

Bentsion Fleishman

The Choice is Yours

*The Hypotheses of Kabbalah, systemology and processology
on this and other Worlds
and their justification*

New York - 2007

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Abstract

In this book the author offers to readers to make a choice between different hypotheses about this world and the spiritual world and about the place of human beings in those worlds. Wordings of these hypotheses are simple enough for their understanding. To justify choosing of some or other hypothesis were used special knowledge. In such situation, to admit some hypothesis for an ordinary reader will be much easier to put oneself in author's hands than to understand his choice. By means of textual analysis the author shows that Kabbalistics had known the basics of Systemology, and what they used basic methods of Systemology. The question about limits of the might of man (man power) is discussed with the greatest possible accuracy using the analysis of the corresponding texts of Torah. In terms of Systemology this corresponds with the estimating of potential effectiveness of complex systems. Accordingly, after following estimating limits of reliability, noise immunity and controllability, it was found that the limits of the might of computer (computer power) are defined by the especial constant which was named constant of Bremmerman. Special section is dedicated to the problem of the might of cryptosystem (Crypto-power). Author believes that Processology (Physics in a broader sense), Systemology and Kabbalah together form a perfect whole that could be the first step towards building of the fundamental science of the twenty first century. Mathematical appendices used by the author do not require knowledge exceeding level a school course of an algebra and a reader can miss them in time of the first reading of this book.

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Translation prepared for the author.

Author's contact data:

in USA

e-mails : s.fleishman@yahoo.com
Pakferma@Yahoo.com

in Russia

Tel : (7495) 237 52 69
(7495) 286 21 55
e-mail : mikel@soils.glasnet.ru

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In retentive memory
of a great scientist
of contemporariness
Aryeh Kaplan

Preface to the second English edition

This edition is identical to the first one published in 2003. Arrangement and preparing of the Second English Edition of the book for the publisher “LULU.COM” was done by Eugene Pakman. The author is grateful to him for great job.

New York, 2007

Preface to the first English edition

The terrible tragedy of September 11, 2001 that happened since the Russian edition of this book had been published, led to the beginning of the total conflict of civilized countries headed by USA with a net of Islamic terrorists. Technological superiority of power of Good over the power of Evil leaves no doubt as to who is going to win (victory in Afghanistan and Iraq). But such a victory is not going to be final without ideological victory. The latter could be assisted by those healthy powers within Islam – G-d given religion affected by the Satan distortion brought into Muslim cognition by Islamic fundamentalists.

The base of such support is ideology of monotheism: Judaism and two of its daughter religions – Christianity and Islam. Representatives of these religions hear confession of One and the same G-d and consider being the Holy One – one and the same Book – Torah. In it G-d blessed Abraham and his descendants including Ishmael and his descendants – contemporary Arabs.

The author hopes to make his contribution into above-mentioned ideological support by publishing this book and especially by the new Guide that is currently being prepared in Russian. It will be addressed to the Jews, Christians and Muslims that are coming back to the Faiths of their fathers. See abstract and Table of Contents of the Guide in English at the end of this edition.

Author hopes that the victories over nazism, bolshevism, and inevitable future victory over Islamic fundamentalism are the signals of coming of the Mashiah.

The translation was prepared by Itta Shiryayeva and edited by Susanna Dubinskaya. The author is grateful to both of them.

New York,
February, 2003

Preface to Russian Edition

The readers are given in this book to make their own choice among different hypotheses on our world, spiritual worlds and human being place in them. Hypotheses are formulated in popular form. But their justification is not always in popular form. In that case making the choice of this or that hypotheses reader has to be guided not by cognition, but by faith in authorities. For religions readers the highest authority is G-d, for non-religious – secular science. At the time when religion and secular science were in confrontation, the problem of the choice between mentioned hypotheses often came to the question of faith in G-d.

Now the situation changed cardinally. Religion and secular science are not in confrontation now and Kabbalah satisfies to common scientific standards of secular science (confirmation of this circumstance is one of purposes of the book). However, to make the choice between the hypotheses the reader can do so already by reading chapter 1 in case if he would take one of extreme positions of solipsism and materialism and the question appears – Is there sense to continue to read subsequent chapters connected with hypothesis of dualism? If he would be inclined to take hypothesis of dualism, then while reading subsequent chapters, according to the author's opinion, the picture of unanimous harmonic science of the 21st century would be open for him. Many questions here have philosophic as well as practical interest and principal of them are: Does mankind have limits of power (might of mankind), and if yes – what kind of limits are they?

The largest part of the book (starting from chapter 5th) is devoted to interpretation of these cardinal questions. Half of century of his scientific life the author devoted to the same questions through researches of potential effectiveness of complex systems.

Dramatic situation constituted on the border of passing and coming century has direct relation to the questions examined and required special commentary. The thing is, that as well as successes of physics in the beginning of 20th century caused non-justified hopes to its all power (physicalism), non-stopping successes of computerization, beginning from the second half of the same century caused also non-justified hopes for the power of computer (cybernetism). Both «distortions of ideas» led finally to huge material losses. The main impediment on the way of these distortions was systemology, appeared in the middle of the 20th century. But, as it is known, inertia of thinking is too big, but rate of life in the 20th century had such an acceleration, that even majority of self systemology creators «had mention diseases», and what to tell about principal mass of scientific fellows. As the result now Cybernetism undividedly predominates in it, and successes of «romantic» period of systemology, connected with names of V.A. Kotelnikov, C. Shannon, J. von Neumann, U.R. Ashby and others exists either in apocryphal memories or are forgotten.

This book is a result of a whole life of its author. But just at the end of life he revealed that all the life long he had been writing only it, without notice it. Wonderful chain of external events promoted its writing. The events occurred in the very place and in the very time. The last of them – translation into Russian Kabbalistic literature, during several years in the middle of 90th. Without this literature the book could not be written (see bibliography). The author came in New York from Moscow in March, 1996 and soon came to Publishing House «Shoroshim» – which happened to be the only place of concentration of this literature. On the other events of this kind the reader can read in the part «The author about himself» in the end of the book.

The history of Kabbalah is much more dramatic from human point of view than history of systemology. This part of Oral Torah intentionally during centuries was hidden from non-confidants, what promoted to a stream of conjectures about it. Unlike Talmudists, exercising

in logic constructions around metaphoric explanations of Torah, Kabbalists gave rationalistic explanation of Torah, using religions meditative experience, which seemed to be a mystic action for non-confidants. So Kabbalah always had what is called theory and experiment in contemporary science, but absolutely was not «mystic» (irrational) tendencies of Judaism, as many people considered up today. Talmud, apart from metaphoric deepening of Torah text, gave beautiful «gymnastics» to the mind for many generations of Talmudists. So. Many Kabbalists were outstanding Talmudists of their time. However, it does not mean the necessity of knowing Talmud for understanding Kabbalah, because they, as it was mentioned above use different methods of Torah explanation. In Kabbalah, as well as in secular science, real revelations sink in the sea of publications that are superficial and even distorting the contents. But as a rule, time puts everything on their places.

The highest scientific authority for modern researchers in Judaic and Kabbalah was Rav Arie Kaplan (professional physicist, who died comparatively not long ago, being 46 years old). After reading his works the author came to the conclusion that A.Kaplan had been thinking as systemologist using model approach (see Appendix 2). This book could not be written without author's acquaintance with many works of this outstanding scientist. Also it was he who paid attention onto system insight of famous Kabbalist of 18th century – Ramhal. Textual analysis, made by the author in the paragraph 4.1, revealed six system propositions of Ramhal, which became later basis for systemology.

Undeclared war between physicalists and systemologists is probably equal to undeclared war between Talmudists and Kabbalists. No doubt that Ramhal was one of victims of the war, obviously non-bloody.

In the introduction to «Living Torah» (unique translation of Torah into English with interpreter's comments) Aryeh Kaplan wrote: «Though a big part of this translation can be understood by teenager, its significant part may cause interest even for serious researchers». Hoping for the same diapason of readers for this book, the author made big efforts for mathematics appendices does not require knowledge beyond school algebra. If does not mean that the author suggests their obligatory reading for those, who will consider the principal text of book convincing enough.

The book is equally addressed both to religious and non- religious intellectuals. However in discussion of problems of secular science the author intentionally appealed when it was possible on religious scientists. Author wanted to emphasize, that the latter well succeed in «other people's» field, what could not be said about their secular colleagues. Author would be glad, if the took make just a small contribution to improve that regrettable distortion.

I express thanks to the first reader of the book – my son Semen, who made a lot important corrections in the text of the book, wrote abstract of it and Contents in English. I also express thanks to Rabbi Natasha Shirayeva who edited Russian text of the book and made a number of valuable remarks. I am also grateful to Doctors Mikhael Kedem and Valeriy Spidkovsky for useful discussions of some problems, touched upon in the book.

Brooklyn, NY
May 1999

«Postulate on unified G-d energy, which created and maintains all Cosmos (space) is beyond borders of researches. Science can serve as means of gaining such a faith that may design the way of such a conclusion, but it can not go further.

Religious cognition, replenished by scientific knowledge in all spheres of human activity may and have to go further. It must announce ancient truth of religion on the language, which corresponds to the condition of society of XXth century».

Rafael Eisenberg

«If one were to choose one outstanding aspect of the Ramhal's works, it is his systematic approach. One can see this in Luzzato's three major works. This work, *Derech Hashem* (The way of God), is probably the most systematic exposition of Jewish fundamentals ever written».

Aryeh Kaplan

Introduction

Judaism is contained in Torah (Written and Oral), given by Creator to Jewish people. Torah shows the purpose of human being in our and spiritual worlds and gives the picture of Creating and subsequent destiny of our world.

The part of Oral Torah, Kabbalah, not only gives description, but also an explanation of mechanism, managed by Creator, of the interaction of our and spiritual worlds in the limits of human cognition. This knowledge is obtained as the result of more than three thousand years of Kabbalists work, who used revelations of Creator.

During the last three centuries secular science was significantly enriched by knowledge about our world in comparison with knowledge of Kabbalists. This knowledge is based on rules of nature, established by Our Creator, discovered by scientists at His Permission but without His Revelation. This knowledge does not concern principal contents of Torah, as «The Deeds of Righteous People mean more than creation of Heaven and Earth» [1, p. 63]. However, they are acknowledged by Judaism as useful if they are properly applied.

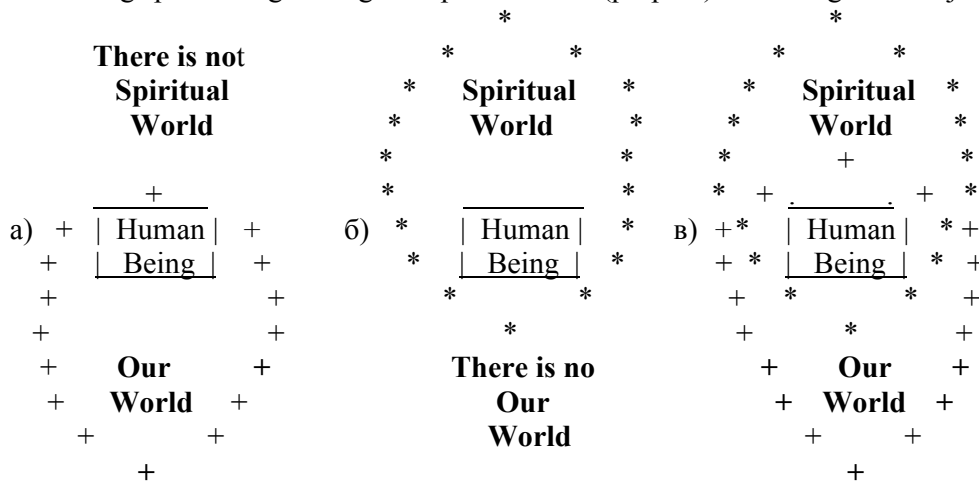
So, there is now some balance between religion (including Judaism) and secular science. Religion predominates in the sphere of moral-ethic relations of people and secular science – in the sphere of production. Self-sufficiency of secular science and Kabbalah in each of spheres noted does not exclude possibility of mutual enrichment of methods, with help of which each of them receives its knowledge. Such mutual enrichment performs already and it is not surprising as both secular scientists and Kabbalists use one and the same apparatus of logic thinking.

1. Evident limitation of a Human being. Is there any use in reading the book further?

Adult people of «childish» period of existence of mankind, as children, did not trouble themselves by questions about possible difference of their sensations from perception of objects of our world and objects as they are. They simply did not see it, considering themselves to be these objects. This tendency of thought is called naive materialism (see Fig. 1a). Later, people went to the other extreme, believing that everything, including objects of our world, with their fellow creatures were only sensations of the person who is thinking about. This tendency of thought is called solipsism (see Fig. 1b). As you can see, there are two extreme points of view and disregarding other considerations solipsism is right – each man has only his own individual sensations. Any attraction of sensations would be excessive thoughts, (speculations). For example, from solipsism logically follows uniqueness of existence of only one thinking person (it disappears even during sleeping). It also leads to denial of existence of our world. Because of absurdity of such consequences of solipsism and common sense, most of the people reject solipsism. The term ‘common sense’ means simply unanimous opinion of absolute majority of mentally healthy people, not connected with any complicated logic decisions or references to authorities. Common sense was on the side of materialism. Let us mention that common sense often let people down . Many scientific discoveries, for example in physics, contradicted to opinions of scientists, based upon common sense. Common sense began also to let materialism down, when the questions about materiality of thought and cognition emerged. Arguments of vulgar materialists, that brain «secretes» thoughts as a liver secretes bile, did not satisfy many scientists too much. It was the only one alternative to those two mentioned above. This alternative is acknowledgment of existence of irreducible from each other essences of material and spirit (their names are not so significant here) . The direction of thought corresponding to the given alternative is called dualism (see Fig. 1c).

Further interpretation concerns with discussion of dualism only, which developed into different trends, studies and sciences. But the reader, being satisfied by one of two first tendencies of thought may decide not to read any further. Such an announcement of the author should not seemed so strange if we take into consideration the psychology of people, who choose simple thing, which does not require further thinking, as opposed to more credible one.

There is no sense to induce a reader who rejected conception of the dualizm to comprehension of more complex conception - existence of the supersensual penetration of the human beings possessing the highest spiritual level (prophet) into the gist of objects.



Pic. 1 Schematic View of materialism (a), solipsism (b), and dualism (c)

2. Occam's Principle. Kabbalah, systemology and processology as fundamental sciences

2. 1. Details of Dualism concept

There are two worlds: our (material) and spiritual (ideal). Spiritual objects exist in both worlds. However material objects exist only in our world. It is connected with the fact that necessary attributes of substance are time and space, but they are absent in spiritual world. At the turn of two

worlds there is a man, as his spirit, including consciousness, presents a spiritual world in its material body. Material objects are divided on simple (non-purposeful) and complex (purposeful). The examples of simple objects are atom, molecule, and body. Examples of complex objects are technical objects, which are alive and performing their specific functions. The spiritual objects are spirits, angels, and daemons and Gods (for polytheists) and one G-d (for monotheists).

For the investigation of the worlds the following categories (undefined essences) are being used: substance, information, action, will, target, spirit, emotion, mind, good (evil), and etc.

2. 2. Occam's principle. Teachings and sciences

It is obvious from common sense, that for description of objects it is not necessary to use more essences than it is needed and sufficient (The Occam's Principle (1290 – 1350)).

Following the Occam's Principle all teaching may be divided onto three classes: superfluous, adequate and insufficient, if the number of essences used in them is consequently more, equal or less than necessary. Furthermore, adequate teachings (they satisfy the Occam's Principle) we shall call sciences. Obviously, science, that covers larger areas, need to use more essences.

So, teachings about simple objects (exact natural sciences), beginning from Aristotle, by freeing themselves from the category of a goal, as well as from excess essences, such as phlogiston, heat-giver, ether and others, turned into science of spontaneous, physical processes, occurring in substance.

We shall call this science - processology. For example, before Newton falling a stone to the ground was explained as its goal to come back to its place. However, when processology is used for investigation of complex objects, it turns into insufficient teaching (physicalism).

In the second half of 20th century series of disciplines of cybernetic directions appeared, which tried to investigate complex objects as systems (further we shall look at simple objects as systems as well). This direction, besides categories of processology of a substance and action, also used categories of information, goal and others and turned into excess teaching on complex systems (cybernetic, system analysis, analysis of systems, operations research, etc). However, when this direction got rid of excess essences such as entropy, negentropy, diversity and others including information, it turned into science of systemology [2]. And again, when cybernetic direction pins chimerical hopes on computer, trying to solve moral-ethical problems, turns into insufficient teaching (cybernetism).

The other insufficient teachings are: Darwinism in its attempt to explain biological evolution, Marxism and Freudism in their attempts to use them to solve moral-ethical problems.

Common for all religions postulate on unrevealing of Creator makes polytheism much more redundant than monotheism. Theosophy give the following excuse for polytheism: «In each Cosmogony behind of Divinity «Creating» and above Him is Divinity the Highest, Plan-maker, Architect and Creator is related to Him only as mediator» [3]. But sayings of such a

kind have no sense, as they concern with essences of higher order, than already unrevealed Creator.

Besides categories mentioned above, Kabbalah includes as separate categories insights : five parts of soul, ten so-called spherot, combinations of which perform actions of Creator and so on. The author did not give analysis of Kabbalah from the point of view of redundancy or insufficiency of essences used by it. However, common direction of methods of explanations given in Kabbalah [4] consists of exclusion of excess essences of polytheism. That's why we will call Kabbalah science as well as processology and systemology.

3 Major limitation of the human intellect. Kabbalah, systemology and processology as fundamental sciences

3.1. Major limitation of the human intellect

Laws, formulated by sciences, obey to major limitation, connected with limitation of human mentality: the higher universality (generality, wideness) of the law, the lower it's robustness (depth, specificity) and vice versa. (Any formulations obey similar limitation). This limitation for formulations is known for a long time. However, it's precise formulation and special importance for sciences was propagated for the first time by the author in the beginning of 90th. (See Appendix 1) The following is a symbolic presentation of the major limitation:

$$(\text{Universality}) \times (\text{Robustness}) = A = \text{Constant} \text{ (Abbreviated as } U \times R = A$$

In fact, if the most universal and robust law existed, there would be enough to know only this law. But such law does not exist. In the reality, less universal law does not follow from more universal law. The first one is just the limitation for the second one. And the law itself should be looked at as limitation. The law claims, that some event cannot occur while specific conditions are not satisfied, but it does not guarantee it's occurrences if specific conditions are satisfied. The event may or may not occur. In the best case, the probability of occurrence of an event is given. Our world is a probabilistic world from the point of view of secular scientist. And not so often occur determination laws where probability turns into a one. Even then, the "miracles" are also possible, when the Creator violates the laws of nature established by him. However, the Creator does it quite seldom under the special circumstances. Principal limitation of the laws of sciences allows classification of all knowledge (teachings and sciences) from the top to bottom, from the most universal to the most robust (see Appendix 1). Then on the very top of sciences there will be philosophy, and on the very bottom such sciences as science of materials, engineering science, biology, sociology, and etc. Somewhere in the middle there will be sciences which by the universality and robustness correspond to the level of theoretical physics. Such sciences we will call fundamental. processology, systemology, and Kabbalah will be placed on the level mentioned above, and therefore, are fundamental.

3.2. Four basic substances

Fundamental sciences have such a peculiarity: they are formulated in terms of concepts, which are called substances. There are the following four substances: substrate, resource, effectiveness and holiness. Material-energetic «matter» of all material systems is called substrate. It is measured by density or intensiveness, for example by mass or its energetic equivalent.

Resource is useful factor for complex system – substrate, time, space, informative or their money equivalent. All these factors are measured, besides informative, which is calculated.

Effectiveness is possibility for complex system to reach its goal at limited resources. Effectiveness is not measured, but calculated, for example through probability of the same event (addition to one of this probability is called risk). The simplest analogue of effectiveness of technical systems is their efficiency factor.

The most simple, primitive goal of the system is determined by profitable for it changes of its resources in number u for resources of medium in number v ((u, v) – change) (determination of medium is given further). Such a goal has lowest animal soul, existing in human being too.

Holiness is the highest substance, which Creator gives to human beings and inhabitants of spiritual world in more or less degree in dependence of fulfilling by them Highest Goals by their good jobs. Holiness in more or less degree exists in time, space, substrate, resources, human beings, parts of spiritual world and their inhabitants. Creator is model of the Highest Holiness. Human Holiness increases with increasing of his likeness to Creator. Holiness is not quantitative substance but strictly regulating objects.

3.3. Irrationality of the foundations of fundamental sciences

With expansion of a field served by science, the number of substances, used by, science increases. In fact, processology (simple systems) uses only substratum, systemology (complex systems) uses also resource and effectiveness, and Kabala (our and the spiritual world with their inhabitants) uses also Holiness. The latter, being quantitative essence, gives Kabala qualitative characteristics, as opposed to processology and systemology. They have quantitative characteristics, as their laws can be formulated in mathematical form.

Therefore, our definition of science has a significant contrast with those definitions of science, which were used by Marxists. According to Karl Marx, there is as much science in teachings as there is mathematics in them. And obviously it contrasts with supercilious expressions of physicalists. The following sarcastic saying about division of sciences into humanitarian and natural belongs to the idol of physicalists, academician Lev Landau. He supposedly said that sciences are divided into natural and unnatural. Such arrogance does not have any basis, as even an aureole of purity of mathematics noticeably lose its luster after renown discovery by Kurt Godel of the effect of incomplete axiomatic – their existence in their boundaries of such expressions which validity or falsity can not be proven.

Fundamental sciences are the highest example of rational ordering of knowledge. However, let's not overestimate their rationality. In fact, using source categories (undefined concepts) and basing on postulates (unproved regulations) only then they are letting mind into their Temple in the form of logical apparatus. So, the basis for the highly rational fundamental sciences happens to be irrational.

This basis is not "Mister's Luck" patrimony, but rather of Creator's Permissions for secular scientists and Creator's Revelations for Kabbalists. Successful findings, such as Euclid geometry, were separated by centuries. Two of such findings: Markov's chains and Neyman-Pierson's criterion. We will describe these two most important for systemology findings in Appendix 5.1 and 5.2. Torah text can have different levels of understanding: literal, metaphorical (emotional), and explanatory (rationalistic).

Such three-unity of Torah is connected with nature of a human being, which usually has one of the dominating in him types of perception of reality: ingenuous, emotional, and rationalistic.

The first type of perception and the beginning of the second can be found even in animals. The third type only is the monopoly of a human being as it's reflection of his highest spirit.

Structure of the spiritual worlds reflects the emotionally-rationalistic nature of a human being, confirming by this that all worlds are created by the Creator for the human being (See point 4.4). Creative demonstrations of a human being in our world in arts (emotions) and science (mind) also agree with the mentioned nature of a person.

Talmud is rich in logical constructions, which use metamorphic interpretations of Torah. Talmud played an enormously important role in formation of Judaism. It also is the greatest intellectual exercise of thousands talmudists during centuries. It's not accidental, that majority, if not all, kabbalists came from talmudists, as it was mentioned in the Introduction. Talmud affected the intellectual 'genes' of Jewish nation, which had a reputation among other nations as "smart". However, in our classifications of parts of Judaism, Talmud is the teaching with metamorphic basis, and Kabbalah is the science with rationalistic basis.

Metamorphic constructions of theosophy try to combine Torah's metaphors with excess teachings of religions of the East. We will not be discussing metamorphic understanding of Torah any further in this book.

Processology for a long time was in confrontation with literal understanding of Torah. Only recently, thanks to newest experimental data, world community of scientists had to acknowledge their agreement with Actions of Creator, described in Torah. We are talking about hypothesis of so called Big Explosion and Anthrop Principle, possibility of spontaneous appearance of Our Universe and Life on it. More details, corroborating this point, may be found in a book by Nathan Aviezyer (5). In this book we will not discuss them any further, although for non-religious scientists such corroboration (using knowledge of people from the times of Giving Torah) is a very valuable argument of Giving Torah by G-d, then the Sinai

4. System insights of Kabbalists. Kabbalah on the structure of the worlds

4.1 Six propositions of Ramhal (textual analysis)

Methods of explanatory understanding of Torah by Kabbalists anticipated the newest methods of systemology. The famous Kabbalist of our time Aryeh Kaplan (1936 – 1983) was the first one who paid attention on it. Characterizing works of Moshe Chaim Luzzato (Ramhal) (1707 – 1746), A. Kaplan writes about the author of the book [6]: « If one were to choose one outstanding aspect of the Ramhal's works, it is his systematic approach. He does not look at various teachings as isolated facts, but as parts of an all-encompassing system. Seeing them as a part of such a system, he is able to point out insights and relationships that would otherwise not be at all obvious. One can see this in Luzzato's three major works. This work, *Derech Hashem* (The way of God), is probably the most systematic exposition of Jewish fundamentals ever written».

Confidence in systemological professionalism of Aryeh Kaplan comes while reading his bestseller "If You Were G-d" [1, p. 34 – 36], where he interprets problem of transforming systems [2, p. 31].

Let us use the method of extending of original propositions of Ramhal. By taking one of Talmudic sayings of Rabbi Pinkhas ben Yair, composed of 11 positions, he, extending each of them created the whole book «The Way of Righteous». We will do the same by extending six systemological propositions in Ramhal's preface to his book [7].

Here they are:

1. « When one knows a number of things, and understands how they are systematically interrelated, then he has a great advantage over one who has the same knowledge without the distinction. ... When an individual is confronted by many details and does not know how

they relate to one another or their true place in a general system, then his inquisitive intellect is given nothing more than a difficult unsatisfying burden».

In modern systemic terminology phenomenon is a system, its portion is a element or subsystem, relationships or connections between elements are mostly called connections, building is hierarchy and step is a level of hierarchy.

If so, the first Ramhal's position contents definition of system: system is combination of elements and connections among them.

But combination of elements with unknown connections and levels of hierarchy, on which they are situated, is non-available for deep cognition by conglomerate.

2. «Each detail will arouse his curiosity, but not having access to the concept as a whole, he will remain frustrated».

The second position has the following systemic formulation. Investigation of separate subsystem inspires a researcher to investigate deep into it (reductionism), but such an investigation is defective, because knowledge of system as a whole is hidden from investigator (systemic knowledge).

3. «If one wishes to understand something, it is therefore very important that he be aware of other things associated with it as well as its place among them... Since he sees it within its framework, he can go on to grasp other concepts associated with it...»

The third proposition has the following systemic formulation. Significant part of subsystem's behavior depends of its connections with other subsystems of the system, but it is hidden from one who investigates separate subsystem. However, it is not the case for a person who accepts system as a whole. As he sees the whole system, he can investigate inside it any subsystem, which he addressed. Here is the preference of systemic investigation in comparison with reductionism.

