MATHEMATICAL ASPECTS IN COMPLEXITY OF BIOLOGICAL, NEUROPHYSIOLOGICAL AND PSYCHOLOGICAL SYSTEMS[1]

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Summary

The (ANs) are networks of multidimensional hierarchic evolution, with various ranks. Their complexity varies horizontally, within the same level and vertically, from the lower to the upper level. The hierarchic, evolutive and multidimensional character of the (ANs) networks is generated by the rank of the component sets and sub-sets, the most comprising set also including the set of evolutive relations. Multidimensionality is understood as number of criteria according to which the components of the same rank are classified. The lower rank sets form the zero rank set which belongs to the immediately superior rank. The biostructural theory (MBt) considers the following hierarchic levels of the living matter as belonging to the human being: 1- coexisting molecular matter (intra-cellular solution and undissolved chemical combinations); 2-biostructure (the spongy mass and intra-capillary spaces); 3-noesistructure (structured noesis mass and coexisting biosic matter (the cortex and the cerebral hemispheres)). Within the bio-system there are biostructural, metabolic and chemical changes generated by the existence of biostructure (chemical combinations in a state that is specific of the living) and of the coexisting molecular matter (chemical combinations in the usual molecular state). The metabolism of biostructure-coexisting molecular matter is superior to the usual chemical processes. The phenomena taking place within the living system of the human being depend on the processes generated by the biostructural components. The living processes are qualitatively superior to the chemical processes which they include subordinately. Ceasing of biostructure existence implies life disappearance, the living systems being different in this sense from the non-living ones (informational controlled programs at biostructural level).

Keywords: Biostructure, Noesistructure, Evolution

1. Introduction

In the paper we analyse the living system belonging to the human being using(ANs) networks, within the context of the biostructural theory (MBt), and we show here some formal mathematical aspects regarding the configuration and functionality of noesistructure(&4). The existence in the cortex of the neuronal networks is considered significant for carrying out its specialized activity,and histerezis aspects, too.The paper is based on the following studies: the theory of (ANs) networks and their exemplification (G. Acalugaritei, 1999-2001); self-organization, biological homeostasis and Macovschi's biostructural conception,analysed by means of networks ANs(S. Baiculescu,1999-2002); the psychic from the informational point of view (M. Draganescu, 1989); biostructural theory (Mbt) and the noesic matter-substratum of the abstract matter (Macovschi, 1978-1984); living matter-cybernetic system on a hierarchic base (E.N. Mizil, 1981). The paper is structured in: summary,

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introduction, general aspects on (ANs) networks and the biostructural theory (MBt), (ANs) network application within the context of biostructural theory (MBt), formal mathematical aspects regarding the configuration and functionality of noesistructure, conclusions.

2. General aspects on (ANs) networks and the biostructural theory (MBt)

It is presented summarized, according to papers [1], [2], [3].

A. (ANs) networks are multidimensional hierarchic evolution networks with various ranks. Their complexity varies horizontally, within the same level, and vertically, from the lower to the upper level. The hierarchic, evolutive and multidimensional character of the (ANs) networks is generated by the rank of the component sets and subsets, the most comprising set also including the set of evolutive relations. Multidimensionality is understood as number of criteria according to which the components of the same rank are classified. The lower rank sets form the zero rank subset that belongs to the immediately superior rank.

Notations:

S_i set of order <i> belonging to (ANs) network; I = 0,1,2,3
S_i^j subset of order <j> component of set S_i; j = 0,1,2,…,p

$$i = \left|\begin{array}{l} 0 \ \ \text{index of the set comprising the fundamental components of (ANs) network} \\ 1 \ \ \text{index of the set comprising the internal relations existing among the fundamental components} \\ \quad \text{(described for i=0)} \\ 2 \ \ \text{index of the set comprising the external relations established at the level of fundamental} \\ \quad \text{components within the internal relations (described for i=1)} \\ 3 \ \ \text{index of the set comprising the evolution relations established at the level of fundamental} \\ \quad \text{components, within the external relations (described for i=2)} \end{array}\right.$$

$$S_3 = \{(i+1)S_3\}_{i=0,1,2,3} \qquad (1)$$

$$(i+1)S_3 = \{(i+1)S_3^j\} \overset{\Delta}{=} \left|\begin{array}{l} \text{E subset of evolutions (i=0)} \\ \text{T subset of time intervals (i=1)} \\ C_n^k \text{ subset of sequences (i=2)} \\ \text{R frame subset (i=3)} \end{array}\right. \qquad (2)$$

