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Some System Comments on the Work of the Brain's Hemispheres: the Role of the "Inputs"

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Abstract Accepting the common opinion that the brain hemispheres are distinct in their *basic* functions, we first suggest some simple arguments, both physical and "system", for the *mutual* dependence (working) of the hemispheres. The distinction in the hemispheres' features is represented by two respective "inputs" of the brain, different in their informational and (thus) frequency ranges. The concept of input allows us to formulate the problem of frequency relations within the thinking process, and to thus come to the conclusion that to treat the information, the brain must *generate* some electrical signals/processes. That is, signal processing by the brain cannot be reduced to a purely algorithmic (logical) treatment typical for computers, and is essentially physiological. Developing this argument, we use the possibility [1] to observe in a complicated system/structure with numerous internal connections, *either NL or LTV subsystems*. In general, the "system approach to biology" appears here to be not entirely subordinated to such requirements, coming from biology, as, e.g., developing electronic models of physiological cells. It is also an independent and instructive research tool helpful in understanding brain function. Noting that the *intellectual overstress* (overloading the right hemisphere) imposed by the society's informational influence, is unhealthy for many, we see in it a reason for the (still unexplained in any other way) "days of violence" and the autistic "epidemic", -- the severe social problems we face which should not be ignored by the biologists occupied with the brain studies.

Keywords Brain Studies, System Inputs, Frequency Conditions, Analysis of Complicated Structure, Definition of Subsystems, Informational Environment, Autism, Social Responsibility

1. Introduction

1.1. General

The present discussion is motivated both by a dissatisfaction caused by the auxiliary role given to system theory in the biological studies of the human brain, and by the fact that when applying the system-theoretic outlook to brain studies, some sociologically important, problematic human behavior becomes understandable. We argue that not only the formal mathematical tools used in system theory and the associated electronics model abilities, *but system outlook in general*, should be applied to understanding brain function.

The system outlook suggests, in particular, that the brain should not be under the huge intellectual stress imposed by modern society, which causes an asymmetry by *overloading* the right hemisphere. This is an example of a human problem whose solution cannot wait until academic biology starts to understand the brain's structure in all its numerous details. In any case, an understanding of what to do with this huge biological knowledge has to be developed in parallel to the biological studies.

The connection of a system with its informational *inputs* is put forward because in system theory signals and systems are so closely connected that we simply do not need one without the other. (After the separately given *descriptions* of signals and systems, any textbook presents all the function or operational aspects as *interactions* between signals and systems.) For a system specialist, the question "What is this system?" is very close to the question "What should it be?", and brain studies should not completely ignore this outlook. Since the study of an object and understanding its purposes are always developed simultaneously, let us focus only on the heuristic system outlook, mentioning some relevant biological works only at the very end.

1.2. The Logical Frame of the Argument

Most of the following insistences and arguments are centred around the concept of "input". Considering the work of the brain as a whole, this concept first of all leads us to a very simple, purely physical argument that explains that *interaction of the brain hemispheres must occur if only because the basic informational functions of the hemispheres are independent.*

Then, the concept of "input" suggests considering some frequency relations. Since the hemispheres are interacting

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within the thinking process, the rate (typical frequencies) of thinking has to be obtained from the different frequencies of the inputs of the hemispheres. This leads us to the conclusion that for thinking, the brain must have some internal, inherent for it, generators of signals. That is, thinking is not just something algorithmic, also physiological.

Remark 1: When applied to biology and human mind, the system analysis must touch some psychological aspects, and let us figuratively compare the brain with a swimmer who is caught by a stream and has to move accordingly, but also has to correlate his movements with his heart's pace, and just as the swimmer wants to survive, remaining with his *healthy* heart, the brain not only tends to understand the received information (that often is something redundant and difficult for real perception), -- it also tends to keep the principles of thinking which are given to it by nature as something healthy for it. In other words, the *intellectual* interaction of the brain with the external world should not harm its physiology. We have to stress this because an analysis of the past of humanity suggests that such bad things can happen.

Furthermore, we consider the fact of existence of numerous *internal connections* of the brain and observe that some can be defined as inputs for some *internal subsystems* of the brain. The possibility to define the connections as "inputs" is associated with the obvious freedom in the definition of the subsystems, and, as is explained in [1] and below in Section 5, this freedom allows one to create either LTV or NL models of the subsystems.

