Annals of the Academy of Romanian Scientists
Series on Science and Technology of Information
ISSN 2066-8562 Volume **5**, Number **1**/**2012**

THE MATHEMATICAL THEORY OF COMMUNICATIONS VERSUS THE PHYSICAL THEORY OF INFORMATION. THE UNIVERSE VERSUS THE MULTIVERSE

Dan Alexandru IORDACHE[1]

Starting from the "classical" (mathematical) theory of information (C. Shannon, W. Weaver), this work has replaced the definitions of the: a) apparent information as a decrease of the non-determination (uncertainty) degree, by means of the overlap area of the true and found probability distributions, respectively, b) agreement of a theoretical relation with the experimental data using the correlation coefficients, by means of the error risks at the compatibility rejection, etc., taking into account also the basic notions of the complex systems: (i) the uniqueness parameters, (ii) the similitude criteria, (iii) the universality classes, (iv) the numerical phenomena intervening in the computer simulations of such systems evolution, etc. [1]. *The accomplished analysis pointed out the existence of some surprising co-relations relating the fundamental interactions and particles. The interpretation of these findings by means of the anthropic principles (leading to the notion of designed Universe) or by means of some recent theoretical models ("of quantum gravitation", "self-reproducing inflation", "quantum cosmology with loops", etc., leading to Multi-verse models) was also analysed by this work* (see also [2]).

Keywords: Mathematical information theory, Compatibility with experimental results, Complex systems, Fundamental interactions, Anthropic principles, Theoretical models of cosmology

1. Introduction

As it is well-known, after some preliminary works as [3], the mathematical theory of information was rigorously formulated by C. Shannon and W. Weaver [4] under the name of « mathematical theory of communications », and completed by the works [5] of A. J. Khincin, A. N. Kolmogorov, etc. The basic notion of this theory is the so-called *uncertainty function* $H(p_1, p_2, ...p_n)$ associated to the complete statistical set (collective) $C \equiv \{E_1, E_2, ...E_n\}$ of incompatible events E_i (i=1, 2, ... n), of appearance probability p_i. According to the axioms of A. J. Khinchin [5] (that allow a rather simple derivation of the expression of the uncertainty function), *the uncertainty function* has properties of: 1) *symmetry:* $H(p_2, p_1, ... p_n) = H(p_1, p_2, ... p_n)$, 2) *maximum value for the uniform distribution:* $H(p_1, p_2, ... p_n)$ = maximum for: $p_1 = p_2 = ... = p_n = \frac{1}{n}$, 3) *prolongation:* $H(p_1, p_2, ... p_n, 0) = H(p_1, p_2, ... p_n)$, i.e. the addition of an impossible event (of null probability) does not change the value of the uncertainty function, 4) *continuity:* the function $H(p_1, p_2, ... p_n)$ has to be continuous relative to its variables:

[1]Professor, Physics Department, University "Politehnica" of Bucharest, Romania; Honorary Member of Academy of Romanian Scientists, Section of Information Science and Technology (IT).

$p_1, p_2, ... p_n$, 5) *linearity:* $H(C \bigcap C') = H(C) + \sum_{i=1}^{n} p_i H(C' \bigcap E_i)$, where $H(C \bigcap C')$ and $H(C' \bigcap E_i)$ are the uncertainty functions corresponding to the set $\{E_i \cdot E'_j\}$ = Cartesian product of the statistical collectives *C* and *C'*, and to the statistical collective *C'*, in conditions when the event E_i appeared.

It was found [5] that the uncertainty function $H(p_1, p_2, ... p_n)$ fulfilling the above indicated conditions is: $H(p_1, p_2, ... p_n) = -a \sum_{i=1}^{n} p_i \log_b p_i$, where *a* and *b* are almost arbitrary constants, that satisfy the conditions: $a > 0$ and $b > 1$. One finds so that the uncertainty function $H(p_1, p_2, ... p_n)$ represents the average (theoretical) value of *the* so-called *information entropy*, defined by the relation:

$$S_i = -a \cdot \log_b p_i \tag{1}$$

Similarly, for the continuous statistical collectives (described by the probability density *p(x)*), the uncertainty function is given by the expression: $H(p(x)) = -a \int_{-\infty}^{\infty} p(x) \log_b (p(x)\Delta x) \cdot dx$ [where Δx is the (conveniently chosen) "quantum" of the variable *x*] and the information entropy by the expression:

$$S(p(x)) = -a \cdot \log_b (p(x)\Delta x) . \tag{2}$$

We have to underline also that the expression (2) is absolutely similar to the (previous) Planck-Boltzmann expression: $S_{therm} = -k_B \cdot \ln \wp$ of the thermo-dynamic entropy (k_B is the Boltzmann's constant, while $\wp$ stands for the probability density of micro-states localisation in the phases' space).

