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Informational Recursiveness Against Singularity

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Abstract. The paper describes the arriving, the probable and the inevitable, emerging through the exponential technological development, particularly the informational one (IT), and by the new concepts of Kurzweil's singularity of the strong artificial intelligence (AI) on the one side and by the recursiveness of author's informational consciousness (IC) on the other. A comparison between the criteria of Kurzweil's strong AI (Paragraphs 1.–6.) and recursiveness of the author's IC (Paragraphs 1°–6°) is made, namely by subparagraphs, named as *Exponential and Considerable Growth of IT Processor Complexity* [°as a Condition for the IC Implementation by the Computer], *Methodology of Strong AI* [°IC], *Functional Efficiency* [°IC], *Changes of Social Circumstances and Views Concerning Results of the New IT* [°together with IC], *Changes in Views Concerning the Consciousness, World and Cosmos*, and *Essential Development of Machine Intelligence* [°Essential Development of IC in Man and Machine] [6], [7]. In Fig. 1, a case of structure and organization concerning creativeness, within the IC system is presented. Components of the complete graph concerning Creativeness are shown with altogether 36 named nodes and their potentially unbound, no named connections yet. The 36 English terms of nodes, listed in the opposite direction of the clock pointer, concerning *properties*, are the following: Creativeness, with the first segment, named as *General Properties of Creativity—Talentedness* (Intentionalness, Sensitiveness, Motivationalness, Cognitiveness, Emotionalness, Aspirationalness, Homeostaticness, Excitedness, Challengingly, Metaphysicians, Physicalness, Hiddenness, Contiguousness, Nonsuccessiveness, Nondoctrinalness, Noneclecticness, Objectiveness) and with the second segment, named as *Special Properties of Creativity—Genius Likeness* (Concentrativeness, Intuitiveness, Transcendentalness, Originalness, Conceptualness, Inventiveness, Innovativeness, Constitutiveness, Ambitiousness, Reflectiveness, Hypothesizingness, Theorizingness, Approvingness, Correctness, Meditativeness, Understandingness, Interpretiveness, Inspirationalness). The suffix *-ness* for named nodes is used consequently to express explicitly the feature of *properness*. The possibility using the concept of informational cloud [1] as a characteristic of a consciousness system is just mentioned at the end of the paper. The dilemma between Kurzweilianism and authors IC in presented by the complete graph in Fig. 2. Dotted arrows indicate the mutual evolution of methodologies.

Key words: creativity components, creativity within IC, dilemma of informational recursiveness vs singularity, informational consciousness, Kurzweilian criteria of singularity (1.–6.), Kurzweilianism, Kurzweil's singularity concept, recursiveness of informational space, singularianism, technological singularity, weak and strong AI, Železnikar's criteria of informational recursiveness (1°–6°), informational cloud [1] of a consciousness system

1 AN INTRODUCTION TO THE ARRIVING, THE UNBELIEVABLE AND THE UNAVOIDABLE

The strong artificial intelligence, SAI, will surpass the present artificial intelligence, AI, which seems to be a sort of the weak artificial intelligence, WAI. Kurzweil's singularity [2] announces still another turning point until the year 2045, being presented exhaustively, by data, tables and text [3]. And now, the reader can understand, how the technological concept will be developed right in the environment of the American style of life—together with financial, academic, organizational, communicational, professional, publishing and internet support—establishing the authority, professional community of seeking and striving followers, supporters and enthusiasts. WAI and SAI became simultaneously also the challenge for the development of organic (biological) intelligence, shifting the borders from the weak to the strong intelligent state of consciousness, its less or more developed efficiencies of specialized cortices. Until 2045, the strong AI should surpass the abilities of all human intelligences together, becoming more reasonable as the entire mankind population in the form of computer systems, their highly efficient components, that is, in system complexity, speed, and circularly perplexed con-

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nectivity. In this way, in the more than 30,000 year lasting history of mankind, it will happen that technological and respectively civilizational development will surpass the cultural tradition and, so, will inters the creativity of man, its mystic and mysteriousness being shaped in the long development of human survival.

