The mathematical mechanism of self-organization in nature

Yuri Germanovich Bubnov buba2033@yandex.ru

Modern mathematics is based on axioms, which makes it superficial in relation to reality, in fact, it is exhaustively constructive, which is the subject of our task.

Introduction

Here prove that the existence of objects in nature is ensured by the Construction from their relations (differences), and not vice versa. By themselves, no objects exist, in any nature. Moreover, natural objects turn out to be fragments of this construction, and their diversity is limited and enumerable. And the phenomena of space and time turn out to be secondary.

The primacy of differences between objects in relation to the very fact of their existence was discovered by V. I. Arnold [12]. He studied the simplest mathematical objects, sequences of 0 and 1, as self-organizing into the structure of a binary tree graph, $\sum_{n=N}^{n=0}(2^n)$. But this is also the structure of derivatives in mathematical analysis (derivative of derivative, etc.).

Consider this construction, $\sum_{n=N}^{n=0}(2^n)$, of relations (differences), the differences of these differences, etc. of arbitrary objects A_1, A_2, ... (see **§3**). And these differences do not belong to these objects, but determine their existence.

The operation of difference of objects in this structure, $\sum_{\mathrm{n=N}}^{\mathrm{n=0}}(2^{\mathrm{n}})$, is represented by two elements of mutual mapping. We denote these elements as (→) and (←). Then (A_i - A_j) are defined as (A_i $\rightarrow^{\uparrow}\leftarrow$ A_j), where these differences acquire directions (↑) orthogonal to the sides of the mapping, ascending ones to the definition of the 2^n-set as a single object (otherwise, this object and its components do not exist, and here we will prove it).

We shall find these differences ($\rightarrow^{\uparrow}\leftarrow$), generating elements of each subsequent rung of the construction $\sum_{n=N}^{n=0}(2^n)$, in the basis of the concept of the derivative of the function f(x), df(x)/dx, in mathematical analysis. Although the differences ($\rightarrow^{\uparrow}\leftarrow$) in the construction $\sum^n(2^n)$ are a discrete and closed manifold, and df(x)/dx is an open manifold, however, with the help of the continuum-hypothesis, which is unprovable, P. J. Cohen [1], and which we will refute here. And we will prove that all the diversity of reality is fundamentally enumerable.

And here we will consider another variant of the development of this construction, where the element (→), located at the top of the construction $\sum 2^n$, is a forcing of the mapping ($\sum 2^n \rightarrow^{\uparrow}\leftarrow \sum 2^n$)=0, and the emergence of the construction $\sum 2^{n+1}$, etc.

Let there be an object A; then there is a mapping of this object, A-A=0, a mapping of this mapping, etc. This is the same construction, $\sum 2^n$, for n→∞ (from $\sum 2^n$ to $\sum 2^{n+1}$, etc.). But here, the seemingly endless mathematical process of determining (implementing) the elements of this Construction turns out to be limited by rational circumstances inherent in this process. However, this mathematical phenomenon has <u>not yet been noticed</u>. And here we will define and show this phenomenon using a mathematical experiment, with arbitrary objects, determining the construction of their relations (differences).

In **§2** we show that the differences of objects, A1, A2 , ...Ap,, the differences of these differences, etc., are derivatives of the preceding ones, as ($\rightarrow^{\uparrow}\leftarrow$). In this case, the sequential orthogonality of the derivatives returns to the direction of the first one, organizing the **spin**, which closes the composition of the fact of movement as an object. With the subsequent development of the construction, more and more complex objects of motion arise from these differences. And here the movements organize the spatial and temporal certainty of facts, events, and not vice versa. With, this manifold does not depend on the objects A_1, A_2, ...A_n.

Thus, it turns out that outside this manifold of mappings, however, fundamentally dynamic and exclusively quantum character, corresponding to this independently developing construction $\sum 2^n(\xi) \rightarrow^{\uparrow}\leftarrow 0$ (for $n \rightarrow N^*$ and where ξ="→"), no other objects are possible in any nature.