One can be sceptical re the possibility of considering the brain as composed not entirely of nonlinear units, but this nonlinearity is, essentially, of the singular switching type, and whether or not a switching system is NL or LTV is defined (see [1] and references there) by whether the instants of switching *depend* on the unknown functions to be found, i.e. on the "state variables", or can be prescribed. If, because of some physiological energetic processes, a small brain's subsystem can randomly become a "master" for another small subsystem; then this influence can be considered as "prescribed", i.e. we have an "input" for the second subsystem.

Remark 2: According to [1] it is important how a known function generated by the first subsystem, appears in an equation describing the second subsystem. Preceding the more detailed discussion of Section 5, let us note that if the function generated by the first subsystem is $a(t)$, and the function of the second subsystem to be found is $y(t)$, then the term $a(t)y(t)$ in an equation for $y(t)$ is NL. Indeed, simultaneous $a(t) \rightarrow ka(t)$ and $y(t) \rightarrow ky(t)$, with a constant k, make this term nonlinear by k. Thus, comparing, e.g., the equations $a_1(t)y(t) - a_2(t) = 0$, and $a_2(t)y(t) - a_2(t) = 0$, in which $a_1(t)$ is a fixed function of a generator, and $a_2(t)$ is the known (but not fixed; it can become $ka_2(t)$) *input function*, one sees that the first equation is LTV (indeed, the checking gives $a_1(t)ky(t) - ka_2(t) = 0$), while the second is NL.

Thus, if in the LTV equation, a known coefficient $a(t)$ ceases to be given by a special *fixed* generator, thus becoming *an input*, this equation can become NL. The possibility to see/define a subsystem either as an LTV or NL is important because for the LTV systems it is easier to come to the conclusion that the thinking process requires some internal brain generators, but if such generators physically exist in the LTV interpretation, they are also present, in the (more expected by many) NL interpretation.

Finally, in the spirit of Remark 1, motivated by some unexplained human behavioral problems, we consider the problem of overburden of the right hemisphere by the signals that the brain receives from the human society.

2. The Basic Functions (and Frequencies) of the Brain Hemispheres As the External "Inputs" of the Brain

According to, e.g., [2-4] the right hemisphere is responsible for our creativity (spiritual education), while the left one deals with the more primitive features, like simple counting and feeling time and distance intervals. We can observe, for instance, that an on-line-decision in ping-pong playing, associated with the estimations by left hemisphere of time and space intervals, is obtained much more quickly than understanding (mainly by right hemisphere) what is honest playing.

The action of the eye retina, and other smart sensors have to be more directly associated with the input for the *left hemisphere*.

We cannot consider this natural "multiplexing" of the input information, but stress that this is, in particular, multiplexing of different frequencies.

One can say that the right hemisphere is responsible for "important things", while the left – for "urgent things", which already points at different *rates* of the processes in the hemispheres. Of course, when speaking about the distinction between the functions of the hemispheres, we mean the *basic* "defined" functions. The interaction of the hemispheres during thinking causes some "mixed states" with some common rate of information processing, which is the typical rate of one's thinking, say, that of a student.

3. The Argument of Electrical Potential Proving the Mutual Dependence of the Hemisphere's Operations, and the Role of Physiology

3.1. The Physical Argument

Since the main physical activity of both of the hemispheres is electrical, we can speak about a somewhat smoothed distribution of electrical potential $\varphi(\vec{r})$ over the whole brain. This natural possibility, together with the *assumed* independence of the input signals, makes it possible to apply an elementary argument that is very similar to the argument appearing in the Fourier method of separation of variables, when linear PDE-s are solved. The non-essential distinction is that here the separated independent variables are not spatial, but some functional or logical (physically, electrical) ones.

Let us denote the somewhat averaged potentials, $\varphi_{right}(\vec{r})$ and $\varphi_{left}(\vec{r})$, of the hemispheres as:

$$f_r(A) = \varphi_{right}(\vec{r})$$

where '*A*' denotes the "intellectual input(s)" of the right hemisphere, and as

$$f_l(B) = \varphi_{left}(\vec{r})$$

where '*B*' denotes the "simple-activity input(s)" of the left hemisphere. This expresses our assumption that the hemispheres should act independently.