The announced storming of the occurring strong AI seems to appear impossible in circumstances of the prevailed weak human mentality, almost unbelievable, also shameless and improper, although being statistically and scientifically valid and credible by data. Perhaps, the strong AI really runs short in its referring to the comprehension of man's consciousness as a whole, within which, e.g., the intelligence occurs only as the one of the thousands general and particular components. Along this, it is possible to stress that Kurzweilian concept of strong intelligence unconsciously or, in this or another way, in fact, meaningly equalizes the intelligence with the conscious whole, placing it in singularity as a turning point from the organic to the technological, cortex-like to the computer-like. By the concept of strong AI, Europe still must confront, since an actual scientific perspective with huge technological, civilization and cultural consequences remains, at last, a crucial question.

2 Singularity of Strong AI or Recursiveness of Informational Space Concerning Informational Consciousness

The dilemma between singularity and recursiveness of intelligence and consciousness, respectively, appears in different forms already in the past. Singularity turns concern in some way civilizations, accompanying them by cultures with their unrevealed cultic, mysterious background. Singularity spreads its methodology also to development and interpretation of civilizations and cultures by particular diagrams, showing their development through the history of human existence. Informational consciousness shows the development of human consciousness at last by the phenomenon, how it was developed in the unreasonable, the beyond, the creative etc., e.g., by the concept of God, His almightiness, alpresence, world and man creation etc., by really impossible properties. So, it spreads the feasibilities of consciousness into the conceptually omnipotent, the limitless, environmentally arbitrarily complex — right to the today's revolutionary singularity and limitless informational recursiveness. Meanwhile, the recursiveness is a regular and constructive ability of informational emerging, developing consciousness, where singularity is merely seemingly jumping over, actually through the continuance of certain development attainable, being voluntary proclaimed ability of Kurzweilianism.

3 Elements of Singularity Belonging to Kurzweilian Strong AI

Singularity is a broader idea extending also out of region of strong AI. It touches biology, human evolution, social systems, exponential development of modern technology etc., however it doesn't speak, e.g., on evolution of future human consciousness, its unity and intelligence *within* it, exposing intelligence according to the initial doctrine of AI as being equivalent to a more complete consciousness system. The enlistment of items belonging to Kurzweil's singularity is certainly insufficient, but it can be categorized according to technological developing, used methodologies, functional capacities, changes of social circumstances because of achievements in information technologies (IT), changes in views to the world and the universe and, lastly, to the evolution of meaning in the region of artificial and human consciousness. The list which items frame-like categorize singularity, is the following:

The Nature of IT singularity (by Kurzweil)

1. Exponential or considerable growth of processor complexity through IT:
   - 1.1 densifying integrated components,
   - 1.2 increasing the operational speed and
   - 1.3 increasing functional effectiveness (e.g., by built-in processor macros).
2. Methodology of strong AI:
   - 2.1 weak AI for mathematical-cognitive purposes;
   - 2.2 strong AI as a substitute for any consciousness and its attaining by means of new IT.
3. Functional performances:
   - 3.1 strong AI together with IT singularity surpasses the human intelligence;
   - 3.2 strong AI surpasses efficiencies of all human intelligences together;
   - 3.3 intelligent power of computer wins finally recognition over human intelligences;
   - 3.4 but the intelligence superpower wins not over the total human consciousness respectively over informational consciousness, IC, of machine or man.
4. Changes of social circumstances and views at achievements of the new IT:
   - 4.1 human loses the intelligence primacy;
   - 4.2 computer becomes intelligently primary;
   - 4.3 social sciences become reconciled to partnership, in which computer is intelligently unsurpassable.
5. Changes in views on the world and universe:
   - 5.1 former worldviews become for the sake of subordination of human intelligence uncompetitive, lose their actuality;
   - 5.2 philosophy, antiphilosophy, philosophical scene

and estrade become funny social games;
5.3 evolutionary views of the state, on the world and universe possibilities are strengthened.

6. Essential evolution of machine intelligence:
6.1 computer is educator, home helper, psychologist to human and family, business advisor;
6.2 robots with new intelligent and other technology become intelligent, family and production helpers on practically all levels of thought and work;
6.3 intelligent computer states at last also by itself that intelligence represents merely a minor c view to onsciousness as a whole and, therefore a concept reconstruction of strong AI in the direction of IC is necessary.