2. Logical scheme of the humankind information accumulation

It is well known that the information processing and storage abilities of each individual people brain are drastically limited. For this reason, the humankind advance in its race for the complex systems knowledge and use imposes the strong cooperation of the human beings by *information transmission.* Taking into account that the information transmission is a resonance process (see fig. 1), it is necessary to ensure: a) *the obtained (got) information* (see fig. 2) *cleaning* before a new experiment (measurement, embryo development, Universe genesis, etc.), b) a sufficiently broad and well-located *information receiver bell*, c) an implant (inside the information receiver bell) of several *connecting relays*, achieving the *cross-fertilization* between the information source(s) and its virtual applications,

so that « Toute la suite des hommes depuis le cours de tant de siècles est comme un seul homme qui vit toujours et qui apprend continuellement » (Blaise Pascal).

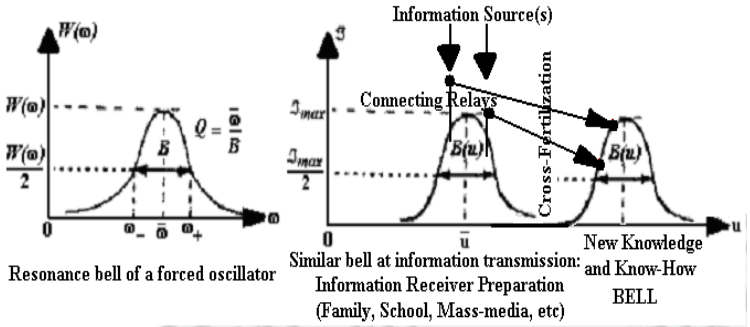

Fig. 1. Information transmission as a resonance process.

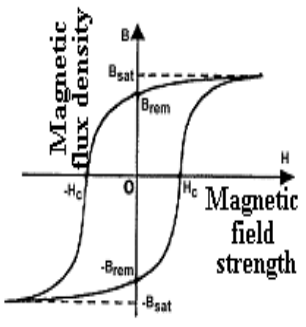

Fig. 2. Magnetic memory – example of got information.

3. Main Conceptual Differences between Mathematics and Nature Sciences

3.1. Typical elementary object

While in Mathematics the typical elementary object (the problem unknown) is a well-defined number or segment, in Nature Sciences this elementary object is a parameter $\wp$, described by a certain probability distribution *P(p)* of the individual values *p* (see figure 3).

While the value of the unknown of a mathematical problem with a right formulation is obtained exactly by means of the problem solution, the most probable individual value (named also "true value", or "mathematical hope") t_p of the physical parameter *p* cannot be never exactly obtained!

For this reason, the definition of the real information amount has to be given by means of the overlap area of the normalised to 1 probability distribution functions corresponding to measurements and to the true parameter, respectively (fig. 4).

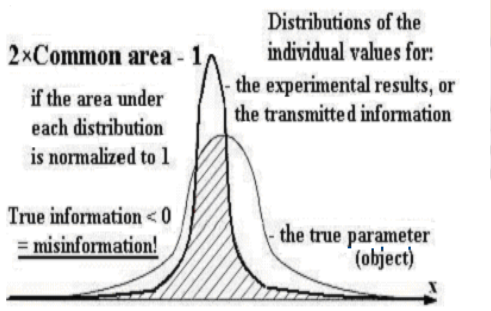

Fig. 3. Probability distribution of a parameter *p* individual values.

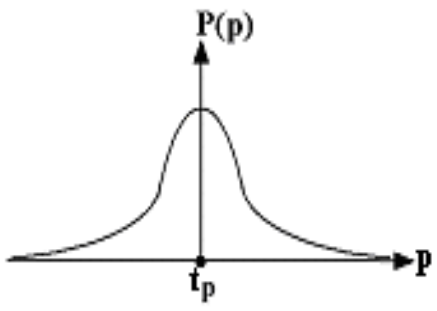

Fig. 4. Definition of the true information amount obtained by measurements.

3.2. Uniqueness parameters

While the number of the uniqueness parameters of a mathematical problem is fixed [e.g.: 3 for an arbitrary triangle (the lengths of the 3 sides, or the lengths of 2 sides and the angle between them, etc.)], *the number of the uniqueness parameters of a physical system depends on the required accuracy for the considered system description* [e.g., the thermodynamic state of the air is described by: (i) only 2 parameters (usually the temperature and the pressure) in a first order approximation, (ii) by 3 physical parameters (adding e.g. the humidity) in the frame of a better approximation, (iii) 4 physical parameters (adding also the carbon dioxide content) in the frame of a still better approximation, etc.

3.3. Well-formulated problems

While in mathematics a well-formulated problem corresponds usually to a system of compatible and non-redundant equations, the number of this system equations being equal to the number of unknowns of the mathematical problem, in nature sciences a well-formulated problem corresponds to a system of (slightly) incompatible (and non-redundant) equations, and the number of equations has to be considerably larger than that of unknowns. This fact is due to the fluctuations of the individual values of the physical parameters and even to the presence of some hysteretic behaviour (the individual values could depend on the system previous history) of the physical systems.

3.4. Position of the incomplete induction method

While in mathematics the incomplete induction method represents only the first step towards the inference (particularly, by the complete induction method) of a theorem, in Physics this (incomplete induction) method represents an essential method, because it allows the discovery of some truths which are not equivalent to the information set used to formulate the respective hypothesis. The incomplete induction method represents one of the most fertile methods used by the nature sciences for the identification of some new plausible hypotheses and the subsequent discovery of some new physical phenomena and laws.