J = 0,1,2,…,p ; $\overset{\Delta}{=}$ signifies <marked by>

Conditions:

$$S_i \subset S_{i+1},\ i=0,1,2 \ (3);\ S_3^j = \{(i+1)S_3^j\}_{i=0,1,2,3};\ j=0,1,2,\ldots,p \ (4);\ S_{i+1,0} = \left|\begin{array}{l} S_i \ \ i=0,1,2 \\ (i+1)S_i = R,\ i=3 \end{array}\right. \qquad (5)$$

B. Biosic matter consists of coexisting molecular matter and biostructured matter.The first form represents chemical combinations in primary molecular state and the second chemical combinations within a particular structure, specific of life forms. Noesic matter consists of coexisting biosic matter and noesistructured matter. It represents a particular structure that conditions the cognitive processes.

Living matter consists of biosic and noesic matter, subsystems with control-self-control processes of feed-back/feed-before type. When life disappears biostructure and noesistructure cease to exist, biostructured and noesistructured matter turning into non-living matter. Unlike the molecular theory of the living matter, which maintains that living matter is made up only of chemical combinations in molecular state, the only possible transformations being biochemical, the bio-structural theory asserts that living matter is made up of biosic and noesic matter, three types of changes taking place (biochemical, metabolic, biostructural). According to the biostructural theory, metabolism makes the exchange of substances at the level of biosic and noesic matter, between the coexisting molecular matter and biostructured matter, the coexisting biosic matter and the noesistructured matter. It is qualitatively superior to usual biochemical relations, assimilation being superior to anabolism, disassimilation being similar to catabolism. Components of biostructured/noesistructured matter become only those substances of coexisting molecular matter/coexisting biosic matter that modify their quality in a superior way, by means of additional energy particular to life. In order to exist, both biostructure and noesistructure use the energy resulting from biochemical reactions, that take place at the level of coexisting molecular level. Biosic/noesic matter are bearers of the electrono-protonic plasma, generating emissive fields, by means of which the living organism may act from a distance upon other living organisms, influencing their behaviour. Noesic matter is specific of the cortex, and can exist (under certain latent forms) after the disappearance of noesistructure, owing to coexisting biosic matter, that disintegrates later, and gradually. The way the emissive fields of biosic matter manifest is different from the way emissive fields of noesic matter does. E. Macovschi distinguishes three levels for the hierarchical system of living matter. Level 1 is represented by coexisting molecular matter, level 2 is represented by biostructured matter and level 3 is represented by noesic matter. Coexisting molecular matter has the intra-cellular solution (H_2O, hydrosoluble chemical combinations) and the solid fraction of the undissolved chemical combinations. Hydrosoluble chemical combinations contain the multitude of proteins, enzymes, nucleic acids, and other combinations as fundamental elements. Biostructured matter contains the spongy mass and intra-capillary spaces and noesic matter includes the noesistructured matter and coexisting biosic matter. Noesistructured matter is to be found in the cortex alongside with biosic matter and coexisting biosic matter is at the level of cerebral hemispheres.

3. (ANs) networks application within the context of biostructural theory (MBt)

(ANs) networks associated to the three levels of living matter, identified within (MBt) are the following: $ANs^{(1)}$ associated to coexisting molecular matter (k = 1); $ANs^{(2)}$ associated to biostructured matter (k = 2); $ANs^{(3)}$ associated to noesistructured matter (k = 3). They have hierarchical character, on a horizontal plane, within the same level, and vertical from the lower to the upper level. The significance of indices <i, j> is shown in &2. There are inclusion relations between $ANs^{(k)}$ networks:

$ANs^{(1)} \subset ANs^{(2)} \subset ANs^{(3)}$ (6), the lower rank ANs forming the zero rank subset that belongs to the network immediately superior in rank. ($S_{k+1,0} = ANs^{(k)}$, k = 1,2).
The other criteria described under &2 are the same.