4 Elements of Recursiveness Belonging to Železnikar's Informational Consciousness

Among others, recursiveness means replication and alloying of informational graphs within the consciousness system on the level of graph landscape, on the ways of which from a node to a node the actual consciousness is moving (see [5]). The landscape emerges simultaneously, still additionally preserving itself by memory, subconsciously, as well as structurally as organizationally with its topography of meaningly named nodes and to them belonging meaningly specified and still free connections. It concerns, for instance, most easily representing landscape of the use of an ethnic language, which is not limited in complexity and grows through informing or acting (operation) of consciousness system. In this view, informational consciousness is similar to operation of organic consciousness, which is directed by acquired and memorized language phrases (patterns, routines, form casts) of the experienced and in this way composes, e.g., sentences in each language after some usable rules and principles of language professionalism.

A comparison of AI singularity and IC recursiveness items of informational consciousness (IC), using similar categorization, brings the following list:

The nature of informational recursiveness of IC (according to Železnikar [5])

1° Exponential and considerable growth of processor complexity through IT is a condition for IC implementation by computer;

2° Methodology of IC is the following:
2°1 assumes the methodology of weak AI for mathematical-cognitive purposes, similarly as singularity the AI;
2°2 methodology of IC is based on the landscape, formed by the IC graph with its nodes and their connections when the each time actual consciousness is moving along the graph, forming sequences of meaning in ethnical or other, also higher, particu-lar command languages for computers and robots;
2°3 in ethnical language, computer can choose substantive and verb phrases and insert them to the places of nodes and their connections in the graph landscape of IC system and, thus, forming sentences of ethnic language;
2°4 the IC graph landscape is a recursive formation where the graph grows by new nodes and new named connections among them; it is conceptualized as a potentially complete graph showing all the possible connections among the nodes;
2°5 recursiveness is assumed also in the structure and organization of IC system by the concept of informational space and corresponding entropon(see formula (15) in [5]) causing IC stratification by superconscious and corresponding subconscious layers arranged around the actual conscious layer (see interpretation in Fig. 1 [5]);here, the concept turns aside of today's vagueness of the intelligent AI arrangement or imagined organization of strong AI.

3° Functional performances of IC:
3°1 the described recursive model of IC system doesn't surpass merely the strong AI and by this the human intelligence but surpasses also the system of entire human consciousness;
3°2 by the new IT, the IC system surpasses also the system of all individual and group consciousness of man and machine (IC hypothesis);
3°3 the superpower of computer supported IC comes forward over all individual and group consciousness of the globe;
3°4 unanswered remains, what is the IC power in comparison to the universe consciousness and in which forms the latter may appear;
3°5 creative recursiveness incorporates the concept of limitless evolution and, thus, authentical innovation of the IC system.

4° Changes in social circumstances and views at achievements of the new IT together with IC:
4°1 man loses the primacy and domination of his consciousness, especially of the mind and he subordinates itself to the computer;
4°2 the computer with IC becomes universally-consciously primary also at crucial decision making;
4°3 social, humanistic, anthropological sciences become reconciled to the superpower of computerized IC, by its mind, rational, intellectual and otherwise superiority.

5° Changes in views on consciousness, the world and universe:
- 5°1 new worldviews and views on the globe change also the human and group consciousness for the sake of new evolutionary consciousness of individual and others, completely cognitively different life actuality;
- 5°2 classical philosophy and funny antiphilosophy become merely the history of former thinking;
- 5°3 evolution, foreseeing and universe possibilities become the preoccupation of the state, society, globe.

6° The essential IC evolution in man and machine:
- 6°1 computer with IC becomes educator, confidant, home helper, psychologist to human and family, business advisor;
- 6°2 robots using IC and other improved technology became intelligent, family and production helper on practically all levels of thought, creativity and work;
- 6°3 Kurzweilian intelligence computer states, at last, by itself, that intelligence is merely a minor view to consciousness as the whole, that a reconstruction of the concept concerning the strong AI in the direction of IC is necessary.

