich, 2010).

The analysis of extensive empirical data from the ancient states of Egypt and Mesopotamia to the modern countries shows that the dominant institutional structure of societies could be represented in one type of institutional matrices: either X- or Y-matrix. They are qualitatively different from each other by the contents of the constituent sets of basic institutions.

The X-matrix is characterized by the following basic institutions:

- In the economic sphere: *institutions* of the *redistributive economy* (a term introduced by K. Polanyi (1977). Redistribution-oriented economies are characterized by a situation where the center (on the top) regulates the movement of goods and services, as well as the rights to produce, reproduce and use;
- In the political sphere: *institutions of a unitary (centralized) political order*;
- In the ideological sphere: *institutions of a communitarian ideology*, the essence of which is expressed by the idea of collective, shared, public values and rights prevailing over individual, sovereign, private values and rights, i.e. the priority of We over I.
- *Institutions of the X-matrix are predominant in Russia, China, along with most Asian and Latin American countries.*
- In turn, the Y-matrix is characterized by the following basic institutions:
- In the economic sphere: *institutions of the market economy.* Market-oriented economies are characterized by a situation where horizontal exchange relations between economic agents exist;
- In the political sphere: *institutions of a federative (federative-subsidiary) political order*;
- In the ideological sphere: *institutions of an individualistic ideology*, which proclaims the prevalence of individual values and rights over the values and rights of larger communities, where groups are subordinated to personalities, i.e. the priority of I over We.

Y-matrix is prevalent in Europe and its former dominions (North America, Australia, and New - Zealand. The material and technological environment in a society is a key historical determinant of whether either an X-matrix or a Y-matrix prevails. The environment can be a *communal* indivisible system, wherein the removal of some elements can lead to disintegration of the entire system or it can be *non-communal* with possibilities of functional technological dissociation (Bessonova, Kirdina, O'Sullivan, 1996:17-18).

Communality denotes the feature of material and technological environment that assumes its existence as a unified, further indivisible system, parts of which cannot be taken out without threatening its disintegration. A communal environment can function only in the form of public goods and cannot be divided into consumption units and sold (consumed) by parts. Accordingly, joint, coordinated efforts by a considerable part of the population, along with a unified centralized government are needed. Therefore, the institutional content of a nation developing within a communal environment is, eventually, determined by the tasks of coordinating joint efforts towards effective use. Thus, X-matrices are formed under communal conditions.

Non-communality means technological dissociation, with the possibility of dissociating core elements of the material infrastructure, as well as independent functioning and private usage. A non-communal environment is divisible into separate, disconnected elements; it is able to disperse and can exist as an aggregate of dissociated, independent technological objects. In this case, an individual or groups of people (e.g. families) can involve parts of the non-communal environment in their economy, maintain their effectiveness, and use the obtained results on their own, without cooperating with other members of the society. If this is the case, the main function of such social institutions is to assure interactions between the atomized economic and social agents. Y-matrix institutions are thus common in a non-communal environment.

During the development of states a dominant position of the basic institutions that are typical to either the X or the Y-matrix, remains unchanged. .At the same time the institutions from the matrix of the opposite type – complementary institutions - play a supporting role, as it is necessary, “adding to the whole” of the institutional structure of societies. As in genetics a dominant gene suppresses the recessive sets, so the basic institutions determine the nature of the prevailing institutional environment in a society, create the frames and limitations for the complementary, subsidiary institutions. Percentage of complementary institutions in stable sustainable societies, as might be expected, is approximately one-third (30-35%). If this percentage is less, the total dominance of the basic instituti-

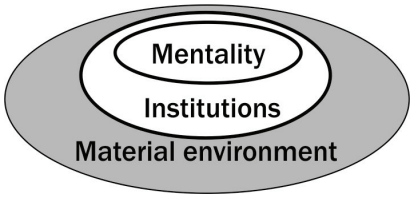
ons of society leads to a crisis or stagnation. At the same time, excessive implementation of complementary institutions, attempts to replace the matrix of basic institutions leads to the social upheavals and revolutions. Socio-economic policy is, as a rule, the constant search for the optimal institutional balance between the basic and complementary institutions that corresponds to modern times, global and other contexts.

If we compare the nations by the nature of their dominant institutional matrices and types of mentality[6], we can see that those countries, where the institutions of the X-matrix dominate (including Russia), are characterized by the prevailing distribution of "non-western" type of mentality.