The phenomena taking place within the $ANs^{(k)}$ are highlighted by means of phenomenological functions, marked $f_i^{j(k)}$, applicable within the subsets $S_i^{j(k)}$, their values being within the ranges $\sigma_i^{j(k)}$, (i=0,1,2,3; j=0,1,2,…,p; k=1,2,3); $f_i^{j(k)} : S_i^{j(k)} \rightarrow \sigma_i^{j(k)}$ (7)

For the whole set $S_i^{(k)}$:

$h_i^{(k)} = \sum^{p} I_i^{j(k)} = \sum^{p} \int f_i^{j(k)} dS_i^{j(k)}$ (8) in which $I_i^{j(k)} = \int f_i^{j(k)} d\, S_i^{j(k)}$ (9) it quantifies the effect generated by operator $f_i^{j(k)}$ in subset $S_i^{j(k)}$.

The variation of indices < k, p, i> is shown in Table 1.

k→	1	2	3
i ↓		p	
0	5	2	2
1	3	1	1
2	2	2	2
3	4	4	4

Table.1
Variation of indices k, p, i within relations (7),(8),(9)

Phenomenological functions $\varphi_i^{j,j+1(k)}$ and $\varphi_{i+1,i}^{(k)}$ describe the horizontal evolution $(H_i^{j,j+1})^{(k)}$ within a set and vertical evolution $(V_{i,i+1})^{(k)}$ (inter-networks,inter-sets) that takes place within the ranges $\Omega_i^{j,j+1(k)}$ respectively $\Omega_{i,i+1}^{(k)}$, having values within the ranges $\omega_i^{j,j+1(k)}$; $\omega_{i,i+1}^{(k)}$:

$\varphi_i^{j,j+1(k)} : \Omega_i^{j,j+1(k)} \rightarrow \omega_i^{j,j+1(k)}$ (10) ; $\varphi_{i+1,i}^{(k)} : \Omega_{i,i+1}^{(k)} \rightarrow \omega_{i,i+1}^{(k)}$ (11)

Sets $\Omega_i^{j,j+1(k)}$ and $\Omega_{i-1,i}^{(k)}$ determine interferences between sets $\sigma_i^{j(k)}, \sigma_i^{j+1(k)}$ respectively $\omega_{i-1,i}^{(k)}$, $\omega_{i,i+1}^{j,j+1(k)}$

Within their framework there take place physical phenomena of transfer, diffusion, fluctuation, continuous and variable exchanges of substance, energy, information, being the seat that generates particles or annihilates them/makes them disappear. The effect of phenomenological functions is quantified by:

$$I_i^{j,j+1(k)} = \Big(\int_{\Omega_i^{j,j+1(k)}} ((\partial\varphi_i^{j,j+1(k)}/\partial x)dx + (\partial\varphi_i^{j,j+1(k)}/\partial\tau)d\tau)\Big) + Ci^{j,j+1(k)} \quad (12)$$

$$I_{i,i+1}^{(k)} = \Big(\int_{\Omega_{i,i+1}^{(k)}} ((\partial\varphi_{i,i+1}^{(k)}/\partial x)dx + ((\partial\varphi_{i,i+1}^{(k)}/\partial\tau)d\tau)\Big) + C_{i,i+1}^{(k)} \quad (13)$$

x vector associated to spatial coordinates; τ time . $ANs^{(k)}$ networks (k=1, 2, 3) (14) associated to the three levels of living matter, identified within the biostructural theory (MBt) are shown in Fig.1.
Network $ANs^{(k)}$ complexity has the expression: $C_{ANs}^{(k)} = A^{j(k)} + B^{(k)} + A^{p(k)}$ (15), in which:

$$A^{j(k)} = \sum_{i=0}^{3}\sum_{j=0}^{p-1}\Big[\int_{S_i^{j(k)}} f_i^{j(k)} dS_i^{j(k)} + \Big(\int_{\Omega_i^{j,j+1(k)}} ((\partial\varphi_i^{j,j+1(k)}/\partial x)dx + (\partial\varphi_i^{j,j+1(k)}/\partial\tau)d\tau)\Big) + Ci^{j,j+1(k)}\Big] \quad (16)$$

$$B^{(k)} = \sum_{i=0}^{2}\Big[\Big(\int_{\Omega_{i,i+1}^{(k)}} ((\partial\varphi_{i,i+1}^{(k)}/\partial x)dx + ((\partial\varphi_{i,i+1}^{(k)}/\partial\tau)d\tau)\Big) + C_{i,i+1}^{(k)}\Big] \quad (17)$$

$$A^{p(k)} = \sum_{i=0}^{3}\int_{S_i^{p(k)}} f_i^{p(k)} dS_i^{p(k)} \quad (18)$$

Indices <k, p, i> in expressions (15) ÷ (18) are shown in Tab.1.