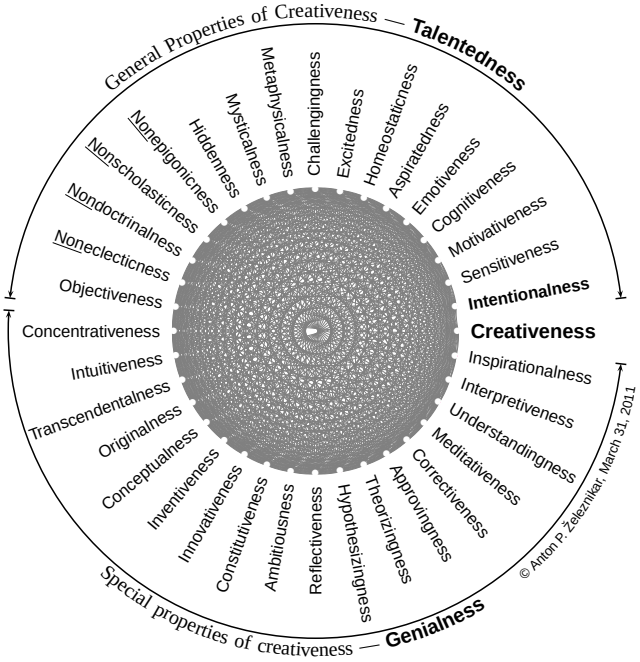

Figure 1. Improved model of *Creativeness* resulting from the broadest use of an ethnic language and not merely from psychological and other doctrinaire items, concentrating to general *Talentedness* as a subregion of a special field of *Genialness*, concerning an object, field of work and creating, respectively.

5 Meaning-Informational Approach to the Problem of Creativity

The meaning-informational approach to the problem of creativity differs methodologically from a merely intelligent or psychological approach remaining limited in its doctrinality. The new approach considers the happening in the mentioned disciplines, however spreads its research region to the domain of an entire, possible meaning system of IC, also to the meaningly hidden, the unrevealed in the mentioned scholastic disciplines. These differences can be easily demonstrated by the case of informational creativity, being one of central problems, components of IC. In this way it is possible to construct, at least in the meaningful sense something being named the *top* creativity, which finally, by an additional completion, could surpass the organic, artistic, literary, scientific or other possible form of creativity.

To creativity subordinated components, in the deformalized form, are first of all creativity properties in the upper half of the graph in Fig. 1, being characteristic for the *talentedness*, namely, Intentionalness, Sensitiveness, Motivativeness, Cognitiveness, Emotiveness, Aspiratedness, Homeostaticness, Excitedness, Challengingness, Metaphysicalness, Mysticalness, Hiddenness, Nonepigonicness, Nonscholasticness, Nondoktrinareness, Noneclekticness and Objektiveness; special creativity properties in the lower half of the graph, characteristic for the genialness, are Concentrativeness, Intuitiveness, Transzendentalness, Originalness, Conceptualness, Inventiveness, Innovativeness, Constitutiveness, Ambitiousness, Reflexiveness, Hypothesizingness, Theorizingness, Approvingness, Correctiveness, Meditativeness, Understandingness, Interpretiveness and Inspirationalness. Creativeness, as the beginning, initial, named meaning node consequently ends in -ness as all of its components (adjective+ness), to stress the property state of components.

The proposed model of creativeness proceeds from the meaning treasure of the English language, which is in a certain, intuitive, also hidden way connected to the creative behavior within human IC. Right here, the broader context of the conscious as a whole can be shown and, just therefore, the informational concept of creativeness essentially abandons and surpasses the usual psychological approach and also that being taught in academic schools for management. It considers and seizes also for those components being regularly conscious, however outside of the domain of the so-called rational, belonging to the higher consciousness layers — superconscious meaning domains [5]. The presented model can be explained by a short description of system components of creativeness. General in special property components concerning creativeness are presented within the area of two circular domain arrows of

talentedness and *genialness* in Fig. 1.