It reveals emergent behaviors of the system, which are not determined by behaviors of separate subsystems composing the system.

4. «... the things are not all in the same category and level. The categories are both varied and numerous, and as they vary, so do the rules and principles associated with them. ... It is also important to realize that the number of individual details is so great that it is beyond the power of the human mind to embrace them and to know them all. One's goal should therefore be to attain knowledge of general principles».

The forth position has following systemic formulation. Systems have different types and are on different levels of system hierarchy. Each type and level of systems has its specific rule which corresponding systems obey. But it has to be understood that we must not go into details, that is we must stay on fundamental level, trying to discover sufficiently universal laws. This proposition ascertains variety of specific laws for different systems and may serve as source for principal limitation of Laws from which impossibility of deriving of less universal rules from more universal ones follows. However, here the most important is warning about danger of going into details of regularities, which has as we shall see further – the system models.

5. « There are, however, certain primary elements that must be recognized as part of the essential nature of each concept. Out of all the levels and categories, one should be able to distinguish the following: the whole and the part, the general and the particular, the cause and the effect, and the object and the associated qualities».

The fifth position has following systemic formulation. All types and levels of systems and laws, describing them, available for human comprehension, may be interpreted in terms: system and subsystem, general and detail, cause and consequence, system as itself and what is adjoined to it. In the other words, logic thinking, given to human being, presents the limits of what he comprehends. How broad are these boundaries ? Which systems are outside of

them? How much we may trust to logic conclusions? The last Ramhal's concept is connected with these fundamental questions.

6. «Beyond this, one must look into the nature of the thing itself, determining whether it involves an absolute or limited concept. If the concept is limited, he should ascertain its limits, since even when a concept is true, its truth is corrupted if it is improperly compared with something, or if it is taken outside its area of validity».

The sixth position has the following system formulation. Bounded systems have limits of their abilities. It is important to determine these limits. As any assertion on ability of system in certain limits will be wrong outside these limits. An example of system's may be its power and more concrete – its effectiveness. The last may have quantitative expression (see further).

4.2. System methods of Kabbalah and their development in Systemology

Kabbalah is not limited by using of comprehensive apparatus of Systemology, by criticism of reductionism and imaginations about emergent behaviors of composite systems. Kabbalah shows their variety and importance of discovery of universal laws of system's functioning, especially of those that limit their abilities. Kabbalah knows about constructive methods, which were widely used in Systemology later on.

4.2.1. Systems Consolidation

Let's begin with the most important rule of system's 'Consolidation', simplifying analysis of system, but different from reductionism. One example of using of this rule from the book [4, v. 1, p. 55] is following: «All created can be divided onto three levels: a) Infinity; b) World of Atselut; c) Worlds of Bria, Ezir, Asiya. The book «Zogar» uses only three last worlds – Bria, Ezir and Asiya, but Infinity and the world of Atselut only in their interdependence with worlds of Bria, Ezir and Asiya».

In general case of consolidation rule, used in systemology means following: instead of the whole system, the part of its subsystem is preserved. The rest of the subsystems are grouped into one «integrated» subsystem, which is called medium for other subsystems. All connections among them are preserved. Connections of subsystems inside medium are not taken into consideration [2, p. 18 – 19].

4.2.2. Connection of Galevi principles with Ramhal propositions and principles of Systemology

In famous book of Rabbi Jehuda Galevi (1075 – 1141) «Kuzari» [8, p. 323 – 325] there are six principles of Truth cognition. The first four of them are:

«The first principle – admission of The First Cause... Persuasion in it appears in the heart of everybody at contemplation of the most affairs of creation...

The second principle – admission of intermediate causes... So, semen and blood – material of creation of human being and they are connected by organs of generation...

The third principle – admission of the fact that G-d gives to each material body the best and the most perfect of all possible forms...

The fourth principle – admission of existence of higher and lower steps... The lowest plants is higher than the highest mineral, lower animals is higher than the highest of plants. The same thing – the most trivial of human beings is higher than the highest of animals...»

Let us comment these principles.

The first principle, besides existence of postulate of First Cause, concerns the nature of perception and cause-effect reality by convincing oneself in it. But by this conviction is

abstract (logic) perception of corresponding cause -effect rules, to, which the fifth Ramhal postulate appeals.

Reductionism strives to reveal the First Cause of all phenomena of our world, to go into micro world of elementary particles, after which looms emptiness. The first principle leads reductionism out of philosophic deadlock by recognition of the First Cause.

The second principle leads the first principle out from practical deadlock. Really, a way out of philosophic deadlock leads immediately to practically unavoidable difficulties. It is practically impossible to follow each event by watching the whole chain of intermediate causes and effects between the First Cause and occurrence of the event as final consequence of it. Yes, Creator was the First cause of creation of all human beings by creating the first man, but the intermediate cause (see the second principle) is sufficient for «working explanation» of appearance of this man. So, the second principle leads out from practical deadlock of reductionism and supplements critics of reductionism, which is contained in the second and third Ramhal's postulates.

The third principle talks about optimal properties, which Creator gave to his creations and was an important addition of the sixth Ramhal's postulate.

And finally, the fourth principle, choosing as the most important property the step of the object, defines it (as it can be seen from the example of biologic hierarchy), as the level of hierarchy. The fourth principle emphasizes by its principal significance of hierarchical structure of worlds and also justifies that of the terms step and level of hierarchy, used in the first and fourth Ramhal postulates are synonymous.

Besides, ascertaining structure of worlds, the fourth principle justifies possibility to cognize reality with help of the second principle, starting not from the First Cause, but intermediate causes (intermediate levels of hierarchy).

Let us go compare listed principles and comments to them with three principles of systemology. Let's list these principles [2, p. 20 – 22]:

«Systemology establishes rules, managing composite systems on principally another logic background (before it is said about empiric laws of processology).

The 1st principle (formation of laws). Feasible models are postulated, and from them laws of more complex systems are derived as theorems...

The 2nd principle (of recurrent explanation). Properties of systems of the level are derived as theorems (are explained), following from postulated properties of elements - systems of directly lower-rank level and connections among them.

For example, derivation of biocenosis properties from postulating properties and connections of populations, composing it; derivation of population's properties from postulating properties and connections of specimens composing it, etc...

The 3rd principle (minimax construction of models).

Theory has to be formed of the simplest models of systems of increasing complexity. Each of them has to at least in minimal (min) degree reflect each of increasing (max) levels of complexity the systems behavior...»

Further, it Then [2, point 1.3.6.] is explained, that in systemology optimization models are investigated. «Optimization models make the background of the theory of complex systems, and monograph itself [2] begins by words: «Only hierarchical regulation of the world allows to observe its diversity».

It is obvious that the first principle of systemology agrees with the first principle of Galevi – both principles tell about abilities of logic cognition of reality.

2nd principle of systemology simply intensifies requirements of the second Galevi principle – to give explanation starting from immediate lower-rank level, but not from intermediate level in general.

The 3rd principle of systemology explains technology of construction the optimization models of objects as systems, working out in detail the third principle of Galevi, which postulates optimum of all Creator's creating.

The importance of hierarchical structure of the world for possibility of its cognition, underlined in systemology, completely agrees with the forth Galevi principle in combination with his second principle.

This striking conformity of principles with time of formulation divided by millennium makes us to acknowledge supernatural, sagacity of their discoverer. Here it is necessary to point out not only depth of principles as they are (they may be explained even to a teenager), but also a fact that they were derived from the sea of postulates, principles, axioms of different teachings and became a basis for one of fundamental sciences – systemology.

Let us mention that the second Galevi principle is also used in fundamental processology, for example in Newton mechanics for objects, investigated as material points without penetration in their molecular structure. For the first time this principle was precisely formulated in biology by D. Bredly [9]. The third Galevi principle is known in biology for a long time as «Principle of optimality in biology». This principle reached its peak in nomogenesis of L.S. Berg, opposing to Darwinism (see Appendix 6.2.).

4.2.3. Initial postulate of Kabbalah as second order reflection

Initial postulate of Kabbalah is the answer on question: why Creator created worlds? The answer is : "To give maximum of Good to the creations".

It is also postulated that Good comes form Creator and means for the person approaching to Him (likening to Him). From this follows that if Creator gives good to a human being then human being has to give Good to Creator. So, the following situation has place for a person. Acceptance of Good by a person (action), then everything happens in person's mind: accepting of Good from Creator as giving Good to Creator (estimate of estimate of action). So, according to Kabbalah, The Highest goal of a person is giving Good to Creator by accepting from him maximum Good [1, p. 52; 4, v. 2, p. 15].

General case of a described situation, called reflection (10), has the following symbolic notation:

(Action) → (Estimate of action) → (Estimate of an estimate of action) → ...
→ (Estimate of an estimate ... of an estimate of action).

Thus, initial postulate of Kabbalah is the reflection of a second order (self-appraisal is the reflex of a first order). Reflective analysis, using simple models of complex intellectual systems was developed by V. A. Lefebvre and is the highest section of systemology. As opposed to cybernetism, which uses complex computer models, reflexive analysis caused a break in constructive resolution of moral-ethical problems. Difference in moral directives of atheism and monotheism leads to two well distinguished ethical systems in boundaries of reflection of a second order! These systems agree correspond to totalitarian and democratic formations.

An example of a modern use of reflexive modeling for "explanation of strategies) of Creator is given in mentioned previously A. Kaplan's bestseller (1), where it is included even in it's title : "If you were G-d?". Taking the baton from A. Kaplan, the author of this book gives systemological quantitative (risk) interpretation of A.Kaplan's model in Appendix 2.

It is meaningful to underline again, that here we will talk mutual enrichment of methods but not about substitution of one with the other.

4.2.4. Free Will and the decision act. The role of decision act in Systemology

Along with the initial Kabbalah's postulate the basis for 'explanatory' construction of Torah is a statement about free will of a human being, given him by Creator. This allows a person to choose in his actions Evil instead of Good. As the result, in our world occurs accumulation of Evil and Good in certain proportions and all processes in it acquire logical closure (completeness).

Free will is shown in all creatures including a human being on the lowest animal level, when we are talking about choice of any material alternatives. Such a choice can be imitated in corresponding blocks of technical systems.

Understanding of the overwhelmingly important role of a simplest case of a demonstration of a free will in a form of, so called, decision act was crucially important for systemology as well [2, p 18].

The thing is that Wiener's cybernetics (ideological basis for cybernetic movement) emphasized an importance of homeostasis of systems provided by negative feedbacks. As homeostasis exists in systems of any nature: physical, biological, etc., it can not act as an indicator of system's complexity. On the contrary, act of decision may be such an indicator, so it is used in systemology as indicator of system's complexity. Act of decision is defined as purposive choice of alternatives also with a help of accidental mechanism of subjective probabilities (here, intellectual choice is not necessary at all).

Let us show a profound classification of systems, connected with our conception of complexity.

A system is called decisive if the act of decision is inherent in it. A system, which includes in it at least one decisive sub-system is called complex. Systems, not capable to perform the act of decision are called simple ones... In particular, decisive systems are complex systems.

In the order of complication of behavior further there are self-organizing system, which revise their experience to increase the effectiveness of behavior.

Then they are followed by foreseeing systems (yet before intellectual level). The level of their complexity has to significantly exceed the level of environmental complexity. Having the powerful enough memory (for example genetic memory), remembering origins of its interactions with medium till the very moment, and suggesting that «tomorrow will be almost the same as today», they prepare beforehand and perform their adequate actions yet before future influences of medium. Reflection is the highest form of the behavior of complex systems of intellectual level.

The highest type of complex systems are transforming systems. They preserve only their structure (connections among elements), meanwhile their elements can be variable. For example, community of populations with fixed «specialties» (connections), when populations may be represented either as highest mammals or pouches.

Let us not that transforming systems in their ephemerally is closer than other inhabitants of spiritual world. From systemic classification only Creator comes out as He is Single (does have to parts) and so does not have systemic description.

4.3. Kabbalah about structure of the worlds and behavior of their inhabitants

Below we just sketch concepts of Kabbalah on the structure of worlds and behavior of its inhabitants. Our world and spiritual world do not exist in isolation, but rather they interact with each other under the supervision of Creator. The supervision comes directly from Creator, but more often it is done through His servants – Angels. The spherot, mentioned

earlier, can be viewed as 10-letters alphabet, on which the program of Creator's action is written [4, vol. 1, p. 55, 61].

Kabbalah states that for each event in our world (to each branch) corresponds its Original (First) cause in spiritual world (root). According to degree of closeness (similarity) to Creator spiritual world is divided into following worlds:

Atzelut (radiation), Briya (creation), Etzira (formation) and Asiya (action) (the highest part) with its inhabitants – Angels and righteous souls. The lower part of the world Asiya (action) constitutes our world with its inhabitants. Then, in the order of decreasing closeness to Creator, in «Mirror reflection» to four spiritual worlds of Good there are four worlds of Evil with their inhabitants – sinful souls and angels (demons) (Fig. 2).

Mirror relation of the worlds of good and evil does not imply the parity of the Creator and the Satan. The later depends on the indivisible G-d the same way as everything that exists. However the Creator prepared for the Satan a special role – to be a tempter of Man. The Satan plays this role from the time of Adam and Eve up until now. The Creator made the Satan extremely independent in fulfilling his mission and provided him with an assembly of demons that are accountable only to him. The Creator equipped Man with freedom of choice between good and evil in his thoughts and actions. He urged Man to righteously serve his G-d, and to make this service more significant he established the institution of Satanic Temptation.

Universally penetrating, not localized presence of the Creator in the worlds that were created by Him is not compatible with any material concepts about Him. The same is true about the Satan, whose wicked tempting power penetrates this world by means of the ideas, doctrines and ideological movements based on these ideas and doctrines.

It had been noticed that in order to gain more tempting power the satanic doctrines often dress themselves into “G-d words” garments. The examples of such doctrines are: Bolshevism, Nazism and Islamic Fundamentalism. These doctrines have been implemented every time by the seduced by them sinners. The Judaism is not compatible with the superstitious conceptions of the polytheists about an assembly of evil spirits that surround a man.

Let us introduce undoubtedly distinguished types of material systems, composing hierarchy of our world and omit the intermediate ones (see Appendix 6.3.). We will receive following hierarchies: a) physical: quark, neutrino, electron (proton, atom, molecule, body); b) biological: cell, specimen, population, association (biocenosis), biosphere; c) religious-ethnic: human being (inspired), family, ethnos, mankind, prophet (Fig. 3). On the same Figure by sign «?» we marked acknowledged but unexplained by secular science quantitative jumps from one hierarchy to another and also The First Cause of «Great explosion». The other phenomenon, unexplainable by secular science, is «sudden» rise of humanistic monotheism of Judaism in the ocean of paganism in relatively wild tribe. Clearly non-evolutionary character of this phenomenon, its alienation to human nature is confirmed by endless denials of humanitarian basis of Judaism by «stubborn l» masses of Chosen People (Exodus, Chapter. 32, poem 9). And only greatest efforts of Leaders and Prophets with help of Creator turned stubborn masses to the Way of Torah. That is why, according to Judaism, Prophets are not only higher (more holy) than people, but in some sense they can be placed above the whole mankind, as conductors of Creator’s Will. In our world there are armadas of technical systems with specific functions of support of human being: services, living conditions, transport, etc. (see Fig. 3 d).

Let us list stations of spiritual systems with worlds of their inhabitance [12, p.35] (Fig. 2).

A stations of Angels inhabits the world of formation of Good (dwelling of pure emotions), station of seraphs (higher angels) inhabits world of creation (dwelling of pure intellect). Correspondingly, a station of demons exists in the world of formation of Evil (the dwelling sin emotions) and a station of lower demons exists in the world of creation of Evil (the dwelling of sin intellect). Emotion-intellectual structure of spiritual worlds, corresponding to emotional and intellectual parts of human souls shows that these worlds were created by Creator for a human being (see point 3.3.). And in a spiritual world there is a station of righteous souls in the world of Good and station of sinful souls in the world of Evil (Fig. 2).

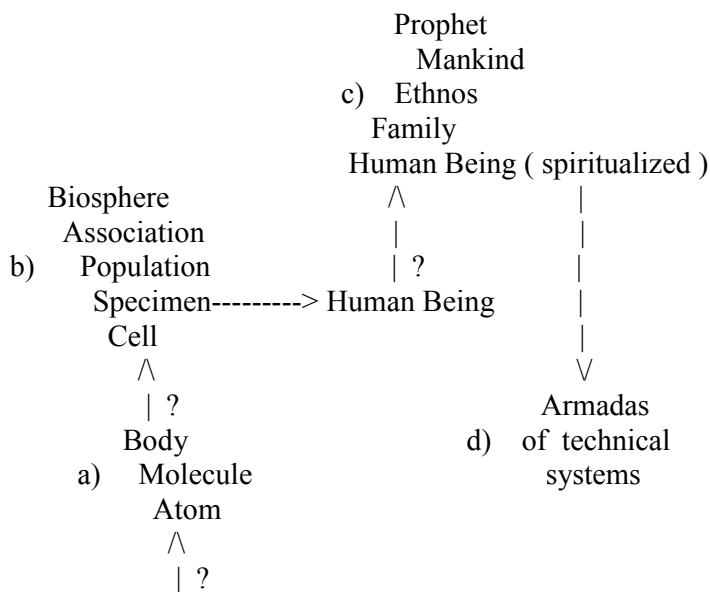


Fig. 3. Our World. Its hierarchies: a) physical, b) biological, c) religious-ethnic, d) armadas of technical systems. Question marks signify qualitative jumps, not explained by secular science.

Kabbalah, in contrast to pantheistic superfluous teachings, strictly limits area of investigations of spiritual world and its inhabitants, considering abilities of human intellect.

At the same time e systemic approach y of investigations is maintained by using described earlier method of isolation . In fact, our spiritual world is isolated too, besides world Atzelut, inhabitants of our world and from inhabitants of spiritual world their unique kind – souls [4, vol. 1, p. 55 – 56].

It is necessary to remember, that only in boundaries on the qualitative level (basis substance – holiness – is not quantitative essence) Kabbalah gives rationalistic dynamic picture in our world and cause-effect picture in spiritual world of worlds' interaction under the supervision of Creator.

The Act of Creation here and control of the worlds by Creator should not be understood in vulgar sense, as continuous «element wise assembling» of systems. Creator predetermined finale of general way of history of worlds. Movement toward a finale is performed by Creator with self-organization of worlds, governed by Him. It consists of series of His interferences into mechanisms of self-organization of systems, created by Him (for example, genetic ones) in direction necessary for Him (see Appendix 6.1 and 6.7).

Because of Free Will of creatures and human being not always expected outcomes take place. Therefore, sometimes Creator has to eliminate creatures worthless according to His Norms (Highest Selection). The highest selection is mentioned in Torah and its traces we can see in geological history of the Earth .

Due to given to a human being Free Will, Creator puts only human being under continuous supervision individual for each human «... as human being was chosen by Him for awards and punishments correspondingly to his deeds... watching at human being differs from that control which He performed over all other species... So, here watching at each separate creature is performed only in connection with events, which might influence the destiny of a whole species... Because the goal of each species is only to keep the whole species. But each representative of human gender is at private watching. The court investigates his personal case. And G-d wills are directed onto each of people separately and they consider the tiniest details of his deeds and life» [6, p. 51 – 52].

In this is major difference of individual moral-ethic approach of Torah to human being from probabilistic examinations of «average statistical » human being and species in systemology. Therefore, for example, even if the risk of human being death, estimated by methods of systemology is equal to one millionth, he has to pray to Creator that he did not select him to be the one from million, about whom we say: «he was not lucky».

Authenticity of information about Creator's interference into events of our world are often called in question among atheists, without even speaking about authenticity of information on spiritual world and its inhabitants.

Let us look briefly on these questions paramount for atheists.

4.4. Sources of experimental knowledge

Experimental knowledge about our world is available to all the people with help of five senses and to scientists with help of with special tools . Experimental knowledge of spiritual world is not available to all the people.

However, it is available to some people, for example to prophets. In the explanation of this effect there is a consequent connection (link) with consciousness, sub-consciousness, soul and spiritual world [4; 6, pp. 54 – 56; 7, pp. 92 – 117]. The important roll here plays state of a person, called meditation . Indian yogis reached the highest art of going into such state .

Aryeh Kaplan [13] considers that in old times in Jewish environment the technique of meditation had mass distribution, but in modern time it was lost, remaining in possession

only of a narrow circle of Kabbalists. The unique example of the result of penetration into spiritual world is the blueprint of the Third Temple, given with amazing details by Ramhal, the great Kabbalists [see 4, vol. 3, p. 106]. Impressive summary of modern experience of a human communication with spiritual world together with contemporary scientific evaluation of authenticity of such experience is given by Michael Kadem [14].

The most important criterion of verity of experimental data is their reproduction and mass character. This requirement can be ideally satisfied for a classical laboratory experiment. But observations «on site» already do not satisfy these requirements. And computer experiments on models of reality go even further from physical experiments.

Modern practice of experiment on such ephemeral objects as elementary particles and atoms does not correspond to ideals of classic laboratory experiment. «And modern equipment as itself... requires... practical experience in profession. Experiment in modern physics stopped to be accessibility of each cultural person» [15, pp. 121 – 122].

Another method of contemporary substantiation of credibility of some events is used in juridical practice. It consists of mass character of people's testimonies. . The same method always followed the religious experience too.

Religious experience of people in our and spiritual worlds consists of multiple non-contradictive revelations of some prophets and also of rare events in site – «miracles», seen by masses of common people. The Greatest Unique Event of such a kind was Sinai Revelation.

The requirement of mass character both in secular and religious experience is quite interesting one. It is symmetric: in the first case multiple experiments or observations by one person is required and in the second case one phenomenon is observed by many people.

Verifying credibility of scientific hypothesis or its alternative requires to present to investigator conditions of a critical experiment before the experiment itself experiment . During the experiment the researcher has no right to change these conditions for the benefit of hypothesis (requirement of a priority (see point 6.3)).

5. Limits of power (sixth proposition of Ramhal). Importance of his fourth proposition.

Mutual enrichment of methods of Kabbalah and systemology can be taken in more narrow boundaries in hope to receive more results. We will conduct investigation in the boundaries of the problem of determination of limits of strength of complex systems of different types (sixth proposition of Ramhal).

This problem beside philosophical, has it's practical meaning. In fact, without knowing these limits, a person, and sometimes the whole country, can set unachievable goals. Attempts to achieve such goals lead only to useless waste of resources, which can be accompanied by the lethality.

We all were witnesses of chimerical goals of communism and fascism. The attempts to accomplish these goals and then resistance to them had demanded from mankind unexampled sacrifices.

As so, do such limits of power exist?

Simple, non-purposeful systems do not have power (might) at all. Behavior of complex systems has different degree of power. Monotheists assign maximum power to Creator who gave a maximum power to a human being among all Earthly creatures. Increase of power of a person in our world especially over the last century was revealed. This was predicted in the main Kabbalistic book 'Zogar' in the second century. It says there: " And in 600es years of 6th millennium the gates of wisdom will be opened on the top and the source of wisdom on the bottom".

Culmination of a growth of 'strength' might of mankind was the creation of nuclear weapon in the mid 20es century. The end of past century together with information boom was marked as the beginning of a computer era.

For the research the limits of power of complex system it is important to know demonstration of this power in the different qualities of this systems, corresponding different demonstrations of power.

5.1. Torah about various manifestations of power (textual analysis)

The change in the level of human might, described in Torah, usually follow schema shown below. Human being has certain level of power given him by Creator. Then he, without permission, raises this level by sinful acts. In response, Creator lowers the new level to the limit correspondent to the sinfulness of person's actions.

Interesting analysis of sinful actions of after the original sin before and after The Create Flood was given by Nathan T.L. Cordozo (16, p26-40). He thinks that in the first case it was Anarchy with the attempts of illegal enrichment by robberies (infringing on a private property), and in the second case people were afraid of the repetition of a first case and they ran into the other extreme - Totalitarianism. With this empire of the tyrant Nimrodus led to egalitarianism, absence of the freedom of speech and to restricted raise of a human power in general. It is obvious, that Creator could not be 'scared' by the builders of Babylonian tower. With his responsive actions He condemned, for ever and ever, Anarchism and Totalitarianism.

Further, we will analyze only partial aspect of the given schema: different methods of lowering by Creator the power of a human being, that help to reveal different types of it's demonstration.

The first man, Adam, placed by Creator into the Garden Of Eden, possessed a power of almost an angel. As opposed to an angel the man needed food, but it was given to him without any effort. However, he immediately increased his might by tasting a fruit from a Tree of Life (the Original Sin). Putting a stop to further rise of man's might by tasting a fruit from a Tree of Live (that gave immortality), Creator expels Adam and his wife, Eve, from Eden. With this the level of their might was dropping.

From now on Adam and his offspring will have to work to get food and the limit of duration of life of a human being will not exceed millennium. The person will be given an ability to reproduce and this will lead to potentially unlimited duration of life of mankind (See Appendix 2).

Punishment for the anarchical sins of mankind was the significant decrease of its quantity by the destructive Great Flood, sent to Earth by Creator. However, after the Great Flood, Creator promised Noah's offspring not to destroy the whole Earth because of their sins. Once again, he lowers the duration of life of a human being to 100 and 20 years. (that's the source for a Slavic world 'person').

As a result of totalitarian sinful acts, the power of a man grew tremendously. And people decided to build the Babylonian Tower as a symbol of their might. In order to limit the might of people, his time Creator decided to divide unified mankind into many separate nations. He did this by substituting one language, common to all mankind, by separate languages for each nation, which could not be understood by the other nation. Breach in communication caused a breach in unity of mankind and in particularly stopped the construction of Babylonian Tower.

Further growth of mankind power was supported by placed into it by Creator mechanism of self-organization, which was controlled and governed by Him, in such way that this growth was strictly divided in dozes.

In spite of this, its modern level is so high, that now mankind is on the edge of self-destruction.

So, Torah teaches us the following: Creator established certain limits of power for creatures, human being, and angels. In Torah as one of the characteristics of power is mentioned minimum price u (in particular amount of work), for acquired recourses v (in particular quantity of food).

The most important characteristics of power of a system is its reliability, which is characterized by duration of life of a system. Decrease in number of groups of systems and dissociation of their actions decrease their power. The decrease in number is caused by destruction of their communications (difficulties in signal exchange, in particular because of the noises). Self-organization is one of the types of increase of power of complex systems.

5.2. Systemology - the theory of potential power (effectiveness)

Further instead of some emotional term «might/power» we will use its rationalistic equivalent «effectiveness», which was defined earlier in this book. Let us study special cases of effectiveness, induced by Torah in order of activity of corresponding characteristics of complex systems. They are as follows: reliability (resistance to disastrous influence), noise immunity (differentiation of signals in the presence of noise), controllability ((u , v)-exchange) and self-organization (adjustment of mentioned characteristics to changing environmental conditions of).