The cooperative and hierarchical system of $ANs^{(k)}$ networks is characterized by the evolution equations:

horizontal: $s_i^{j,j+1(k)}(x,\tau) = \varphi_i^{j,j+1(k)}(x,\int\ldots,\nabla,\alpha,\tau)$ (19),vertical: $s_{i,i+1}^{(k)}(x,\tau) = \varphi_{i,i+1}^{(k)}(x,\int\ldots,\nabla,\alpha,\tau)$ (20)

having the solutions: $s_i^{j,j+1(k)}(x,\tau) = S_{0,i}^{j,j+1(k)} + \sum_{st.}\varepsilon_{st.,i}^{j,j+1(k)}(\tau)\omega_{st.}^{j,j+1(k)}(x) + \sum_{inst.}\varepsilon_{inst.,i}^{j,j+1(k)}(\tau)\omega_{inst.}^{j,j+1(k)}(x)$ (21)

respectively: $s_{i,i+1}^{(k)}(x,\tau) = S_{0i,i+1}^{(k)} + \sum_{st.}\varepsilon_{st.,i,i+1}^{(k)}(\tau)\omega_{st.i,i+1}^{(k)}(x) + \sum_{inst.}\varepsilon_{inst.,i,i+1}^{(k)}(\tau)\omega_{inst.i,i+1}^{(k)}(x)$ (22)

Indices k, j, p, i in expressions (19)/(21) are shown in Tab. 2, and indices for expressions (20)/(22) are k = 1, 2, 3; I = 0,1,2.The values used in relations (20), (21), (22) were the following:

$s_i^{j,j+1(k)}$ the state parameter functioning the process of horizontal evolution; $s_{i,i+1}^{(k)}$ the state parameter functionin in the process of vertical evolution; x vector associated to spatial coordinates; τ time; φ non-linear function ; ∫ … integration (it describes the overall character of subsystems cooperation and submission);∇ operator(describes the flows (diffusions)); α vector associated to order parameters ; st. steady regime; inst. unsteady regime; S_0 particular value of vector α.

NOESI STRUCTURE (k=3)	3	4	4	-	-	-	framework relations(interface $ANs^{(3)}$/psychic phenomena)	$ANs^{(3)}$		
			3	-	-	-	sequences(noesic metabolism)			
			2	cortex	-	noesic disassimilation	time(non-linear biodynamics)			
			1	cerebral hemispheres	changes existing at the level of noesistructured matter;components movement	noesic assimilation	specific evolution (noesic assimilation)			
			0	$ANs^{(2)}$	fundamental components $ANs^{(3)}$	internal relations $ANs^{(3)}$	external relations $ANs^{(3)}$			
BIO STRUCTURE (k=2)	2	4	4	-	-	-	framework relations(interface $ANs^{(2)}$/ $ANs^{(3)}$)	$ANs^{(2)}$		NOESICS
			3	-	-	-	sequences(biosic metabolism)			
			2	intracapillary spaces	-	biosic disassimilation	time(non-linear biodynamics)			
			1	spongy mass	changes existing at the level of biostructured matter;components movement	biosic assimilation	specific evolution (biosic assimilation)			
			0	$ANs^{(1)}$	fundamental components $ANs^{(2)}$	internal relations $ANs^{(2)}$	external relations $ANs^{(2)}$		BIOSICS	
		5	5	undissolved chemical com binations	-	-	-	$ANs^{(1)}$		