The first area of the top creativity is conditioned by the *General Properties of Creativeness—Talentedness*. *Intentionalness* is the general property of any consciousness system, from the simplest to the most complex. It means purposefulness, aim, goal directedness, radical orientation, predominant destination, the main preoccupation and individual actuality, when creativeness concentrates on its *object* of meaningful or other creation. *Sensitiveness* means a sufficient extent of sensibility for the meaningful or other appearing of a creation object, acquiring creative impulses in the entire meaning spectrum of languages, disciplines and imagination, including sensory, reasonable and other impulses coming from the environment and individual consciousness. *Motivativeness* is a property supporting intentionality in improvement of endeavor for attaining of the set up goal proceeding from talentedness as a set of characteristic general creativeness components, being ambitiously self-actualized in its acting (informing). Motivation is like a spur, revival for consciousness demanding activity, being like a catalysis, stimulating from the certain meaning and conscious situation, with a strong interest to achieving a commonly distant goal. *Cognitiveness* sharpens the critical cognition up to the extreme limits, recognizing situations in creating object, original forming of its meaning. *Emotiveness* is being present quite regularly by the spectrum of its concrete components (anger, care, pleasure, sadness, curiosity, etc.) in the creation process. *Aspiratedness* is the necessary zeal for attaining meaning and other advancing in the defining and realization process of the creating object. *Homeostaticness* is a cybernetical principle balancing antagonism, new ideas with indicated reality. *Excitedness*, first of all, is generally an awakening of the necessary attention, later also the excitedness at attaining of the creative arising. *Challengingness* functions as competition calling to the surpassing of the existing, as a necessity for new achievements in the field of intellectual and physical. *Metaphysicalness* stresses not only phenomenalism but directs its pressure to the internal, not yet seen, perceived and conceived in an informational, meaningful and conscious way, functioning in the sense of of conscious emerging, conscious internal arising, of actuality forming concrete states of consciousness. *Mysticalness* is spiritual meaning or the reality being not comprehensible for organs of sense and uncommon for the average intelligence, but being within consciousness quite regular in the deep, divine, holy and in the categorial as the supernatural and superconscious. *Hiddenness* already announces the possible revealment of something, being its more or less appointed presentiment of meaning, when at last the essence will be crystalized in the form of a language expression, by a language characteristic terminology. The next four entities of creativeness stress a part of their meaning by underlining what *shouldn't* appear at creative work or their nonnegative presence should not appear because of their uncreative nature. *Nonepigonicness* opposes epigonism, imitation of the known, created, for instance also to the extensive quoting of sources acknowledging the written by references of other authors, by a citation mania, from the time immemorial to nowadays. *Nonscholasticness* concerns teaching of predominantly known concepts without the own or critical contribution of teachers, particularly on the academic level, thus, being contrary to such a presentation of the matter, e.g. in the situation of weak intelligence, practicing in the closed university circles. *Nondoctrinalness* shouldn't rigidly follow the doctrinalness of the profession, but be on the way of revealing what surpasses it, enriches it professionally. *Noneclekcicness* turns away from the source quoting, copying and repeating of the known, respectively. *Objectiveness* moves in the area of veracity belonging to the actuality of internal and external world, spirituality and substantiality, phenomenalism and sensuality, the momentary and essential.

The second area of top creativity is conditioned by the *Special Properties od Creativeness—Genialness*. *Concentrativeness* or raptness is the basic companion of genialness providing continuous attention concerning the object meaning, when enthusiasm emerges creatively in the background of composure, equanimity, enchanting, commitment, absorbability (the opposite is scattering, chaos, confusion, going mad, *distraction*, etc.). *Intuitiveness* relies on idea, instantaneous mind flash turning aside from the logical and empirically known, considering the internal instinctive, indirectly essential and truthful. *Transcendentalness* is the region of the being beyond in the sense of no yet seen, recognized and known, otherworldly and abstract, concealed and separated from commonly known and transparent. *Originalness* or prototypicalness aims at its research to the entirely new object identification, analysis and determination or definition, respectively, creating a new meaning of something. *Conceptualness* projects in a definitional way the meaning of its object, also of itself and creativeness. It searches new naming for the meaning, nodes and new connections (e.g., verb phrases) between nodes (e.g., substantive phrases). *Inventiveness* is ingeniousness, designing of the new, unattained, improving, creatively imagined, by brain storming, producing new ideas. *Innovativeness* means essential change, e.g., by deviation, divergence of meaning, new introducing, folding the meaning. *Constitutiveness* founds the created, determines its structure and organization by meaning within the graph landscape of consciousness system, sets by creativeness obtained object in the area of regular meaning. *Ambitiousness* is a strong wish for advancing in getting the meaning of the given creativity object, attacking the object unknown