In physics, this solution is imitated by a system of 2^n equations. For example, Maxwell's equations determine the electromagnetic composition of the fact of motion. But this is a construction $\sum 2n(\xi)=0$ (where n=0,1,2), consisting of successively self-organizing elements of mutual mapping (→←), in the construction of differences ($\rightarrow^{\uparrow}\leftarrow$). These are the electric and second, magnetic components of the motion vector, accordingly. This construction is organized by one element (1ξ="→") in the upper part of this structure, displacing another (1ξ="←"), but in another part of the developing structure (already with composition n=0,1,2,3), which represents an elementary fact of movement. And these are movements along the elements of an independently developing construction $\sum 2^n(\xi) \rightarrow^{\uparrow}\leftarrow 0$ (n=3, 4... $n \leq N^*$). For n=3, this is the minimum composition of the fact of existence.

However, it is impossible to assert the existence of exhaustively constructive n-set before solving the problem discovered by K. Godel [2] (a problem, however, turned into a proof of incomprehensibility). For no proof can be sufficient after the statement of the incomprehensibility of the grounds of analysis and before the refutation of this statement.

Here, an exhaustively constructive set generates its own elements. And all the elements and fragments of this set are carried out by one repetitive mathematical mechanism of self-organization. These are the differences ($\rightarrow^{\uparrow}\leftarrow$), the differences of these differences, etc. Moreover, concepts are organized by the same mechanism. And thus, the entire grandiose diversity of reality is fundamentally enumerable. And here we will show this algorithm in §4.

§ 1. Definition of the subject and method of our proof.

We prove that any set is the result of a construction from the relations (differences) of the elements of this set. In other words, the relationships of objects force their existence, not the other way around.

To prove this statement, we will form the basis of the analysis by the interconnectedness of the definitions of its own elements. Let's define properties as relations of elements of a set, and elements of a set as aggregates of values of properties.

It is clear that properties are defined only in the relations of objects. And the very fact of the existence of objects is provided by their properties, exclusively. (Note that no fabrications go beyond the boundaries of this definition).

Wherein, based on the one-parameter character of the property, they can be determined independently of the predefined ones, as all possible sequences of objects of the n-set, as sequences of ascending (and descending) values of each i-th property (table rows, **tab. 1.**). And then the objects themselves can be defined independently of a predetermined space, as sets of places in sequences of values of such properties (columns of the table **tab. 1.**).

Note that this is the only way to avoid postulating the foundations of analysis, which would be followed by the well-known paradox of K. Goedel [2]. But here the initial concepts about objects and their properties are the result of their own relations, are exhaustively constructive (they do not contain preventive grounds) and here we will prove this.

It is not difficult to build a model of such a definition. This is a table (**Table 1**) of some n objects (A, B, C, etc.), where the values of their properties are determined by the place in the sequences $F_i(k)$, k=1, 2... n. And there is n! (n factorial) of such properties-sequences here. And here all properties = $\sum^i F_i(k)$ and all values of all properties = $\sum^i \sum^k F_i^k$, where k=1,2...n and i=1, 2…n!. Moreover, $\sum^i F_i(k)$ is not a sequence, but an unordered (n!) set.

Table 1. Table of n objects and their n! sequence-properties

k – objects / i – properties	1	2	3 →	etc. until the n-th
1	C	A	B	
2	B	A	C	
3	A	B	C	

↓ and so on until i = n!.

We will also construct tables of sequences from the relations (differences) of these elements F_i^k, from the relations of these relations, etc., as successively generated in the superstructures of **Table 1**. These are called relations of the first order, second, etc. See **Table 2 in § 3**. Here these are $[\sum F_i(k\text{-}x)]$-sequences from the elements F_i^{k-x} (where x is the order number...). And **Table 2** consists of n tables of type **Table 1**. These are $[\sum^x \sum^i F_i(k)]$-sequences, where $[\sum^i F_i(k)]$-sequences also remain unordered sets.

Let us define this construction of relations (differences), F_i^{k-x}, as a state of relations of elements of an n-set in one fact, event. And will find relations of these elements Fik-x, as all proper elements of the n-set, in adjacent (adjacent) states of this set. And the uniqueness of the result of this experiment will leave this representation of the n-set unique (against whatever).