However, since the hemispheres are physically connected, no significant distinction between the averaged potential of the right and left hemispheres is permitted, i.e.

$$f_r(A) \approx f_l(B). \qquad (1)$$

The mutual independence of '*A*' and '*B*' obviously makes equation (1) to be the requirement of *constancy* of each of the side. However, this requirement is unacceptable, because there is no physical reason or mathematical condition for a certain value of the common potential, i.e. this value cannot be calculated.

Remark 3: The fact that we often meet a situation where potential includes an arbitrary constant, should be considered here. Since in Poisson's equation for electrical potential, the potential appears under the *differentiating* operator Laplacian, any constant can be added to it, but here the inputs *A* and *B* are some *voltage* signals, and the relevant field-equations have to be of Helmholtz's type, i.e. with a term that includes the unknown potential *without* differentiation. This does not allow the potential be arbitrary, after the input signals are given, and with a change in *A* or *B* it can be changed, contradicting (1). Works [5,6], especially [5], consider this point in detail. Note also that in order to choose a unique solution of Helmholtz's equation, one considers [7] the stationary situation as a limiting case of a wave propagation, using special "conditions of radiation". In any case, we do not have here the standard problem for potential with given charges distributed in a finite space, or with electrical current density given in a conductive medium, described by Poisson's equation.

We conclude that the hemispheres cannot work completely independently, i.e. the informational variables (arguments), *A* and *B*, have to appear in each side of (1).

On the behavioural aspect, it is worth noting that without the combining the important and urgent functional features of the hemispheres, -- we would be absolutely helpless as re *making decisions* which is the main purpose of thinking.

3.2. A comment re Material Compactness, i.e. Physiology: Thinking Cannot be Defined on an Abstract Mathematical Set

The role of the physical closeness of objects in the above proof of the mutual dependence of the hemispheres' operations touches on physiology. Without seeing the role of the material closeness for performing informational operations, it is even impossible to understand why we need two distinct hemispheres. Such a construction of brain does not increase its mechanical strength, and if the physiology were not be important for the informational treatment, the different functions of our mind would not need be so macroscopically separated in the brain (i.e. just between the whole hemispheres). For instance, the *set* of responses associated with the action of the right hemisphere, might belong to several, mutually separated (distanced), relatively small parts of the brain, which would be the associated physiological set. (As an informal comparison, -- in the parliament of your state all those who support the same particular ideology need not sit together in the hall.)

However, the two-hemisphere structure of brain *encourages* the separation of the *hemispheres'* functions, and this separation is *necessary*, in particular, because it gives us (Section 6) some important indication regarding the *balance* in the development (activity) of the hemispheres that are responsible for the so different aspects of our activity. Humans feel in some way, and are troubled by, the disbalance in the action of the hemispheres.

This is a simple argument against the assumption that thinking can be done in entirely algorithmic way. Thinking is something more "human", having *physiological limitations*, which has to be (Section 6) understood and respected by the society responsible for "feeding" us information.

4. On the Interaction of the Hemispheres (Thinking, Memory, and Frequency Parameters)

According to the conclusions of Section 3.1, there *must be* some interaction between the hemispheres, which would cause the previously assumed $f_r(A)$ to be, in fact, some $f_r(A+\hat{T}B)$, and $f_l(B)$ to become some $f_l(B+\hat{T}A)$, where $\hat{T}$ is some operator of interactions of the hemispheres, which physically causes, the "inputs" of the right hemisphere to influence (indirectly) the left hemisphere, and conversely. That is, we have instead of (1)