4. On the bridge between the mathematical theory of communications (information) and the physical theory of information

For a uniform distribution of the true value t_X inside its corresponding confidence interval:

$$1 = \int_{-\infty}^{\infty} p(t_X) \cdot da_X = \int_{\tilde{x}_n - z_L \cdot s(\tilde{x}_n)}^{\tilde{x}_n + z_L \cdot s(\tilde{x}_n)} C \cdot dt_X = 2C \cdot z_L \cdot s(\tilde{x}_n),$$

hence the corresponding expression of the uncertainty function is:

$$H(p(t_X)) = -a\int_{-\infty}^{\infty} p(t_X)\log_b(p(t_X)\Delta x)\cdot dt_X = a\cdot\log_b\left[\frac{2z_L s(\tilde{x}_n)}{\Delta x}\right]. \quad (3)$$

It results that the apparent information obtained in frame of the n^{th} physical determination can be expressed by means of the square mean errors corresponding to the sets of the obtained results obtained after the *(n*-1*)* determination and after the n^{th} determination as: $I_{app.n} = H_{n-1} - H_n = a\cdot\log_b\frac{\sigma_{n-1}}{\sigma_n}$.

One finds so that the usual $I_{app.n} > 0$ values (corresponding to the convergence towards the true value), it is possible to meet also values $I_{app.n} < 0$, which could be due to:

a) rough errors (hence misinformation),

b) random gathering of the first individual values, the decision being established by means of some statistical tests.

It results that the additional elements brought by the physical theory of information refer mainly to: (i) experimental measurements, (ii) the corresponding errors, (iii) the necessary statistical tests.

For this reason, the compatibility of a given theoretical relation $y = f(x)$ with a certain set of experimental individual values pairs x_s, y_s (s=1, 2, … N) should be decided not starting from the usual correlation coefficient which does take into account the existing experimental errors, but from the error risks at the compatibility rejection of each "suspect" pair x_s, y_s: $q_s = \exp\left[-\frac{p_s}{2(1-r^2)}\right]$, where (see also fig. 5):

$$p_s = \left[\frac{x_s-\tilde{x}}{\sigma(x)}\right]^2 + \left[\frac{y_s-\tilde{y}}{\sigma(y)}\right]^2 - 2r\cdot\left[\frac{x_s-\tilde{x}}{\sigma(x)}\right]\cdot\left[\frac{y_s-\tilde{y}}{\sigma(y)}\right]. \quad (4)$$

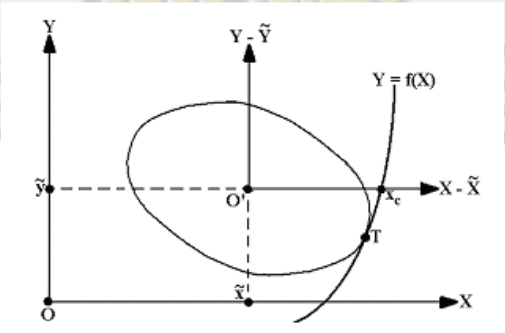

Fig. 5. Evaluation procedure of the error risk at the compatibility rejection of a theoretical relation $Y = f(X)$ relative to some local data.

5. Main features of the complex systems description

Because several completely different complex systems [computer arrays, robots, networks, social sciences, biology (with some specific topics: colonies, swarms, immunology, brain, genetics, proteomics), non-linear dynamics, economics, mathematics, glasses, agents, cognition, etc.] have some common features centred on their *statistical behaviour* and the corresponding *phase transforms* [6], [7], it results that these complex systems have certain universality properties, which – due to their generality (see e.g.[7a]) - can be described only by some specific numbers (the so-called similitude numbers, or criteria [8]).

If: $[P]=\prod_{i=1}^{n_U}[U_i]^{\alpha_i}$, where [*P*] is the physical dimension of a parameter *P* specific to the studied state (or process), then 2 states (or processes) *Σ', Σ"* are named similar if the values of the parameters $\{U_i \mid i=1,n\}$ and *P* corresponding to these states fulfil the relation [8]: $\frac{P'}{P''}=\prod_{i=1}^{n_U}\left(U_i'/U_i''\right)^{\alpha_i}$. Some of the uniqueness parameters could be similitude criteria, i.e. non-dimensional parameters: [s] = 1, with equal values: *s' = s"* in all similar states or processes. While the first known similitude criterion was introduced by Archimedes (287-231 b. Chr.): $Ar=\frac{gl^3\Delta\rho}{\rho\cdot\nu^2}$, the first (existence) theorem of the similitude theory was stated by Newton, all these theorems being presented in work [9].

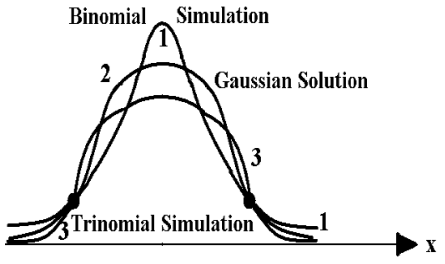

Fig. 6. Plots of different pseudo- convergent simulations of elastic pulses propagation.