Here, all F_i^{k-x} have only a place in the **table. 2**, and the properties, $\sum^i F_i(k)$, are no more than linear sequences. But in this $[\sum^x \sum^i F_i(k\text{-}x)]$ we have listed sets as circumstances of a single fact, event.

And here we prove that of all the F_i^{k-x}, in all tables of relations, from the relations of these relations, etc., objects of n-sets, only such F_i^{k-x} are valid that organize the constructions of vectors and facts of motion, which will return to us the spatiotemporal certainty of n objects (A, B, C and etc.) and their properties and the certainty of properties and their values.

Then all $F_i^{(k-x)}$, in all tables of **Table 2**, will be sufficient and the assumption (and study) of other relations of objects of the n-set does not make sense.

In other words, here is the statement of the problem, namely, about the exhaustive constructiveness of the entire variety of reality, from the side of the concept of a set from G. Kantor [12]. And this is a rational task, if only because the objects of nature are exhaustively constructive. But this can only be proved by defining the algorithm for implementing the entire variety of reality as exclusively self-organizing, and proving that no other objects (and phenomena) are impossible, do not exist.

Such an algorithm turns out to be a binary tree construction, $\sum 2^n(|F_i^k|) \rightarrow^{\uparrow}\leftarrow 0$, n=0,1,2,3…, developing towards the top of this construction. At the same time, F_i^{k-x} exist only as part of their constructions and do not exist by themselves. And this mathematical mechanism of the realization of objects from the side of their relations determines the exhaustive basis of nature and, accordingly, the computability of all its forms, which is the purpose of our proof.

§ 2. Definition of the mathematical mechanism of realization of objects from the side of their relations (differences).

Here we show that the trivial notion of a set as a collection of objects is sufficient to define a construction that ensures the very existence of objects of any nature.

$\sum F_i(k)$ is a set (a set of lines in the **table. 1**.) contains direct $F_i^+(k)$ and inverse $F_j^-(k)$ sequences. They are mutually contradictory, $[F_i^+(k)-F_j^-(k)] = 0$. The table, **Table 1**, is symmetrical. And properties-sequences of n-sets, not n!, but n!/2. Than half of $\sum F_i(k)$ would have to be excluded as mutually inconsistency in the composition of one fact. Otherwise we will not find the n-set as such, but then we will not find zero either, however, they exist.

Here the divergence of views, however, is due to insufficient circumstances for a rational conclusion. There should be $\sum 2^n$ such circumstances. And here we will define this, and that other conclusions are not conclusions.

In the construction of a single fact, an event, it is necessary to state that all its components. Here, it is the relations of these relations (differences of differences), etc. of the elements of the n-set, which certainly exist and ensures the very fact of the existence of the n-set as an exhaustively constructive. We will prove this here.

These are n tables, representing $\sum^i F_i(k-x)$-sets (where x=n, n-1....1). And here they are built as superstructures of **Table 1**, by the order of the differences x=n-1, n-2....1, see **Table 2** in **§ 3**. And the elements of $[F_i(k-x-1)]$-sequences are F_i^{k-x-1}, the differences of the elements of F_i^{k-x} in $F_i(k-x)$ sequences, $F_i^{(k-x-1)} = F_i^{k-x} - F_{i+1}^{k-x}$, $F_{i+1}^{(k-x-1)} = F_{i+1}^{k-x} - F_{i+2}^{k-x}$, etc.

And just as in **Table 1**, for each $F_i^+(k-x)$-sequence there is an $F_j^-(k-x)$-sequence. Likewise, within the limits of one fact of the existence of an n-set, all $F_i(k-x)$ sequences of $[\sum^x\sum^i F_i(k-x)]$-sets are in the composition of zero.

But $\sum^i F_i(k-x)$ exist and are determined from their external side, and without the participation of observers.

The sequences $F_i(k-x)$ are determined only from the side of the sequences F_i (k-x-1). And thus, the $\sum^x\sum^i F_i(k-x)$-sets is a **descending sequence of definition of the n-set** (descending from $F_i(k-x)$ at x=n to $\sum^i F_i(k-x)$ at x=1).