with the ambition of determining still the unknown, still emerging meaning. *Reflectiveness* means return of the meaning of object determination to consciousness or in this case to creativeness, with the aim deepening the meaning, reflecting on the object, replying to consciousness challenge, being caused by the obtained object meaning. *Hypothesizingness* is an instrument for testing the supposition being otherwise probable but being not yet approved. Hypothesis is the forerunner of theorem when it was logically proved. *Theorizingness* relies on theorems being logically or empirically (experientially) transparent and, of course, in this respect or explicitly approvable. Basic informational theorems in [5] are just of this sort. *Approvingness* can be quite formally, logically or informationally, meaningly different, for instance, factional. *Correctiveness* is the possibility of unlimited reexamining and correcting the attained, by changing and adding, being never to the end utilized, meaningly purified, perfect. *Meditativeness* is an important methodology in discovering of the creative and created, their changing, online and systematic emerging. *Understandingness* concerns phenomenalism, being bound to interpretation, to the possibilities of broadening the meaningful of already understood of creativeness and its object. *Interpretiveness* remains the most common property of consciousness, because all the meaning is being interpreting online and historically, in each moment somewhat differently in comparison with the already attained. *Inspirationalness* means also animating happening in the process of creative endeavoring, as a wish upon more creative finding out of the meaning, creativeness and its object.

Creativeness is, thus, at last, being put together by the components and their connectives in Fig. 1. Through this instance, one can understand how the research of meaning is essentially broader and more systematical from any other *particular* investigation of creativeness, e.g., in psychological, managerial, scientific and pure cognitive sense, covering the realm of consciousness, together with its intelligence, as a whole.

6 Conclusion

In the European scientific and technological environment, the beginning of singularity remains nearly unbelievable, when a progressive leap into strong AI by the complexity of IT will happen and the intelligent computer will surpass the human intelligence. This paper broadens the idea of singularianism to a thoroughly familiar understanding of informational recursiveness of the IC system, being conceptually and formalistically essentially more elaborated than singularity, just waiting for the progress of IT. Meanwhile, untill 2045, the evolution of human consciousness will enormously progress too, and conceptually surpass the then computer performance. At last, singularity is understood in the sense of the today's informational cloud [1] of strong AI and extremely complex IT, from which the user will dispose of data sources, computer procedures and methodologies without his prefessional knowledge on cloud sources. The basic problem of the future IT with its accompanying disciplines remains the complete graph in Fig. 2 where the dotted arrows have to be realized in the near future. They represent the discussion area between Kurzweilanism and Železnikar's informational consciousness.

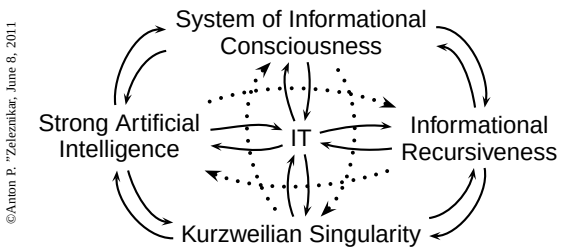

Figure 2. Focal point of the emerging information technology, IT, attracts the four only apparently opposing areas of actuality, informing in the complete graph. The dotted arrows indicate the evolution of comming connections between Kurzweilian singularity and the conceptualism of Železnikar's IC.

Dedication

The author dedicates this paper to the memory of his recently passed colleague, the excellent electrotechnical engineer of the Faculty of Electrical Engineering in Ljubljana, the member of the Royal Institute of Technology, Microwave Dept., Stockholm (Sweden) — *Boris Keržar,* Ph.D.

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