The last half of the century attention of systemologists was drawn to those characteristics of complex systems. However, in living systems these characteristics are so much «interweaved», that biologists could not recognize them separately «in pure state». And only engineers of Universal Laboratory of Technical Progress of the 20th century managed to reveal them in a pure state in complex technical systems.

As the cognition of simple systems qualities from Newton's times was occurring in the boundaries of natural sciences (processology), cognition of listed characteristics of complex systems took place in the middle of 20th century by wide communities of engineers, out of boundaries of natural science. Not in vain the Great pioneers of such cognition were outstanding engineers of our days V.A. Kotelnikov and Claude Shannon.

In fact, in «feeble current» techniques of communications, because of continues invention activity of the mass of communication engineers, noise immunity of receiving – transmission communication system was continuously increasing. However, before the 2nd World War the process slowed down (the period of saturation). The question came up: is it insufficient invention activity of communications engineers or there exists fundamental limits to noise immunity?

The answer was given in PhD's dissertation of V.A. Kotelnikov, which had the title «The theory of potential noise immunity» defended in 1946. In it was shown the limit of noise immunity and method of its achievement for the most important so-called normal-fluctuation noises. It appeared that at fixed resources: energetic (relationship signal / noise) and temporary (delay u of signal reception) almost reliable (with the probability to $P = P(u) \rightarrow 1$ for large u) we can differentiate no more than $v = f(u)$ signals for any methods of their transmission and reception, where $f(u)$ is a definite function, independent from physical carriers of a signal.

Later on, in 1948 independently from V.A. Kotelnikov, Claude Shannon received the same result for wider class of noises, but in special case of increasing duration u of signals'

reception. It also appeared that $P = P(u) \rightarrow 1 - \exp(-K u)$, where K is some positive constant. That result later was constituting the basic contents of his theory of information.

In the same years, independently from signalers, setting automation of production and operation of complex technical systems, mass of engineers-administrators continuously improved their administration by intensive invention activity. In 60th in connection with rapid growth of large radio-electronic systems and computers the question of reliability of their operation came up with a high importance. . Independently from signalers and administrative engineers the task of finding solution to the problem was given to the mass of engineers which were working on increasing of reliability of complex technical systems by different methods of duplicating and searches for malfunctions . And again, as in cases of noise immunity and controllability, their came the period of saturation in reliability and the same question appeared.

In 60th the author found limits for potential reliability and controllability of the same kind $v = f(u)$, that the limit of potential noise immunity, independent of substrate of the corresponding complex systems. The derivation of the first was based upon elementary probability expressions, and conclusion of the second used profound results of J. von Neumann on the theory of games [17].

For (u, v) – exchange in the case of reliability - u is the number of elements of the system, and v is the duration of its life, for which it pays by elements out of order. For sufficiently general conditions of coming of elements out of order, the law of potential reliability states the following.

For unlimited duration v of life (immortality) of a system it is necessary to have at least logarithmic growth of the number $u > C \log v$ of its elements. Here C is a constant, dependent on probability of death of the one element. It follows from here, that all the finite systems are mortal. However, necessity of minimax logarithmic growth of the number of elements of a system for its immortality is not trivial. (it explains, for example, empirical Bakman's law [18]) (see Appendix P. 6.4).

For (u, v) – exchange in the case of noise immunity - u here is the delay in signal reception and v – the number of known signals, from which in a presence of noises only one transmitted signal is distinguished .

At sufficiently wide class of noises the law of potential noise immunity in the Shannon's case leads to exponential dependence of the number of signals $v = \exp(u H)$ from delay u , where $H < C$ and C – maximal constant, dependent of probability properties of noises.

And at last, for (u, v) – exchange in the case of controllability - u is duration of a control and v – acquired as a result of multi-step game, in the sense of J. von Neimann, resources, in sufficiently general case of one-step drawings of payments. Here we examine cases of indefinite indifferent environment or conflict situation with ill-intentioned opponent. The law on potential controllability leads to linear dependence of resources of $V = C u$ from duration of u , where C – maximal constant, dependent of one-step payments.

In all three examined laws time characteristics are discrete with their intervals of discreteness, taken as unit. The first law is concerned with optimal acquirement of time resources, and d two others are concerned with their optimal expenditures for information orientation in environment in order to optimally get new resources (closed loop). These questions are reviewed in more details in Appendix 6.6.2. All these laws concern structural – behavior qualities of complex systems, so as laws of processology concern substrate of simple systems. These properties are following: reliability (R – quality), noise immunity (I – quality) and controllability (C – quality). Here are abbreviations of English terms: Reliability, Information and Controllability correspondingly.

The most important is difference in relations of laws of processology from the laws of systemology to an experiment. To deny empiric laws of processology one experiment is

sufficient. But an experiment can not deny or confirm the law of systemology, as this law has abstract character. So, it does not need experimental confirmation. And its discrepancy with experiment tells us that the class of models, for which it is true, does not contain that model, which corresponds to real system used for experiment.

This situation was discovered for the first time by U.R. Ashby, who claimed that systemology does not tell about what is present, but rather about what can be. Let us describe the method of simplification in the form of as literate deviation of excessively complex problems.

We already discussed the impartiality of separate qualities interweaved in a real complex system. The precise estimate of effectiveness of the system is practically impossible. Instead of it, the upper estimate of effectiveness is given by following method. Models of system are built with respect to each individual characteristic while holding other characteristics constant. For each of them overstated estimate of effectiveness of an individual characteristic of a system is received and then using these estimates, overstated estimate of effectiveness of a system in general is derived. If this estimate is less than given effectiveness, then, obviously, effectiveness of a real system will be less.

Well-known specialist in investigation of surgeries T. Saati tells about his field of knowledge with the words, completely applicable to systemology too. He says that this field of knowledge gives poor answers on the questions on which other fields of knowledge either do not answer at all, or give even worse answers.

It should be mentioned that maturity of fundamental science comes when it point to limits of abilities of described by this science system, according to sixth proposition of Ramhal. This happened with systemology, when to 60th of 20th century laws of potential effectiveness of some properties of complex systems were discovered. In processology laws of preservation of substance and energy, discovered in 18th century, were analogous to ones in systemology.

5.3. Systemology – an intermediate science between processology and Kabbalah

Methodologically systemology is important as a intermediate science between processology and Kabbalah. It can be seen more clearly in metamorphosis of quality of stability of simple, complex and spiritual systems: strength, reliability and invulnerability correspondingly.

In fact, strength of simple system is achieved by permanency of composition of its elements (substrate), due to powerful connections between elements (for example, inter-atomic).

Reliability of complex system is achieved by permanency of its structure only, due to opposite effect – variability of composition of its elements inside of the structure (for example, metabolism in living elements and substitution of elements which are out of order in complex technical systems).

Using words of J. von Neumann: complex systems are reliable systems, consisting of unreliable elements and remaining only in their structure. The later is much more ephemeral than simple substrate system. Though a complex system cannot exist without substrate, by ephemerally, it is closer to a completely ephemeral spiritual system in comparison with a simple system.

Invulnerability of spiritual systems is achieved in particular because they are ephemeral, and their existence is defined only by Creator's Will, who created them among other things. He also eliminates them when they exceed some limit of depravity known only to Creator.

Fundamental difference of principles, on which stability of simple and complex systems is based, creates properties which corresponds to both types of systems. For example, property

to reproduce systems alike them, connected with reproduction of complex living systems draws our attention.. But can we consider it a characteristics of life? By giving an example of growing crystals, H. von Ferster gives a negative answer and shows really profound property distinguishing living systems from natural non-living ones.

Let us investigate a collection , consisting of N-subsystems, each of which contains n elements. Number n H. von Forster examines as the simplest characteristics of complexity of subsystem and number n N as a characteristic of stability of subsystem as a storage of elements. In fact, this number in fixed volume shows distributive ability of elements, belonging (stored) particularly to given subsystems.

Investigating collections of different subsystems of increasing complexity (increasing n), H. von Ferster names empiric dependence of number nN of number n dependence of «complexity – stability».

By taking elementary particle for an element and atomic weight of atom (number of its elementary particles n) for complexity of atom, Ferster, on the basis of data on prevalence N in Universe of atoms regulated in Mendeleev's Table according to atomic weight (beginning from Hydrogen), discovered, that numbers nN decreases with increase of n.

Taking living cell for an element, average number of n cells in the organism of the given species of animals for its complexity, on the basis of data on population n of different animals on Earth (beginning from unicellular) he finds that number nN increases with increase of n.

Final formulation of H. von Ferster's empiric law «complexity – stability» is as following: with increase of complexity the stability of simple systems decreases, and stability of complex living systems increases. This is a property and not ability to reproduction and not at all F. Engels physicalistic «proteinness», and it makes the difference of living from non-living one according to H. von Forster. He tried to explain this effect qualitatively by the fact that only living systems are capable to «real» coalitions. The author managed to receive theoretical dependence «complexity – stability» for complex systems, coming of the model of so-called vitality, combining such qualities as reliability and controllability [17, 18] (additional information about this law see in Appendix 6.5).

5.4. Where does the failure to carry out fourth Ramhal's proposition lead to?

A burden of Physicalism and «Magic of Numbers»

Search of limit law for self-organization (the fourth property of complex systems) began simultaneously with search of limit laws for mentioned above three more simple properties, but there are no results till now. Probably the formulation of this law goes beyond of human comprehension, being possession of o f the Highest Intellect of Creator. Speaking metaphorically, constant A of basic limitation of scientific laws for human being is much less than for Creator.

Search seemed to be very dramatically. It was under obvious influence of bionics (efforts the build formal models of biologic systems to use them in engineering). Formal and then computer models of perceptrons, neuron nets, evolutionary self-organized models and other «biomathematics» objects filled up cybernetic literature of 60th and 70th as mushrooms after rain. But this abstract boom, as opposed to described technical boom, gave neither desirable results nor even some visible side products.

the exception was the model of so-called cellular automates of J. von Neumann [19], which as side product induced wonderful qualitative model of Biocosmology of V.A. Lefebvre [10, chapter 3], in boundaries of which the explanation of empirical laws of preservation is given, and Janus-faced cosmology tries to explain co-existence of two physically isolated worlds in which interaction is defined by logic rules. It was a big step of

secular science in direction to perception of Kabbalistic mechanism of interaction of our and spiritual worlds!

Let us describe flaws of J. von Neumann's model, which did not allow to discover limit law of self-organization in its . First of all it was based on effect of self-reproduction, rejected by H. von Forster, as the sign of living creature. Cellular automate is the same collection of subsystems, each of which is placed in one cell of a plane, divided into cells, having m states, depending on neighboring cells.

The new in this model was fact, that movement (shift) of subsystems from cell to cell was subject not to physical but to logic laws. As in the model of H. von Forster, subsystems consisted of n parts (elements).

J. von Neumann writes [19, p, 98 – 99]: «We do not know yet what is complexity and how to measure it, but it seems to me that it is correct conclusion, even if to make measurement absolutely primitively – by the number of elementary particles. Below some minimal number of elementary particles complexity degenerates in such a sense, that if less complex than the first. If the number of elementary particles exceeds this minimum, than automate constructs automates of equal and higher complexity. Quantity of this minimum depends of how we defined elementary particles. At reasonable choice, of conditions (for example, as I will describe further) giving one or two dozens of conditions with simple properties, this minimum is rather large – about one million».

So, for the same definition of complexity, that we've seen in H. von Forster, we have here clear definition of a problem to find minimal critical value of complexity for super-reproduction, the same way as minimal order of growth of the number of elements with a time for immortality of system was found. But J. von Neumann could not solve his problem because of overload with details – failure to carry out the 4th Ramhal proposition.

In fact , definitions of cells' states and elementary parts of automates are too concrete . As a result, it is impossible to find analytical expression for critical minimal value of n and we have to limit ourselves with only numerical analysis of this complex construction only. So, self-reproduction begins at $m = 29$, and it was discovered at this critical value n has exponent of a million.

Sure, it is difficult to overestimate contribution of J. von Neumann into formation of systemology, only because of his contribution to formation of limit law of controllability by discovery of game approach to it mathematical formalization. But, being educated on solving physical problems, he, as other great mathematician of his time A.H. Kolmogorov, liberated of physicalism with great difficulties. For engineers V.A. Kotelnikov and Claude Shannon it was not so difficult. For example, J. von Neumann all the time dreamed to liberate from combinatory analysis in cybernetics and turn its apparatus into bosom of regular continuous analysis. He was looking at Claude Shannon's theory of information from thermodynamic point of view and was giving advices to its creator in the same spirit. Claude Shannon, recollecting conversation with J. von Neuman on measure of uncertainty , writes [20]: «I was mostly troubled how to call that value. I thought about calling it information, but the world was too much overloaded so I decided to take vagueness. When I discussed all this with John von Neumann, the later suggested better idea. Von Neumann told me: «You have to call it entropy according to two causes. First, your function of vagueness was used in statistic mechanics at this name, so it has name already. Second, and it is more important – nobody knows what is really entropy, so in the dispute always predominance will be on your side». The further flow of apocryphal as well as thermodynamic explanations of theory of information aggravated confusion in this field even further, which led to following saying of G. Glinsky, with whom we can not disagree [21]:

«They say, that on theory of information is written more nonsense than about any other subject». Probably only Kabbalah may be compared with it. Really, Shannon's theory of

informatics, at it was said, it is theory of potential noise immunity, but not «the theory of measurement of information» and, if it would be such, it would be long ago forgotten.

Magic of numbers is the most ancient companion of mystic speculations, from which so industriously try to separate all of three sciences: processology, systemology and Kabbalah. Magic of numbers does not distinguish between the first and the second sciences and tries to find formal expressions for fundamental constants of these sciences through «magic» numbers.

Jewish tradition did not avoid influence of Magic of numbers in the form of gematrum – numeric representation of the letters of Jewish alphabet with different rules of comprehension of their transformations. Our time added computer for «deciphering» of Torah (see Appendix 5.1.):

«There are people who like to make various calculations, proposed by gematrum. Even Torah already is put into computer and they try to find in it some regularities ... Gematrum is only method of description and information, which contents is open not in knowledge of a number, but in joining to spiritual level of object, nominated by the number. So in real Kabbalistic books they have such a small attention» [4, part 3, pp. 99, 103].

6. Limits of algorithmic power.

6.1. Bremmermann`s Limit and combinatorial difficulties.

Vigorous progress of computer technologies, which we are witnessing now, creates glowing hopes for possibility of solving the tasks of any kind of difficulty, if not by modern computers, but at least by computer of a future. Denying of such possibilities causes doubts on how to establish the limit of power of a computer and on finding and where such difficulties, which it will never be able to overcome, are coming from? It would be especially important if we were talking about the problems vitally important for mankind. Let us begin with the answer on the first question.

U.R. Ashby for the first time drew attention of systemologists into non-physical constant b derived by Hans Bremmermann in 1962 from fundamental physical constants: speed of light and Plank`s constant. It has the following meaning: one gram of material, formed arbitrarily, for one second cannot process more than $b = 2 \cdot 10^{47}$ bit/g.s. of information. From this follows that any hypothetical computer, with a mass of a whole Earth and working for a period of time, equal to a period of existence of Earth would not be able to process more than $B = 10^{93}$ bit of information. Here is fundamental limit of H. Bremmermann (see Appendix 3).

Let us go into description of so-called combinatory difficulties, which almost always accompany resolution of some or how non-trivial vitally important problems. Resolution of such problems, as was first brought to attention of systemologist by U.R. Ashby, is connected with complete enumeration of astronomical number of variations of possible solutions. Contemporary problems, solved by computers in the descending order of their combinatory difficulties are following: routine tasks of preservation and search of information and profound tasks of prediction of complex systems` s behavior and their management . Volume of information processed for resolution of contemporary routine problems are often less than limit B and they are being solved by the army of programmers which creates an impression of unlimited abilities of Computer.

Volume of information, which would be necessary to process for resolution of a profound task of prognosis of complex systems` behavior or their control, is more than limit B and therefore, can never be resolved by a human being. They are solved only by Creator,

for example, by controlling Jewish people, providing them survival during 3,5 thousands years, in spite of all vicissitudes of their destiny.

But let us come back to our time. Masses of programmers, immersed into development of more effective programs written on more effective versions of programming languages, sometimes forget, that in general effectiveness of the problem's resolution is defined by effectiveness of the algorithm of a solution, for which they create software. So, the programmers, who may be reading this book, should not be surprised if further we will talk only about algorithms for resolution of the problems.

The definition of algorithm itself as strict sequence of certain actions, leading to achievement of a final goal (resolution of the problem) is significantly developed in mathematics (for example, in the model of Turing's machine [26]). However, here it is better to equate a concept of algorithm with a category of an action and by doing this to avoid its detailed elaboration, especially as it gives an ability to receive optimal algorithms.

To support the last statement let us evaluate minimal volume of information processed, necessary for search algorithm to find fixed element from a set, consisting of N elements. If it is possible, by separating a set into two parts, to know in which part there is an element, we are looking for, then minimal number of algorithm steps would be equal to an integer part of a binary logarithm $\log N$ (Appendix 3).

Many objects of a search have following abstract structure. Let's be given Basis set (for example, set of colors), consisting of a elements. Then, from a basis set we can receive «complex» set of all subsets (subsets of colors), including an empty set. It could be shown that number of elements of a complex set is equal to $N = 2^a$ (Appendix 6.7). Then, number of bits of search algorithm's by definition is $\log N = \log 2^a = a$ bit.

The most common is the following standard description of the system. The system, described by n variables, each of which takes m values, is examined. Then a set of all states of a system has them in number $A = m^n$ (Appendix 6.7). Let us take this set as a basis and let its complex set contain one desired state. Then, according to foregoing, number of bits of a search algorithm is equal to A and a pairs (n, m) of values for which $A = B$ are following $(n, m) = (308, 2), \dots, (93, 10)$.

Let us try to examine verification of states of arbitrary technical system, consisting of binary parts ($m = 2$), k inputs and l output, when $n = k \times l$ of inputs and outputs $(k, l) = (308, 1), (154, 2), (20, 20) \dots$ can never be verified. However, modern complex technical systems have number of inputs k and outputs l exceeding not only hundreds, but also thousands.

Let us investigate the most important for the theory of «spontaneous» functioning of biological systems search algorithm for their complex enough components (elements), without looking at more complex algorithms of discovering of these components and manipulations over them.

We can image this functioning as continuous support of «falling apart» construction – phenotype with parallel creation of building material (proteins) using some fragmentary instructions of genome of genotype. The fact that this can be managed by some constructional components immediately raises a problem of «guard of guards». In any case all explanatory descriptions of functioning of microbiological systems reveal objects, examined by us previously as a-elementary complex sets (formations of genes and proteins) and standard descriptions of a system with special time interpretation (creodes) (Appendix 6.7). As regards numeric values of parameters the examined formations, according to contemporary data, genes and proteins could be described by «words» of different non-small lengths on alphabets from four – and twenty letters correspondingly. The original parameter a here may vary from one dozen to million (Appendix 6.7). It is intuitively clear, that here situation is more complex than in the previous example. So for a

single search of corresponding components usually a situation comes up that exceeds the bounds, proportional to constant of Bremmermann (see more details in Appendix 6.7).

However, interpretation of such effect here is more dramatic than in the case with technical systems. Just here, as living systems exist in our world, dilemma appears.

We should either admit that preservation of existence of biological system in our world is connected with some powers from another world, or to admit to be groundless at least one from two concepts: corresponding biological theory or constant of Bremmerman or both of them.

As regards of belief in to the first option, it is not so fanatic for our brother-scientists. Regarding second option, here substantiation stands on two whales of contemporary theoretical physics – Einstein’s formula of connection of energy with mass and inequality of Heisenberg, connected with fundamental principle of uncertainty (Appendix 3).

Kabbalah claims that Creator not only created but continues uninterruptedly support existence of our world. It has own models of mechanism of this support, about which we may read in the work [4].

So, we examined the problem feasibility of resolution only one of typical sub-tasks of the task of prognosis and control when it concerns complex technical, biological, ecological, and social systems is investigated. But the complete solution of such problems requires much more volume of information processed. So, worldly wisdom of democratic leaders suggests them not to make revolutions in our world, leading by Creator and to act according with His Precepts for good of people selected them.

Really, being absolute (non-connected with decision of concrete type of problems) Bremmerman’s limit seems to be too overstated/

6.2. Further limitation of algorithmic power by systemology

Systemology (theory of potential effectiveness) is aimed on establishing of maximal values $v = f(u)$ (u, v) – exchanges on separate characteristics of complex systems with the help of optimal algorithms of their behavior. Let us give quantitative calculation of such a kind for noise immunity, using given previously general exponential dependences in the simplest case of transmission $v = M = 2^{uH}$ entering signals on binary alphabet with the presence of noises, which independently mixes up two symbols of alphabet with constant probability p in real boundaries ($0.01 < p < 0.5$).

In fact, for $p = 0$ there are no noises and no problem of noise immunity, whereas for $p > 0,5$ changing two resulting symbols of the alphabet onto opposite ones, we will receive given condition for p . In this case $C = 1 - h(p)$,

where $h(p) = -p \log p - (1-p) \log (1-p)$ ($0 < C < 1$) and volume of information which has to be preserved by recipient of information for optimal reception is equal to $\log M = uH$ bit (*here logarithms are binary*).

It can be shown (see Appendix 4), that here

$1 < \log M < u \times H < D(p) \{ \log [1 / (1-P)] \} (H/C) / (1-C/H)^2$, where $D = D(p)$ is some constant, depending on p . Whereas from the specified diapason for values p and real value $0.01 < p < 0.49$,

$1-P > 0.1$ and $H/C > 0.99$, we have $b^* = \log M = u \times H \text{ bit} < 3 \times 10^{10} \text{ bit}$, which is much less than quantity $b < B < 10^{93} \text{ bit}$. So, limitations found are much more strict than those given in common case by Bremmermann’s limit.

Let us point out, that for $H \rightarrow C$ ($H/C \rightarrow 1$) delay u increases unlimitedly, that is value $H = C$ in reality cannot be achieved, in analogy with efficiency factor = 100%.

6.3. Concealment and revelation of Kabbalah and Crypto-Power

Concealment by Creator of Oral Torah and Kabbalah in its number for unworthy ones and revelation of it only to Moshe and the chain of wizards provided parallel transformation of Knowledge in two ways: ancient – personal through «guru» (Oral Torah) and modern – for masses through publications (Written Torah).

Revelation of Kabbalah for everybody was connected also with growth of «outside» Knowledge and with paradox circumstances, described in the book «Zogar».

It is said there: «that to the end of generations Kabbalah will be open for everybody and everybody will be able to study it... But from the other side... the face of generation will be as a muzzle of a dog, impudence will be traditional phenomenon and just this generation will be worthy to study Kabbalah. The cause is in that it will be no more be people who want Knowledge, nobody will want it and willy-nilly any idealists will come to Kabbalah and naturally the strict selection of pupils will not be necessary... » [4, part 3, p. 58 – 59].

In principal the text of Oral Torah could be hidden, by ciphering it with stable code with a key, known only to initiated into it. However, it, as it seems, did not happen. And a story, that canonic text of Written Torah is crypto text itself, deciphering of which promises new Knowledge, seems to be even more impossible. . Now even sensitive examples of such deciphering are given, «sanctified» by use of computers. It may be shown that these are new speculations of cybernetism (see Appendix 5.2.). Canonic text of Torah, such as It is, is so deep, that deciphering of Its meaning in boundaries, comprehensible to human intellect will not be exhausted to the end of generations .

It may appear, that given examples of combinatorial difficulties, connected with complete enumeration of possibilities are far-fetched and artificial, but in real life roundabout ways of solution always can be found. And where could be met necessity in setting probabilities

$P = 1 - 10^{-10}$, whereas everybody accustomed to confidential probabilities $P = 1 - 10^{-2}$, according to the rule of «three sigma».

However, it is not so. All hesitations come from people that are not dealing with discrete technology of software, for which an error in one (no matter which) position of a code leads to an error of large chunk of a program and confidential probabilities are connected with programs, providing safety of people.

It appears that combinatorial difficulties of complete enumeration are the basic method of providing crypto-immunity of codes in cryptology – one of the most ancient sciences of mankind, which influenced the systemology through theory of information (Claude Shannon made a big contribution in development of cryptology too (see Appendix 5)). Society is not widely informed on development and contemporary state of this science due to some known reasons, but its level really is an indicator of a level of contemporary development of countries. In the victory in the 2nd World War superiority of Allies over countries of Axis are played the most important role in cryptology. And cryptology played the most important role in after-war computer boom. Obviously that any algorithms of solutions for problems of prognosis and control, decoding of codes, for noise – and crypto-immunity which use partial but not complete enumeration (for example, parallel [17, pp. 165 – 171]), have paramount importance in systemology (see Appendix 5).

7. Harmony between religion, science and education in the 21st century (one of the Mashiah`s steps).

Mashiah`s steps are heard in our world. Many of them are visible: creation and miraculous victories of the State of Israel, practically bloodless failure of the Empire of «Evil», Uncle Sam in the role of international policeman, etc. But there is one Mashiah`s step, may be the

most important one, but invisible for people yet. This is already outlined harmony between religion and science, that were in confrontation for a long time.

The reader should not have an impression that the author wants to canonize systemology with help of Kabbalah or just the opposite. As it was mentioned several times, they simply do not need it. And ludicrous examples of sanctification of everything by Marxism – Leninism is yet in our memory and are very instructive.

Sure, at first harmony (but not merger) has to be between monotheistic religions: Judaism and daughter religions – Christianity and Islam. Regarding this it Aryeh Kaplan writes: «At one time Christianity and Islam broke off Jewish study... Though they are far from perfection these religions make the step in the right direction – further of idolatry. But the decisive step, must be done» [1, p. 26].

Steps on conciliation of Christianity with Judaism, coming from Christianity, are performed before our eyes. Pilgrimage of Pope John Paul the 2nd into Holy Land in the year 2000, starting from Sinai is evidence of it. We may hope that aggressive phase of today Islam would not be long-term.

Harmony between Judaism and Science is already starting to be visible and the real work confirms it. This assures harmony between monotheism and science and the basis for overcoming confrontation between polytheism and monotheism, if look at the polytheism as at superfluous science with vulgar basis.

But harmony between Judaism and Science promises bright prospects to modern education, which came to dead end and is a subject to smashing pressure of cybernetism. Really, what may be more logic than single origin of education with elements of language, mathematics, processology, systemology and Kabbalah for all children of the Land with games of physical culture, musical and art and computer character. Further it will be only professional specialization and obviously continuous. Tendency to decrease of working week leads to great abilities of free activity. Just it should be directed by righteous way.