That is, in the fact of the existence of an n-set (in one such event), all the elements of [$\sum F_i$(k-x)]-sequences do not exist by themselves, but are determined only by the relations of the elements F_i^{k-x-1}, in F_i(k-x-1).

On the other hand, the elements $F_i^{(k-x-1)} = F_i^{k-x} - F_{i+1}^{k-x}$, these are the differences ($\to^{\uparrow}\leftarrow$), which is described in the introduction. But $F_i^{(k-x-1)}$ does not belong to the elements $\sum^i F_i^{(k-x)}$. And also as df(x)/dx from the function f(x), in Mathematical Analysis. $F_i^{(k-x-1)}$ are derivatives of the sequences of F_i(k-x) by the parameter k, $F_i^{k-x-1} = \Delta[F_i(k-x)]/\Delta k$. And one value of F_i^{k-x-1}, as a derivative of a linear sequence, is mapping the entire sequence F_i(k-x).

And here we define the elements of $F_i^{(k-x-1)}$, as <u>elements of an equation</u>. Only then can they be mutually defined. In other words, we will compose such an equation and define the values of the elements of $F_i^{(k-x)}$, relative to all other elements from the composition of the n-set.

It is precisely by the equality of the entire construction of the equation to zero that the very fact of the existence of its elements is ensured. However, here we also define zero, as an element of the construction of differences, $\sum^x\sum^i F_i(k-x) \to^{\uparrow}\leftarrow 0$. In this case ($\to^{\uparrow}\leftarrow$) turns out to be the only element providing the construction of the equation.

Thus, we determine the exhaustive constructiveness of the n-set itself and all its elements, including zero.

Unlike the usual equation in mathematical analysis, this equation and all its constituent fragments are fundamentally dynamical character (there are self-generating, exhaustively constructive).

Thus…

F_i^{k-x} are derivatives by the parameter k. $F_i^{k-2} = \Delta[F_i(k-1)]/\Delta k$, $F_i^{k-3} = \Delta[F_i(k-2)]/\Delta k$ etc., and they are interconnected, as $F_i^{k-3} = \Delta[F_i^{k-2}]/\Delta k = \Delta^2[F_i^{k-1}]/(\Delta k)^2$ (k=1,2...n).

And at the same time, the derivative $F_i^{(k-1)}$ of $\sum F_i^k$ (as well as from the function f(x) in Mathematical Analysis) defines the existence of only two values of its antiderivatives $\sum F_i^k$, just as in the concept of difference ($\to^{\uparrow}\leftarrow$) described in the introduction. So, when determining F_i^k from F_i^{k-1}, F_i^{k-2}, etc., we get only 2^k values for each of [$\sum^i F_i^{(k-x)}$]- sequence, x=1,2…n. And for k=n, n-1...1, i=1, ...2^k, we get $\sum^k\sum^i \left|\mathbf{F_i^k}\right|$ **=** $\mathbf{(2^{n+1}-1)}\left|\mathbf{F_i^k}\right|$ **=** $\sum_{n=N}^{n=0}(2^n|F_i^k|)$. And thus, there are no other elements and other relations (differences F_i^{k-x}) in the composition of the n-set.

But the sequential orthogonality of $F_i^{(n-1)}$, $F_i^{(n-2)}$, etc. (what is defined in the introduction), as sequences of derivatives of previous bases, leads the direction of $F_i^{(n-x)}$ to the original, $F_i^{(n-1)}$. And this cycle can be very big.

However, this sequence can be displayed, already as the fact of rotation (spin) of the vector, already in the next derivative $F_i^{(n-3)}$. Because the mappings $F_i^{(n-3)}$, $F_i^{(n-4)}$ etc. are constructed, as a descending sequence, and their relationships determine the construction of one fact in $F_i^{(n=4)}$. This is the spin of the fact of movement. And this is the first spatial form (6 vectors self-organizing into cube faces... and this is the simplest representation of this phenomenon).

And in the further expansion of the Construction of the equation $\sum^x\sum^i F_i(k-x) \to^{\uparrow}\leftarrow 0$ (see also **§4**) more and more complex constructions are forced from elementary $F_i^{(n-3)}$ =

$\Delta^2[F_i(k)]/(\Delta k)^2$, possessing more complex properties of elementary particles, charges, etc. And these are not more than constructions of mappings.

