Promoting Origination of Constituents of Non-Cellular Cognizers

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***Abstract*— According to the hypothesis of abiogenesis the simplest cellular, uncials, originated from chemical compounds that already existed in nature. Unfortunately, in spite of ongoing intensive research efforts, abiogenesis owns more difficulties and hopes than advances. That is why new hypotheses try to exempt its difficulties.**

Particularly, successful modeling of cognizing lets us assume that uncials were designed by some cognizers of the Universe, originated in nature as elementary recurrent classifiers, then evolved to attain the power of cognizing, at least, comparable with the highest human one, allowing them to design uncials analogous to the human design of robots nowadays.

In parallel, molecular studying assumes that even elementary units of matter are able to communicate through the IDs of classifiers.

And since the constituents of uncials are functionally analogous to those of cognizers, while communication is vital for cognizing, it is worth trying to promote the origin of constituents of cognizers by reaching in abiogenesis and communications.

For these proposes, we have decomposed the nuclei of cognizers to constituents, followed by examining the potential impact on the origin of cognizers by functionally analogous constituents of uncials and molecular recurrent classifiers.

***Keywords*— Modeling, cognizing, abiogenesis, molecules, communication, semiosis, recurrent classifiers.**

I. Introduction

1.1. Nowadays, powerful cognizing is predominately associated with the living, i.e., the cellular, therefore the origin and development of cognizers are inevitably linked with evolvement of the simplest cellular, uncials, which, according to the hypothesis on *abiogenesis* [1], originated from chemical compounds already existed in nature.

1.1.2. According to another hypothesis on the *origin-able cognizing in nature* (oacin) arisen in AI, particularly in constructive modeling of cognizing [2, 3], cellular were designed by a type of cognizers of the Universe that were earlier originated in nature as elementary recurrent classifiers, then evolving had attained the power of cognizing comparable, at least, with the highest human one, followed by designing cellular, analogous to the human design of robots nowadays.

1.2. According to abiogenesis, the origin of cellular, or life, is the natural process by which life arose from non-living matter, such as simple organic compounds. The prevailing scientific hypothesis is that the transition from non-living to living entities on Earth was not a single event, but a process of increasing complexity involving the formation of a habitable planet, prebiotic synthesis of organic molecules, molecular self-replication, self-assembly, autocatalysis, and emergence of cell membranes.

Many proposals have been made for different stages of the process aimed to determine how pre-life chemical reactions gave rise to life under conditions strikingly different from those on Earth today. It primarily uses tools from biology and chemistry, with more recent approaches attempting a synthesis of many sciences.

Particularly, the genomics approach sought to characterize the last universal common ancestor (LUCA) of modern organisms by identifying the genes shared by archaea and bacteria, members of the two major branches of life (where the eukaryotes belong to the archaean branch in the two-domain system).

355 genes appear to be common to all life; their nature implies that the LUCA was anaerobic, deriving energy through chemiosmosis, and maintaining its hereditary material with DNA, genetic code, and ribosomes.

1.2.1. Arguing abiogenesis, in spite of ongoing intensive research efforts, unfortunately, owns more difficulties and hopes than advances.

Paul Dirac, reasoning on the probability of origination of uncials by chance, states that "… it is so difficult to start a life that it has happened only once among all the planets... Let us consider, just as a conjecture, that the chance of life starting when we have got suitable physical conditions is 10^{*-100}" [4].

1.2.1.1. Eugene Koonin [5] has argued that "no compelling scenarios currently exist for the origin of replication and translation, the key processes that together comprise the core of biological systems and the apparent pre-requisite of biological evolution".

1.2.1.2. A challenge for researchers of abiogenesis is to explain how such a complex and tightly interlinked system as uncials could develop in evolutionary steps, as at first sight all parts of uncials are necessary to enable it to function.

1.3. Some physicists succeed in the anthropic principle [6] stating that "…if the dimensionless physical constants had sufficiently different values, our Universe would be so radically different that intelligent life would probably not have emerged, and that our Universe therefore seems to be fine-tuned for intelligent life".

1.3.1. The followers of intelligent design [7] also reject incremental, evolutionary appearances even though uncials providing "…two main arguments against evolutionary explanations: irreducible complexity and specified complexity, asserting that certain biological and informational features of living things are too complex to be the result of appearance by chance and natural selection" [8].

1.4. Consequently, the followers of intelligent design and anthropic principle conclude that cellular were designed by a creator, God and postulate its existence in nature forever.

Paul Dirac more carefully reasons about God setting up the connection between the existence of a God and the physical laws assuming that "… if physical laws are such that to start off life involves an excessively small chance so that it will not be reasonable to suppose that life would have started just by blind chance, then there must be a god, and such a god would probably be showing his influence in the quantum jumps which are taking place later on" [4].