Appendices

App 1. Classification of knowledge on the basis of

«Universality × Constructiveness = Const.»

Let us give a classification of sciences on a basis $U \times C = A = \text{Const}$ connected with the principal limitation (constraint) of human intellect (see point 3.1). Classification will be given with more details but far from being completed with some comments concerning only non-canonical sciences.

The principal part of this classification was given by the author in [22]. The basis $U \times C = A = \text{const}$, as the major limitation was first published in the same article [22] and in other non-accessible articles in the beginning of 90th of the last century. The classification has the following type (see Table A. 1).

Level of system Universality Types of Teachings	Material		Spiritual		
	Simple	Complex			
Overdisciplinary $U \gg C$	T e a c h i n g s Natural-philosophy, Humanitarian, Religions, Theology T h e o s o p h y General Systems Theory Cibernetica S c i e n c e s Philosophy				
Fundamental $U = C$	K a b b a l a h Processology (Physics in Board sence) Monoprocesses Mechanics Physics Chemistry :			Systemology or Theory of Potential Effectiveness: Noise Immunity Control Theory Self-organization Theory Survivability Theory Risk Theory Reflexive Analysis	Norms of Maralityand and Ethics
Interdisciplinary $U < C$	G e o g r a p h y Polyprocesses Geophysics Geochmestry Landscape Science Control of Environment Protection of Environment Using of Environment		Cosmogony of Words		
Disciplinary $U \ll C$	Material Engineering Machine Engineering (Hardware and Software) Biology Sociology Psychology		Angelology Demonjlogy		

Table App. 1. Classification of knowledge on different systems in order to fall, Universality (U) and constructiveness (C) of teachings

Theosophy is the first attempt of synthetic unification of natural sciences, philosophy and religion on metaphysic basis [3, 25]. In the last work the short abstract of events, followed

after those fixed by E. Blavatskaya in traditional theosophical interpretation is given. Theosophy played for fundamental sciences of Kabbalah, systemology and processology the same inducing role, that alchemy played for processology in its time.

Kabbalah, as fundamental science in the sense mentioned (given) in the principle text is divided conditionally onto two parts. The first (basic for original approach to Creator) explains the role and duties of human being in his service to Creator (moral and ethics) and the second one for the further getting closer to Creator explains organization of worlds and function of their inhabitants in managing them by Creator (Cosmogony).

Engineering ecology, which emerged recently on the base of systemology, is interdisciplinary science. It consists of two parts: using of Environment [18] and environmental Protection [22, 23]. Principle function of this science consists in elaboration of counting methods of ecological regulation (normalization). It uses the theory of risk.

Machine engineering is conditional name of many disciplines working with theory of optimal synthesis of different kinds of technical systems. Theory for non-solving systems of hardware is based on processology and solving ones – on systemology and is well developed. It (determined) caused stable base of technical normalization (regulation) for corresponding technical systems. There is no similar theory for software and as a result normative base for software as well as for any other intellectual product is absent. According to the author's opinion it will be one of the principal brake in development of corresponding branches of industry in 21st century.

Mathematics is not discussed here, as only substantial knowledge is under investigation and mathematics might be overlooked as one of languages of qualitative knowledge [15, p. 73].

Let us comment the part of systemology – theory of feasibility [17, chapt. 7]. This theory does not concern with what exists, but rather with what may or not exist in our world. For example, it may evaluate feasibility (principal) of projects of complex technical systems. But it also may evaluate feasibility of spontaneous preservation of life in our world without participation of powers of spiritual world on the base of existing theories (see App. 6.7).

It is considered that the goal G of system is feasible (P – feasible) if with probability $P > P^*$ for its achievement it would be necessary to expend resources in quantity $K < K^*$ where quantities

(P^*, K^*) are called thresholds of feasibility and they are given originating from concrete conditions in analogy to levels of significance in statistics. It is considered that the system is not feasible if only one of inequalities mentioned above for potentially effective system is not satisfied.

Connection of this theory with theory of potential effectiveness is obvious and also its role in prevention of useless expenditure of money for attempts to fulfill non-real projects. Practical example of using the theory of feasibility is given in App. 6.7.

Conception on feasibility has important methodological (meaning) significance. The thing is that speculative aspect of systemology is reason for many scientists to classify it as one of the branches of mathematics (for example such was the destiny of the theory information). But in reality it is not so. And that is why: objects of mathematics have to satisfy some requirements, among which the most important is logical non-contradictoriness. Systems, objects of systemology, besides these conditions also have to satisfy requirements of feasibility in our world.

Let us at the same time note, that here we speak about feasibility of anything by human being. According to monotheism Creator is Almighty.

Let us comment such a part of systemology as reflective analysis. Reflection just of the second and not of the first and the third orders (point 4.2.3) has for Kabbalah and systemology the same meaning as for processology the second, but not the first and third

derivatives of coordinates of material point in time (acceleration). It is one more indication of fundamentality of these three sciences (they satisfy the Occam Principle).

App. 2. Risk interpretation of A. Kaplan`s model per «If you were G-d»

In basic text six Ramhal`s propositions served for reproduction of principles of systemology. In this appendix we use already mentioned qualitative reflexion model by A. Kaplan for construction of quantitative risk model. A. Kaplan`s model substantiated special role of Jews in Creator`s control of our world. We will try to do the same on quantitative level. Besides self-dependent significance these investigations may be an example of how to use other qualitative models of Kabbalah for construction of quantitative models of systemology on the same theme.

App. 2.1. Basic propositions of A. Kaplan`s model (textual analysis).

1. «A Problem. You are given an island inhabited by several tribes. These tribes... constantly fight each other. And prejudices aggravate this difficult situation even more.

Your task: to teach people to live in harmony, to reduce their sufferings up to minimum. Your task is to create healthy society.

Your means: everything that advanced technology can offer... to cause floods and earthquakes and create other «natural» phenomenon.

Your limitations: inhabitants of the island under no circumstances should not know about your presence. And if natives will learn about your presence it will cause «a cultural shock...». And even if they recover after it, there can be such an explosion of violence, which destroy all former positive values... However by not discovering yourselves you may bring good, as if is coming from human being as itself, or not understanding where it came from. To put it briefly you are given the possibility to play the role of G-d. What would you do?» [1, p. 11–12]

The *first* proposition of A. Kaplan at basic restriction «not to be discovered» requires to minimize human sufferings, that is to maximize giving good to them. As further in our investigations giving of good will be interpreted as giving to people vital important for them resources in quantity K , our task will be to maximize value of K with a fixed permissible (available) risk R (probability of a death of a man) or to minimize value of R at a fixed value of K (see later 4th proposition).

2. «Solution: as we saw, first of all, it is impossible to us to reveal our influence on the world... we inevitably come to the conclusion of necessity of gradual and imperceptible penetration into life of natives. With this task one can manage by using spies (are able to manage our spies) and it does not contradict the accepted rules.... But our spies would always be in danger... they would be distributed along all the island and most likely they would convert into prosecuted minority and we should have resource to many tricks to save them of taking false values of environment» [1, p. 23]. This process, this «game» is real human history. It is not difficult to reveal the «spies» in our world. It is Jewish people» [1, p. 23].

Second Kaplan`s proposition, which follows from the first one, states affirms that spies (Jews) will be in minority in relation to non-Jews and constant aggressiveness of the later towards the former creates constant threat for life of the spies. In terms of systemology it means that relative number P of Jews in proportion to the entire population has to be a small

value ($P \ll 1$), and risk R (probability of death of each of them – to be a larger value ($1 > R^* \gg 0$)).

Here we will make an important comment that it is necessary to consider not only physical but also a spiritual death of Jews, taking false values from the surroundings environment.

3. «...each way may require dozens or even hundreds of years. You will achieve the results, but it is very long-term process... Our final goal – forming of highest values at natives – it is much more important than influence on course of events. And even if the lesson is learnt by the first generation – it may be forgotten by the following one» [1, pp. 22–23].

Third proposition by A. Kaplan tells about small receptiveness of natives and weaken influence of the spies to them that leads to extremely long-term process of re-education.

4. «...life of natives is full of sufferings and troubles... Because of a danger to be discovered revealed we are obliged to reduce our communication with spies up to a minimum. And by the rules of the game we have no much to help them.» [1, p. 11, 23].

The *fourth* proposition of A. Kaplan tells that in everyday hard life of people on the island we should not help spies more than other natives. In system terminology it that those limited vital resources $K = K^* + K^{**}$ which are allocated for two representatives of spies and natives should not be distributed for the benefit of spies. They have to be distributed according to first proposition only for minimizing of risk R of human being, independently of is it spy or native one. It is easy to show that this problem is mathematically equivalent to original task of maximizing the value K (Good) at a fixed risk R .

Let us discuss some aspects of the problem. Psychological justification and attractive humanism of the problem do not cause any doubts. The spies do not play role of privileged dictators. Most likely they are in sacrificial role of fanatics – humanists.

And atheist may be confused by probabilistic incorrectness of a problem statement in connection with large value of risk R for a spy. Considering long duration of the process of influence on natives and even the distribution of spies among them, probability of full disappearance of them tends to be very close to one,. The other words they would have to disappear very quickly at «natural» course of events if we did not take some «ultra-natural» saving measures in multiple critical situations.

App. 2.2. Interdependencies between parameters of the model and with other parameters

Further calculations use expressions for computing risk, which are given in systemology [2, p. 320; 22, 23].

In basic text risk in a general case is considered to be addition of effectiveness to one. Here we look at the special case of effectiveness – reliability, when survival is the goal of system. Then risk R is probability of non-survival (death) of system during the given interval of time taken as unit (instant risk). In system ecology as well as in Torah a year is such an «unit» of time interval. Then, time, calculated in years (year – unit interval of time) is whole – numerical variable. Also we use traditional meaning for degree function $X^0 = 1$.

There are given such relations in systemology: for so-called instant risk R (probability of death the system on the unit interval of time):

$$R = \begin{cases} A L^s & [22] & \text{a)} \\ B K^{-d} & [22, 23] & \text{b)} \\ 1/T & [2, \text{p. 320}], & \text{c)} \end{cases} \quad (\text{App. 2. 1})$$

where L – density (intensity) of harmful substrate, K – quantity of vital important resources ; A, B, s and d – empiric constants, and T – expected time(average time) of system’s life in years. The first and the second dependences are stated empirically, and the third – mathematically. The first dependence is called «dose – effect», the second «improvement – cost». The first connects substances of processology and systemology, the second – systemology.

It also can be used for interpretation of variable K as Good from Creator to people according to the first proposition of A. Kaplan.

Let us derive the third relation. If the events of death of the system in any moment of time are independent then probability of its death in exactly Nth moment of time is equal to $R (1 - R)^{n-1}$ (n=1,2,...). So, considering expression

$$(1-R)^0 + (1-R)^1 + (1-R)^2 + \dots = 1 / [1 - (1-R)] = 1/R \quad \text{if } R < 1, \text{ we have:}$$

$$\begin{aligned} T &= 1R (1-R)^0 + 2R (1-R)^1 + 3R (1-R)^2 + \dots = \\ &= R (1-R)^0 + R (1-R)^1 + R (1-R)^2 + \dots = R/R = 1 \\ & \qquad \qquad \qquad + \\ & \qquad \qquad \qquad R (1-R)^1 + R (1-R)^2 + \dots = R (1-R)^1 / R = (1-R)^1 \\ & \qquad \qquad \qquad + \\ & \qquad \qquad \qquad R (1-R)^2 + \dots = R (1-R)^2 / R = (1-R)^2 \\ & \qquad \qquad \qquad + \\ & \qquad \qquad \qquad \cdot \\ & \qquad \qquad \qquad \cdot \\ & \qquad \qquad \qquad \cdot \\ & \qquad \qquad \qquad = 1/R. \end{aligned}$$

From here $R=1/T$ and equation (App. 2.1 c) is proved.

For quantitative solution of the problems, that are stated qualitatively in the first proposition of A. Kaplan, it is necessary to have a quantitative description of positive influence of spies onto natives. Let risk of native be equal to value R, than risk R of the resident of the island, inhabited by spies and natives, has the following representation : $R = p R^* + (1-p) R^{**}$. Let us consider that presence of spies decreases risk R^{**} death of native in such a way, that the more spies will be (the greater their density p), the less is his risk R^{**}. This dependence can always be described rather precisely by degree function $R^{**} p^{-c}$, where c – non-negative coefficient of decrease of influence (at c=0 there is no influence and according to the fourth proposition it is very small, that is $c \ll 1$). So we have

$$R = R(p) = p R^* + p^{-c} R^{**} - p^{1-c} R^{**}.$$

With more accurate definition of the second proposition of A. Kaplan ($p \ll 1, R^* \gg R^{**} p^{-c}$) having place at $R^{**} \ll p^c$, the last term of the previous expression may be ignored and we have

$$R = R(p) = p R^* + p^{-c} R^{**} . \quad (\text{App.2.2})$$

For further calculations is convenient in the expression (App.2.2) «to separate» parameters R_* and R_{**} from variable p .

To do this let us substitute variable $p = r x$ in such way that

$$R = \Gamma G(x), \quad (\text{App. 2.3})$$

where r and Γ are constants and $G(x)$ is a function independent from parameters R_* and R_{**} .

It is easy to check that it is sufficient to put for it

$$\begin{aligned} \text{then} \quad r &= (R_{**}/R_*)^{1/(1+c)}, & \text{a)} \\ \Gamma &= R_*^{1/(1+1/c)} R_{**}^{-1/(1+c)} & \text{b)} \\ \text{and} \quad G &= G(x) = x + x^{-c}. & \text{c)} \end{aligned} \quad (\text{App. 2.4})$$

Now expression (App. 2.3) allows to conduct minimization of value R independently separately on parameters R_* and R_{**} and variable x (which is equivalent to minimization on p). The necessity of these minimizations follow from the fourth Ramhal proposition. Let us show this (prove this) for the first minimization.

In fact, according to the expression (App. 2.1 b) the power dependence (function) around zero may be approximated with sufficient precision by hyperbolic ($d=1$): $R=B^*/K$. In this case the condition for minimization $K=K_*+K_{**}=\text{const}$ transforms into the condition $1/R_*+1/R_{**}=\text{const}$. Necessity of the second minimization is connected with uncertainty of a requirement to make value of p small – this value can have different level (order) of being small, for example $p=c$ or $p=c^2$. Let us do the first minimization. For this let's present the expression (App. 2.4) as

$$\begin{aligned} \Gamma &= H 2^{-(1-h(C,W))}, & \text{a)} \\ \text{where} \quad h(C, W) &= -C \log W - (1-C) \log (1-W), \quad C=1/(1+1/c), \\ W &= 1/(1+R_*/R_{**}), & \text{b)} \\ H &= 2/(1/R_* + 1/R_{**}) & \text{c)} \end{aligned} \quad (\text{App. 2.5})$$

and logarithms are taken with the e base 2.

Let us show that for transforming into a minimum the expression (App. 2.5) at variable W of the expression (App. 2.5 a) with fixed value H we have to take $W = C$. We shall have

$$\Gamma^* = \min \Gamma = H 2^{-(1-h(C))}, \quad (\text{App. 2.6})$$

where

$$h(C) = h(C, C).$$

To prove expression (App. 2.6) we have to show that

$$h(C, W) - h(C) = (C \ln(C/W) + (1-C) \ln((1-C)/(1-W))) / \ln 2 = (W-C)^2 / C(1-C) 2 \ln 2 > 0 \quad (\text{App. 2.7})$$

for value W in neighborhood of value C with a precision to values of the order $(W - C)^3$.

It could be shown by using presentation of the natural logarithm $y = \ln(1+x) = x - x^2/2$, which is true for small values of x with precision to the value of order x^3 . Let us note, that the later expression may be received by solving quadratic equation, receiving beforehand exponential function from the power function with the help of Newton's binomial. From the optimal value $W=C$ and expressions (App. 2.5 b and c) follow optimal values R^* and R^{**} ; satisfying expressions

$$\begin{aligned} & R^{**} = (H/2)(1+c) < R^* = (H/2)(1+1/c) & \text{a)} \\ \text{at} & & & \text{(App. 2.8)} \\ & H < 2c / (1+c), & \text{b)} \end{aligned}$$

Which are consistent with precision of the second A. Kaplan's proposition, when $c \ll 1$ (the fourth A. Kaplan's proposition). As from expression (App. 2.8 a) we have $R^{**}/R^* = c$, then from expression (App. 2.4 a) we have

$$\Gamma = c^{1/(1+c)} \quad \text{(App. 2.9)}$$

Now let us begin minimization of the expression (App. 2.4. c) on the argument x ($p = \Gamma x$). Let us show that $x=x^*$ is optimal value at which minimal value $G=G^*$ is achieved

$$\begin{aligned} & x^* = c^{1/(1+c)}, & \text{a)} \\ \text{и} & G^* = G(x^*) = c^{1/(1+c)} + c^{-c/(1+c)}, & \text{b)} & \text{(App. 2.10)} \\ & p^* = \Gamma x^* = c^{2/(1+c)}, & \text{c)} \end{aligned}$$

corresponding optimal value p according to the expression (App. 2.9)

Really, let us denote small deviation $g = x - x^*$ of the argument $G = G(x)$ from its optimal value, at which extreme value $G^* = G(x^*)$ is achieved. Then, according to the expression (App. 2.4 c) we shall receive following expression by using generalized formula of Newton's binomial with precision to the value of the order g^2 :

$$\begin{aligned} G(x) - G(x^*) &= g + (x^* + g)^{-c} - (x^*)^{-c} = g + (x^*)^{-c} [(1+g/x^*)^{-c} - 1] = \\ &= g + (x^*)^{-c} [1 + (-c)g/x^* + (-c)(-c-1)(g/x^*)^2 / 2 - 1] = g + (x^*)^{-c} [-cg/x^* + c(c+1)(g/x^*)^2 / 2] = \\ &= g - gc(x^*)^{-(1+c)} + c(c+1)(x^*)^{-(2+c)} g^2 / 2 = g [1 - c(x^*)^{-(1+c)}] + c(c+1)(x^*)^{-(2+c)} g^2 / 2. \end{aligned}$$

The first term of this expression converts into zero, when value x^* satisfies the expression (App. 2.10 a). Here, the second term is positive. It follows that in neighborhood of value $x=x^*$ value $G^* = G(x^*)$, defined by the expression (App. 2.10 b), is the minimum of the function $G = G(x)$.

So, according to the formula (App. 2.10 b) twice minimized value $R^{**} = \Gamma^* G^*$ exists for $R^{**}/R^* = c$ and $p = p^*$. On the other side, if after the first minimization to equate items of the expression (App. 2.4 c), then $x = 1$ and according expressions (App. 2.9)

$$p = p, = \Gamma = c^{1/(1+c)}.$$

As the result we have :

$$\begin{aligned} R^{**} &= R^{**}(p^*) = H \Gamma^*(p^*) G^*(c), p^* = c^{2/(1+c)}, & \text{a)} \\ R^* &= R^*(p) = H \Gamma^*(p) / 2, p = c^{1/(1+c)}, & \text{b)} \\ R^* &= (H/2)(1+1/c), R^{**} = (H/2)(1+c), & \text{c)} \quad (\text{App. 2.11}) \end{aligned}$$

where

$$\begin{aligned} \Gamma^* &= 2^{-[1-h(c/(1+c))]}, & \text{d)} \\ G^* &= G^*(c) = c^{1/(1+c)} + c^{-c/(1+c)} & \text{e)} \end{aligned}$$

and

$$H = 2 / (1/R^* + 1/R^{**}) < 2c / (1+c).$$

Formulas (App. 2.11) show that all optimized parameters depend on only two parameters: c – influence and H – harmonic mean of two risks R^{**} and R^* .

Let us mention, that we have the only $\max G(x)=1$ at $x=1/2$ и $h(x)=x \ln(1/x)$, at $x \ll 1$, because of the expression $x^{-x} = \exp(x \ln(1/x)) = 1 + x \ln(1/x)$, which is true with precision to the value of the order $(x \ln x)^2$, correspondingly $\Gamma^* = (1+c \ln(1/c))/2$ at $c \ll 1$ и $\Gamma^* = 1$ at $c=1$; $G^*(c) = 1+c \ln(1/c)$ at $c \ll 1$ has the only $\max G^*(c)=2$ при $c=1$.

Then from expressions (App. 2.11 a, b) we have:

$$R^{**} = H(1+2c \ln(1/c)) \text{ at } c \ll 1 \text{ and the only maximum } R^{**} = H \text{ at } c \text{ as } c=1.$$

So in case of small $c \ll 1$, analyzed now, by using expression

$$c^{-c} = \exp(c \ln(1/c)) = 1 + c \ln(1/c),$$

which is true with precision to the value of the order $[c \ln(1/c)]^2$, we have from the formulas (App.2. 11) and (App 2.1 c) an approximated formulas which will be used for further calculations.

$$\begin{aligned} R^{**} &= R^{**}(c) = H(1+c \ln(1/c))/2 = 1/T^{**}, p^* = c^2 & \text{a)} \\ R^* &= R^*(c) = H(1+c \ln(1/c)) = 1/T^* = 2/T^{**}, p = c, & \text{b)} \\ & \text{and} & \\ R^* &= H/2c > R^{**} = H/2, (H < 2c). & \text{c)} \end{aligned} \quad (\text{App. 2.12})$$

From expression (App. 2.12) follows that at non-optimal value $p=p$, which is significantly exceeds optimal value $p=p^* (p=c \gg p^*=c^2)$, minimal value of the average risk R^{**} only twice less than corresponding value of risk R^* , and also $T^{**}=2T^*$. However, further substantial analysis will reveal extreme importance of this result.

The expression (App. 2.12) allows to approximately present all parameters of the task through parameters T^{**} and R^* .

$$\begin{aligned} R^{**} &= R^{**} = 1/T^{**}, p^* = (1/T^{**} R^*)^2 & \text{a)} \\ & \text{and} & \\ R^* &= H = 2/T^{**}, p = c = 1/T^{**} R^* (R^{**} = R^{**} = 1/T^{**} < R^* < 1 < T^{**}). & \text{b)} \end{aligned} \quad (\text{App. 2.13})$$

App. 2.3. Quantitative identification of parameters of the problem according Torah's data

Commenting Torah words about creation of human being by Creator in his own Image A. Kaplan mentions: «The largest part of Kabbalah is devoted to the detail analysis of how it happened... Some understand here «image» and «resemblance» as some ideal model, archetype or blueprint which G-d made before he created a human being (Rashi). Probably this «model» is «the initial man» (Adam Kadmon) »[22, pp. 4–5].

On the other side, Creator gave to our world the time of its existence $T=T_w=6000$ лет [1, v. 1, p. 81]. Virtue of Creator before original sin could give Adam Kadmon the same duration (time) of life T_w , but after original sin Creator gave to Adam and adamites (his offspring) average duration (time) of life $T_a=880$ years $\ll T_w$ years and after The Flood Noah's offspring (noahites) – average duration (time) of life $T_n=120$ years $\ll T_a$ [24, p. 14]. Mankind would have become similar to animals if average time of life corresponded only to child-bearing age $T_o=16$ years $\ll T_n$ years. Let us note, that in a given sequence of average durations of human lives they decrease each time approximately in eight times (corresponding risks according to relation (App. 2.11 c) increase in eight times).

Reduction of average duration (time) T (in years) of human life did not decrease average size of their populations N . In fact, from graphical constructions [24, p. 14] (see Fig. App. 7.2) is easy to receive expression

$$N=S T, \quad (\text{App. 2.14})$$

when S – average number of new-born children for one year per one person.

As our analysis concerns slave-owing society, where polygamy dominated, we shall investigate only number of single men and new-born boys in their harems. Average number of new-born boys depended on the size of harems. The later were limited by resources of their owners. So value S increases with increase of these resources. The expression (App. 2.14) shows that if value of S grows faster than the average duration of life T of single men decreases, the size of the population of the later N increases. The same effect for any formations at monogamy is seen in the model of non-instant (annual), but rather life-long risk on the level of family – large families of parent with short duration of life.

Emergence of abrahamits – Jews (Abraham's offspring) among noakhites did not mean yet appearance of «spies» of the analyzed model. They also did not emerge from Jews, which too much multiplied after two centuries of living in Egypt. And only in the moment of Sinai Revelation, receiving Torah from Creator, Jews could pretend to have a role of spies and make their contribution to Service to Creator.

In investigated model which is too much emasculated it looks as following. After the Flood Creator would not annihilate mankind which was again deep in sinful actions, violating even minimal amendments of Noakh [24, p. 21–22]. It would lead it itself to the animal – like existence ($T=T_o$, $R_o = 1/T_o$).

Creating of Jewish people by Creator opened new abilities for upswing of mankind. Now according to the model investigated (see relation (App. 2.13)), average time of human life T^{**} could be concluded in the limits $T_o < T^{**} < T_n$ as the result of increasing the risk R of death of Jews in comparison with risk of death R of non-Jews ($R^{**} > 1/T^{**} = R^*$). It could happen only at optimal control of Creator the relative size $p=p^*$ of Jews. Sharp, non-permitted increase of their size

($p=p^*, \gg p^*$) leads to twice decrease of average term of human life ($T=T^*=T^{**}/2$).

The only thing which goes out of «natural-scientific» limits in the model investigated, it is already mentioned «miracle» of long-term existence of Jews at large risk of their death,

retained even considering their dispersion. And here we can not avoid hypothesis on salutary interference of Creator in critical moments of Jewish history.

Taking into consideration that all listed events happened in the limits of one-century interval of average terms T of the life of human beings ($T_o=16$ years $< T < T_n=120$ years), let us investigate some numerical examples.

Let us assume $R^* = 0.1; 0.25$, $T^{**}=30, 50, 70$. Then according to relations (App. 2.13) we will have

T^{**}	$R^{**}=R^{**}$	T^*	$R_s=0.1$		$R_s=0.25$	
			p^*	p_s	p^*	P_s
30	0.033	15	0.1	0.33	0.017	0.13
50	0.020	25	0.04	0.20	0.0064	0.08
70	0.014	35	0.002	0.14	0.0031	0.056

Table App. 2

Investigation of the first three columns of the Table App. 2 shows onto importance of decreasing of average time of human life at non-observance optimal relative size of Jews, noted in 4th and 6th columns (in 5th and 7th columns are shown its unjustified increased value at different values of risk R of death the Jews).

Data of the Table are in accordance with modern data (last column).