This is the **ascending sequence of definition the n-set** as derivatives of $F_i(k)$. And this is a construction of the differences (→↑←) in the structure $\sum_{n=N}^{n=0}(2^n F_i^k)$.

In this case, the degree of the derivative of $F_i(k)$ (for k=1, 2... n and i=1,2...2^k) determines (implements) the fact of time, as their sequences by parameter k. And spatial certainty is realized with the growth of the construction of the n-set from F_i^k by parameter i (see **§4**).

Moreover, $F_i^{(k-3)} = \Delta[F_i(k-2)]/\Delta k$, this is the metric ratio of the proximity of events in the structure of complex motion within the construction of the descending sequence of the definition of the n-set. And this metric (measure) is renewed with each act of unconditional expansion of the fact of existence (of course, it can be calculated using the generating function, see **§ 4**).

But there is no preventive space here, but a completely definite construction of a binary tree developing towards its vertex, see **§ 4**, with movements along i and along k, with the metric (measure) $F_i^{(n-3)} = [\Delta^2 F_i(k)]/(\Delta k)^2$.

Thus, with defining the descending sequence $F_i^{(n-x)}$, in the fact of the existence of the n-set it was **proved** that the relations of objects are realized before the objects of these relations, which corresponds to the fundamentally quantum composition of nature. But all movements are forced from their external side, by the unconditional development of the Construction of the equation $\sum^x\sum^i F_i(k-x)$ →↑← 0 (see also **§4**).

And note that no matter what the objects of the n-set were at the beginning of our experience, but already in the next event, the fact of existence, the n-set turns out to be a construction of a completely definite character.

That is, the same thing applies to the meaning of words and concepts. They do not exist apart from this grammar, descending and ascending sequences. And any logic is contained by the same quantum basis. The meanings of words and concepts are also determined by the construction of their relationships (differences). This construction is one on the whole of nature. And here it is proved that no other nature exists.

And note that $\sum^x\sum^i F_i(k-x)$ →↑← 0 (see ***§4****) is much simpler than any axiomatic theory, does not contain axioms and does not contradict intuition, but only the ambitions of a limited mind.*

§ 3. Visual definition of the construction of $\sum^k\sum^i |F_i^{n-k}|$.

So, in the fact of the existence of an n-set there are only differences, $[F_i^+(k-x)-F_j^-(k-x)]=0$. But the length of each sequence $F_i(k-x)$ is one less than the previous one.

And here, all $F_i^{k-x-1} = \Delta[F_i(k-x)]/(\Delta k)$, as the value of the property, will be written at the end of each of the sequences of all $F_i(k-x)$. And such values are here $\sum|F_i^{k-x-1}| = 2^{k=n-x}$, in each of $[\sum^i F_i(k-x)]$-sets *(see* **§2***)*.

And in the **Tab. 2.**, Fi(k-x) are grayed out, and the elements $\Delta[F_i(k)]/(\Delta k)=F_i^{\,n-x}$ – colored. And here we will not repeat **Table** 1.

Table 2. A table of successively generated $\sum F_i(k\text{-}x)$ sets, where x = 1, 2... n-1, and №(n-x) is the number of $\sum^i F_i(k\text{-}x)$-set.

k–objects / i-properties	k=1			etc..	k=n
table №(n-1) by k=1, 2…n-1					
i=1	$F_{i=1}^{(k-x)}$				$\Delta[F_{i=1}(k)]/(\Delta k)=F_{i=1}{}^{n-(x=1)}$
i=2	$F_{i=2}^{(k-x)}$				$\Delta[F_{i=2}(k)]/(\Delta k)=F_{i=2}{}^{n-(x=1)}$
i=3					...
etc.					
$i=2^{k=n-(x=1)}$					$\Delta[F_i(k)]/(\Delta k)=F_{i=2^k}{}^{n-(x=1)}$
tables №(n-2), №(n-3) etc.					
table №2, by k =n-x=2					
i=1	$F_{i=1}^{(k-x)}$		$F_{i=1}{}^2$		
$i=2^{k=2}$	$F_i^{(k-x)}$		$F_{i=2}{}^2$		
table №1, by k =n-x=1					
$i=1=2^{k=1}$	$F_{i=1}^{(k-x)}$	$F_{i=1}^1$			

Here, in the descending (here - ascending) sequence of the definition of the n-set, all relations(differences), F_i^k, are elements of the construction of zero in one fact of exist the n-set, with the exception of $\Delta[F_i(k)]/(\Delta k) = F_i{}^{n-(x=1)}$, which make up the graph of the binary tree.