COEXISTING MOLECULAR MATTER (k=1)	1		4	H_2O	-	-	framework relations(interface ANs(1)/ ANs(2))		
			3	auxiliary chemicalcombinations	undissolved chemical combinations and auxiliary reactions	-	sequences (metabolism)		
			2	nucleic acids	catabolism	dizassimilation	time(non-linear biodynamics)		
			1	enzymes	anabolism	assimilation	specific evolution (assimilation)		
			0	proteins	fundamental components ANs(1)	internal relations ANs(1)	external relations ANs(1)		
				SUBSETS $S_i^{j(k)}$					
(MBt) NIVEL	k ↑	p ↑	j ↑	FUNDAMENTAL COMPONENTS	INTERNAL RELATIONS	EXTERNAL RELATIONS	EVOLUTION RELATIONS	ANs(k) ↑	LIVING MATTER SPECIFIC OF THE HUMAN BEING
				COMPONENTS SETS $S_i^{(k)}$ OF THE NETWORKS OF MULTIDIMENSIONAL HIERARCHIC EVOLUTION ANs(k)					
i→				0	1	2	3	4	5

Fig.1 The ANs(k) networks (k=1, 2, 3) associated to the three levels of the living matter, identified within biostructural theory

The general form of the operators that take place within the subsets $S_i^{j(k)}$ belonging to sets $S_i^{(k)}$of ANs(k) network and within interfaces $I_i^{j,j+1(k)}$ si $I_{i-1,i}^{(k)}$ is the following (Fig.2):

j		j+1	
$f_i^{j(k)}$ $S_i^{j(k)} \rightarrow \sigma_i^{j(k)}$	$\varphi_i^{j,j+1(k)}$ $\Omega_i^{j,j+1(k)} \rightarrow \omega_i^{j,j+1(k)}$ $I_i^{j,j+1(k)}$ <INTERFACE>	$f_i^{j+1(k)}$ $S_i^{j+1(k)} \rightarrow \sigma_i^{j+1(k)}$	i
<INTERFACE>	$\varphi_{i-1,i}^{(k)}$ $\Omega_{i-1,i}^{(k)} \rightarrow \omega_{i-1,i}^{(k)}$ $I_{i-1,i}^{(k)}$	<INTERFACE>	
$f_{i-1}^{j(k)}$ $S_{i-1}^{j(k)} \rightarrow \sigma_{i-1}^{j(k)}$	$\varphi_{i-1}^{j,j+1(k)}$ $\Omega_{i-1}^{j,j+1(k)} \rightarrow \omega_{i-1}^{j,j+1(k)}$ $I_{i-1}^{j,j+1(k)}$ <INTERFACE>	$f_{i-1}^{j+1(k)}$ $S_{i-1}^{j+1(k)} \rightarrow \sigma_{i-1}^{j+1(k)}$	i-1

Fig.2 Functional operators within subsets $S_i^{j(k)}$ belonging to sets $S_i^{(k)}$ of ANs(k) network and within the interfaces $I_i^{j,j+1(k)}$ si $I_{i-1,i}^{(k)}$

Table.2
Variation of indices k,j,p,i within relations (19)/(21)

k→	1		2		3	
i↓	j	p	j	p	j	p
0	0 1 2 3 4	4	0 1 - - -	1	0 1 - - -	1
1	0 1 2 - -	2	0 - - - -	0	0 - - - -	0
2	0 1 - - -	1	0 1 - - -	1	0 1 - - -	1
3	0 1 2 3 -	3	0 1 2 3 -	3	0 1 2 3 -	3

Note:

For $I_0^{0(k)} + I_0^{0,1(k)} + I_{0,1}^{(k)} \overset{\Delta}{=} F^{(k)}(ANs^{(k-1)})$ (23)

$F^{(k)} : S_0^{0(k-1)} \rightarrow ANs^{(k)}$ (24) ; $S_0^{0(k-1)} \equiv ANs^{(k-1)}$ (25) ; $F^{(k)}$ definite operator in network of order <k-1> with values in the network of order <k>(it describes processes one by one and horizontal/vertical evolution taking place in the analysed set), it follows: $C_{ANs}^{(k)} = F^{(k)}(ANs^{(k-1)}) + C_{ANs}^{*(k)}$ (26), k=1,2,3 with

$$C_{ANs}^{*(k)} = A^{*j(k)} + B^{*(k)} + A^{p(k)} \quad (27)$$

$$A^{*j(k)} = \sum_{i=1}^{3}\sum_{j=0}^{p-1}[\int_{S_i^{j(k)}} f_i^{j(k)} dS_i^{j(k)} + (\int_{\Omega_i^{j,j+1(k)}}((\partial\varphi_i^{j,j+1(k)}/\partial x)dx + (\partial\varphi_i^{j,j+1(k)}/\partial\tau)d\tau)) + Ci^{j,j+1(k)}] \quad (28)$$