App. 3. The proof of Bremmerman`s limit

In this work we use the expression for a constant B , given in monography [26] of J. Klir, a well-known American systemologist of U.R. Ashby school, who developed (introduced) his version of systemology. His systemology is theory of solution of system problems, but not the theory of potential effectiveness of complex systems [2]. However, both versions of systemology have common roots, rising to U.R. Ashby. In the end of point 6.1 we use numerical example of combinatory difficulties given in [26, point 6.4].

According to traditions, used in the theory of information, if $M=2^n$ signals are transferred or kept in memory, they may be encoded by words of length $n=\log M$ using two-lettered (binary) alphabet (logarithms are taken with respect to base 2). We say in this situation: « n bits are transferred» or « M signals contain information equal n bits», words, that add nothing to the essence of the case. These word-formations create an impression of some substance – information, «measured» by bits. In reality, in our constructions information according to principle text is one of categories, but not substances. Despite of remarks made, we will express number M of transferred or kept in memory in bits (taking logarithm with respect to base 2) using serious results of the followers of this tradition. It is obvious, that signals should be encoded on some physical carrier. Let it be some levels of energy E of arbitrary type in the interval $(0, E)$ measured with precision to the value e . Then the whole interval $(0, E)$ may be divided onto (up to)

$$u = E/e \quad (\text{App. 3.1})$$

distinguished levels at maximum. M signals may be encode by $u+1$ words ($M=u+1$) of the unit of length constructed on the alphabet of $u+1$ symbols, which correspond to portions of energy $0, e, 2e, \dots, uxe = E$. However, it is more advantageous to encode M signals by 2^u words ($M = 2^u$) of the length u and constructed on the alphabet of two symbols, which corresponds to portions of energy 0 and e (App. 6.7.2). In this case, $\log M = \log 2^u = u$ bits of

information may be transferred or kept in the memory by using energy in the quantity E. At a fixed value of E the value u increases with decrease of e, but this decrease is not infinite. As it is necessary to differ levels using some measuring procedure with a definite precision. However, maximal precision is defined by the principle of uncertainty of Heisenberg: energy may be measured with precision to the value of e, if the following inequality is being fulfilled:

$$e t > h, \quad (\text{App. 3.2})$$

where t is the duration of the measurement and $h = 6,625 \cdot 10^{-27}$ erg s. is the Plank's constant. Let us present now energy E as corresponding quantity of mass m according to Einstein's formula

$$E = m c^2, \quad (\text{App. 3.3})$$

where $c = 3 \cdot 10^{10}$ cm/s. – speed of light in vacuum. So, from formulas (App. 3.1), (App. 3.2) and (App. 3.3) we have the most optimistic estimation for u of the kind:

$$u < b = m c^2 t / h. \quad (\text{App. 3.4})$$

Let's substitute c and h in formula (App. 3.4) with their numerical values. On representing in the relation (App. 3.4) numeric expressions c and h considering values $\text{erg} = \text{g} (\text{cm/s})^2$ for $m = 1$ g and $t = 1$ s and finally we will receive constant of Bremmerman $b = 1.36 \cdot 10^{47}$ bit of information, more than which could not be transferred or kept in the memory 1 g of substance organized just as you like in is.

Now, let us imagine hypothetic computer with a mass equal to mass $m = 6 \cdot 10^{27}$ grams of Earth, working the time equal to its age $t = 10^{10}$ years = $3.14 \cdot 10^{17}$ s. In this case the number of bits transferred or kept by such computer, regardless of how it was constructed, would not exceed the number $B = b \times m \times t = 2.56 \cdot 10^{97}$ bits. Value B without inessential factor 2.56 is taken for so-called Bremmerman's limit. It can be shown that with imaginary «world-wide computer» similar value quantity would be equal to 10^{120} bits.

App. 4 Numerical estimates of possibility of distinguishing M signals at presence of noise.

Such as in previous appendix is not given conclusion of fundamental correlations of processology (App. 3.2) and (App. 3.3) we did not give derivation of the original fundamental approximated equations of the theory of potential noise resistance.

$$P = 1 - 2^{-uK}, \quad \text{a)}$$

$$K = g^2 / 2p(1-p) \ln 2 \quad \text{b)} \quad (\text{App. 4.1})$$

and

$$(\log M)/u = H = 1 - h(p+g) < C = 1 - h(p), \quad \text{c)}$$

where $0 < p < 0.5$, $g \ll 0.5 - p$ and all symbols are defined in main text. Let us only mention that derivation of expressions (App. 4.1), which uses expressions (App. 2.7) and (25, chapt. 8) unlike derivation of relations (App. 3.2) and (App. 3.3) does not require knowledge exceeding limits of a school algebra.

For transformation of original expressions (App. 4.1) let us use special representations of expressions $h(p+g)$ and $h(0.5 - r)$ ($r \ll 0.5$), and also approximated for $x \ll 1$ formula

$\ln(1+x) = x - x^2/2$. We have:

$$\begin{aligned} h(p+g) &= -\{ (p+g) \ln[p(1+g/p)] + (1-p-g) \ln[(1-p)(1-g/(1-p))] \} / \ln 2 = \\ &= h(p) + g \log[(1-p)/p] \quad \text{a)} \\ &\text{and} \quad \text{(App. 4.2)} \\ h(0,5-r) &= -\{ (0,5-r) \ln[0,5(1-2r)] + (0,5+r) \ln[0,5(1+2r)] \} / \ln 2 = 1 - 2r^2. \quad \text{b)} \end{aligned}$$

From formulas (App. 4.1 c) and (App. 4.2 a) we have the expression:

$$g = (C-H) \log[(1-p)/p]$$

With its help, excluding value g from the expressions (App. 4.1) we receive :

$$\begin{aligned} \log M = uH = D(p) \times F(H/C, P), \quad \text{a)} \\ \text{where} \\ D(p) &= 2(\ln 2) \{ \log[(1-p)/p] \}^2 p(1-p) / [1 - h(p)] \quad \text{b)} \quad \text{(App. 4.3)} \\ \text{and} \\ F(H/C, P) &= (H/C) \{ 1 / [1 - (H/C)] \}^2 \log[1 / (1-P)]. \quad \text{c)} \end{aligned}$$

Let us narrow the diapason of values for parameter p ($0 < r < p < 0,5 - R^* r \ll p$). In this case, using expression (App. 4.2), we have :

$$\begin{aligned} 2r^2 / \ln 2 < 1 - h(p) < 1 - r \log(1/r), \quad \text{a)} \\ \text{and also:} \\ r(1-r) < p(1-p) < 1/4 \quad \text{b)} \quad \text{(App. 4.4)} \\ \text{and} \\ 4r / \ln 2 < \log[(1-p)/p] < \log(1/r). \quad \text{c)} \end{aligned}$$

Using formulas (inequalities) (App. 4.4) in the same diapason for values p we have

$$(32 / \ln 2) r^3 < D(p) < [(\ln 2) \ln(1/r) / 2r]^2. \quad \text{(App. 4.5)}$$

Finally, by using formulas (App. 4.1. a), (App. 4.3. c) and (App. 4.5) and practically acceptable values of parameters $0.01 < r \ll p < 0.49$, $H/C < 0.99$ и $P < 1 - 10^{-10}$, we receive:

$$b^* = \log M = uH < 3 \times 10^{10} \text{ bit.}$$

App. 5. Cryptology and Systemology. Do the «Torah Codes» exist?

On Friday, January 7th, 2000 President Bill Clinton addressed his co-citizens (the nation) with his first message in the new millennium. It concerned the most important national problem – protection of a security (uninterrupted and secret) of the computer system of the country. In previous years the country many times was a witness of penetration of individuals into the sanctum sanctorum (holy of holies) of the state and private companies, which pointed to similar abilities of enemies and «friends» on the level of other countries. Clinton, on causes quite obvious, did not go deeper into disclosure (divulge) of planning measures on protection of a security of computer network of the country. But obviously, its crypto-resistance is of paramount importance.

Let us look in more detail to principles of cryptology, which after Kabbalah (ideological roots), together with theory of probability and mathematical statistics supplied systemology with constructive conceptual and mathematical instrument.

App. 5.1. Combinatorial–Probabilistic technique.

App. 5.1.1. Theory of Probability. Principal role of estimates by Chebyshev and Boole

Let A and B be two sets of objects $A(i)$ and $B(i)$ ($A = (A(i))$ and $B = (B(j))$) labeled by integers $i = 1, 2, \dots, a$ and $j = 1, 2, \dots, n$. Objects may be «published» in any amounts, but they are not ordered. Places are unique and ordered ($B(j)$ «precedes» $B(j+1)$).

Arrangement $C = (A(i, j))$ is called a set of objects $A(i)$, standing on places $B(j)$ in such a way that on one place may stand only one object, but on different places $B(j)$ and $B(r)$ ($j < r$) may stand the same object $A(i, j) = A(i, r)$. This combinatorial concept [27] in different fields is called differently: in statistics it is a selection of sample from the whole population of objects, in theory information and cryptology it is the word of a length n , written on a -letter alphabet, etc.

Population $E(i)$ ($i = 1, 2, \dots, a$) of a only possibly incompatible events is called the complete group of events if probabilities $p(i)$ of events $E(i)$ are such that $p(1) + p(2) + \dots + p(a) = 1$. Population

$p = (p(i))$ is called *distribution of probabilities*. The variable $X = \{p, x\}$ (RV), taking values $x = (x(i))$ ($x(1) < \dots < x(i) < \dots < x(a)$) with probabilities $p(i)$ correspondingly is called a *random variable* (RV).

If $x(1) > 0$, then RV is called non-negative. Probability *Distribution Function* (FD) RV is called a function $P = P(x) = p(1) + \dots + p(i)$ ($P(a) = 1$), that is the probability of $X < x(i)$. *Mathematical expectation* (ME) RV X is called the expression :

$$A = x(1)p(1) + \dots + x(i)p(i) + \dots + x(a)p(a).$$

The following trivial as itself estimate for FD for non-negative RV, $P(x) > 1 - A/x$, belongs to the famous Russian mathematician, founder of Russian school of Probability theory, Pafnuty Lvovich Chebyshev (1821 – 1884). However, this estimate was very significant for the theory of probability and especially for systemology.

This estimate takes place for voluntary non-negative RV and is *non-improvable* as at $a=2$ and

$x(1) = 0$ we have $P(x) = p(1)$, $A = x(2)(1 - P(1))$ or $P(x) = 1 - A/x(2)$, that is inequality of estimation comes into equality. Chebyshev's estimate can be easily generalized for any large RV value $a \rightarrow \infty$ and «continuous» RV (difference $x(i+1) - x(i) \rightarrow 0$).

In this case we have an estimate of probability $P(x)$, where $P(x)$ is the probability that continuous RV $X < x$ of a following representation $P(x) > 1 - A/x$, where MW A has corresponding «integral representation».

Let us go to not a well-known estimation of Bool. George Boole (G. Boole (1815 – 1865) – English mathematician and logician, known as creator of «Boole's algebra» - a base of mathematical logic. Let $p(j)$ ($q(j) = 1 - p(j)$) be probabilities of occurrence (non-occurrence) of events (j) ($j = 1, \dots, n$). Then, the probability $p(1, \dots, n)$ of occurrence of at least one of them has an upper estimate $p(1, \dots, n) < p(1) + \dots + p(j) + \dots + p(n) = \sum p$,

where $p = (p(1) + \dots + p(n))/n$. This trivial as itself and not so interesting for the theory of probability estimate was received by Boole. However, it has cardinal meaning (and is even more important that Chebyshev's estimate) for systemology.

This estimate takes place for the arbitrary events $E(j)$, but if they are incompatible, the inequality transfers into equality meaning that this estimate, as well as Chebyshev's estimate, is *non-improvable*. The equivalent form of Boole's estimate is a lower estimate of probability $q(1, \dots, n) > 1 - q(1) - \dots - q(j) - \dots - q(n) = 1 - n(1-p)$ of compatible occurrence of all events $E(j)$. In the case if these events are independent we have:

$$q(1, \dots, n) = p(1) \dots p(n) > 1 - q(1) - \dots - q(n).$$

App. 5.1.2 Mathematical statistics. Principal role of the optimal choice between two probabilistic hypotheses.

Let's be given two distributions P^* and P^{**} , considered as general populations in which $A(i)$ exist in proportions $P^*(i)$ or $P^{**}(i)$. Let's say, the sample of a size n to be taken but it is not specified from which of two populations it needs to be taken. Let's define two probabilities p_1 and p_2 . The first is a probability of taking for the sampling a hypothesis that the first distribution takes place, as in reality the second distribution takes place (probability of an error of the first type). The second is a probability of an error in the opposing situation (probability of an error of the second type).

We will say that the optimal choice between two probabilistic hypotheses exists, if such a procedure of sample treatment is given, for which at fixed two parameters from the group of three (p_1 ; p_2 ; n) the third parameter becomes minimum.

Such an optimal procedure (relation of plausibility) was found by Jury Neyman (immigrant from Russia) and son of great English statistician Carl Pearson Egon Pearson in 1933 (J. Neyman and

E. S. Pearson. as *On the problem of the most efficient tests of statistical hypotheses Phil. Trans. A, Vol. 231, 1933, p. 289*). This work and V.A. Kotelnikov's dissertation mentioned in the point 5.2 were in the very beginnings of the theory of potential effectiveness. The first author of the work cited describes the 150-years long way which took probabilistic researches towards the result received in this work starting with Laplas, and then Bertran and Borrel. During the World War II statistician Abraham Wald, immigrated in USA from Austria, used the relation of credibility to construct sequential procedure which was even more efficient than procedure of Neyman–Pearson, denying the fixation of a size of a sample.

Later on, it turned out that found procedure underlies optimal decoding for noise-immunity as well as for decoding with so-called parallel enumeration [25]. The important circumstance was that in C. Shannon's asymptotic case with the optimal decoding $M = a^{nH}$ signals at presence of noise and increasing n , the problem coming to optimal choice between M probabilistic hypotheses and in the turn it came to M optimal choice between two probabilistic hypotheses [27].

App. 5.2 Three statistical laws of texts and concept crypto-resistance

For a long time written texts in different languages were subjects to statistical researches for needs of cryptology. Empirical researches led to discovery of three principle laws on the level of letters (Markov), words (Zipf) and long texts (Shannon).

The famous Russian mathematician Andrey Andreevich Markov (1856 – 1922), father of discrete probabilistic methods, which are in the base of mathematical apparatus of systemology. All substantial results of the theory of probability, beginning from Laplas, were based on the hypothesis of independence of (considered) events under investigation.

With the development of the model of events, connected into chain, A.A. Markov freed theory of probability from the mentioned restricting hypothesis, by bringing this theory closer to the reality. As one of the applications of his chain model, named after him, he examined frequencies of consequent vowels (v) and consonants (c) in Russian texts of the types (v, v), (c, v), (v, c) and (c, c).

It turned out that there is significant difference between probabilities p of a sequential vowel occurrence and p^* – probabilities of occurrence of a vowel after consonant: $p - p^* = -0.54$. However the same difference for letters coming after one is $0.19 < 0.54$, which shows that says about increasing independence of occurrence of these letters as the distance between them in the text increases ..

It appeared that absolute probabilities of occurrence of vowels and consonants $p=0.45$ and $1-p=0.55$, as in all full-vowel languages, were approximately equal to $1/2$ (of course we can not say about equal probability of all $a=32$ letters of Russian «telegraphic» alphabet). These research results are given at the end of his famous textbook «Computation of probabilities» 4th edition, Gos. Izd. Moscow, 1924.

Law of G. Zipf is not connected to any theoretical models. It states the following. Let letters of given language be numerated by integers $i = 1, 2, \dots, M$ in order of a decrease of their probabilities $P(i)$.

Then these probabilities are well approximated by expression $p(i) = (c-1) i^{-c}$, where $c > 1$ is some empirical constant varying in the large diapason for different languages.

As corresponding lengths of words $m(i)$, starting with some not so big in comparison with number M , increase in general it is possible approximate dependence $m(i)$ by the expression $m(i) = i^d$, where $d (0 < d < c-1)$ some empiric constant as constant c . As the result the average length m^* of the word has the following form:

$$m^* = p(1)m(1) + p(2)m(2) + \dots + p(M)m(M) = (c-1)/(c-d-1) = 1/(1-d/(c-1)). \quad (\text{App. 5.1})$$

For derivation of the expression (App. 5.1) we used well-known approximation for large values $M \gg 1$ and $c > 1$, expression $1^{-c} + 2^{-c} + \dots + M^{-c} \sim 1/(c-1)$.

Claude Shannon, along with fundamental results on optimal differentiating (distinguishing) M signals at the presence of noises (see point 5.2), theoretically proved that texts based on a -letter alphabet, with the increase of their length n practically consist of $M = a^{nH}$ texts with equally probability, where $H (H > 0)$ is some empirical constant, which, as it appeared, does not change much for different European languages. For example, for English, German and Swedish full-vowel languages $H \leq 0.3$ (in the following we assume $H=0.3$).

We will call chaotic text of n length on a -letter alphabet a text, in which letters emerge independently from each other in probabilistic sense and with equally probabilities (with probability $1/a$). Obviously (It is evident), that there exist $M = a^n$ all such texts and they all have equally probabilities c . Here $H=1$ and for sufficiently large value n all texts in any language may be coded by all $M = b^n$ chaotic texts of the same length n , where b is equal to the whole number of a^H :

$$b = [a^H].$$

As a summary of all three statistical laws of texts we can give the following approximate statement

If from any full-vowel a -letter text in the language with parameters c , d and H to obtain the text from letters of the first one, consequently standing apart from each other on fixed distance of k letters, then for sufficiently large value of k , the obtained text approaches in its statistical properties to chaotic b -letter text with value b and average length of word m^* ,

defined by expressions (App. 5.1) and $b = [a^H]$ correspondingly. Let us move to cryptology.

Crypto-resistance – is provided by the fact, that the open text is encrypted by the cipher and transforms into encoded text, which may be decoded only by one knowing the key to the cipher. The cipher is *absolutely* crypto-resistant if its encoded text (cipher-text) is chaotic and any one-time use of the key takes place. As an example of such a cipher is the Vernam's cipher, in which on the two-lettered plaintext with letters «0» and «1» one time as a key is «put» chaotical text of the same length, written on the same alphabet with law of addition of letters on the same places: $0+0+1+1=0$ and $0+1=1+0=1$ [28, 29]. Absolute crypto-resistance of this cipher follows from the fact, that that from the given cipher-text can be received any plaintexts, with equal probabilities, for the corresponding key. Concept of *practically* crypto-resistant cipher is derived from other conceptions. Number of choices for the keys is so large, that complete selection of all possible keys, usually, is not feasible in sense defined in Appendix I. Let us note that the most important concept of feasibility emerged in cryptology.

In such conditions any methods of reduce of complete (specifically parallel) selection (enumeration) are sometimes the only possible to overcome combinatory difficulties [17, 23].

In his fundamental work on cryptology [28] Claude Shannon showed that the most ciphers could be presented as combination of ciphers of substitution and commutation. The first ones, in order to receive an encoded text from plaintext, substitute letters of the text with the other letters, and the second simply commute (swap) them onto different places.

Special case of the later is the cipher «Szital», which was used by Spartans during their war with Persians [29]. In this cipher the belt of the messenger was winded onto szital (cylinder of specified diameter). The belt worn by the messenger had unreadable text. Hypothetical «codes of Torah» according to the opinion of their investigators, were advanced variation of the cipher «Szital», when the text on the belt was read differently of encoded one and so did not attract any attention as did the unreadable text. Let us call such a cipher «Readable Szital» (RS – Cipher in short).

App. 5.3 Conditions of occurrence textual artifacts in RS–ciphers.

Let us investigate RS–ciphers without discussing methods for their construction. The later are very complicated by themselves. RS–ciphers belong to the special type of ciphers that use arbitrary readable plaintext to receive (obtain) from its letters to build readable hidden text using definite secret rule -key. For the researches looking for a key of «Codes of Torah» plaintext is Torah and the key is the same key which, as they say, was used by Creator to cipher (encode) the hidden text.

To describe the RS–ciphers let us imagine the whole plaintext written as one line, length of N using the alphabet consisting of a letters. Let us begin reading from k^* -th letter not in succession but with an interval of k letters. The key to correct reading is an unknown pair of whole numbers (integers) (k^*, k) , and the words, formed by this process of length m , we will call (k^*, k, m) – chains.

First of all let us note, that no matter what kind of manipulations we would apply to readable plaintext it is easier to obtain from it readable text than with the same manipulations on chaotic text.

Therefore, if we perform any manipulations on chaotic texts and receive as the result readable text, then performing the same manipulations at readable plaintext will give us

readable test as guaranteed. Let us investigate instead of readable plaintext the chaotic text of the same length N .

Let us fix an interval k and analyze n of non overlapping (k^*, k, m) – chains with different values of initial positions k^* ($n \cdot m < N$). Let us take an arbitrary word (it can be readable or unreadable) with length m on a -letter alphabet.

So, using calculations of the same type as in derivation of the expression (App. 2.1 c) we receive:

$$P = 1 - [1 - (1/a)^m]^n = 1 - \exp[-n(1/a)^m], \quad (\text{App. 5.2})$$

where $n(1/a)^m < 1$, $n \cdot m < N$ and P – probability that among n received (k^*, k, m) –chains a given word occurs at least once. We will call such a chain pseudo-special (pseudo-particular), and occurrence of a readable word in it we will call textual *artifact*.

From the expressions (App. 5.2) it is easy to receive upper estimate of the length m^{**} of pseudo-special chain, which, by the definition, can be obtain as the result of n -multiple attempts to find a given word of the length m in chaotic text of the length N with probability of success of such a search equal to the value P . This estimate has the following presentation

$$m < m^{**} = \{\log N - \log \ln [1 / (1-P)]\} / \log a. \quad (\text{App. 5.3})$$

This estimate may be weakened for languages with known parameter H . For example, for full-vowel languages, including Hebrew, this parameter H as in other languages of this type, is approximately equal to 0.3 (see previous section). Therefore, here for sufficiently large value of m it is possible to transfer to statistically equivalent chaotic text on b -letter alphabet, where $b = [a^H]$.

The core element of arbitrariness is variety of ways of writing in V (i) variations an i^{th} object on a given language ($i = 1, 2, \dots, M^*$). Then, for quantity M of all readable writings of the words we have following identical presentation:

$$M = V(1) + V(2) + \dots + V(M^*) = M^* V^* \text{ или } M^* = M/V^*, \quad \text{a)}$$

where $V^* = [V(1) + V(2) + \dots + V(M^*)] / M^*$. (App. 5.4)

$$V^* = [V(1) + V(2) + \dots + V(M^*)] / M^*. \quad \text{b)}$$

Here V^* is an average variance of presentation of objects by the words of a given language.

Now let us enrich the shown procedure of the search with the element of arbitrariness and begin the search not for the readable writing of the length m from the M all possible such writings, but rather for one from M^* objects, presented in the text in the average of V^* writings with different lengths m (average length m^* and maximal length m^{**}). Let us assume that formally $V^* = a^{nH^*}$ ($H^* = (\log V^*)/n$).

So, from the expressions (App. 5.1) and (App. 5.4 a) we have $b = [a^{H-H^*}]$. By substituting in the expression (App. 5.3) value a with value b and value m with value m^* , we receive for value m^* approximate estimate which is weaker in comparison with estimate (App. 5.3) :

$$m^* < m^{**} / (1 - S)H, \quad \text{a)}$$

where

(App. 5.5)

$$S = H^*/H < 1. \quad \text{b)}$$

Is the parameter of arbitrariness, characterizing arbitrary choice of writing of the object on the given language. Using formula (App. 5.1) and estimate (App. 5.5) we receive conditions of occurrence of textual artifact depending on a value of the parameter of arbitrariness S of the following kind:

$$S > 1 - m^{**} [1 - d / (c - 1)] / H \quad \text{a)}$$

non-trivial at

(App. 5.6)

$$m^{**} < H / [1 - d / (c - 1)] (N < a^{H/[1-d/(c-1)]}). \quad \text{b)}$$

Let us show now, that real numerical values of parameters, for which, supposedly, «Torah codes» were obtained show that in reality the textual artifact took place.

App. 5.4. Computer in the role of the serpent tempter. The refutation of presence of «Torah codes»

Let us analyze numerical values of parameters, which were used by “searchers for” «Torah codes». Text of Torah consists of $N = 304805$ letters in Hebrew alphabet, having $a = 22$ consonants. In the text itself there is no «voweling» of letters and reader performs it according to his consideration (additional arbitrary element). Therefore because Hebrew is full-vowel language the effect of approximately doubling of the length of words occurs. For practical needs it is sufficient to put value $P=0.99$. By substituting values P and a with their numerical values in expression (App. 5.3) we will receive the following, taking into consideration doubling effect:

$$m < m^{**} = 2 (\log 304\,805 - \log \ln 100) / \log 22 = 8.6$$

So, we proved that comprehended words up to eight-letter ones, derived by «Torah code» from Torah text, really are artifact. That is with the greater probability they could be received with the help of the same code from any (chaotic as well) text of the same length and number of letters as in Torah.

It is interesting that Rafail Nudelman comes to the same result on intuitive level [30]. He writes: «In any sufficiently long text (the text of Torah, as I mentioned before, consists of 304805 letters) the probability of finding four-, five-, and even eight-letter combination, when letters are apart on equal intervals and this combination, itself, forms some meaningful word is unimaginably high ». And in fact, many examples given by the author, show that all «code-searchers» of «Torah codes» both ancient and modern ones did not find in their search chains with the length exceeding eight-letter combinations.

Here we use extremely strict estimate (App. 5.3) of the artifact, which does not use Hebrew parameters H , H^* , c and d . Usage of these parameters permits with a help of expressions (App. 5.5) and (App. 5.6) to weaken estimate (App. 5.3) by one order (level) and to prove by its presence of artifact not only of words but of sentences.

For example, considering only one of these parameters, H , which, because of full-vowelness of Hebrew has approximated value $H=0,3$ as in the other full-vowel languages, we will receive the following expression by substituting value of a in the expression (App. 5.3) with a value

$$b=N(a, H):$$

$$m < m^{**}/H. \quad (\text{App. 5.7})$$

Being full-value, Hebrew as other full-vowel languages has a value of a parameter H closer to the value $H=0,3$. By substituting H in the expression (App. 5.7) with its value, for the same value of other parameters, determining value $m^{**}=8.6$ we receive:

$$m < m^{**}/H=28.7,$$

which is more than three-time weakening of previous estimation.

As it was mentioned before, true Kabbalists in accordance, with rationalistic spirit of Kabbalah and meditation religious experience, distanced from magic of numbers, especially from light-minded manipulations on Torah Text. They devoted all their life to the Study of the Deepest Meaning of this Text, every time convincing in its Infinity. Dislike the numbers of Talmudic rabbis, They, observing traditions with pleasure, made the corner-stone not the letter, but Meaning of G-d given Torah, rousing by its persistent censure and sometimes repressions of pedants.