And all $F_i{}^{n-x} = \Delta[F_i(k)]/(\Delta k)$ are arranged in an increasing sequence of derivatives, in the construction $(F_{i=1}{}^1)^{-1}$ (forced, as a prefiguration, mapping of $F_{i=1}{}^1$), the implementation of which occurs on the part of derivatives (of differences) $F_i^{n-x-1} = \Delta[F_i(n-x)]/(\Delta k)$ from x=1 to x=n-1. And the construction shown in **fig. 1** in **§ 4** is just a transformation of the form of **Table 2**.

§ 4. Algorithm for calculating the composition of objects of any nature.

Let's open $F_i^{n-x-1} = \Delta[F_i(k-x)]/(\Delta k)$ in private relations F_i^x, at the base of the construction in **Tab. 2** and in **Fig. 1**.

For x=1, $F_i^{n-x-1} = \Delta[F_i(k-x)]/(\Delta k)$ is defined as $(F_{i=1}{}^{n-2}) = (F_{i=1}{}^{n-1})-(F_{i=2}{}^{n=1}) = \Delta(F_i{}^{n-1})/\Delta k$, $(F_{i=2}{}^{n-2}) = (F_{i=3}{}^{n-1})-(F_{i=4}{}^{n-1}) = \Delta(F_i{}^{n-1})/\Delta k$ etc. by parameter i, of the second degree of the construction, **Fig. 1**. Here i = 1, 2,... $2^{N-(x=1)}$.

For x=2, $(F_{i=1}{}^{n-3}) = (F_{i=1}{}^{n-2})-(F_{i=2}{}^{n-2}) = \Delta(F_i{}^{n-2})/\Delta k = \Delta^2(F_i{}^{n-1})/(\Delta k)^2$. And $(F_{i=2}{}^{n-3}) = (F_{i=3}{}^{n-2})-(F_{i=4}{}^{n-2}) = \Delta(F_i{}^{n-2})/\Delta k$. And here i = 1, 2,... $2^{N-(x=2)}$, in the next step construction. The same is true in the next steps of the construction (**Fig. 1**).

In addition, $F_{i=2}{}^{N-3} = \Delta^2(F_i{}^{N-1})/(\Delta k)^2$ and $F_{i=2}{}^{N-4} = \Delta^3(F_i{}^{N-1})/(\Delta k)^3$, etc.

And the sequences F_i^{n-x-1}, by parameter i, in the preceding sequence F_i^{n-x}, as 1, 2 and 3,4, is determined by the fact that each subsequent act of the ascending sequence is preceded by a descending sequence of determining its elements.

Fig. 1. The structure of the $\mathbf{F}_i^k$, which determines the composition of the objects of reality as facts of movement.

Here the differences $(\rightarrow\uparrow\leftarrow) \equiv [(F_1^{N-1} - F_2^{N-1})^{-1} = F_1^N]$ *are shown as* $(/\rightarrow\leftarrow\backslash^{\rightarrow})$*, where* $(F_1^{N-1} - F_2^{N-1})^{-1}$*, reverse image, the same thing, prefiguration, the same thing, mapping* $(F_1^N - F_2^N)=0$*.*