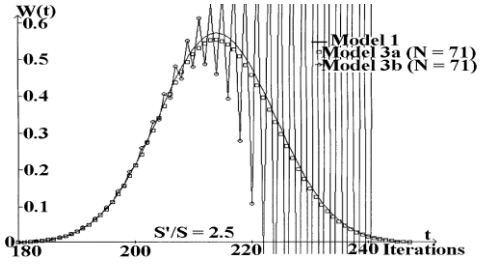

Fig. 7. Gradual installation of instability in simulations of elastic pulses propagation.

The accomplished study [1] of the typical study procedure of complex systems pointed out that it involves the following main stages: a) identification of the uniqueness parameters, b) identification of the characteristic similitude criteria, c) obtainment of the set of irreducible criteria, d) translation of all relations of scientific and/or technical interest in terms of similitude criteria, e) check of the theoretical and experimental similitude models, f) test of compatibility of theoretical relations and models relative to the existing experimental data.

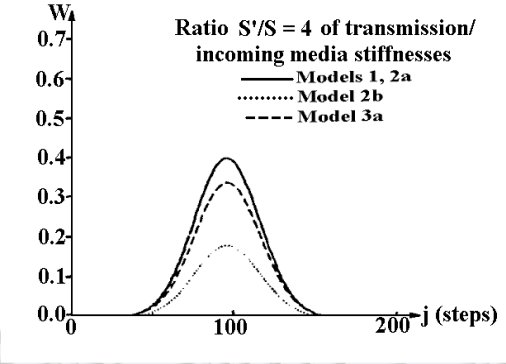

Fig. 8. Distortions in the simulations of some random walk processes [10].

6. Main numerical phenomena intervening in the Data Processing

A detailed study of the main numerical phenomena: pseudo-convergence (fig. 6), instability (fig. 7), distortions (fig. 8), intervening in the computer evaluations of certain physical parameters and/or some simulations of different physical phenomena was accomplished by work [10].

Taking into account the various errors types and numerical phenomena intervening in the data processing, we consider as the most accurate data processing procedure that presented in the frame of fig. 9.

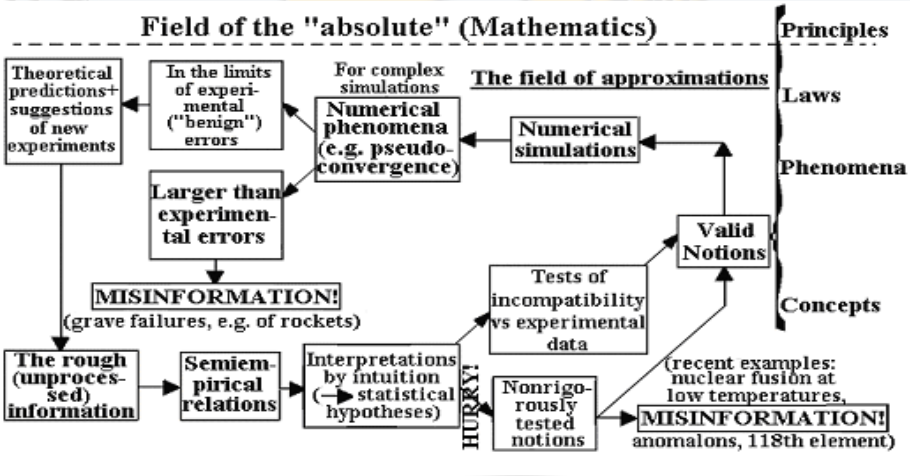

Fig. 9. Basic Stages of the present Scientific Information Processing.

7. Interpretation of the physical information about Complex Systems

Unlike the classical (mathematical) information, the physical information (referring to complex systems, especially) requires a very careful interpretation. First of all, it is necessary to answer to the basic questions about the observed features:

a) are they random or reproducible?

b) could they be connected to other results, obtained by different methods?

c) could they be explained by natural causes or it seems to intervene some transcendent reasons?

We have to underline that the acceptance of a physical interpretation needs multiple completely different experimental results, whose explanations converge to this interpretation. E.g., the existence and parameters (charge, mass) of electrons were established as a result of AT LEAST 5 completely different experiments:

(i) the electrolysis (Faraday's) laws leading to the elementary electrical charge $e = F/N$,

(ii) the J.J. Thomson's experiment concerning the cathodic rays deviations in an electrical field, which pointed out the existence of the electron,

(iii) the Millikan's experiment which led to the electrical charge of the electron,

(iv) the Lenard's method of crossed (electrical and magnetic) fields, which allowed the evaluation of the specific charge e/m of the electron,

(v) the Compton's effect which allowed the evaluation of the rest mass of the electron.

Without redundant (completely different) experimental methods, the Physics is often subject to major errors; some recent examples:

a) the so-called anomalons (1970-1980), erroneous interpretation supported initially by several very good Physics reviews,

b) the so-called "fusion nuclear reactions at low temperatures" (Palladium compounds, 1980-1990), again a mis-interpretation,
c) the trans-uranium 118 element, initially claimed by a research group of the Berkeley University and vanished after 2-3 years.