Accordingly, the countries where the Y-matrix, prevails institutions are characterized by the "western" type of mentality. This correspondence, as can be judged by a number of works (Nisbett et al., 2001; Kirdina, 2001, pp. 85-92), has historically stable character. With this in mind, we believe it is possible to use the indication of X-and Y-institutional matrices to refer to the types of mentality - that is, to identify the non-western type of mentality as an X- mentality and western type of mentality as a-Y-mentality.

We also believe that it is possible to use the hypothesis about the material condition of the social processes to support the relationship between the type of mentality and institutional structures (about the relationship between the environment and the type of mentality see also Shudinov, 2006). Thus, the environment (communal and non-communal) forms two types of institutional structures (Figure 1).

Figure 1



The institutions, in their turn, operate as the environment for individuals who have social relationships, and form two types of mental models. Active interactions of population with the environment are resulted in the creation and strengthening of prevailing mental, and institutional structures, which determines means for achieving goals in different types of societies. Type of environment (communal or non-communal) could be considered as a key factor of both types of differentiation. The feasibility of this logic is proved by the relatedness of the same nations to the type of societies with the dominant X-matrix (or Y-matrix) and to the cluster of the dominant X-mentality (or Y-mentality). In the future, we plan to test this hypothesis more thoroughly.

4. Mechanisms of formation for mental and institutional models

The prevailing social attitudes (mentality) in society, on the one hand, and the structure of institutions, on the other hand, are related to their embededdness in the social consciousness and social practice. This, in turn, is due to the mechanisms of mental and institutional structures folding. First, we consider the psycho-physiological mechanism of formation for certain *mental models* for individuals.

In systemic psychophysiology (Aleksandrov, 2004; Alexandrov et al., 2000), the formation of a new system that is aimed at achieving a useful adaptive result (system genesis) is considered as an fixation of the stage of individual development - the formation of a new element of subjective experience in the process of learning. It is a process of the specialization of neurons with relation to the newly formed system that may be considered as the basis of the formation of new systems during learning. The efficiency of this process depends on what types of pre-specialized neurons formed at the earliest stages of ontogenesis.

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[6] More information about the relationship of the dominant type of mentality and institutional structures, see Aleksandrov, Kirdina, 2012.

The systemic specialization of neurons is permanent and means their obligatory involvement in the sub serving of the functional systems. This means that neurons are specific-to-system. Therefore, the individual experience is a structure that is formed by systems of neurons of different "ages", the interaction follow specific rules. First, the newly formed and more differentiated elements of experience (and culture) do not replace the previous ones, but appear superimposed over them. Second, the mechanism for formation of new elements is based on selection. Third, the actualization of individual experience is achieved by the simultaneous activation of elements formed in successive stages of development of the person (or community; for more details about common features of systemic structures of individual experience and culture, see Aleksandrov, Aleksandrova, 2009).

In the framework of this concept, we can represent a "transformation" of the structure of individual experience to the structure of the community through the joint activities and the achievement of "collective results", which form a particular social reality. It, in turn, acts as an external "environmental" condition for the formation of individuals, leads to a characteristic set of genomes (through gen-culture co-evolution), and the individual genomes lead to certain neural specializations that form the structure of individual experience.

Thus, it is shown that the features of perceptual activity, thinking and their brain subserving are culturally conditioned (Haun et al., 2006; Sebanz et al., 2006; Chiao, Cheon, 2010; and others). There is some cross-cultural covariance of differences in language and cognitive strategies (as well as in brain activity) that are related to spatial orientation, to the fragmentation of the visual scene, to the forming of metaphors of time, to solving problems of distinguishing of objects characteristics, including color, the perception of facial expressions of emotion, to risk assessing and confidence in the correctness of the choice made, the solution of arithmetic problems, etc. (see Alexandrov, Alexandrova, 2010). Although the theoretical ideas that underpin the now well-grounded empirical statement about the cultural validity of perceptual activity and thinking, have been put forward a long time ago[7], the major breakthrough in the data collection on the cultural conditioning of perception happened only recently.

Currently more and more available data support the assumption that significant phenotypic variation does not necessarily reflect the mutations in the genome, but can be induced in the absence of genetic variation. It is found that a variety of adaptation can be transmitted from parents to children by "somatic" way, through the activation of "cell system of inheritance", but without using of the mechanism of changes in the genome, changes in DNA sequence. In this regard, , a growing number of authors consider the following factors determining the differences in behavior, mental processes and brain bases. First, cultural factors that depend on epigenetic modification of regulation of gene expression during the process of development of individuals in the culture. They influence the next generation without restructuring of the DNA sequence ("epigenetic inheritance"). Second, the factors of gene-culture co-evolution that contribute to adaptive changes in the genome of the cultural community (affecting DNA) (Chiao, Cheon, 2010; Henrich et al., 2010; Laland et al., 2010; Kitayama, Uskul, 2011; see more details in Alexandrova, Alexandrov, 2009) are highlighted. These (interacting) factors contribute to culture specific effects on behavior and mental processes through their influence on the formation of pre-specialization and specializations of neurons.