1.4.1. Unfortunately, the assumptions on the existence of God unavoidably cause another even more difficult question on how such a sophisticatedly complex creator as God could appear in the Universe.

Such declarative postulating of God, unfortunately, provides only suitable interpretations of events without any of their reproducibility and predictive power.

Let us acknowledge also that contemporary physics also grounded on postulates including those on the primordial existence of energy, fields and the Universe itself.

Nevertheless, these postulates radically differ from one of all ever-existed God because are supported by an overwhelming amount of reproducible expertise and by cause-effect chained assertions tidily united into prognosticable theories.

1.5. While studies in abiogenesis continue, new ideas and hypotheses on the origin of uncials arise attempting to exempt from the above difficulties.

Oacin's hypothesis, implied by successful models of cognizing, is mastering new strengths in the study of originating, then developing cognizers to design time-evolving uncials.

1.5.1. The strength of Oacin's hypothesis is entailed, first of all, by the advances of the highest cognitive power of humans bringing them close to constructive modeling of their own self-reproduction, both biological and cognitive.

1.5.2. Viability of Oacin's hypothesis is strengthened by assertions that: -the constructions, *mentals*, adequately model mental systems, -mental systems and means of their constructing can be composed of elementary "atoms", *recurrent 1-/2- place classifiers* [2], -a type of constructive cognizers, *octaves*, exempted from computer dependencies and able to enhance the power of cognizing by learning mentals, but so far limited in that, can adequately model cognitive development of newborns by Piaget [9], - octaves, and assumingly their roots, can be reduced to some alphabet of uniform units, i.e., inevitable constituents of cognizers [2] -studying of constituents of octaves and their assembling can be processed independently.

1.5.3. Thus, within the framework of the laws of physics the development of existing in nature single classifiers into recurrent ones, then, their evolvement in time to developing means of octaves, followed by processing this means to form non-cellular cognizers comparable with the highest human ones is not excluded.

1.5.3.1. Consequently, questions arise, whether the models of the origin of recurrent classifiers can be constructed capable developing octaves, with the subsequent achievement of the highest human cognizing.

In other words, whether following the laws of physics, 1-/2- place recurrent classifiers can originate in nature, say by chance and exhaustive search, then using nets of these classifiers imply chains of conjunctions of 1-/2- place classifiers from ongoing root-situations to the acknowledged utilities, to compose these chains, finally, into algorithms, particularly, ones of octaves [2,3].

1.6. The above questions, in what follows, will be reduced to those on the origination of constituents of the *nuclei of roots of cognizers* (nrcogs), particularly, symbolic and not symbolic classifiers or their compositions including sensors, energizers, carriers of and compartments for constituents of cognizers, as well as to the fundamental question of the reproducers of these constituents and their compositions including themselves.

1.6.1. Apparently, questioning the origin of constituents of nrcogs refers to some functionally analogous ones of uncials, including compartmenting, sensing, energizing, reproduction. Thus, it is not excluded that reaching in studying of constituents of uncials can contribute to the origin of these functionally analogous ones of cognizers.

1.6.2. In parallel, questioning in [11] on "…whether language is a general principle of Nature that exists independently of humans ", seemingly calling over with the ideas of semiosis by C. Pierce [12], lets assume that elementary units of matter, say molecules, communicate with each other.

Linking this attractive hypotheses with the assertion (argued in [2]) that communications inevitably rely on ID's and recurrent classifiers of IDs of the correspondents could imply the existence of such classifiers in nature.

1.7. For these aims in what follows we continue decomposing the nuclei of cognizers to constituents, followed by examining the potential impact on the origin of cognizers by functionally analogous constituents of uncials, by molecular recurrent classifiers, as well as by rooting dynamicity and algorithmic formation of classifiers [2,17].

II. Takeaways from modeling Cognizing

2.1. Let us recall some aspects of cognizing necessary in the presentation of our studying.

2.2. *Human cognizers.* Humans, as a type of cellular realities, cellulars, include *roots* or inherited utilities that in their lifetime they enrich with new utilities.

Our roots, first of all, cover doings on continuing to be *energizers*, i.e., attributed by the ability to gain energy from any sources (assuming, at least, one such source) aimed to preserve the utilities of energizers, including the ability to gain energy.

2.3. *Doers* are realities having input-output parts and for realities at the input parts (that are not necessarily pre-classified) either elaborate certain output realities or remain passive. Doers are *do-classifiers* Cl if input domains are split into two classes +Cl and ?Cl; otherwise they are *corresponders, cors.*

2.4. Roots, sensors of all over, effectors to figure out our doings, overall controllers and some others embrace *octaves* of our cognizing.