For this reason, the interpretation of some new Physics experiments has to be cautiously examined; some examples:

(i) the Palo Alto results concerning the "magnetic monopoles" and the "exotic particles", generally,

(ii) the very recent (2011) results of Pamela's orbital station, referring to the anomalous strong fluxes of accelerated cosmic radiations around our planet, which seem to indicate that the Earth has an absolutely singular location in our (Milky Way) galaxy, etc.

8. Just Six Numbers seem be able to describe the Universe structure [12]. The Anthropic principle(s) [15]

In 1937, the British Physics Nobel prize laureate Paul A. M. Dirac had noted that the number of baryons (basically protons plus neutrons) in the universe ($\sim 10^{77}$) is almost equal to the inverse square of the gravitational coupling constant $\left(C_g = \frac{k \cdot m_p^2}{\hbar \cdot c} \cong 5.906 \times 10^{-39} \right)$ [11]. Later it was found that amazingly the electromagnetic intersection parameters are also strongly connected to the basic quantum parameters, the electromagnetic coupling constant (ζ_o being the vacuum electromagnetic impedance): $C_e = \frac{e_o^2}{\hbar \cdot c} = \frac{e^2 \zeta_o}{2h} \cong \frac{1}{137.036}$ being also given by a transcendent number (the so-called Sommerfeld's fine structure constant). The synthesis of the results obtained during the last decades indicates that a set of only 6 numbers is able to describe the Universe structure. These « constitutive » constants may be chosen: a) starting from the 4 fundamental interactions coupling constants $C_s \approx 1$, $C_e \cong \frac{1}{137.036}$, that of the weak nuclear interactions $C_w \approx 3 \cdot 10^{-7}$ and the gravitational one $C_g \approx 5.906 \times 10^{-39}$, and adding the ratio of rest-masses of the proton and electron: $m_{op}/m_{oe} \cong 1836.15$ and the number of physical dimensions of the Universe: $D = 4$ (usually) and $D = 10$ or 11 around the Planck's time $t_P \cong 0.533 \times 10^{-43}$ s, characteristic to the "*Big Bang*" process, b) by means of the M. Rees [12] parameters: (i) the relative strength of the electric coupling constant to the gravitational one: $C_{emg}/C_g \cong 1.2356 \times 10^{36}$, (ii) the nuclear efficiency (percent of the mass of the nuclear constituents that is converted to heat when they react via nuclear fusion to form heavier nuclei) $\cong 0.007$, (iii) the parameter Ω and the dark matter (known matter $\cong$ 4% of the critical mass for Universe to expand forever), (iv) the cosmological constant (introduced by Einstein in the expression of the Universe acceleration: $3a/R = -4\pi \cdot k \cdot (\rho + 3p/c^2) + \Lambda$): $\Lambda \cong 0.7$, (v) proportion of energy to their rest mass energy needed to break up and disperse clusters: $Q \cong 10^{-5}$, and – of course: (vi) the Universe physical dimension(s).

Given being that: a) even in 1961 R.H. Dicke [13] derived that these relations would imply a narrow time window in the development of the Universe during which life could exist, b) some later accomplished calculations [14] seem to indicate that intelligent life exists only on the earth, it aroused the idea that the earth too, in addition to the Universe, has experienced divine design ("*anthropic principle(s)*" [15]). We have to underline that - in opposition to the Anthropic principle(s) - there appeared very soon (even earlier [16]) some theoretical models assuming the existence of multiple "*parallel*" Universes, the so-called *Multiverse*.

9. Basic Present Cosmological Models leading to the Hypothesis of the Multiverse existence

In order to synthesise the basic assumptions and results of the main present cosmological models, Table 1 below presents their basic features.

Table 1. Comparison of basic assumptions and results of the main present cosmological models

Nr	*Theoretical Model*		*Number of dimensions*	$t < t_{Planck}$	$t > t_{Planck}$	*Main Authors*
	Basic	*Specific*				
1	Strings Theory	Quantum Gravitation	10D Space 1D Time	$t \rightarrow \ln t$ Infinite time before Big Bang	Possible $10^{500} \ldots 10^{1000}$ parallel Universes, each with its laws (L. Susskind, Stanford U.)	Lee Smolin, Ca [17b] Th. Damour, Fr; M. Henneaux, Be, Solvay; H. Nicolai, D.
2		3D Branes flowing in a 10D space	10D Space 1D Time	Collisions → Big Bang		2001: Neil Turok (Cambridge, UK) Paul Steinhardt (Stanford U.)
3		Black Holes	Compressing initially extremely diluted gas	Compression limit $\rho \sim 10^{12}$ Sun masses/ proton volume	a) Multiple black holes, b) Worms holes, c) Multiverse (Stephen Hawking)	G. Veneziano (Coll. Fr.), M. Gasperini (U. Bari) >1990
4	Quantum with loops	Oscillating Gravitation	Pre-existing compressing Universe	Compression limit $\rho \sim 10^{12}$ Sun masses/ proton volume	a) Repulsive gravitation; b) Pre-existing Universe cleaning (M. Bojowald, Pennsylv. U.)	A. Ashtekar, T. Pawlowski, P. Singh (Pennsylvania Univ.)
5	Inflation Theory A.H. Guth [18]	Self-reproducing Inflationary Universe	10D Space 1D Time	Quantum Fluctuations of the Scalar Field	Fractal Inflation $10^{10^{12}}$ times! (fig. 8) → multiverse	Andrei Linde (U. Stanford) > 1980 [19]

Taking into account that:

a) the present cosmological models represent extrapolations over a huge number (larger than 25) of magnitude orders of the somewhat classical Einstein's gravitation and quantum theories, as well as that:

b) the religion (mainly the Bible) predicts some of the Universe basic features, the comparison of their arguments in favour of the different present basic Universe evolution models - synthesized by Table 2 - could present a certain interest.