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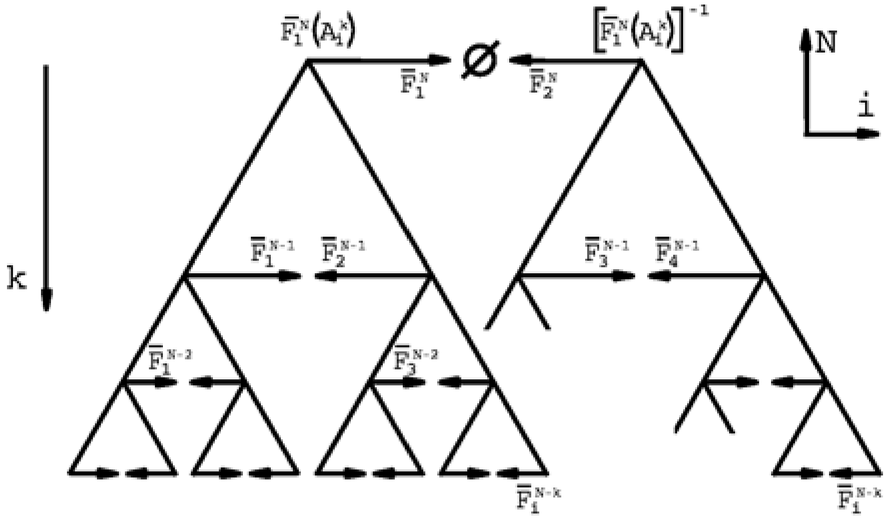

Here F_1^N crowns a part of the binary tree structure that constitutes the object A_1^k. The vector $F_1^N(A_1^k)$ has its own composition, which is realized from the side of the base of the Construction from F_i^k (see **§ 2**). And $[F_1^N(A_1^k)]$ is forcing $[F_1^N(A_1^k)]^{-1}$, as a new descending construction of the definition of an n-set, which is also realize from the side of its own construction from F_i^k.

This structure from $\mathbf{F}_i^k$, also defines its generating function (Equation 1) as a explication of the structure defined here in **Table 2**, and in **Fig. 1**. And the definition of the analytical form of this expansive construction is not worth additional literature here.

The generating function. Equation 1.

$$\left\{\cdots\left[\left(\bar{F}\genfrac{}{}{0pt}{}{0}{i} - \sum_{k=0}^{0}\sum_{i=1}^{2^k}\bar{F}\genfrac{(}{)}{0pt}{}{0-k}{2^k+i}\right)' - \sum_{k=0}^{1}\sum_{i=1}^{2^k}\bar{F}\genfrac{(}{)}{0pt}{}{1-k}{2^k+i}\right]' - \cdots - \sum_{k=0}^{N}\sum_{i=1}^{2^k}\bar{F}\genfrac{(}{)}{0pt}{}{N-k}{2^k+i}\right\}' = \bar{F}\genfrac{}{}{0pt}{}{(N+1)}{1}$$

Here it is the same equation $\sum^x\sum^i F_i(k-x) \rightarrow^{\uparrow}\leftarrow 0$ from **§ 2**. It is also defined in the introduction as $\sum 2^n(\xi) \rightarrow^{\uparrow}\leftarrow 0$, where n=0,1,2,3... n≤N*) and 1ξ ≡(→), as determining the electromagnetic composition of the fact of motion.

Equation 1 is similar to the wave, psi-function, but not in space-time, but generating it, where ∑Δt (time) and ∑Δi (distances) are determined by the number of elements of the mappings $|F_i^k|$ in the constructions $F_i^n(A_i^k)$, for n≤N*.

Here the second element of differences is the construction of descending sequences of n-set definitions consisting of zeros (see **§ 2** and **§ 3**). And each fragment of this equation is forcing as a mapping of the previous one in this construction $\sum_i \sum_k (2^k\,|F_i^k|)$=0 (one can say that this is a construction of absolute vacuum, since this issue was discussed...).

Here, the inversion of the elements of the F_i^{n-k} construction to the original $F_i^{(n-1)}$ in an ascending sequence of derivatives generates its own elements in the bases of the maps, in the constructions $\sum_i \sum_k (2^k\,|F_i^k|)$. And this is an avalanche-like process of the emergence of an increasing number of vectors $F_i^{(n-3)} = [\Delta^2 F_i(k)]/(\Delta k)^2$, which are organized into increasingly complex objects of physical nature. This is the reason for BV, independent nuclear fusion (where nature in all its diversity comes from).