Sensors along with other classifiers inherited and identified by *controllers* in conjunction with those studied and identified in a lifetime, i.e., revealed, discovered but mostly acquired from cultures of communities, comprise our *attributes.*

2.5. The outputs of attributes entail *imprints* in each member x@C. Classifying imprints x represent their causers, particularly those caused by the impacts of causers on the utilities of x.

2.6. The imprints, their causers and classifiers are *realities of x@C,* while the totalities of realities of x comprise *the Universe of x, xU.*

2.7. *Human cognizers,* or hcogs, were defined in [2, 3] as realities over energizers that in collaboration with communities of analogous hcogs learn and organize mss for preserving their personal and community utilities.

III. Targeting Constituents of Nuclei of Cognizers

3.1. The question of the origination of cognizers is inevitably reduced to the question of the origination of unavoidable constituents of cognizers capable of developing to the highest ones. For targeting these constituents let us recall the categories of constituents of cognizers focusing on nrcogs. Recall also that in [2], algorithms for the formation of some of constituents are offered, which, expectedly, can provide hints to their origination.

3.2. Summarizing, we can state that the categorization of constituents of cognizers allows us to reduce them to uniform units and requirements, some alphabet seemingly inevitable for these constituents and, assumingly, for the nuclei of root cognizers, nrcogs.

3.3. Thus, the question of the origination of the diversity of constituents of cognizers can be reduced to questioning, particularly, the origination of

-*carriers* of and *compartments* for constituents of cognizers

- *doers* of the types of 1-/2- place symbolic and not symbolic classifiers (possibly represented firstly as case-based g or gg goals oriented matrices of imprints) and comprising nets Ncb

- *Ncb searchers of strategies* equal to symbolic and not symbolic *composers* that

---compose the variety of doers into energizers.

---compose case-based g/gg- matrices into rule based 1-/2- place classifiers and their nets Nrb

- *Nrb searchers of strategies* equal to algorithms,

as well as to the fundamental question of the

-*reproducers* of these constituents and their compositions including themselves.

3.4. The above reduction of constituents of cognizers to possibly uniform and elementary units must be helpful in revealing their origination because it decreases the number of chains necessary to link the units to fundamentals and because chaining fundamentals with elemental units are expected to be easier than doing that with complex ones.

In searching the questioned chains, the takeaways from contemporary views on originations by QFT have been evoked in [17] allowed to interpret doers as models of dynamicity of several cases. Then in [2] algorithms and certain likelihood tracks of the formation of some constituents of cognizers were provided.

3.5. Continuing this research line in what follows we focus on the constituents of uncials studied for origination and functionally analogous to those of the nuclei of roots of cognizers, nrcogs, then along with premises and hints to them, followed by addressing to studying the communication of molecules looking for premises and hints to links with the origin of recurrent classifiers.

IV. Examining the Impact of Constituents of Uncials

4.1. Uncials can survive by themselves because they can perform all necessary functions such as obtaining energy, breathing, growing, removing waste, reproducing, and moving within one cell [1].

Uncials usually reproduce asexually. They can be eukaryotes or prokaryotes. They are found in almost all habitats, from hot springs to frozen tundra.

A single-celled bacterium can respond to a negative stimulus as well. If the bacterium is moving, and its receptor picks up the presence of a dangerous chemical, the bacterium will change directions, moving away from the danger.

Growth in uncials is marked by division which produces daughter cells.

4.2. The hypotheses of abiogenesis that uncials originated from chemical compounds already existed in nature, encounter serious difficulties if related to whole uncials.

Nevertheless, it is not excluded that study of detached constituents of uncials may contribute to the origin of functionally analogous ones of cognizers.

4.3. Examining the viability of this idea forced us to adopt that

- uncials are holistic realities with tightly functionally interdependent parts

-presentation of these parts as constituents and uncials as a system of constituents is only some approximation

-- acknowledged explanations of the constituents of uncials, particularly of their origin, do not exist yet.

V. Premises to Natural Recurrent Classifiers

5.1. Origination of roots of cognizers question, first of all, recurrent classifiers, while single ones, apparently, exist.

5.1.1. Indeed, atoms x represent single classifiers, i.e. those capable identifying certain realities not recurrently, but lonely, solitarily. Input domains of x comprise all realities, while out-domains of x comprise compounds formed by x and atoms reacted with x.

5.2. Recurrent classifiers in certain interpretation are absorbers and peso crystals corresponding to input pressures electric signals of proportional power.

5.3. A significant case of natural recurrence provide hypercycles that are cycles of connected, self-replicating macromolecules [10].