One of types of such manipulations, as it was shown above, is so-called «Torah Code». The search for it in Talmudic surroundings began in 13th century of New Era.

Even such a great sage as Gaon Vilensky rav Eliyagu Zalman (1720–1797) did not ignore it. Ardour of medieval rabbis in searches of Torah codes was retrained by necessity of complete enumeration of astronomic number of variants of keys, which had to be done to reveal even short two-syllable words of the type «To-rah».

In our computer-oriented century, the situation changed sharply as a result of incredible processing speed of a computer. A computer began to play a role of a serpent tempter, tempting scientists with computer games. And ordinary folk in our century takes passing of any data through a computer as special act of its consecration and as the result it receives the status of indisputable truth.

App. 6. Empirical laws of system ecology

App. 6.1. Empirical basis of Systemology

Ecology considers systems of biological hierarchy (Fig. App. 6.1 b), starting with individual. It is the youngest part of biology which is not completely formed yet. Such position of ecology led to conducted to its undergoing to expansion together with physicalism and cybernetism.

The physicalism constructed theories based only on the rules of preserving substrate and therefore was insufficient to describe living systems. The basis for physicalism was the concept of so-called ecosystem.

The cybernetics conducted redundant computer experiments (overloaded with details of ecosystem with arbitrarily given coefficients because of deficit of data) for physicalism. «Beautiful coincidence» of theory and experiment in these conditions was an artifact absolutely like artifacts described in previous Appendix.

The author can not resist not to describe reaction of Andrey Nikolaevich Kolmogorov on this artifact, which the author was witnessing in exotic circumstances. In 1971 two scientific-research ships of the Academy of Sciences of the USSR, «Academician Keldysh» and legendary «Vityaz», simultaneously were at the opposite sides of Pacific Ocean. In those no-money-value times the temptation to meet in the middle of Pacific Ocean and «petty interests» including additional expenses of oil were simply incompatible. And surely, such meeting took place. Andrey Nikolaevich was on the board of the first ship, which was led by Andrey Sergeevich Monin. On the board of the second one, among excited discoverers of artifact was the author, who did not join their enthusiasm and so was in «proud» loneliness. The noisy crowd of enthusiasts of artifact came to the patriarch of state science and waited for him to take them to Olympus. However Andrei Nikolaevich cooled their enthusiasm with only one sentence: «Through the some number of points with arbitrary configuration, received experimentally, it is always possible to draw, for example a polynomial curve, if the number of polynomial coefficients is not less than the number of points». This phrase seized all the essence of defect of redundant polynomials, imitations and sciences – artifacts.

Only twenty years ago the ecologists were brought down to earth. It was reflected in the following shy statement of ecologist A. M. Gilyarov: «Now we begin to realize that probably there is no sense to develop ecology and biology taking physics as specimen. It is possible that biology of the future will be closer to humanities. Anyway, «adoption» is one of the central concept in Darwinism (and now it is the only sufficiently common evolutionary theory) and it relates to the field of semantic information...» [31, p. 4 – 5].

Such are the first timid steps of modern evolutionists on the way from processology (physics) through systemology to Kabbalah – the way, which would walk through few ones. Since, that after 150 years is revealed – principal conception of Darwinism «adoption» is non-physical and what? It seems to be humanitarian and again is information (but some or how semantic).

Or may be it is simply expediency. This word is «dangerous» for materialists as from teleology (science on expediency) both in sounding and in essence is not far from theology. Obviously, the matter is not in words, but in the models that stand behind them. But is Darwinism really «yet the only sufficiently common ecology – evolutionary theory»?

App. 6.2. of L.S. Berg – antithesis to Darwinism. Objective teleology

App. 6.2.1 Nomogenesis

Distinguished thinker of our days and the founder of the modern ichthyology and biogeography Lev Semenovich Berg (1876 – 1950) wrote: «...secret recognition of principle of original expediency of living creation is included in the theory of natural selection. In the reality, this theory is supported by further unexplainable origins: 1) variability, 2) heredity, and 3) the battle for survival (struggle for existence). Meanwhile, all these properties are... advisability... The battle for survival (the struggle for existence) suggests presences of ability to self-preservation... But it could be said that all these properties emerged as the result of battle for survival... and only those survived who happened to have by chance those

properties. However, this conception has vicious circle, as it explains the battle for survival basing on three mentioned above principles, and then explains these principles basing on from the battle for survival» [32, p. 73 – 74]

The opponents could not answer on this destructive critic of Darwinism . They wrote in the comments [32, p. 18]: «Without considering the real essence of Darwinism, Berg imputes to it postulate on original (primordial) advisability, that is the conception, denial of which would be one of the greatest service of Darwinism». But Berg does not impute, but drives the presence of advisability in postulate of Darwinism. The opponents do not consider -,what Darwinism wanted, but could not deny- the postulate of original expediency, mistaking wishes for reality. It already reminds not a scientific argument, but an ideological order.

L.S. Berg opposes nomogenesis (natural or as he says « ducted » mechanism of purposeful evolution) not on the level of individual as in Darwin, but on the level of the whole Liney's Tree of life in general on the bases of originally placed inclinations. This conception completely reflects conception of a single Act of Creation of the Tree of Life and Managing it by Creator with help of Purposeful Interferences into created by Himself mechanisms of self-organization (see the end of point 4.3).

It is important that hypothesis of nomogenesis is proved by the several empirical laws of Tree of life but not by speculative conceptions [32]. Let us look at one of the most important of them. Even in 18 century Gekkel the biogenetic law in the distinct form was formulated ontogeny (ones own development of individual) repeats phylogeny (development of branch of Tree of Life to the species of this individuals).

Collecting extensive empiric material L.S. Berg revealed that ontogeny can lead to its phylogeny and moreover (furthermore) phylogeny of group of individuals of given species may be in advance to the strange phylogeny of species standing higher on Tree of Life and formulated new genetic law of advance. From this law follows likelihood of hypothesis that Tree of Life emerged not as a result of spontaneous evolution with random mechanism of selection (according to Darwin), but it was predetermined at once and in a whole at the moment of the Act of Creation.

Speaking of purposefulness of the structure and behavior, L.S. Berg looks on individual, population, species but not always on the Tree of Life as a whole. He speaks only on predetermination but not on purposefulness of the later. What may be said on purposefulness of the Tree of Life in the frames of Intention of Creation? In App. 6.3 will be given an answer on this question in the very beginning of its investigation.

App. 6.2.2. Objective teleology

Adequate penetration of human being into Intentions and Final Goals of Creator (G-d's teleology) is performed by Kabbalists on the basis of Torah , meditation experience , and rationalistic methods of logistic analysis of simple adequate models. As it was previously mentioned, Kabbalists sharply distanced from magical, mystical, and other irrational «methods of excessive comprehension» of Creator. Secular science was in a difficult situation in comparison with Kabbalists when teleological problems emerged – problem of identification of goals of Creations.

It is fortunate that in processology, being busy with investigation of spontaneous behavior of simple systems, such problems did not appear. But in systemology, being busy with investigation purposive (goal-seeking) behavior of complex systems, such problems took important place. Their resolution required creation of special methods of so-called objective teleology, consisting in following [2, p. 27].

Not knowing the goal of complex biological systems created not by us we propose several plausible (credible, believable) hypotheses about these goals with corresponding to them different objective functionals on a structure and behavior of system's models. As a rule, extremums of these functionals lead to different structures and behaviors of optimal models of system. The comparison of the latter by the structure and behavior with original is conducted. The closest among them by structure and behavior to the original defines the most credible optimal model of the system as well as objective functional and the objective.

Simple optimization models of systemology (theory of potential effectiveness) were induced not only by engineering practice (see point 5.2). Not less significant were for them models of biological systems. With their help qualitative explanations of series of empirical biological laws and connections between them were given [2, chapt. 3; 16].

Besides theoretical significance those laws were significance for estimates of risk of ecological systems, which in their turn is important for the development of ecological norms [23, 35]. Below are given four empiric laws of ecology of such a kind, which came across to the field of vision of systemology (laws of systemic ecology).

Let us note, that for establishing (revealing) new laws and their explanation by simple optimization models of systemology, according to the 3^d principle of systemology (see point 4.22) we have to move from the Tree of Life to more generalized Tree of systems with «two branches» (see Fig. App. 6.1).

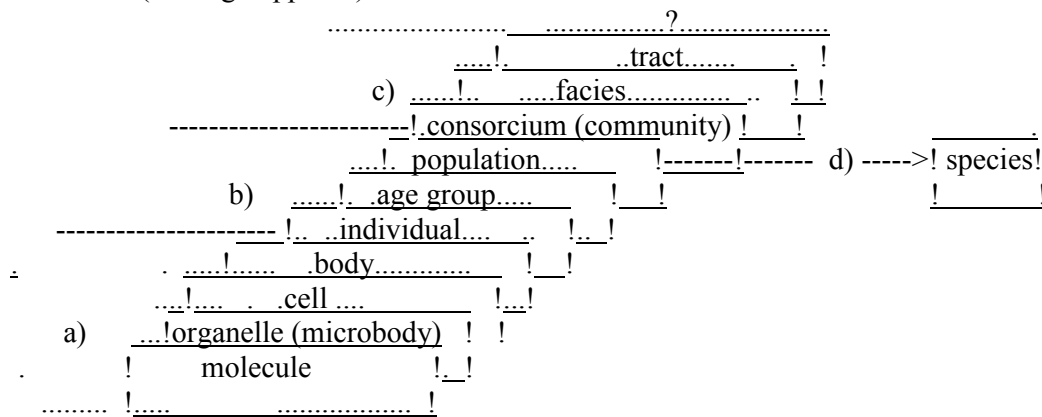


Fig. App. 6.1. The law of alternation (Malinovsky) for detailed biological hierarchy. Its parts: a) microbiological; b) macrobiological (ecological); c) geographical and d) species branch

App. 6.3. The law of alternation (Malinovsky)

App. 6.3.1 Law

Examination of a detail biological hierarchy given on Fig. App. 6.1, reveals amazing alternation of systems of two types, which we named in the point 4.3 as stations and collections, forming armadas in such a way that we have (armada, stations, collections) = (supersystem, systems, subsystems). Here, neighboring armadas in hierarchy are placed in a such way that a supersystem of the lower armada is a subsystem of the upper armada. So, biological hierarchy is a complete formation (chain) consisting of a sequence of *linked* with each other armadas (links of the chain).

In fact, let us examine individual, its unpaired organs and cells, which constitute the latter. Organs are strictly organized, non-replaceable by each other, form a structure of individual

and complement each other, providing normal functioning of the individual. On the contrary, cells (corpuscles), replaceable by each other, realize metabolism changing in individual and homogenous. This group of three types (individual, organs, cells) is a special case of a formation (armada, stations, collections), examined in point 4.3.

The same are following groups of threes: (cell, organelles, molecules), (population, age groups, individuals), (facium, consortiums, populations), (tract, fasciums, consortiums). In geography consortiums correspond to communities in ecology, and fasciums are their integrated union, constituting the part of landscape (tract).

Before 20th century, attention of biologists was concentrated on species branch (d). So, for the first time the effect of alternation for microbiological part of hierarchy (a) was discovered only at the end of the century (A.A. Malinovsky. Common traits of biological level and alternation of types of organization. In the book «Development of conception of structural levels in biology». Moscow. Nauka, 1972, p.217–277). After many years this effect was revealed independently and simultaneously by the author for the part of hierarchy (b) [18] and for the part of hierarchy (c)

(A.D. Armand. Strong and weak systems in ecology and geography. In the book «Stability of geosystems». Moscow. Nauka. 1983, p. 50–61). Author called this effect by the name of its discoverer. As discoveries were made independently in different parts of hierarchy they were described by different terms, given in the Table App. 3.

Common name	Names in the parts of biological hierarchy		
	A	B	C
Collection	Corpuscular	Metabolic	Homogenous
Station	hardly organized	Structural	Supplementary

Table App. 3. Special names for Collection and Station in different parts of biological hierarchy.

As it was mentioned earlier, neighboring armadas of hierarchy are situated in such a way that supersystem of the lower armada is subsystem of the upper armada.

So, biological hierarchy is integrated formation (chain), consisting of a sequence of linked together armadas (links of the chain) and reliability of the chain depends in reliability of its links.

Limiting law of reliability (probability P of survival) of armadas was found by the author in 1971 [17, p. 164] and search for its demonstration in ecology, not always successful, was conducted during many years (K.V. Beklemishev. Regulation on bio coenostical level of life organization. Bul. MOIP, Ser. Boil. 1969, v. 74 (3)). Secondary product of K.V. Beklemishev's searchers was important example of a transforming system in the form of a community found by him (see the end of the point 4.2.4). The author noticed by himself the demonstration of the law of alternation in the part of biological hierarchy (b) [33, 18, p. 172]. At the same time together with investigations of two mentioned above authors in parts of hierarchy (a) and (b), the law of alternations was discovered in its entirety.

App. 6.3.2. The explanation

To establish limiting law we have to consider subsystems (primary metabolic elements) of all m aggregates to be identical (as it was done in von Forster law) and therefore, π , fixed common number of original elements of armada, is equal to the following sum $\pi = \pi(1) + \dots + \pi(i) + \dots + \pi(m) = \text{const.}$, where $\pi(i)$ – number of original elements in the i aggregate.

However, getting into different aggregates (storages) primary elements have correspondingly different fixed individual probabilities $p(i)$ of destruction, which defines non-identity of m aggregates.

For the case of independence of destruction of original elements we calculate value P_{max} . Then we solve a problem of identifying maximums P_{max} for value P at all possible values $n(i) = 1, \dots, m$.

It is proved [17, p. 164], that with increase in $n(i)$ value

$$P_{max} \rightarrow \begin{cases} 1 & \text{if } n(i) > c(i) \ln m & \text{for all } i=1, \dots, m & \text{a)} \\ 0 & \text{if } n(i) < c(i) \ln m & \text{at least for one } i, & \text{b)} \end{cases} \quad (\text{App. 6.1})$$

where non-negative constants $c(i)$ depend on of probabilities of destruction $p(i)$, that is for maximal reliability in any way close to one it is sufficient to follow the condition (app, 6.1.), required not too small (at least such as logarithmic m) splitting up of armada onto m parts (aggregates) [18, p. 185].

Besides, it follows from limiting law [17, p. 163] that for P_{max} to be close to one is necessary optimal proportion of original elements of armada and its aggregates

$$n(i)/n = d(i)/m, \quad (\text{App. 6.2})$$

where positive constants $d(i)$ depend of probabilities of destruction $p(i)$.

Limiting law of reliability of armadas – is structural static law. Limiting law of system reliability (see point 5.2) is behavior dynamic law of system, being on metabolic level. However, formally is possible to receive second from first. To do this instead of armada, consisting of m parts (aggregates, aggregate with number $n(i)$ elements) let us examine one aggregate with variable with age I of amount $n = n(i)$ of elements at $i=1, \dots, m=t$, where t – final age. Then from relation (App. 6.1 a) we receive $n > c(i) \ln t$ or, changing designations $n=v$, $t=u$ and suggesting

$\max c(i) = C$, we receive conditions of limiting law of reliability of the point 5.2.

In historical dispute between theories of spontaneous evolution and nomogenesis there is much in common with analogous dispute between Ptolemeum and Kepler models of sun system. The first was more complicate then the second and continued to complicate at the revealed of contradictory facts. Evolutionary theory behaves in analogous way. But a special support to Kepler was mathematically perfect Newton's mechanics. Author hopes, that analogous modest support to the theory of nomogenesis will also be law of alternation with mathematically estimating of reliability of armada.

Conditions (App. 6.1 a) and (App. 6.2) really is that available to human being weak reflection of Endless Purposefulness, which Creator put into the Tree of life for its reliable existence during all the history of the Earth.

App. 6.4. The law of logarithmic growth (Bachman)

App. 6.4.1. Law

It is being established empirically that exists logarithmic dependence of spatial growth of biological systems or their «biological» age or some indicator B of “biological age” from age t in astronomic time. Then, so-called «temporal logarithmic law » has a following representation :

$$B=B(t)=K \ln t + B(1), \quad (\text{App. 6.3})$$

where K and $B(1)$ are some non-negative constants, reflecting specifics of the investigated biological system.

Value B in different cases had following biological nature [33, 18]: the area of healing wounds, the size of the crystalline lens of an eye of a rat «Nesokia indika», 23 different indicators of biological age and, finally, increasing (increment) of biomass $B(t) - B(1)$, starting from some fixed age $t=1$.

The last, the most universal regularity was first found by G. Bakman in 1943 (law of «organic» time) and so we will call the equation (App. 6.3) the Bakman's law. (see Fig. App. 6.2).

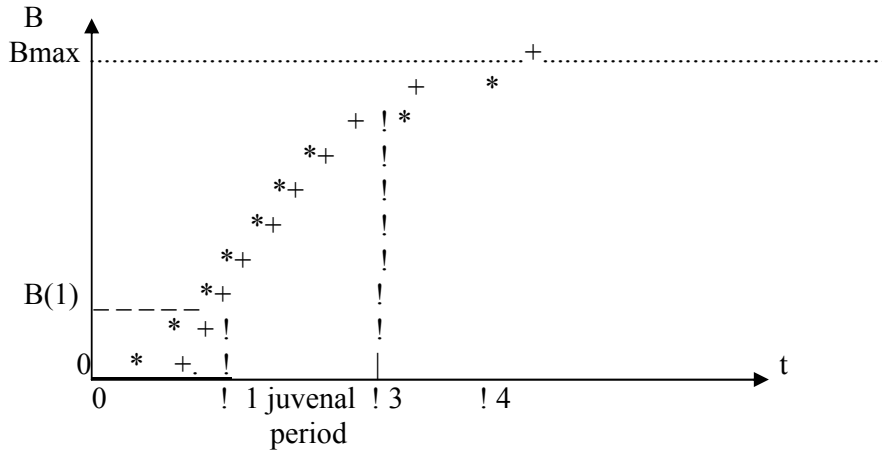


Fig. App. 6.2. In the above picture the Law of logarithmic growth (Bakman) is represented by «crosses» ++...+, whereas Logistic law is represented by «stars» **...*

$B = B(t)$ is a biomass at the age t , $B(1)$ – original biomass at the age $t=1$. $B = B_{max}$ – maximal biomass.

One may assume that the logarithmic law, without asymptote with growth (increase in) of age, contradicts realistic logistic law with asymptote.

However as Bakman's logarithmic law exists (takes place) only for juvenal (young) period of biological systems, then on this age interval logistic and logarithmic curves are sufficiently close to each other and can equally approximate empirical data.

App. 6.4.2. The explanation

Bachman's law applies to the dynamics of biological systems being on metabolic level, that is under the conditions of action of limiting law of reliability (see part 5.2). If the average biomass of the original (prime, initial) element is equal to b , then $B=u b$, where u – the amount of original (prime, initial) elements. After making corresponding re-nominations $v=t$ and $K=C \gg B(1)$, we receive expression (App. 6.3) from the law of reliability of the point 5.2.

App. 6.5. The law «complexity – stability» (von Forster)

App. 6.5.1. Law

At the end of point 5.3 the law «complexity – stability» by von Ferster was detail formulated. Here we give some its concretization (see Fig. App. 6.3).

The law concerns specious branch (a) of biological hierarchy. Linear regression of decimal logarithms, received by the way of the smallest squares on «cloud» of points and has the type.

$$\log n N = 15 + 0.52 \log n . \quad (\text{II. 6. 4})$$

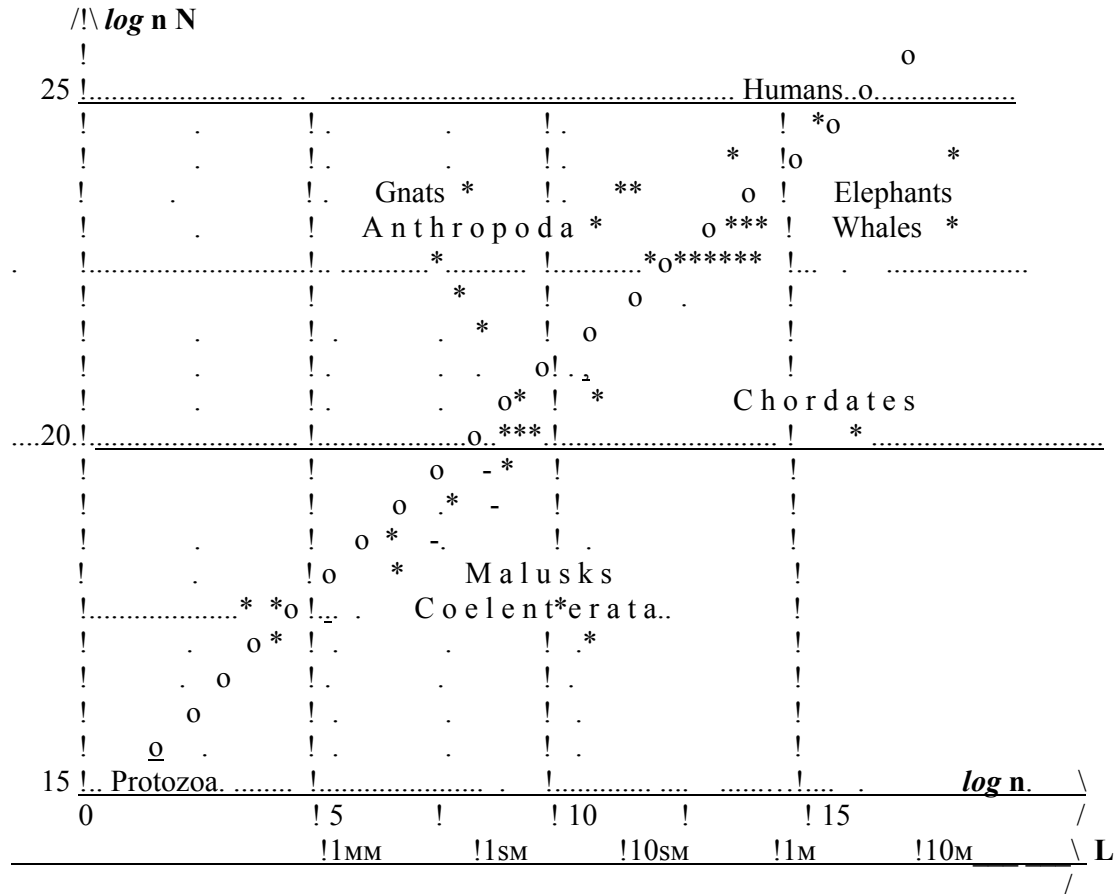


Fig. App. 6.3. The law «complexity – stability» (von Ferster).

On the axe of abscises $\log n$ – complexity, on the axe of ordinates $\log n N$ – stability. n – average amount of cells in the individual; N – amount individual of species. Linear regression portray of line $o o o o o o$.

L – the scale of average linear dimensions of the animated bodies (For example, a scale in around 10m is corresponded to Elephants).

App. 6.5.2. The explanation

Von Forster himself did not comment empiric constants, received by him: 15 and tangents of corner of decline 0,52. In the work [17, p. 198] simple interpretation of the first constant is given. Really, for one-cellular organisms we have $n=1$ and $\log N = 15$, where N is amount of

one-cellular organisms on the whole Earth. And really if on each m^2 to place one one-cellular organism, we have $14 < \log N < 15$, that is this value defines parameter of «critical» density.

The biggest part of point 6.2 of the same monograph is dedicated to improvement of value of tangent of corner of decline, approximately equal to the half, connected with model of vitality (also see [18, p. 186 – 190]).

App. 6.6. The law of latitude zone of ecological optimum (Volskis)

App. 6.6.1. Law

This law as well as the law of von Forster is related to species branch (Fig. App. 6.1 d) of hierarchy of biological systems and is one of the reflections of a previously mentioned common principle of optimality (purposefulness) in biology. It is known long ago physiological tolerance (prefer ability) of individuals of given species to definite diapasons of temperature, light, humidity, inhabitation and so on.

Analogous ecological tolerance of populations of some kind existed before investigations of Richard Volskis (R. Volskis. Regularities of variability of the parameters of the populations of species in time and space (with reference to freshwater fish model species research) Vilnius, 1994) was not revealed. Difficulty of its revealing is connected with the fact, that tolerance of population is its emergent property, that connected with tolerance of its species. From the other side the amount n of factors, influencing onto population significantly more than the amount factors, influencing onto individuals and the amount of their combinations in abstract ecological space is astronomic. In this connection in ecology is developed special theory of ecological niches – neighborhoods of tolerant ecological optimum in ecological n -space.

R. Volskis investigated on very big empiric material separate populations of the species, arranged to one and the same ecosystems on one and the same height over sea level – local one-type populations (LOP).

It happened that depending of different values of geographical latitude (x) of ecosystem, many parameters LOP (specific gravity $d(x)$, average duration $T(x)$ of individuals life etc.) reveal precise ecological optimum on latitude in the zone of ecological optimum (ZEO) (see Fig. 6.4).

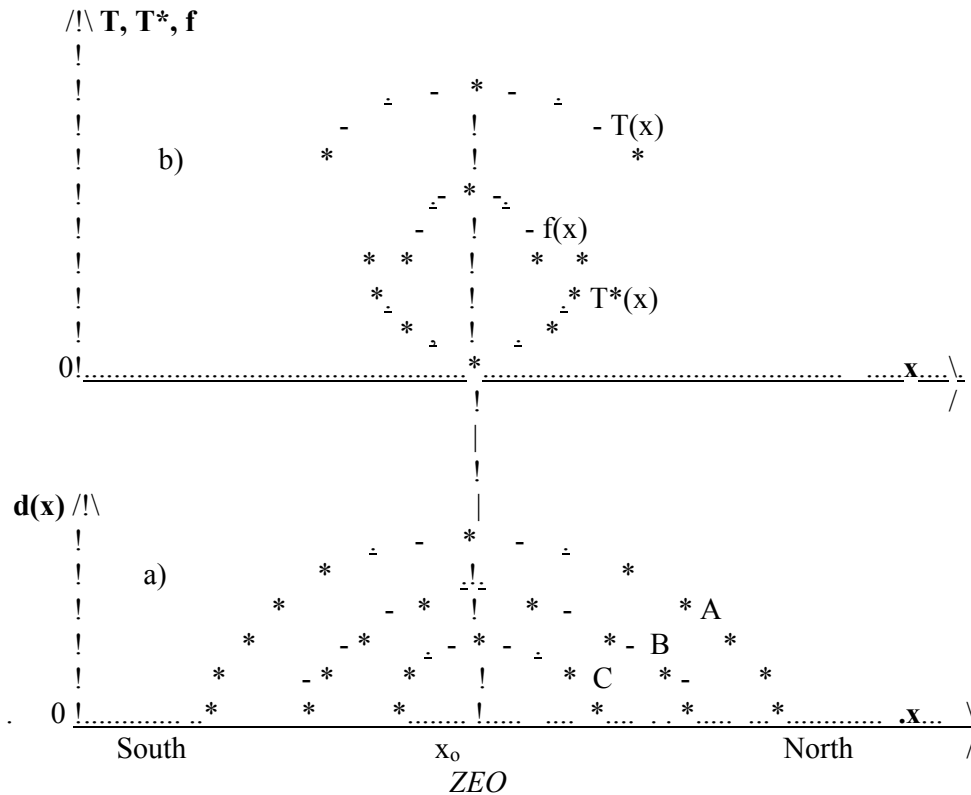


Fig. App. 6.4. Law of latitude ecological optimum for populations of species (Volskis).

a) Latitude curves of specific gravity $d(x)$ of population on the latitude x : A – in pre-industrial period, B – in the end of XXth century, C – prognosis for beginning of XXIst century. Zone of ecological optimum (ZEO) with co-ordinate $x=x_0$. b) Theoretical curves of average life duration $T(x)$ and fundamental parameter $f(x)$, receiving with using of empirical curves of average time of restoration $T^*(x)$ and $d(x)$.