$$f_r(A+\hat{T}B) = f_l(B+\hat{T}A). \qquad (1a)$$

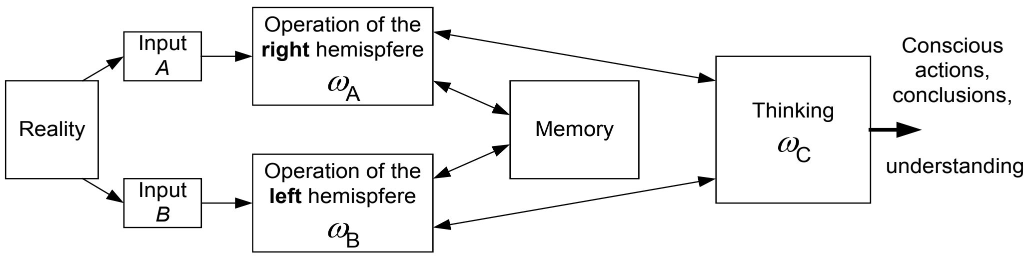

Figure 1. The scheme to which we came (the internal generators are inside "Thinking"). That we use the different "inputs" A and B, expresses the fact that the basic functions of the hemispheres are different. However, the thinking requires the actions of the hemispheres to be mutually connected. Memory is an organic part of the thinking, and each of the hemispheres must use the memory. Creation of the frequency of generation of "thinking", ω_C, using the very *different* frequencies of the operation of the different hemispheres, ω_A and ω_B, remains a constructive point for further research.

This equation allows one, in principle (Section 6), to consider overloading of one of the hemispheres.

One observes, furthermore, that for each hemisphere a good *memory* is needed, since estimation of time and space intervals cannot be done without comparison with some such known (i.e. held, as some images, in the memory) intervals, and any moral problem also requires analysis of the past. Thus, the hemispheres must be functionally connected if only via the use of memory. In fact, memory is an organic part of thinking, which is well seen, e.g., via the example of old people who after a stroke always exhibit: a strong reduction of memory and a strong reductions of both the thinking and the movement abilities related to both hemispheres.

One sees that the role of memory must be central in any brain activity relevant to thinking, and the difficulties in treatment of the received information, considered in Section 6, may be interpreted as the difficulties to remember the information. It is worth stressing that, contrary to the brain, binary programs can realize [8] logical schemes while not using any intermediate memory.

Let us consider now the fact that thinking, having some *typical* frequency of its generation, involves the *very different typical (basic)* frequencies of the brain responses to A and B. That is, denoting the typical frequencies of the right hemisphere as ω_A, and of the left as ω_B, consider that the frequency of usual thinking, denoted as ω_C, is different from ω_A and ω_B.

The generation of the new frequency ω_C, which is not that of any input, requires the equations describing the thinking process to be *either NL or LTV*.

For the *LTV* case, the changing-in-time parameters of a system, i.e. the coefficients of the described equations, always have some *known* frequency features. (Think, e.g., about a time-dependent coefficient of a forced Mathieu equation). This obviously requires the existence of some internal generator(s) within the brain.

Schematic Fig. 1 indicates this argument.

That nonlinearity does not change the conclusion re existence of the internal generators, should not be doubtful, but the methodological side is important per se, and we now consider the transfer from LTV systems to NL systems in some detail.

5. The Inputs of a *Subsystem* and Its Nonlinearity

The situation of the structurally complicated system allows us to apply the approach of [1] that pays a lot of attention to the *definition* of a systemas including definitions of its inputs (more generally, *ports*). This approach gives a somewhat unexpected flexibility in the transfer from LTV to NL systems and back, so that one can even speak about different linear and nonlinear "versions" of possible models of brain subsystems. This has to be understood, first of all, as regards the equations.

Thus, for instance (compare to Remark 2), the equation for the unknown function $y(t)$:

$$(\hat{L}y)(t) + g(t)y(t) = g_{in}(t) \tag{2}$$

in which: $\hat{L}[\cdot]$ is any linear operator, $g(t)$ is a prescribed time function, and $g_{in}(t)$ is the input function, is linear (LTV), since the test of linearity (just for brevity, we consider only the scaling):

$$g_{in}(t) \to kg_{in}(t),$$

with a constant k, obviously leads in (2) to

$$y(t) \to ky(t).$$

However, the equation with differently applied input:

$$(\hat{L}y)(t) + g_{in}(t)y(t) = g(t), \tag{2a}$$

and its important particular case:

$$(\hat{L}y)(t) + g_{in}(t)y(t) = 0$$

are *nonlinear*, because now the scaling $g_{in}(t) \to kg_{in}(t)$ does *not* yield $y(t) \to ky(t)$.

By the same reason, the equation

$$(\hat{L}y)(t) + F(t, g_{in}(t))y(t) = g_{in}(t)$$

in which

$$F: \ \frac{\partial F(z_1, z_2)}{\partial z_2} \neq 0$$

is nonlinear.