Table 2. Comparison of the arguments of the main types of present Universe evolution models

Models type	*ARGUMENTS*	
	Theoretical	*Experimental Proofs*
Multiverse models	FAITH (!) in the continuity (over a huge number of magnitude orders) of some theoretical models	No one and: a) probably not in future, outside our Universe, b) hopes to find some proofs inside our Universe
Possible transcendent religions (mainly, the Bible)	Information (e.g. AND, the Bible, etc.) is the starting element of any design (Genesis 1:3-26, John 1:1). AND is implicitly present in chapters 4 and 5 of Genesis.	Checked experimental evidence for some millenary predictions: a) Big Bang (see fig. 11), b) Relativity, c) Possible transcendent relations.

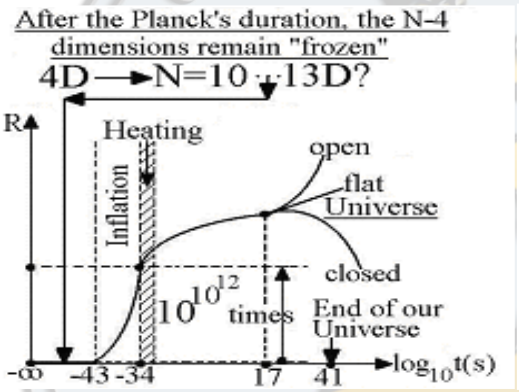

Fig. 10. The Alan Guth's model [18] of the Universe evolution.

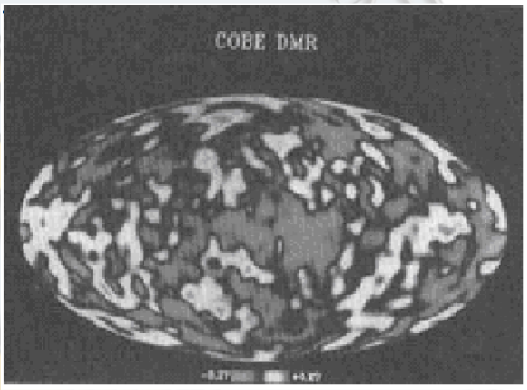

Fig. 11. Microwave Map of the Whole Sky made from One Year (1992) of Data taken by Cosmic Background Explorer-COBE Differential M.W. Radiometers 10^5 yrs after Big Bang.

10. Transcendent Integers and possible Transcendent Information, Relations and Insertions in Bible

As it is known, the transcendent mathematical numbers have the properties: a) do not depend on any human artifacts (a true collection of remarkably misleading numerical artifacts is presented inside the book: M. Gardner "The magic numbers of dr. Matrix", Prometheus Books, Buffalo, New York, 1985), as the numeration system, choice of numerical figures, personal data, etc., b) are unique for a given mathematical property, c) are irrational. We will define here the transcendent integers as the natural numbers which fulfil the first 2 [a) and b)] requirements. Examples of transcendent integers in Bible: (i) 153 (John 21:11) defined as the unique solution M of the equations system in integer numbers: $M = \sum_{i=1}^{m} i = \sum_{j=1}^{n} j!$, (ii) 276 (Acts 27:37) – unique solution N of the equations system:

$N = \sum_{i=1}^{p} i = \sum_{j=1}^{q} j^5$. Of course, the accurate quantitative explanation of the pointed out transcendent integers requires a rather difficult[1] additional study.

The most important possible (or even probable) transcendent information elements in Bible refer to the cosmological predictions; some examples:

a) Genesis 1:3 "And God said: Let there be light, and there was light"; Genesis 1:14 "And God said: Let there be lights in the expanse of the sky to separate the day from the night …", hence the light appeared before the stars, agreeing with the present «Big Bang» theory, which has found that the light appeared – through the photons escape from atoms (fig. 9) – much earlier than the stars;

b) 2 Peter 3:8 "*With the Lord a day is like a thousand years, and a thousand years are like a day*" - particular statement of the Special Theory of Relativity (see also Psalm 90:4);

c) Hebrews 11:3 "… *what is seen was not made out of what was visible*" - appearance of matter, space and time from nothing known, during the "*Big Bang*" process;

d) Job 9:8 "*He alone stretches out the heavens*"; Isaiah 40:22 "*He stretches out the heavens like a canopy, and spreads them out like a tent to live in*"; Isaiah 42:5 "*He who created the heavens and stretched them out*" - the Universe expansion.

Example of possible transcendent relations:

It is known that inside the extremely complex Bible structure are embedded some amazing information (see e.g. [23] for the Old Testament). This work brings a new example of possible transcendent relation embedded in Bible.