Parameter d of specific gravity of population (SGP) is calculated as relation of biomass of population to common biomass of community to which it belonged and which in its time is included to ecosystem investigated. Let us mention that the same parameters of populations of the same species apply to different ecosystems on one and the same latitude do not reveal ecological optimum. Considering mentioned astronomic amount of combination of factors it is not possible to see element of luck in R. Volskis discovery.

App. 6.6.2. The explanation [34]

Explanation of empiric dependences, concretization of cycles (u, v)-changes, noted in the point 5.2 and also of questions, given further in App. 6.7.7, which requests one of central concept of systemology – probability $P=P(t)$ achievement by system of the goal (effectiveness) during «relatively» time $t=Ta/T$, where Ta – age, and T – average durability of the life of system. This dependence according to technical systems is called function of feasibility and for biological systems 0 function of existence.

The most common situation of providing of system existence is investigated (R-quality) with fulfilling by it of vividly important actions (I-quality and C-quality). In this accordance common goal of system is divided onto two sub-goals: $G=\{X>Ta\}$ – to live at least to age Ta ,

measured by the amount of some time intervals, taken as units and $G^* = \{Y < Ta\}$ – to have a time at life time to the age Ta to fulfill vividly important actions. Here Ta current age and X and Y – random times, necessary to fulfill the first and the second sub-goal with mathematical waiting T and T^* correspondingly.

According to definition probability $P(t) = P(G, G^*)$ is probability of mutual performance of events G and G^* . So, with the growth of the age Ta probability of performance of the first goals is decreasing and the second – increasing, so becomes possible the existence of maximum of function $P(t') = \max P(t)$ at some value $t = t'$. Using Bool's estimation for the event G , Chebyshev estimation for event G^* and again Bool's estimation for combining of these events (see App. 5.1.1), we will receive lower estimation $P(t, f)$ of arbitrary function $P(t)$ with the same values T and T^* :

$$P(t) > P(t, f) = 1 - t - 1/ft = (1-t)(1-1/ft) - 1/f = [1 - 1/f^{1/2}]^2 - [t^{1/2} - (1/ft)^{1/2}]^2 - 1/f \quad \text{a)}$$

and (App. 6.5)

$$f = T/T^*, \quad \text{b)}$$

is fundamental parameter of systemology, defining total effectiveness of the system. From the last expression of relation (App. 6.5 a) is shown that at $t = t(f) = 1/f^{1/2}$ we have $P(t(f), f) = \max P(t, f) = (1 - 1/f^{1/2})^2 = 1 - 2/f^{1/2}$ при $f \gg 1$.

If random times X and Y are independent each from other and have exponential distribution, then:

$$P(t) = \exp(-t) [1 - \exp(-ft)], \quad t' = (\ln f)/f < t(f) \text{ and } P(t') = 1 - (\ln f)/f > P(t(f), f) \quad [27, \text{p. 206}].$$

Let us investigated important degenerated cases of the first expression of the relation (App. 6.5 a):

$$\text{a) } 1 < t \ll 1/ft < 1 \quad (t \ll 1/f^{1/2})$$

and

$$\text{b) } 1 > t \gg 1/ft \quad (t \gg 1/f^{1/2}). \text{ For them we have:}$$

$$P(t, f) = \begin{cases} / & 1 - 1/ft & \text{a)} \\ \backslash & 1 - t & \text{b)} \end{cases} \quad \text{(App. 6.6)}$$

The case a) corresponds to relation $Ta \ll (TT^*)^{1/2}$ or $Ta \ll T$ at $T^* < T$, that is because of being young ($Ta \ll T$) of highly reliable system, having only activity. Case b) corresponds to relation $Ta \gg (TT^*)^{1/2}$ or $Ta \gg T$ at $T^* > T$, that is because of being old ($Ta \gg T$) of a little-reliable system with only supplies its reliability and so non-active.

Let us move to the latitude law of Volskis. This law, besides self significance has important significance for identification of parameters of model of so-called life-long risk Ra of over-organisms biological systems (OBS).

This model deepens model of reliability in absolutely differing from the previous interpretation of function of existence (parameter T keeps the former sense, but parameter T^* is seen as average time of system «restoring»). Varying of instant risk R , connected with single interval of time and determining by relation (App. 2.1 c), life-long risk $Ra \gg R$ is connected with age Ta of the system order of average duration T of its life and is defined by relations (App. 6.7 a, b) (see further).

The thing is that in OBS (population, species and community) differing of individuals is clearly expressed inhibited (just lightning) condition (?) intermediate between normal (1) and lethal (0). And from the condition (1) system transfers into condition (0) only through

condition (?). Quality difference of deepened model from classic model of reliability consists in that from condition (?) is possible transfer not only to the condition (0), but also back into condition (1) (restoring)!

In this model we see system in inhibited condition, when non-possible internal restoring and transferring into condition (1) before external bad factors «kill» system irretrievably transferring it into condition (0). For life-long risk Ra (probability of death of the system (here LOP)) we have in these conditions:

$$Ra = T \cdot \begin{cases} \ln f / f & [27, p. 206], & a) \\ 1 / f^{1/2} & [18, p. 83], & b) \end{cases}$$

where

$$f = T / T^*(x) \quad [27, p. 206], \quad c)$$

$$T = 1 / [1 - d(x) / d(x_0)] \quad [34]. \quad d)$$

Value T (Ra) – is highly probable (with probability to 1-Ra) age, to which system survive and x, - co-ordinate of the latitude ZEO. Significantly stronger in comparison with (App. 6.7 b) estimation of risk Ra (App. 6.7 a) is achieved by request of exponential distribution with parameters T and T* of random time of life and restoring of the system correspondingly.

Analysis of relations (App. 6.7) shows that risk Ra=R(x) LOP has the same appearance that T*(x), that is has minimum in ZEO. Relations (App. 6.7) is significantly used for probability criteria of ecological safe, founded on conception of possible risk [22, 23].

App. 6.7. Insufficiency of modern microbiological conceptions for explanation of spontaneous maintenance of life

App. 6.7.1 Microbiological conceptions on spontaneous maintenance of life

Despite the fact that this appendix is dedicated to ecology (macrobiology) logic of previous constructions makes us to look at some microbiological problems. Indeed, nomogenesis of L.S. Berg and biogenetic law of Gekkel lead to a thought that predetermination of phylogeny corresponds to predetermination of ontogeny.

The latest seems to be even more credible because of grandiose experimental discoveries of the last decades in deciphering (decoding) of genetic code. However, dominating theoretic version of spontaneous beginnings and maintenance of life on the Earth is in lamentable state. Let us describe it with minimum details, using wonderful review [36], which does not seem to be obsolete at reading the later review [37]. It turned to be, that genetic structure of organism (genotype) defines form genesis and differentiation of cells of organisms (phenotype) to a very small extent.

Here is the description of biologists themselves: «And we thought, we were absolutely sure, that all plan of organism structure was completed once and for all as soon as zygote was formed (fertilized egg-cell (B.F.)... And in reality each organism during its development produces its own, absolutely unique group of genes... which is one of those factors that determine individuality, its «I» of each vertebrate» [38, p. 86–87].

Regarding processes in phenotype C.H. Waddington writes: «I showed that process of elementary differentiation in the cell of high organism... is connected rather with formations or «batteries» of genes, that with individual genes...» [36, p. 20].

So, genotype acts not as linear chain with N elements of an aggregate of DNA-genes, but as their different combinations, that are elements of a complex set. It creates corresponding potential set of constructive proteins of phenotype of the same volume $a=2^N$ (see further).

The same author writes: «... phenotype may be represented as a branchy system of trajectories, extended in phase space along axes of time» [36, p. 19]. And further: «For such a canalized trajectory which attracts neighboring trajectories the term creod was suggested» [36, p. 21].

So, creod is the standard description of the system with $A=a^n$ states if parameter n is interpreted by discrete time and parameter a as an indicator of a point in «protein» phase multidimensional space.

We find here two basic factors, leading to combinatory difficulties in the problem of search, mentioned in the point 6.1: complex set and standard description of the system. And in conclusion the same author writes: «It is important to understand the nature of mechanisms, defining emerging of creod because creod – is the simplest common description of so-called purposive biological process» [36, p. 22].

So, such a clear purposive behavior microbiologists try to describe by spontaneous processes by using mathematical image of multidimensional phase space in the same way as as macrobiologists (ecologists) use multidimensional ecological space (see App. 6.6.).

The most indefinite in the definition of creod as a trajectory in a phase space is its canalizing and «gravity» of other neighboring trajectories. Here has to be mentioned, that it was much more difficult for the author to decode sayings of modern biologists than ancient Kabbalists' and he is not alone in it.

So, «decoded » C.H. Waddington writes: «In our days everybody comes to the point that in the basis of the theory of evolution have to be Darwin's conceptions on random variability and survival of the most adaptable organisms. It should be mentioned, however, that modern orthodox Darwinism, using the same phraseology, changed the meaning of almost all words, that resulted in something significantly differing from conceptions, developed by Darwin» [36, p. 26]. Interesting, that C.H. Waddington, without knowledge about Berg's works in macrobiology uses in microbiology not only the same conceptions but also even the same terms of expediency and canalizing.

In the Review [36, p. 38–46] is given physicist view of R. Tom's conception of canalizing. However, in the same Review, H. Pattee, repeatedly underlining determinative significance of the problem of choice, writes [36, p. 77] about «deviation of classic physics from a main problem». At last, in monograph [39, p. 72] according to ideology of physical approaches to microbiology we read: «... capacity of accumulator of information is limited by precision of recognition of symbols». Going deeper into physical-chemical problems of microbiology, these authors understand, that these problems are not essential and in general correctly choose the key (dominated) non-physical problems. However, the misunderstood results of the theory of information and physical per se homeostasis with back connections, and in the best case principle of Le Chatelier – here is poor collection of their constructive «non-classical» apparatus (App. 6,7,6). As a result, the progress of theoretical microbiology was not seen till now, despite of impressive experimental results and some recent progress in the theory of «molecular machines» (see App. 6.7.4).

App. 6.7.2. Optimization of text recording and object search

Let us examine two elementary processes: a) recordings of some text and b) search for some object. These processes accompany the most complex microbiological processes and in their turn break down onto multiple actions of choices of (bits) a symbol from alphabet with its placement onto corresponding place in the text and corresponding finding of one object from the group of objects.

a) In App. 3 we looked at the first task in optimization placement of receiving from fixed energy $E=Ne$ (where e - its indivisible portion) of the most possible large number M of words of a length u . Let $N=uv$. Let us write words on $1+v$ - letter alphabet by letters corresponding portions of energy $0, e, 2e, \dots, ue$, including its absence. So $M=(1+v)^u$. Let us show that for $v=1$ ($u=N$) value M would be maximal, so that the inequality $2^N > (1+v)^u$ takes place or equivalent inequality, received from the first one by taking the u^{th} root from the both sides: $2^v < 1+v$. But the latest inequality takes place for all values of v , which can be proved by direct checking.

b) Let one of the desired objects be obligatory present among N objects of the aggregate. It is required to find optimal search algorithm. In particular, maximal number of N^* trials (bits) to find the object among N objects has to be minimal with probability equal to one. We may be fortunate and we may find the desired object on a first attempt with probability $1/N$ (see further).

Principle request for solving this problem is following. Let us consider that for any group from $L < N$ objects we know whether or not the required object exists.

Let s be the whole number and $N=L^s$. Then by sequentially breaking groups of objects into L portions, starting with the original one, after s steps we will receive L unitary objects, among which we will find desired objects. Here, each time we need to check for presence of the desired object in no more than in $L-1^{\text{st}}$ group, as if it is not present in them, it will be certainly present in the remaining L group. So, $N^*=s(L-1)$.

Finally we have:

$$\begin{aligned} & / (\log_L N) (L-1), & \text{a)} \\ N^* = \begin{cases} [N^c - 1]/c & \text{at } L=N^c, \\ \backslash N^c & \text{at } \log N \gg (1/c) \log(1/c), \end{cases} & \text{b) (App. 6.8)} \\ & & \text{c)} \end{aligned}$$

where $\log_L N$ means logarithm of value N with the basis L , derivation of the expression (App. 6.8 a) uses expression $\log_L N = 1/\log_N L$, and from requirements (App.6.8 c) follows the requirement $c \gg (\log \log N) / \log N$.

From the expression (App. 6.8 a) we have for the values of N^* in the following boundaries: $\log_2 N < N^* < N-1$ for changes in the values of L in the boundaries $2 < L < N$ and correspondingly value of c in the boundaries of $\log_2 2 = 1/\log_2 N < c < 1$. So, minimal the value of $N^* = \log_2 N$.

For large values of N fulfillment of the principal requirement at which the expression (App. 6.8) takes place, is not real as signals from the desired objects «are sinking» in «chorus» of signals from other objects [2, p. 340–342]. So, there exists only comparatively small group from $N \gg N_c$ objects, inside which signal from the desired object does not sink and for which the principal requirement is fulfilled. Therefore, when the original aggregate has $N \gg N_c$ objects, it is necessary to bring it into the aggregate of N_c objects by overall

examination of $N - Ncr$ of its objects and only then use the optimal search algorithm . Thus, here we have $N^* = N - Ncr + \log_2 Ncr = N$ at $N \gg Ncr$.

Let us examine more common case, when among N objects of aggregate $M > 1$ objects are desired . It is easy to show that probability P to find the desired object for the first time with their overall examination exactly on n -th attempt, has the following expression:

$$P = \left[\frac{N-M}{N} \right] \left[\frac{N-M-1}{N-1} \right] \dots \left[\frac{N-M-n+2}{N-n+2} \right] \frac{M}{N-n+1} = \left(\frac{M}{N} \right) \left\{ 1 - \frac{M-1}{N-1} \right\} \dots \left[1 - \frac{M-1}{N-n+1} \right].$$

Further we will examine the case $n \ll M \ll N$.

In this case we have approximate equality $P = p (1-p)^n$, where $p = M/N$. From here for probability P^* to find the desired object with N^* trials has for large values of N^* the following expression: $P^* = 1 - \exp(-N^* p)$. From here $N^* = \frac{N}{M} \ln \left[\frac{1}{1-P^*} \right] = N$ at $P^* = 1 - \exp(-M)$, which is practically absolutely acceptable because of $M \gg 1$. So, from this point forward in search tasks we take $N^* = N$ at $N \gg Ncr, M \gg n \gg 1$.

App. 6.7.3. Conditions of an unfeasibility of spontaneous maintenance of life and numerical estimates

Let us decline attempts of physical description of process of canalization and let us examine it just as decreasing of number of trajectories of creod in comparison with their number in a integrate potential diversity, characterized by two average feasible numbers h and g of combinations of genes (CG) and trajectories of creod (TC) correspondingly.

Let us start with the genotype. Let it contain N genes (portions of DNA, responsible for particular inherited feature). Then all possible combinations of genes, comprising a complex set, will be:

$$a = h(0)C(0, N) + h(1)C(1, N) + \dots + h(j)C(j, N) + \dots + h(N)C(N, N) = 2^N h, \quad (\text{App. 6.9})$$

where $KG \ h = h(0)v(0) + \dots + h(1)v(1) + \dots + h(j)v(j) + \dots + h(N)v(N), 0 < h(j), h < 1, v(0) + v(1) + \dots + v(N) = 1, v(j) = C(j, N)/2^N, C(j, N) = N! / j! (N-j)! = 2^{Nh} (j/N)^j$ at j and $N \gg 1$
 $C(j, N) = (N/j)^j$ at $J > j > 1, J = \text{const}$ and $N \gg 1$

a) case $h = h^* = N/2^N$ corresponds to inadmissibility of any combinations of genes,

b) case $h = h^{**} = C(I, N)/2^N$. The most real intermediate case, when besides individual genes all the combinations are admissible, but only to the strictly small order J ($j < J \ll N$). In this case we have $h(j) = 1$ at $j = 1, 2, \dots, J$ and $h(j) = 0$ in the other cases,

c) case $h = 1$ corresponds to the admissibility of any gene combination.

By using expressions (App. 6.9) we will have in all examined cases:

$$a = \begin{cases} / N & \text{provided } h = h^*, & \text{a)} \\ (N/J)^J & \text{provided } h = h^{**}, & \text{b)} \\ \backslash 2^N & \text{provided } h = 1 & \text{c)} \end{cases} \quad (\text{App. 6.10})$$

and in case b) approximate coincidence of the sum with the largest item for large values of N is used. Because of a genetic code, which performs practically unequivocal conformity between combinations of genes and proteins elaborated by organism, number of different proteins will have the order of the number a .

Let us move to phenotype. According to the concepts of creod described above, from number $A(n)$ its spontaneous available trajectories in phase «protein» space, one from the set of «purposeful» ones is materialized as the result of search-selection mechanism. Here, $n=U/U_0$ is a discrete number moments of time, U – time of spontaneous existence of creod and U_0 – duration of the slowest process, defining completion of protein forming, necessary at the moment of n -elementary act. Number $A(n)$ may be written as an exponential function

$$A(n) = A^n, \quad (\text{App. 6.11})$$

where

$$A = \text{ag и } g = \{[a(1)/a][a(2)/a] \dots [a(i)/a] \dots [a(n)/a]\}^{1/n} \quad (1/a < g < 1)$$

is TC (geometric mean) and $a(i)$ – number of admissible states in discrete moment i from all possible numbers of a states.

Let us now present the conception of Brennerman's linear function :

$$B(n) = Bn, \quad \text{a)}$$

where

$$B = b m U_0, \quad \text{b)}$$

(App. 6.12)

$b = 10^{47} / g s$ – fundamental Bremmerman's constant, $m(g)$ – mass of the part of the organism promoting reproduction of proteins and $U_0 (s)$ – time completion of elementary act. From the expressions (App. 6.11) and (App. 6.12 a) follow conditions of unfeasibility of spontaneous sustenance fe in the form of ::

$$A^n > Bn \quad (\text{App. 6.13})$$

From the nature of functions, used in the condition (App. 6.13) it follows that at any non-negative values of coefficients A and B , these conditions are satisfied for all values of n , starting from some value $n' = n(A, B) = U'/U_0$.

Here we have to define more accurately the model of examined life process as alternation of two phases of trajectory: the 1st – physical-chemical and the 2nd – «biological» (not physical-chemical). The first one, unlimitedly continuing during the time $U = nU_0$ without the 2nd, leads to thermodynamic destruction of a biological system for $U > U_{cr}$. The 2nd, being in the boundaries of duration U_0 of elementary act, performs managing interference into the 1st, directing it into biologically «necessary» intermediate state (expedient behavior). Of course, it is possible to impute to 2nd phase spontaneous behavior, which obeys unknown yet physical «antientropic» laws, as it is done by materialists. Here multiple emerge about intra-penetration and duration of these two phases.

At the same time, critical value $U_{cr} = n''U_0$ of spontaneous duration of trajectories and connected with it frequency of appearance of the 2nd phase with «slit» U_{cr} have important methodological significance. Kabbalists interpretation of these problems in the following.

Sustenance, as all processes in our world, occurs according «spontaneous natural» laws established by Creator with His rare interference into these processes (we discussed the reasons of of such behavior of Creator in App. 2.1). As these processes become more complex, the interference of Creator is more frequent. More simple processes of celestial mechanics occur with the rare interference of Creator. The example of such processes is one-day pause in rotation of the Earth (look Jesus Navin, chapt. 10, poem 13). It gave to atheists the impression that even if Creator as a watchmaker once winds up mechanism of Universe; it continues to function as a clock without His interference. Such interferences into more complex historical process were happening more often as it is pointed out in Torah. As for extremely complex, transient processes of life support, interference into them may occur more often than into other processes. However, its frequency has to be in rational boundaries

not changing the spontaneous component. In other words, with any interpretation of this question interference should not become continuous sustenance of each living cell (In this case there is no substantial problem).

It means that time U of spontaneously made trajectories should be in boundaries $U_0 < U < \min(U', U_{cr})$. Hence we have for corresponding discrete analogues $n = U/U_0$ conditions

$1 < n < \min(n', n'')$. So, condition $n > n'$ is sufficient to satisfy conditions of unfeasibility (App. 6.13).

Let us note, that clarification of numerical estimates on the base of the expression (App. 6.11) with use of a quite indefinite parameter N_{cr} and $U_{cr} = n'' U_0$ maximal number of proteins, among which the signal of a desired protein is still heard and maximal duration of spontaneous trajectories of creod, requires to express these parameters through measurable values, for which it is necessary to use more detail models of theory information and physics (look App. 6.7.4). But here we can avoid it because of weak dependence of final estimates of specified parameters.

Let us give explicit expression of value $n' = n(A, B) = F(J, g; N, B)$ through coefficients $A = ag$ and $B \gg n'$, when according to the expression (App. 6.10 b) $a = (N/J)^J$. By taking logarithm of both sides of the expression (App. 6.13) and using expression (App. 6.11 b), after simple transformation we receive:

$$n' = (\log B) / \log A = (\log B) / [\log a - \log(1/g)] \quad (g > 1/a, B > A) \quad a)$$

and

(App. 6.14)

$$n' = 1 \quad (B < A) \quad b)$$

We give numerical estimates $n' = F(J, g; N, B)$ as functions J and g at fixed N and B .

Let us start with coefficient A . According to the contemporary data number N of genes of higher animals reaches dozens thousands and of human being – to one hundred thousands (number of specialized genes of immunoglobulin comes to million) [38, p. 86].

Let us take $N = 10^5$. Then, for the inequality $g > 1/a$ for $a > N$ it is sufficient to have values $g = 10^{-k}$, $k = 1, 2, 3, 4$. Further we calculate values a on N and values $J = 1, 2, 3, 4$ (large values $J > 4$ bring to $n' = 1$) using formula (App. 6.10 b). It defines numerical value of denominator of the expression (App. 6.14 a). Let us go to its numerator.

Let us calculate coefficient B . Then, time parameters are given in a fraction of one second. According to data given in [38, p. 21–22] duration of elementary biochemical reactions takes interval of time such as 10^{-3} . Fermentative processes require from 10^{-2} to 10^{-3} , recognition of genes and proteins 10^{-4} , to construct a chain out of them 10^{-4} . May be there exist some more slow processes. Therefore, further we take $U_0 = 10^{-2}$. Thinking of highest animals we take their maximal masses, participating in formation of proteins, equal to $m = 100 \text{ kg} = 10^5 \text{ g}$. So according to the expression (App. 6.12 b) coefficient $B = 10^{50}$.

Numerical calculations, made according to the expression (App. 6.6.14 a) as in our case $B > A$ g , are given in the Fig. App. 6.5.

It can be seen on the Fig. App. 6.5 that with growth of variety of genotype (J) and phenotype (g), durability of U' spontaneous trajectories of life support decreases. As this duration in the boundaries of duration of elementary action obviously has no sense, Fig. App. 6.5 shows that interference into spontaneous support of life at exclusion of participation of gene combination in protein forming is necessary at least every second. With participation of already paired combinations interference should be ten times often, on the limit of plunging into time interval $U_0 = 0,02$ of elementary action and it is the same even for extremely

determining trajectories ($g=1/10000$). It contradicts sayings of C.H. Woddington about participation of gene combinations in protein formation (App. 6.7.1).

It is evident that if we worked out in detail processes of search, recognition and collection using limiting laws of systemology, specially differing signals on the preset of noises, then instead of coefficient $B=10^{50}$ it would be used coefficient $B^*=B10^{-37}=10^{13}$, as otherwise $b^*=10^{10}=b10^{-37}$ (point 6.2) would be used instead of constant $b=10^{47}$.

It would lead us, as is not difficult to calculate with the formula (App. 6.12 a), to number $n=13$ and 2,3 correspondingly for $J=1$ and 2 at $g=1/10000$ (see on Fig. App. 6.5 two points of the «curve» b), marked with ooooo).

So, any progress in construction of substantial systemological models of microbiological processes would lead to sharp decrease of duration of spontaneous trajectories of creodes till their degeneration, that is to its unfeasibility. In which degree theoretical microbiology is ready to accept the mentioned way after described above long-term crisis?