This role of the placement of the input in an equation expresses the mentioned flexibility in passing from LTV systems to NL systems, and when subsystems of a complicated real system with numerous connections are considered we have different possibilities to regard the real physical (biological) connections as "inputs", *i.e. to differently define a subsystem.*

That the frequency spectra of $g_{in}(t)$ and $y(t)$ are very different for any such equation, LTV or nonlinear, is clear. An LTV model suggests that some internal frequency generator (as $g(t)$ in (2)) must be present for the frequency transform at the brain operation named thinking. The fact of the existence of the generator(s) cannot be changed by redefinition of inputs of some subsystems, which turns them from LTV into NL.

We see the argument that the frequency conditions for thinking require some internal auxiliary signal generation be so important that it will be now supported by discussing the specific nonlinearity of *switching systems* that also can be either LTV or NL. This time, it is not a frequency, but a time-intervals' analysis, and the necessity of existence of the internal generators appears not via frequency "mixing", but via the action of some level-comparators.

5.1. The "Switching Nonlinearity": An Alternative Argument for the Need in the Internal Generators

Work [9] and the references there introduce the possibility of creating nonlinearity using principles of switching systems, which (as we assume) might be relevant to modeling brain operation. We mean the nonlinearity of some level-crossings, *seen as functionals* (i.e. as numerical values defined by functions).

Consider some signal/process $y(t)$. The time-instants $\{t_k\}$ of the *level-crossings* by the $y(t)$-wave of *any given time function/wave* (that may be, in principle, a constant level, but in the present case we should prefer a known inconstant function generated in the brain) appear to be some analytically-constructive parameters.

Since $\{t_k\}$ obviously depend on $y(t)$, *any expression of the type* $f(t-t_{k'})$, where f is not identically constant and $t_{k'} \subset \{t_k\}$, *is nonlinear* by $y(t)$. Thus, any equation for $y(t)$, which includes a term $f(t-t_k)$ will be nonlinear. For instance, equation

$$(\hat{L}y)(t) + g(\{t - t_k\})y(t) = 0 \qquad (3)$$

in which, as was said,

$$t_k: \ y(t_k) = p(t) \ \text{(i.e. } y(t) \to t_k\text{)},$$

where both $g(\cdot)$ and $p(\cdot)$ are known functions, is *NL* just because $\{t_k\}$ in (3) depend on the unknown $y(t)$.

The necessity for an auxiliary internal generator(s), e.g. the generator of $p(t)$, is thus expressed in the use of the level-crossings in the functions' shifts. Though we did not come this time to nonlinearity via an LTV case (which would be obtained in (3) for *prescribed* $\{t_k\}$), the necessity in auxiliary generators of functions is well seen here also.

6. On the Behavioral Problem when the Right Hemisphere is Overloaded

Having two different kinds of inputs, we can have them to be of different intensiveness, and one of the hemispheres can be overdeveloped (overloaded). Actually, the problem exists when the more "inertial" *right* hemisphere is overloaded with respect to the left one. That is, there is an unbalance in the development of the brain, which must be associated with the insufficiently well treatable (too difficult for real understanding) information that is held (accumulated) in the memory, but not as something that can become "organic" to the memory.

Thus, in terms of Section 4, taking in the smoothed potentials $f_r(A + \hat{T}B)$ and $f_l(B + \hat{T}A)$, $A >> B$ and $|\hat{T}A| \geq B$, we have from (1a) that

$$f_r(A) = f_l(\hat{T}A). \qquad (1b)$$

Since such an asymmetric overburden (denoted in [10] as '*R*+'), associated with an over-stress of the right hemisphere, can occur in many people, an intellectual overstress, or brain unbalance, caused by information delivered to many, is sociologically dangerous. Thus (1b) expresses an *unhealthy* "thinking mode".

Remark 4: From the mathematical point of view, (1b) is just some asymptotic case, and for the opposite limit we would have $f_r(\hat{T}B) = f_l(B)$. Such equalities can be helpful in modeling $f_r(\cdot)$ and $f_l(\cdot)$ using some series expansions.