$$B^{*(k)} = \sum_{i=1}^{2}[(\int_{\Omega_{i,i+1}^{(k)}}((\partial\varphi_{i,i+1}^{(k)}/\partial x)dx + ((\partial\varphi_{i,i+1}^{(k)}/\partial\tau)d\tau)) + C_{i,i+1}^{(k)}] \quad (29)$$

$$A^{p(k)} = \sum_{i=0}^{3}\int_{S_i^{p(k)}} f_i^{p(k)} dS_i^{p(k)} \quad (30)$$; $\overset{\Delta}{=}$ signifies <marked by>

(26) for k=2 si k=3, in the conditions (23)/(27)shows that among networks$ANs^{(3)}$,$ANs^{(2)}$,$ANs^{(1)}$attached to noesistructure, biostructure and coexisting molecular matters there are systemic dependences (31) and cybernetic adjustment relations $ANs^{(1)} \Leftrightarrow ANs^{(2)} \Leftrightarrow ANs^{(3)}$ (feed-back/feed-before).

$$C_{ANs}^{(3)} = F^{(3)}(ANs^{(2)}) + C_{ANs}^{*(3)}$$
$$C_{ANs}^{(2)} = F^{(2)}(ANs^{(1)}) + C_{ANs}^{*(2)}$$
$$F^{(3)}(ANs^{(2)}) = I_0^{0(3)} + I_0^{0,1(3)} + I_{0,1}^{(3)}$$
$$F^{(2)}(ANs^{(1)}) = I_0^{0(2)} + I_0^{0,1(2)} + I_{0,1}^{(2)}$$
$$C_{ANs}^{*(3)} = A^{*j(3)} + B^{*(3)} + A^{p(3)}$$
$$C_{ANs}^{*(2)} = A^{*j(2)} + B^{*(2)} + A^{p(2)}$$

(31) *Their homeostasis implies functional simultaneity with all the three systems (MBt) to which the three (ANs) networks are attached.In the conditions $ANs^{(2)} \rightarrow \Phi$,biostructure ceases to exist ($F^{(3)}(ANs^{(2)}) \rightarrow 0$), the biostructured matter biostructured matter turning into nonliving matter ($F^{(2)}(ANs^{(1)}) \neq 0; C_{ANs}^{*(2)} \rightarrow 0$).*

Losing of cognitive capacity supposes that noesistructure ceases to exist ($C_{ANs}^{(3)} \rightarrow 0$) which also happens later to biostructure. The living system becomes, from homeostatic (within certain limits) unsteady, ceasing its four-dimensional existence (space-time).The existence of the three ANs networks and of the three Mbt levels is simultaneous (according to (31)) beginning with the initial moment of life on earth, their relations improving with time evolution, later being damaged until coming to disappear. When estimating the complexity of $ANs^{(k)}$ network, the considered phenomenological functions imply quantitative/qualitative components (marked by indices C,Q) $f_i^{j(k)} = (f_i^{j(k)C}, f_i^{j(k)Q})$; $\varphi_i^{j,j+1(k)} = (\varphi_i^{j,j+1(k)C}, \varphi_i^{j,j+1(k)Q})$; $\varphi_{i,i+1}^{(k)} = (\varphi_{i,i+1}^{(k)C}, \varphi_{i,i+1}^{(k)Q})$,determining the synergetic, substantial, energetic and informational character of the processes taking place in the human organism. The sums $\sum$ used in the paper will be marked (${}^{(C)}\sum$,${}^{(Q)}\sum$), simultaneity of phenomena being marked <$\wedge$>. Feed-back/feed-before aspects may be highlighted by means of interdependencies coexisting molecular matter-biostructure-noesistructure that generates specific transfer functions.