The formation of *institutions* in societies is based on the similar mechanisms. In social systems, institutions have a dual nature. On the one hand, institutions are created by people who "make their own history" that is, institutions are artifacts, results of human behavior for "construction of reality" (Berger, Luckmann, 1966). On this subjective side of the institutions, researchers usually tend to draw the focus. Thus, in his definition of the institutions D. North points out that institution – are the "*humanly developed constraints that structure human interaction*" (North, 1996, p. 344). The literature on the design of institutions, in descriptions of how and by whom they were created or spontaneously arise as a result of human behavior, is very extensive, and it is not possible to list all works in economics and sociology on the subject.

On the other hand, institutions are objectively existing restrictions that are imposed on human interaction. Institutions express themselves as a result of repetitive actions of agents and effective social practices that are enshrined and legitimized. From this point of view, institutions are, according

[7] How M. Donald notes (2000), L. S. Vygotsky was one of the first who realized the existence of a "symbiotic relationship" of developing mind and culture.

to Ananyin (2005, p. 103), trans-subjective and trans-objective universals, that are existing "beyond" of people. They appear in the performance and reproduction of social specific rules and norms, behavior patterns, forms of relations, etc. In this connection it is illegitimate, in our view, to assess the "correctness" or "wrongness" of institutions. They exist, because they are rational and appropriate for known or unknown reasons.

Even K. Marx wrote that in social production people enter into definite *need (italics* is mine – S. K.), independently of their will relations that correspond to a certain stage of development of the material productive forces. "*Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past*", wrote Marx (1852). The institutional structure is one of these "circumstances existing already", in which social subjects act.

As V. Kvashnitsky (1996, p. 90) wrote, basing on F. Hayek (1960), "*no one human mind can comprehend all the knowledge that governs the actions of the society and, therefore, requires impersonal mechanism, independent from the judgments of specific individuals to coordinate individual efforts*". This impersonal, but created by people mechanism is embodied in the institutions. In other words, institutions are at the same time both the results and the conditions of human activity, and this is reflected in dialectics of their content.

As neurons "specialize" with respect to the entire system, social institutions perform various functions to ensure the integrity of society as a system. However, their system specialization, as it follows from the assumptions of the institutional matrices theory, is constant. In other words, they are "always involved" in the process of maintaining the integrity of the entire system of economic, political and ideological functions.

In the development of institutions, we can see the same "*learning effect*" (North, 2005) and regularities, which are typical for the formation of the individuals' experience, that expresses itself later in existing mental models. History shows that new and more differentiated institutional forms do not replace the previous ones, corresponding to the basic institutions, but superimpose on them. Second, the selection of institutional forms, that are appropriate to basic institutions, also allows selecting the most useful and necessary institutional forms. The similarity of the reproduction mechanisms for mental models and institutions is also related to the fact that they reflect the common ways of self-organization of living systems, which include systems of thinking, and social systems. In cybernetics, it is proved that the most economical and saving method of reproduction for living systems is a reproduction of the instructions, or rules of interactions between their elements. It is assumed that the process of their development is a continuous self-reproduction of the initial set of instructions and therefore these sets are the elements of development. The normal development of living systems is ultimately determined by only these instructions (Apter, 1966, p. 199). Setting connections in the human brain between neurons, as well as institutions in the social system, are such "instructions", which define the rules of activity and ensure the development both mental models and institutional structures.

5. Conclusions

Using a systemic approach we built the classifications of countries by the dominant types of mentality defined on the basis of psychological research, and types of institutional matrices, that are defined on the basis of economic and sociological research. There are concurring classifications. The prevailing social attitudes (mentality) in a society and the structures of institutions are embedded in the social consciousness and social practice and depend on the material and technological environment. The similarity of mechanisms of mental and institutional structures' folding was shown. The similarity of the reproduction mechanisms of mental models and institutions is related to the fact that they reflect the common ways of self-organization of living systems. Setting connections in the human brain between neurons, as well as institutions in the social system, are a sort of "instructions", which define the rules of activity and ensure the development both mental models and institutional structures.

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