Assuming, following [10-12], that the unbalance (or the associated increased electrical activity of the right hemisphere) associated with (1b) is an unpleasant neurological problem felt by the person, we have the necessity of *stopping* further development of the creative right hemisphere. Unfortunately, the solution (a kind of "medicine" [10,11]) may be simply the cruelty. (Since one can apply the cruelty to himself, not only killing, also suicides are relevant here, though not immediately.)

Work [11] thus explains some regretful events of the period of WWII, and [10,12] thus explain the (absolutely unexplained by any other way) relatively recent "days of violence" accompanied by the strange propaganda of the violence as a "need for us, the society, and the whole humanity". The point of [10] and [12] is that, opposing intellectualism, presented by the means of information (Radio, TV, Internet) as the main society ideal (thus causing in many simple people depression), violence simplifies for one the intellectual situation. That is, the "days of violence" are needed for the *defined* "hooligans" as some days of intellectual (informational) rest, and, of course, as a protest against intellectual overburden.

This phenomenological point of view is in some correlation with the pioneering biological works [13-15] that connect the brain's asymmetry with human non-satisfaction (angry faces in [13] and violence in [15]). These works mainly succeed in investigating the *frontal* part of the brain (as a whole, this is a very difficult research) that specifically relates to the role of the hemispheres in *human communication*.

Regarding the research of [13] it has to be noted (added) that according to [16] when one tells lies (a situation when the *real* communication is obviously strongly weakened) -- the mimicry of one's face becomes asymmetric. The observation of faces in [11] can also be of some interest here, if only because of the pointing at some significant material *existing* for such a study.

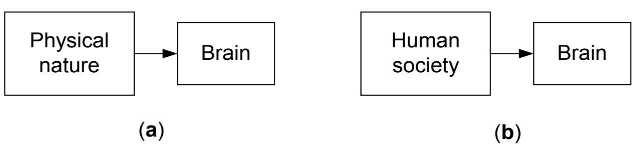

Figure 2(a) and (b). The signal and the system. Two cases of the informational input sources. In each case, signal *A* should be informationally *proper and treatable* in order to cause a healthy information perception ("digestion", using the terminology of [10]). In this sense, case (**b**) is much more problematic than case (**a**). Making intellectualism the societal ideal can lead many to overburden of the right hemisphere, and then stopping the excessive activity of the right hemisphere can be associated with cruelty. This should be a point of our concern, and the principles of work of the means of public information have to be reconsidered under supervision of professional teachers and sociologists. Today, the future EE (especially communication) the specialists have to learn sociology.

The opinion of [10,12] that the *overburdening of child's developing brain* by the very intensive flow of information can be the reason for the increase in the percentage of autistic children in the population (now about 1:100 in some developed counties) must be considered. (Recently, President Obama even called this situation "autistic epidemic", but nothing really passes here from one human to another; the cause of the problem is "centralized" in/by the informational means, and it is in our hands to reduce the harmful intellectual overburden.)

The very schematic Figs 2, (**a**) and (**b**) refer to the distinction introduced by the societies' intellectual ideals, which can be missed by biology focused on the brain per se, but not by system theory in which a system and its input function is required to well fit each other.

Hardly can the distinction of the "signals" received from the physical world and from human society become a focus of academic biology, but system theory introduces an important warning. We should study the brain just as we study our child, -- that is, study while realizing on line the warnings and seeing these warnings as instructive for the study. We simply have not a lot of time.

We definitely have not only to study the algorithms of operation of the brain, but also to understand the very important *limitations on our mind*, associated with the danger of the unbalanced loading of the hemispheres. These limitations on the ability to treat the received information are as natural as the limitations on the ability to digest our usual food. The modern informational world is changing very quickly, while our physiology (of any kind), -- *not at all, at any relevant time-scale*, and humanity should be careful with its enthusiastic wish to make intellect a kind of world-scale dictator who decides how to intellectually feed us and our children.

Looking at this point more deeply, one even sees that the warning against overburdening of the right hemisphere is important not only for the sociology, but also for the basic philosophy of the human society concerned with the advance of democracy. Indeed, the means of public information are given very significant democratic freedoms, and making intellect a kind of world dictator creates a growing problem for the numerous people who just want to *conduct their traditional life with a clear mind, and be thus respected*. Neglecting this is a kind of violence of the society against simple people. This intellectual violence causes the prosaic physical violence, just as during the "days of violence", which can once take the form of an explosion.