Consider the 20th century when the humankind succeeded [24] to evaluate the Universe age. Then (20th century), the Genesis 7th yowm [the Hebrew word *yowm* may be translated both by day (usually) or age/epoch] duration (according to

[1]We will mention that many problems in the field of Numbers Theory are extremely difficult. E.g., the statement of the (Pierre de) *Fermat's last (greatest) theorem* was published in 1670 [20], by his eldest son – Clément Samuel Fermat, but its solution was found only in 1995 [21] by the American professor Andrew Wiles. Wiles describes ([22], p. 236) his experience of doing mathematics in terms of a journey through a dark unexplored mansion: "One enters the first room of the mansion and it's dark. Completely dark. One stumbles around bumping into the furniture, but gradually you learn where each piece of furniture is. Finally, after six months or so, you find the light switch, you turn it on, and suddenly it's all illuminated. You can see exactly where you were. Then you move in the next room and spend another six months in the dark. So each of these breakthroughs, while sometimes they're momentary, sometimes over a period of one day or two, they are the culmination of, and couldn't exist without, the many months of stumbling around in the dark that precede them".

Christian chronologies, as the Archbishop Ussher's one [25]) is between 6000 and 7000 years (indicated by God). Multiplying this duration with:

a) 365.25 (number of days/year),

b) then with 10^3 Earth years/God day (2 Peter 3:8), and finally:

c) with 7 *yowm* in Genesis (2:2),

one finds: 6000÷7000 years indicated by God × 365.25×10^3 Earth years/God day ×7 Genesis *yowm* = $(15.34\div17.9)\times10^9$ Earth years, hence exactly the presently evaluated Universe age! Is this calculation a transcendent one? Yes! Is it meaningful? To answer it is necessary to know if its insertion in the Bible structure was transcendent, and … we do not know!

This answer is valid also for the "beast" number 666. It is obvious that this number is not transcendent (being significant in the decimal numeration system), but … if it could have a transcendent insertion, it would have the role to represent numerically the false being - main humankind enemy (Satan).

Conclusions

It is well-known that at the beginning of the 20th century, the Physics Nobel prizes were awarded only to works experimentally confirmed; e.g. the absolutely outstanding physicist Albert Einstein received (in 1921) the Physics Nobel prize for the theory of photoelectric effect (experimentally checked up) and not for his Special and General Relativity theories, which were still considered as insufficiently proven. Later, the successes of the theoretical Physics were so striking that in 1979 the theoreticians S.L. Glashow, A. Salam and S. Weinberg were awarded by the Physics Nobel prize for their theory of unified weak and electromagnetic interaction, though the intermediary vector bosons $W^{\pm}$ and Z^0 predicted by them were not still discovered (they were experimentally found by C. Rubbia and S. van der Meer only 4 years later). For such reasons, the confidence of physicists in the unified theories was so high that it was a deep disappointment [17], [26] to find that these unified theories are not valid for the Universe evolution descriptions.

Taking into account that:

a) while the masses of the intermediary vector bosons predicted by the unified theory of weak and electromagnetic interactions are only 2 magnitude orders larger than that of protons,

b) the parameters of the Big Bang processes are more than 25 magnitude orders distant to somewhat « usual » ones, c) the Physics advance from Democrit's atomistic theory to the quantum atomic Physics (over 7 magnitude orders) require

more than 20 centuries, we don't have to be exaggerate: even if now the Physics progresses are much accelerated, its advance over more than 25 magnitude orders (up to the Big Bang field) will require probably several decades (perhaps even centuries)! We have to be patient to be accumulated in the following decades and (probably) centuries sufficient experimental data to be able to formulate valid theoretical cosmological models.

As it concerns the Bible, it seems that: a) inside the Bible structure are "hidden" some important information, b) the modern Physics and the Bible predictions are convergent. That is why the Bible deserves a thorough study, for its scientific information, and not only for its outstanding ethics recommendations (cultivate empathy, fight our selfishness, etc.). Despite the main goal of Bible is to improve the human beings ethical behaviour, it involves also some (rather few) scientific elements. However, one finds that the number of Bible sentences initially without any scientific meaning that got in the last centuries such a connotation is monotonically increasing, and even in an accelerated manner [e.g. (few examples) from the: a) transcendent integers (John 21:11, Acts 27:37) to the: b) role of Information in the "building" of complex systems (Genesis 1:3), c) appearance order of light sources (Genesis 1:3 and 1:14), d) chromosomes (Genesis 2:22), d) ADN defects and repairs, implicitly (Genesis 4 and 5), e) the special relativity theory (2 Peter 3:8), f) main features of the Big Bang process (see above), etc.].

Either it happened that – between a tremendous number of parallel Universes, with different features [19a] – our Universe be the unique (accidental) one [26] with suitable conditions for the life existence and (on Earth) of the intelligent life presence, or this Universe and Earth were created by supernatural design, it results that the humankind has a huge responsibility – to run optimally the only one World experiment, whose main actors we are.

R E F E R E N C E S

1. a) DOBRESCU R., IORDACHE D., eds, *Complexity Modelling* (in Romanian), Politehnica Press Printing House, Bucharest, 2007; b) DOBRESCU R., IORDACHE D., *Complexity and Information*, Romanian Academy Printing House, 2010.