4. Formal mathematical aspects regarding the configuration and functionality of noesistructure

The configuration and functionality of noesistructure (NSt.) is dependent on the components and processes that take place within biostructure (BSt.) and coexisting material matter (MMC).On the whole,for certain regions of noesistructure, the following formal relations take place :

$$\left.\begin{aligned} {}^{(C)}\sum_{NSt.}{}^{(Q)}\sum_{NSt.} C_{ANs}{}^{(3)}(\tau) &= {}^{(C)}\sum_{BSt.}{}^{(Q)}\sum_{BSt.} F^{(3)}(ANs^{(2)})(\tau) + {}^{(C)}\sum_{NSt.}{}^{(Q)}\sum_{NSt.}(C_{ANs}{}^{*(3)})(\tau) \\ {}^{(C)}\sum_{NSt.}{}^{(Q)}\sum_{NSt.} C_{ANs}{}^{(2)}(\tau) &= {}^{(C)}\sum_{BSt.}{}^{(Q)}\sum_{BSt.} F^{(2)}(ANs^{(1)}) + {}^{(C)}\sum_{NSt.}{}^{(Q)}\sum_{NSt.} C_{ANs}{}^{*(2)}(\tau) \end{aligned}\right| \quad (32) \qquad \tau\text{-time}$$

The dynamics of neuron excitation-inhibition processes is modelled by the following differential equations:

$$s_i^{j,j+1}(x,\tau,k)_{ex.-inh.} = \varphi_i^{j,j+1}{}_{ex.-inh.}(x,\int\ldots,\nabla,\alpha,\tau,k) \qquad (33)$$
$$s_{i,i+1}(x,\tau,k)_{ex.-inh.} = \varphi_{i,i+1}{}^{(k)}{}_{ex.-inh.}(x,\int\ldots,\nabla,\alpha,\tau,k) \qquad (34)$$

having the solutions:

$$s_i^{j,j+1}(x,\tau,k) = S_{0,i}^{j,j+1} + \sum_{st.}\varepsilon_{st.,i}^{j,j+1}(\tau,k)\omega_{st.}^{j,j+1(k)}(x,k) + \sum_{inst.}\varepsilon_{inst.,i}^{j,j+1(k)}(\tau,k)\omega_{inst.}^{j,j+1(k)}(x,k) \quad (35) \quad \text{respectively}$$

$$s_{i,i+1}(x,\tau,k) = S_{0i,i+1} + \sum_{st.}\varepsilon_{st.,i,i+1}(\tau,k)\omega_{st.i,i+1}(x,k) + \sum_{inst.}\varepsilon_{inst.,i,i+1}(\tau,k)\omega_{inst.i,i+1}(x,k) \qquad (36)$$

k - coefficient that quantifies the degree of neuron excitation-inhibition.

(33) it refers to inter-neuron processes that take place among neurons of order <j ; j+1>belonging to layer <i> and (34) refers to inter-neuron processes that occur amon the neurons belonging to layers of order <i ; i+1>. Values $(x,\int\ldots,\nabla,\alpha,\tau,k)$ have the same significance with that described when writing relations (19)/(20). The existence in the cortex of neuron networks is considered significant for carrying out the specialized activity of noesistructure. Neurons being considered automata of probabilistic type, their state at any two moments τ si $\tau-\tau_0^{/}$ ($\tau_0^{/}<\tau$) implies close <performances>, provided the formal condition is met:

$$\left| {}^{(C)}\sum{}^{(Q)}\sum C_{ANs}{}^{(3)}(\tau) - {}^{(C)}\sum{}^{(Q)}\sum C_{ANs}{}^{(3}(\tau-\tau_0^{/}) \right| < \delta \qquad \delta\geq 0 \qquad (37)$$

The synthesis of these processes generates framework relations ($ANs^{(3)}$,i=4), placed in interface $ANs^{(3)}$/ psychic phenomena (Fig.1).

5. Conclusions

According to the facts presented in the present paper and the results in [2], for the configuration and functionality of noesistructure, we consider viable the Von der Malsburg (1973) / Wiesel-Hubel (1974) point of view. The coexisting molecular matter and biostructure ensure genetic specificity of noesistructure, before one’s own experience, according to the preset programme at cellular formation (moment τ_0). Its starting a specific stage of existence (momentτ), causes stabilization of synaptic self-organization under the conditions of interacting with the environment. In paralel with this process the form of activity carried out by the human being generates new neuronal grafts which enable the impulses that circulate within the neuronal network to get specific, selective trajectories [2]. These conclusions are also in accord with the Gerald M.Edelman theory (1992)-The Theory of Neuronal Group Selection,TNGS (neural Darwinism).

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