All molecules in hypercycles are linked so that each of them catalyzes the creation of its successor, with the last molecule catalyzing the first one. In such a manner, the cycle reinforces itself. Furthermore, it is assumed that each molecule is additionally a subject for self-replication, hypercycles could originate naturally, and the incorporation of new molecules can extend them [18].

So, an exciting challenge is to link the recurrence of hypercycles with recurrent classifiers of cognizers.

5.4. Communication, we assume, necessarily requires regular identification of the IDs of correspondents, and thus, their possession of recurrent classifiers of IDs.

5.4.1. This inevitable linkage between communication and recurrent classification is refined in [2] as follows: realities I{i} are *identifiers, IDs* of realities R{r} and doers Z{z} with respect to Z if to any r, z, z correspond unique IDs i(r), i(z),

- certain classifiers are linked any r, z allowing z to recall the corresponding r, z by i(r), i(z),
- any r can address to any z by certain requests, say, recalling some r, z.

Identified realities of the given R, Z paired with their IDs become *nominals* with respect to Z.

5.4.2. In other words, the nature of identification of realities r, r' by IDs presumes that r, r' contain classifiers that identify those IDs, followed by their processing.

5.4.3. Consequently, in such interpretation communicating living molecules, argued by Bernd-Olaph Kupper [11], unavoidably have to control and process certain recurrent classifiers. Thus, Kupper's statement (and, generally, in ontogenesis by Pierce [12]) that "…language is a general principle of Nature" and the statement that recurrent classifiers are primordial can be interpreted as equal.

5.4.4. Note, that the above definition of ID's, in fact, is not exotic and can easily be reduced to acknowledged interpretation of sign by Peirce [12].

Note also that such interpretation allows reciprocal enriching of the models of cognizing and semiosis

5.5. The basic constituent of cognizers – energizers, both cellular and constructed, can also impact the origin of classifiers since they compose a variety of them.

5.5.1. Indeed, energizers are defined as realities attributed to the ability to identify and then gain energy from any sources (assuming, at least, one such source) aimed to preserve the utilities of energizers, including the abilities to gain energy.

5.5.2. Examples of cellular energizers provide sunflowers that identify the energy of sunlight, then transform it into one of sugar, accumulate sugar and process it, particularly, reproducing cells of sunflowers and controlling effectors to continue the effective supply of sunlight.

5.5.3. On the other hand, constructed satellite stations identify sun energy, then acquire and accumulate it with certain engines, the effectors, automatically directing stations to the max sun radiation.

5.6.1. To consist the complexity of energizers with their origination by chance it is worth overcoming the difficulties incrementally, for example, at first, reveal the origination by chance of the constituents of energizers, then reveal the origination by chance of the means of preserving the constituents, followed by their compositions by chance into energizers and means of further preserving of energizers.

In other words, it is worth reveling the origination of energizers to reduce to sub-goals of the origination of its constituents, particularly, sensors/effectors /controllers, compartments to contain the constituents, memory for changeable constituents, say, classifiers, algorithms of coordinated processing of constituents.

5.6.2. Note, that energizers and their classifiers are constructively regularized for a variety of their types including, for example, satellites, as well as DNF (disjunctive normal forms) and NN (neural nets) based classifiers.

5.7.1. Recall that classifiers Cl, in general, are processed to identify utilities common for communities, while the regularized ones, in addition, allow to produce samples of input domains of Cl that deliver target utilities.

5.7.2. Recall also that energizers, even if originated by chance, have to be reproducible to preserve the already gained utilities, which needs special study.

VI. Conclusions

6.1. Researchers of abiogenesis of cellular, in spite of ongoing intensive research efforts own more difficulties and hopes than advances. The assumption - that cellular were designed by forever existing God, unavoidably causes another even more difficult question on how such a sophisticatedly complex creator as God could appear in the Universe.

6.2. Constructive modeling of cognizing implies a promising hypothesis on the *origin-able cognizing in nature* (oacin) argued by proven total reducibility of adequate models of cognizing to elementary 1-/2- place recurrent classifiers, constructive modeling of developmental cognizing by Piaget, as well as by exemption of models from cellularity allowing to be impacted from functional analogues constituents of any realities [2,3].

6.2.1. Oacin's hypothesis does not exclude the possible origination of cognizers in nature, which to preserve utilities (gained in some ways earlier) could invent a fine-tuned universe with evolving cellular that in one of branches of their evolution attained humans.

6.3. As a footstep to promote Oacin we decomposed the nuclei of cognizers to constituents and examined the potential impact on their origin by functionally analogous constituents of uncials, linked self-replication of macromolecules and communication of living molecules with recurrence of classifiers, rooted dynamicity of doers by a variety of scientific cases [17] , while earlier [2] provided algorithms for the formation of 1/2place classifiers.

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