It becomes obvious that the spreaders of information (as, e.g. TV) have to revisit the principles of their work. See [10,12] for the associated discussion.

Thus, contrary to the physical nature, the *society* gives improper input for the "system" of the brain. This observation, demonstrates the power of the system outlook that always considers a system with its inputs.

7. Main Conclusions

The brain hemispheres choose for themselves signals of different information and (thus) *frequency* ranges. However, the very distinction (independence) in the "input signals" causes (Section 3.1) the hemispheres to interact while thinking.

Since thinking can introduce new frequencies, the brain must have some internal generator(s) of real (electrical) processes, which is associated with the physiological nature of thinking.

A "system approach to biology" should not be limited by such problems as the electronic modeling of a cell, that is, it should not be totally subordinated to the needs of biology, *as these needs are formulated by biologists*. The system approach is also a source of independent, instructive observations.

Since human society behaves according to the action of the human mind, the possibility of applying the system outlook to the logical operations of the brain can be helpful in explaining some important social phenomena, and thus this outlook can be instructive for experiments with brain responses. The danger in the overburdening of the right hemisphere by the improper informational "feeding" of the population is especially important.

We hope that the developed argument can be encouraging for system specialists and of some interest for biologists.

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REFERENCES

[1] E. Gluskin, "An application of physical units (dimensional) analysis to the consideration of nonlinearity in electrical switched circuits", Circuits, Systems, and Signal Processing, vol. 31 (2012) pp. 737–752. (Especially the appendices.)

[2] S. Pinker, "*How the mind works*", W.W. Norton, New York, 2004.

[3] R.F. Thomson, "*The brain, a neuroscience primer*", Worth Publishers, New York, 2000.

[4] J. Bradshaw, "*Hemispheric specialization and psychological function*", Wiley, Chichester & New York, 1989.

[5] E. Gluskin, "On the ideal low-frequency spatial filtration of the electrical potential at infinity", Physics Letters A, 338(3-5), 2005 (209-216).

[6] E. Gluskin, "Spatial filtering through elementary examples" European J. of Physics, 25(3), 2004 (419-428)

[7] V.S. Vladimirov, *Equations of Mathematical Physics*, Marcel Dekkel, New York, 1971. (Also appears in Pure and Applied Mathematics. A Series of Monographs.)

[8] O.P. Kusnetsov, G.M. Adel'son-Vel'skii, "*Discrete Mathematics for Engineers*" Gordon and Breach, New York, 1985.

[9] E. Gluskin, "Switched systems and the conceptual basis of circuit theory", Open Column – IEEE Circuits and Systems Magazine, 3rd quarter 2009 (56, 58, 60-62).

[10] E. Gluskin, Slides for a lecture given at NDES 2012. http://vixra.org/abs/1207.0082 (Especially see the last section, entitled "*Informational Feeding*"; see also some other my works at vixra.org).

[11] E. Gluskin, "Cruelty as the 'medicine' treating an unbalance in the development of the brain's hemispheres", Int. J. of Neuroscience, 119, 2009 (1150-1154).

[12] E. Gluskin, "An argument regarding the nature of hooligan behavior", DIAL PHIL MENT NEURO SCI, 5(2): 51-53, (Dec. 2012), Seehttp://www.crossingdialogues.com/Ms-C12-01.pdf.

[13] D. Hofman, D.J.L.G. Schutter, "Inside the wire: Aggression and functional interhemispheric connectivity in the human brain", *Psychophysiology*, 46 (2009), 1054-1058.

[14] P.M. Keune, M. Schöenberg, S. Wyckoff, K. Mayer, S. Riemann, M. Hautzinger, U. Strehl, "Frontal alpha-asymmetry in adults with attention deficit hyperactivity disorder: Replication and specification", Biological Psychology 87 (2011) 306–310.

[15] P.M. Keune, L. van der Heiden, B. Varkuti, L. Konicar, R. Veit, N. Birbaumer, "Prefrontal brain asymmetry and aggression in imprisoned violent offenders", Neuroscience Letters, 515 (2012) 191-195.

[16] V.V. Pimenov (collected by) "*10000 Advices; Self-defense and Defending the Others*", ("*10000 Sovetov; Samo-Zaschita i Oborona*", In Russian), Modern Literator, Minsk, 2000.