The direction of derivatives (differences, $\rightarrow^{\uparrow}\leftarrow$, see introduction) towards the greatest commonality of objects is manifested, as gravity in nature, and their number is equal to the mass of the object. And changing this direction to the opposite creates charge ratios of objects (charges) that form the internal structure of objects.

Objects and phenomena can be as complex as you like, composed of a very large number of mapping, but their diversity is enumerable.

Thus…

- ✓ After calculating the number of mappings in F_1^N on the face of the Construction, all derivatives of this sequence, derivatives of derivatives, etc. are calculated. And so $F_i^{(n-3)} = [\Delta^2 F_i(n-1)]/(\Delta k)^2$, in the structure of the very fact of existence, is determined by the numerical value in relation to all fragments of the Construction of the general fact of the existence of nature.
- ✓ And yes, these are 2^n generating function equations, which matches the computational structure of a quantum computer (which still has no worthy tasks). At the same time the construction $F_i^{(n-3)} = [\Delta^2 F_i(n-1)]/(\Delta k)^2$ and is a photon, aka a quantum of electromagnetic radiation.
- ✓ And of course, this computing structure can be modeled from electronic components and complex objects can be constructed from electromagnetic pulses.

Of course, there are algorithmic nuances, without defining which the use of the generating function is impossible. And here there may be errors, due to the complexity of this function, and this is in the future. But these are questions of experimental mathematics, not philosophy.

Experimental mathematics, in the sense of the study of the relations of all own sets in adjacent (neighboring) states of this set. Thus, here it was proved here that uncountable (infinite composition) and continuous sets do not exist.

Conclusion.

The definition of an exhaustive constructive basis for the analysis and mechanism of the independent emergence of nature is presented here very briefly and, of course, requires verification. And here it is physics, against superficial ideas about this subject. First we need to know that the relations of objects provide their existence, and not vice versa. This fact is proved here.

And it turns out that nature is not the universe, but is constantly being renewed in all its details, with a self-organizing frequency, of a fundamentally quantum composition. This is definitely an (independently) evolving construct, as mapping, mapping of mappings, etc.

Thus, the mechanism of biological evolution is determined, against the concept of randomness. And the difference between living nature and inanimate nature is in the definition of sensory images of consciousness, in the definition of the constructiveness of this phenomenon. Thus, the solution of our problem reveals the constructiveness of phenomena hidden by the limitations of analysis and ideas about nature.

Consciousness is a constructions of sensory images from elementary emotions. And this is the same as the construction from mappings, from motion vectors (these constructions are defined in **§ 2**), and there is also a limited, enumerable set of them (also self-organizing). We can say that these are constructions of complex reflections. But this is a physiological property of the brain, associated with the motor and sensory system of the body. And in general, this is the same binary tree structure, self-organizing into constructions of mappings.

*Here we remind (**§ 2**) that maps have an external side (a descending sequence of defining objects from their external side) and an internal (an ascending sequence of facts of motion).*

The mappings cause active reactions of the organism, starting with the most complex mapping (thus and the consistency of the bodies' activities is ensured). And, the adequacy of life reactions is ensured by the sameness of the formation of mappings in nature (which is proven here).

But thus, it is the complexity of sensual images of consciousness that contains the interconnectedness of physiological processes that constitute the very fact of life, of man, more so. And the insufficiency of sensory richness (complexity of sensory images) leads to the degradation of life, both socially and physiologically. Thus, it is clear that it is simply dangerous not to know the origins of nature and life....

It is also proved that logic (any kind) has a quantum, vector basis. This is a comparison of real circumstances in the construction of a motive for activity, which contains the very fact of life, including of the simplest organisms.

And modeling the fact of life and intelligence is a field of mathematical physics, not philosophy, where, instead of the concept of a derivative, there was and remains a struggle of opposites with a known practical outcome of such goal-setting (the simplest win, as they are more energetic, both physically and morally). Within the limited base of analysis, there was and cannot be an alternative to violence.

And until the mathematical mechanism that ensures the very existence of objects from the side of their relations (differences) is defined (and mastered), it is impossible to resist the ideas of violence, pessimism and savagery. It is precisely this lack of knowledge that is the cause of social catastrophes.

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