2. IORDACHE D., *Main complexity features of the thermo-mechanical evolution of the universe*, chap. 5 in *Research Trends in Mechanics*, vol. 2, Romanian Academy Printing House, 2008.

3. HARTLEY R.V.L., *Transmission of Information*, Bell System Techn. J., July 1928.

4. a) SHANNON C., *The Mathematical Theory of Communication*, Bell Syst. Techn. J., **27**, 379-423, 623-56(1948); ibid., **30**, 50(1951); b) SHANNON C. E., WEAVER W., *The mathematical theory of communications*, Illinois Urbana Univ. Press, 1949.

5. a) KHINCHIN A.J., *Mathematical Foundations of Information Theory*, Dover, New York, 1957; b) KHINCHIN A.J., in *Arbeiten zur Informationstheorie I*, VEB Verlag, Berlin, 1961, pp. 7-85; c) KOLMOGOROV A.N., ibid., pp. 91-116; d) GUIAŞU S., *Information theory with applications*, McGraw Hill, New York, 1977.

6. a) ANDERSON P.W., Science, **177,** 293(1972); b) ANDERSON P.W., Proc. Natl. Acad. Science *(USA)*, **92,** 6653-6654(1995).

7. a) SOLOMON S., SHIR E., Europhysics News, **34**(2) 54-57(2003); b) SOLOMON S., Annual Reviews of Comp. Physics II, 243-294, D. Stauffer ed., World Scientific, 1995.

8. a) GUKHMAN A. A., *Introduction to the Theory of Similarity*, Academic Press, New York, 1965; b) BARENBLATT G. I., *Dimensional Analysis*, Gordon and Breach, New York, 1987; c) BARENBLATT G. I., *Scaling, Self-Similarity and Intermediate Asymptotics*, Cambridge Texts in Applied Mathematics, 1996.

9. BODEGOM E., IORDACHE D., *Physics for Engineering Students*, vol. 1, *Classical Physics*, Politehnica Press, Bucharest, 2007

10. IORDACHE D., *Contributions to the Study of Numerical Phenomena intervening in the Computer Simulations of some Physical Processes*, Credis Printing House, Bucharest, 2004.

11. DIRAC P.A.M., *The Cosmological Constants*, Nature **139**, 323(1937).

12. REES M., *Just Six Numbers*, Basic Books, 2000.

13. DICKE R.H., *Dirac's Cosmology and Mach's Principle*, Nature **192,** 440-441(1961).

14. a) ROOD R.T., TREFIL J.S., *Are we alone? The possibility of Extraterrestrial Civilisations*, Scribner's sons, New York, 1986; b) TIPLER F.J., *The search for extraterrestrial life: recent developments*, Physics Today, **40**, 92, December 1987.

15. WHEELER J.A., *Foreword*, in *The Anthropic Cosmological Principle*, Oxford, Clarendon Press, UK, 1986.

16. EVERETT H., *Many-World Interpretation of Quantum Mechanics*, PhD Dissertation at Princeton, 1956.

17. SMOLIN L.: a) *The Trouble with Physics*, Houghton Mifflin Harcourt, 2006; b) *Thread-Bar theories*, IEEE Spectrum, January 2007, www.Spectrum.ieee.org/geek-life/tools-toys/ threadbar-theories.0

18. a) GUTH A. H., *Inflationary Universe: A possible solution to the Horizon and Flatness problems*, Physical Review D, **23**, pp. 347-356(1981); b) GUTH A. H., STEINHARDT P. J., *The Inflationary Universe*, Scientific American, p. 116, May 1984; c) GUTH A. H., *The inflationary universe. The quest for a new of cosmic origins*, Addison-Wesley, Reading, 1997.

19. a) LINDE A., *The Self-Reproducing Inflationary Universe*, Scientific American, pp. 48-55, November 1994; b) LINDE A., *Particle physics and Inflationary cosmology*, Physics Today, **40**(9) 61-68 (Sept. 1987), & treatise, Harwood Academic Publishers, 1990; c) LINDE A., *Inflation and Quantum cosmology*, Academic Press, 1990.

20. FERMAT C.S., *Diophantus' Arithmetica containing* (48) *observations by P. de Fermat*, Toulouse, 1670.

21. A. WILES A., *Modular elliptic curves and Fermat's last theorem*, Annals of Mathematics, **142,** 443-551(1995).

22. SINGH S., *Fermat's Enigma: the Epic Quest to Solve the World's Greatest Mathematical Problem*, Walker Publishing Company, New York, 1997.

23. a) WITZTUM D., RIPS E., ROSENBERG Y., *Equidistant letters sequences in Genesis*, Statistical Science, **9**(3) 429-438(1994); b) M. Drosnin, *The Bible code*, World Media Inc., vol. 1 (1997), vol. 2 (2002).

24. HUBBLE E., *A relation between the distance and radial velocity among extra-galactic nebulae*, Proc. National Academy of Sciences, **15**, pp. 168-173(1929).

25. JOHNSON P., *A History of Christianity*, Athenaeum, New York, 1976, p. 413.

26. LIGHTMAN A.P., *The accidental Universe: Science's crisis of faith,* Harper's Magazine, December 2011; d) www.harpers.org/archive/2011/12/0083720