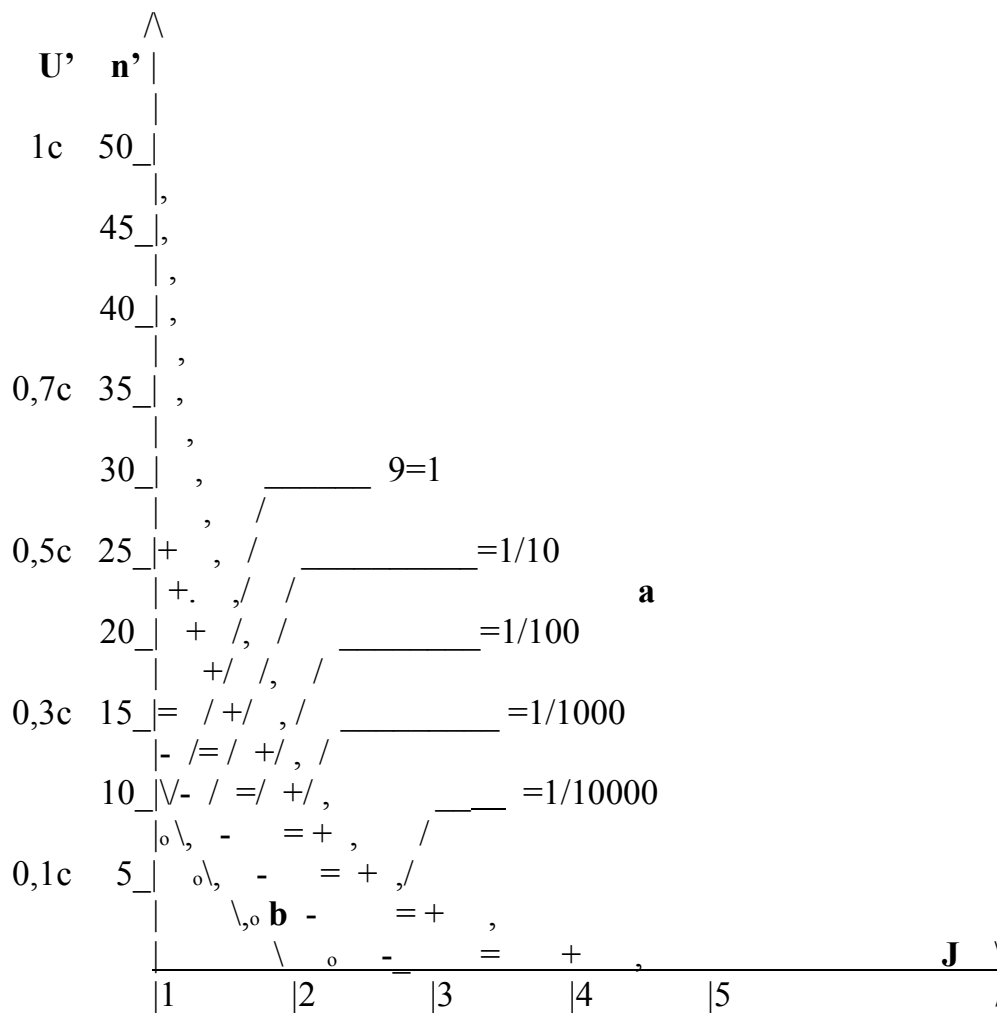


Fig. App. 6.5. Estimate of maximal spontaneous duration U' sec. of trajectory of maintaining of life of high animals depending on maximum number J all possible combination of genes and value g – average fraction of a number of proteins participating in each elementary act; $n'=U'/U_0$, where $U_0=0,02$ sec. duration of elementary act:

a) at extremely soft constant $b=10^{47}$,

b) at consideration of more strict conditions of noise immunity (point 6.2) (see «curve» o.o.o)

App. 6.7.4. The first systemological steps of theoretical microbiology

As it was already mentioned turbulent progress of experimental microbiology and partially of macrobiology (ecology) was followed by general stagnation theoretical biology in connection with physicalism and cybernetism. The author, beginning from 60th, tried to attract attention of his colleagues to these misinterpretations of the idea first in systemotechnics (it corresponds to American conception software and complex electronic hardware), and then in ecology and microbiology [37, p. 19–29]. However, position similar to the position of the author in these issues occurred to microbiologists only in the mid 80th. It is important that this common position occurred to them absolutely independently of the author, who worked in macrobiology (ecology) in complete ignorance and even hostility of the colleagues to his ideas.

In fact, critics on physicalism is already contained in some sayings of the authors of work [36], given in App. 6.7.1., for example H. Pattee. Consequently it had sufficient resonance and we will not stop on it. As of critics on cybernetism, it is very peculiar by the fact that in it simple optimization models are opposed to large computer imitation models as bases of microbiological theory.

So, Kalevi Kuul writes [37, p. 44–45]: «... it is clear that complex imitational models ... can not serve as base and fundament of biological theory ... «Minimal organism» – it is such a model (ideal representation of organism) which may be object of productive theoretical (deductive) investigations/ At construction of usual big imitational models with use of empiric dependences this goal is often overlooked and so models received are of little significance for theoretical biology». It is not empty talk and wishes. In the work [37] models of minimal organisms, so-called hyper cycles, sizers, etc are given. Further, the same author comes to definition of the most important property of simple optimization models [2, p. 24–25]. He writes [36, p. 49]: «Principle of optimal construction is a mighty tool of construction and deductive investigation and also of simplifying of models of organism». And continue [36, p. 50]: «However it is necessary to mention that checking of identity of chosen goal function ... usually represents large if not principal difficulty», that is it comes to the threshold to formulation of the most important principle of objective teleology (App. 6.2).

However it was not possible to reach yet really constructive results for models of so-called «molecular machines» quite recently (Schneider, T. D/ (1991). Theory of molecular Machines. I. Channel capacity of molecular machines. *J. Theor. Biol.* 148, 83-123).

It is interesting that here was used non-physical Shannon's model of optimal verification of signals on presence of noises of normal fluctuations (for correct definition of this model biologists needed half of a century). If it happened that corresponding algorithms of maintaining of life not met with noted combinatory difficulties, the calculations given above by the author concerning this theme would not have any sense.

App. 6.7.5. Optimality of 4-and 20-letter alphabets of genotype and phenotype

Among emerging successes of system microbiology is to be mentioned outstanding success not that much in principal, but in methodical significance of S.Yu. Ruderman break. On the base of mathematical and, most importantly, conceptual methods of systemology [2, 17] he constructed non-physical model of placing letters from a – symbol limited alphabet into the text of a length n. Because of unavailability to Russian as well as Western readers, two publications of S.Yu. Ruderman («Division of the whole onto parts and their optimal diversity» in the book «Overwhelming of complexity in the tasks of organization and management. Ufa, 1983 and «On formation of «messages» in biopolymers». Russian Academy of Sciences. Tolyatti, 1994. Separate brochure, p. 22), the author has to restore in

detail mathematical proof of optimality of 4-and 20-letter alphabets for writing of polymer texts of DNA (genotype) and for writing of amino acid texts of proteins (phenotype). The first work is a main one, it begins by words (cited according to our literature): «On the central role of the concept of feasibility in the theory of complex systems is noted ... in [2, 17, 27]. In [17, 27] are built models, connecting qualitative characteristics of feasibility – probability to gain the goal during a time not exceeding some bound – with such concepts as volume of memory and fast action of computer».

Complete solution of the simplest task for genotype is described in the 2nd work. We have general number of messages $M=a^n$ of the text of n length on a -symbol alphabet, hence:

$$n = (\ln M) / \ln a . \quad (\text{App. 6.13}^*)$$

Formation of the text consists in sequence of trials of random drawings of necessary letter from alphabet with replacement in the case of non-success and then placement of a chosen desired letter into the text. Each drawing is connected with consumption of some «resource» which value is considered to be one. Then, common quantity of consumed resources coincides with the number of drawings. It is clear, that with increase of a average number of drawings would increase.

On the other side at a fixed $M=\text{const}$ and increase of a , n decreases and by this decreases general number of drawings for the creation of the whole text of a length n . So, there exists some optimal number a^* , which minimizes average number of drawings.

It can be showed that this problem is equivalent to a search for an optimal a at fixed number of drawings for maximization of M (one and the same optimal a).

In our case probability of drawing of a necessary symbol is equal to $1/a$ and MO of number of drawings is $1(1/a)+2(1/a)+\dots+a(1/a) = (a+1)a/2a = (a+1)/2$.

Hence MO of the number of drawings for construction of the text of length n according to the expression (App. 6.13*) is equal to $(a+1)n/2 = (\ln M) (a+1)/2\ln a$. So, optimum value $n=n^*$ has to turn into a minimum a value $f(a) = (a+1)/\ln a$. We have:

$$f(a+1)-f(a)=[(a+2)\ln a-(a+1)\ln(a+1)]/(\ln a)\ln(a+1)= \\ = \{ \ln[a^2/(a+1)] - \ln[(a+1)/a]^a \} / (\ln a)\ln(a+1).$$

This difference is positive if $a^2/(a+1) > (1+1/a)^a$. As the left side of the inequality increases with the growth of a and the right side is less than e , we have for $a > 4$ $f(a+1) > f(a)$, that is $f(4) < f(5) \dots$. We can determine directly that $f(2) > f(3) > f(4)$. So, $f(2) > f(3) > f(4) < f(5) \dots$. So $f(a)$ has minimum at $a=4$.

Solution for phenotype is described in the 1st work, not even a solution, to be more precise, but rather a general condition at which volume of alphabet is equal to twenty ($a=20$).

The condition of Ruderman requires for probability P^* construction of errorless text of its definite dependence of n :

$$P^* = 1 - R^* = 1 - C^*/n \text{ or } R^* = C^*/n, \quad (\text{App. 6.14}^*)$$

where n length of «protein» text and $C^* < 1$ voluntary positive constant.

Let us begin to describe Ruderman's model. Let us for the creation of some protein text of n length on a -symbol alphabet some random resource in quantity K is selected and creation of the text is reached if $K < K^*$. Then from Chebyshev's inequality we have for probability P that $K < K^*$ ($R=1-P$ probability that $K > K^*$) estimate $P=1-R > 1-A/K^*$ ($A < K^*$), where A M O K (App. 5.1.1). This inequality converts into an equality if K takes value 0 and K^* with probabilities A/K^* and $1-A/K^*$ correspondingly (this particular case we will examine).

Furthermore, certain goal G (in a given case it is a creation of a protein text) we will consider P -feasible if $P > P^* = 1 - R^*$. It is sufficient for it to require that $1 - A/K^* = 1 - R^*$ or

$$K^* = A/R^* \quad (\text{App. 6.15})$$

The expression (App. 6.15) is the condition of P-feasibility of the goal G at given bounds of feasibility (P^* , K^*) (see App. 1).

If the goal G is achieved at achievement of n sub goals: $g(1), \dots, g(j), \dots, g(n)$, and goal G is P-feasible and sub goals $g(j)$ p(j)-feasible ($j=1, 2, \dots, n$), then according to Bool's inequality we have $P > 1 - n(1-p)$, where $p = [p(1) + \dots + p(n)]/n$ (App. 5.1.1).

For P^* -feasibility of the goal G now it is sufficient to require that $1 - n(1-p) = 1 - R^*/n$ or $p = 1 - R^*/n$. But according to the expression (App. 6.15) for sub goal $g(j)$ to be $1 - R^*/n$ -feasible resource $k^*(j)$ has to be assigned: $k^*(j) = A(j)/(R^*/n) = nA(j)/R^*$, where $A(j)$ is MO of resource $k(j)$ which will be necessary to achieve sub goal $g(j)$. Then summarized (total) resource $k = k(1) + \dots + k(n)$, necessary to create text of length n, will be equal to:

$$k = n^2 A^*/R^*, \quad (\text{App. 6.16})$$

where $A^* = (A(1) + \dots + A(n))/n$

Here by sub goals $g(j)$ we mean the successful placement a «protein» letter from a-symbol alphabet onto j-place of the text, connected with its search, recognition of the place, «installment» and may be some other actions.

Presence of the search for symbols of a volume a in this actions evidently shows that value A^* is proportional to value a, that is $A^* = C^{**}a$, where C^{**} is some positive constant.

Now let R^* satisfy Ruderman's condition (App. 6.14*). Then, using expressions (App. 6.16) we will have $k = (C^{**}/C^*)a n^3$. And finally, using as in the first case the expression (App. 6.13) for $M = \text{const}$, we receive:

$$k = k(a) = C a / (\ln a)^3, \quad (\text{App. 6.17})$$

where $C = C^{**} (\ln M)^3 / C^*$ some positive constant.

By examining function $k(a)$ of a continues argument a, we receive its minimum for value of argument $a = e^3 = 20.079$. (To avoid taking derivative $k'(a)$ it is possible to prove it by direct checking). The whole part of a, converting the same function into minimum is equal to $a = 20$. Here Ruderman mentions that if to reinforce a little the requirement for probability P^* errorless ness in comparison with (App. 6.14*), assuming $R^* = C^*/n^{1.22}$, then optimal value a is equal to $a = 25$. This shows large sensitivity of a final result to the kind of dependence from a (requirement of Ruderman's conditions (App. 6.14*)).

Let us show the attempts of their model substantiation.

The first attempts belong to the author of the conditions. Already in the first work he writes that requirement of making of common number of necessary protein texts in the quantity proportional to their length n with constant probability P^* of correctness instead of requirement (App. 6.14*), leads to the same result. But we consider it to be too voluntary. In the second work he does not explicitly formulate his conditions, but implicit assumptions, which present here in abundance, make this attempt incompatible even with the attempt mentioned above.

The author also made an attempt of model substantiation of Ruderman's conditions. The first was unsuccessful, but may be its description will be instructive for other researchers. The thing is that formally Ruderman made mistake in the expression (App. 6.13*), as according to the expression (App. 5.2) for any long texts (and such are protein texts) we have $M = a^{Hn}$, and H here obviously satisfies the condition $H \ll 1$, and not $H = 1$ (see the expression

(App. 6.13*). It is good that this mistake did not influence the final result because of $H=\text{const}$.

However the author had temptation to build a special model of formation $M= F(a, n)$ protein texts with dependence $F(a, n)$, which is different from $M=a^{Hn}$. This attempt was not successful.

So, the author turned to some exaggerated but absolutely correct from positions of materialism conceptions of microbiologists about «goal» of the life consisting only in keeping gene-fund in changeable organism protein flow. Not for nothing they modernize famous aphorism of Samuel Butler: «chicken is means with what egg products another egg» into aphorism: «organism is means by which DNA products new quantities of DNA».

We use the model (App. 6.6.2) for examining situation. Really, here genotype is long-term preserver of gene-fund – highly reliable genetic information (average time of preserving T for achievement of sub goal G). For short times such as $T_a \ll T$ genotype participates (in its number with help of RNA carriers) in forming of proteins of phenotype of organism (for achievement of sub goal G^* – their faultless). So, in a whole genotype has to achieve both sub goals with probability P , which according to relation (App. 6.6 a) has not improvable estimation $P= P(t)= P(G, G^*) > 1-1/ft=1-T^*/T_a$.

Here formation of protein text of the length n in the model of Ruderman has to perform during the time T_a and value T^* is interpreted as average time necessary for genotype to achieve sub-goal G^* .

Let V ($V \ll U_0$) be average time for installment of one letter into the text of the length n . Then $T_a = nV$, $P > 1 - (T^*/V)/n$ and for value of probability $P=P^*=1-R^*$ of faultless of protein text of n length, required in Ruderman's model is enough to require that $R^*=C^*/n$, where $C^*=T^*/V$, that is requirement of Ruderman (App. 6.14*) is fulfilled.

App. 6.7.6. Back to the problems of macrobiology

In the App. 6.1 we stopped on doubts of the ecologist A.M. Gilyarov on productivity of physicalistic development of ecology. But overwhelming number of ecologists now does not agree with his point of view, and mentioned devotion to cybernetism in the West reached its culmination in 70th in the activity of famous Roma Club. Large imitation models of «world dynamics» of Club adepts [40] were acquiring more political interest while losing the scientific interest. The Club's activity by itself moved from scientific into social one, leading the movement of so-called alarmists. It was accompanied by extreme broadening of the term «ecology», which was interpreted as some unfavorable for human being and biota anthropological changes in the environment and exhaustion of useful resources of the Earth in the boundaries of hundreds of years. Stability of living cover of the Earth (biosphere) during almost all geological history of the Earth represents no less mystery than phenomenon of life on the level of elementary organisms.

And this mystery was noted by ecologists already on the level of physicalistic ideas, coming to the following [41, 42]. Under stability one understands energetic balance (closure) of biochemical processes in communities of biosphere. It is disturbed at exceeded in certain(specified) limit external perturbations, not allowing to compensate their actions by counteraction in accordance with so-called principle of Le-Shateliet. Analyzing really wide communities with growth of territories occupied by them ecologists note: [41, p. 91]: «Contrasting picture in which not closure continues to decrease unlimitedly with the growth of territories of averaging in accordance with the law of large numbers, means the absence of biological regulation of the condition of environment and chance of emerging of small value of not closure (if it really emerges). Watching stability of environment in this case is unexplainable, mystic (spacing is our)».

However, neither exhausting of useful resources to the end of generations (six thousand years), nor continuing after creation of biota and human being «irrational» support of their existence make no mystery for Kabbalah [4, 6, p. 61]. Wonderful monograph of Rabbi Philip Berg (Rabbi Berg. «Power of the Single one», New York, 1995, trans. from English) is dedicated to Kabbalistic explanation of these questions with taking modern physical conceptions. The author investigates modern holistic (systemic) approach as the sign of period of Aquarius, contradicting it to previous mechanistic Newton conception.

Rabbi and Doctor of Sociology Rafael Aizenberg writes [43, p. 91]: «Postulate on a Single G-d energy, which created and supports all cosmos is behind the limits of scientific researches. Science may serve the means of achievement of such faith, may mark the way of such conclusion, but it cannot go further.

Religious cognition replenished by scientific knowledge, has to go further. It has to declare ancient truth of religion on the language corresponding to condition of society in XX century». The book is one of attempts of this kind.

App. 7. Major dates and events

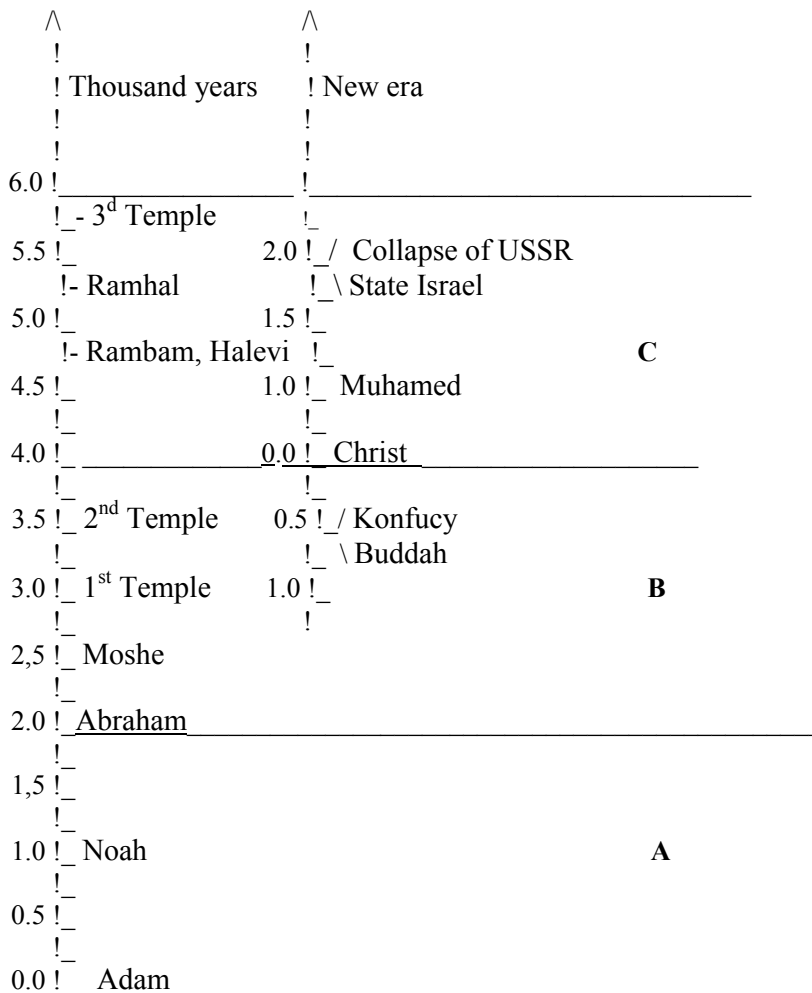


Fig. App. 7.1. The most important data from Adam till our days with periods according to Kabbalah: A – of Darkness, B – Torah`s and C – Mashiah`s

0. Adam Cadmon

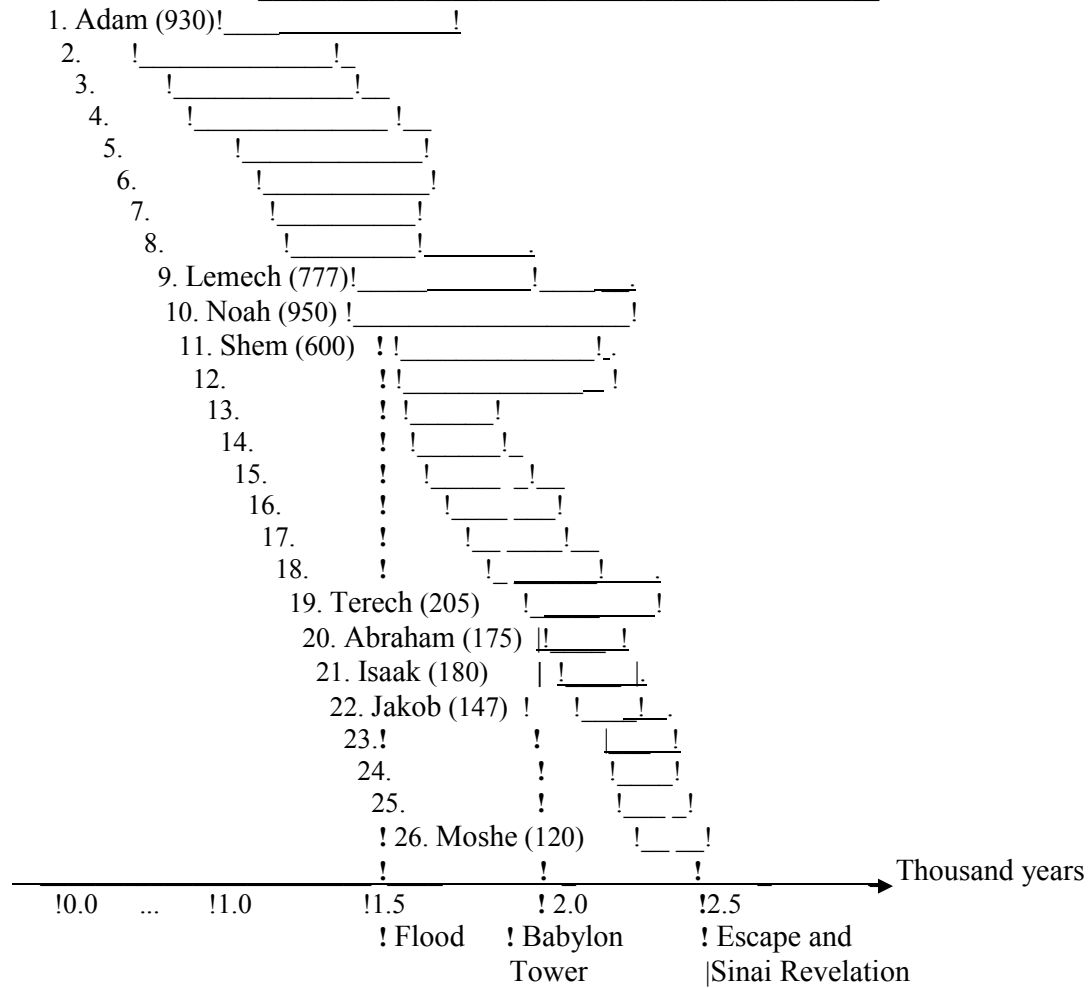


Fig. App. 7.2. Generations from Adam to Moshe with duration of life of patriarchs (in brackets after the name) on the base of the most important historic events.

Basic notations and indexes

Notations

- OO - the symbol of the Creator in modern kabbalistic (he borrow from mathematics, where he note the infinity)
- A - symbolic constant in the law $Y \times K = A$
- B - Bremmerman`s limit
- b - Bremmerman`s constant
- C - fundamental constant of the limit laws of potential effectiveness
- d - specific weight of a population (SWP)
- e - basic of the natural logarithms
- f - fundamental constant of model of life-long risk
- H - harmonic average
- $h(x)$ - entropy function of argument x
- K - quantity of resources
- L - quantity of substrate
- M - number of signals
- N - size of a population or species
- n - average number cell in the individual of given species
- P - the probability of effectiveness
- p - the probability for noise with reception of message an the two-symbolic alphabet
- R - quantity of instant risk
- Ra - quantity of life-long risk
- Ta - age of system
- T - average age of system
- T* - average time of restoration of system
- T(R) - highly probable (with probability 1 - R) age of system
- t - time, ratio Ta/T
- Uo - duration of elementary act of biochemical synthesis
- Ucr - maximal duration of existence of a spontaneous trajectory till thermodynamic decay
- U' - maximal duration of existence spontaneous creed`s trajectory
- u - quantity of returned resource
- V - installation time of the letter in protein text ($V \ll Uo$)
- v - quantity of acquired resources
- (u, v) - exchange

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Colleagues about the author an «his systemology»

In spite of discontinuous opposing the author's and his students creation, opponents did not leave written traces of their dissatisfaction and all their complaints were on the level of emotional telling for which Andrey Nikolaevich Kolmogorov reproached them.

But positive talks of official opponents concerning dissertation of the author and two dozens of his students according to soviet traditions had just ritual character and so are not interesting to anybody.

So, there are given furtherly only two obviously non-inspired independent tellings of foreign colleagues of the author. The first of them which was subjected to pre-reconstruction (perestroika) censorship of the 1st Department gave a lot of troubles to the author. Here is the text

B.S. FLEISHMAN
USSR ACADEMY OF SCIENCES
INSTITUTE OF OCEANOLOGY
21 KRASIKOVA ST

Dear Doctor:

The World Cultural Council congratulates you for your valuable scientific labor, which, through many years of continuous effort has placed you in the category you deserve and this Council confirm.

During the last plenary sessions your nomination was considered since you are regarded as a scientist with outstanding merites to distinguish you as a member of the Interdisciplinary Committee of Honorary Presidents.

This nomination means that you would participate in the evaluation of candidates to the "Albert Einstein World Award of Science" granted by this Council. Your collaboration would not, by any means, absorb too much of your valuable time.

I hope to receive notice from you soon.

With my best personal regards

Sincerely,

DR. ESTEBAN MESZAROS WILD SECRETARY GENERAL

After receiving of this letter first of all, before giving agreement for membership in the Committee of Honorable Presidents it was necessary to require what kind of world-wide organization it was. Especially here were caused misgivings if it could be Zionist organization.

And what about finances? When after receiving written report that world-wide Council was sponsored by group of Mexican millionaires and in Committee half of members were Nobel laureates and what was the most important – nobody had to pay, passions some or how decreased and the author was «permitted» to because one of Honorable Presidents.

The second review on creative activity of the author was done by editor of monography «Complex Ecology» (pp. 32-33) Bernard Patten in Preface to 6th author's chapter of the same monograph [18] He writes:

The mathematical approach is continued in Chapter 6, which represents a substantial formalization of complex ecological systems theory as developed in the former Soviet Union. The author, Benzion Fleishman, distinguishes between thermodynamics and "systemology," the latter a version of cybernetics appropriate to the quantitative analysis of complex systems. He considers stochastic versus deterministic objects; micro-, meso- and macro-states of processes; interacting versus noninteracting processes; system versus environment; elementary versus emergent processes; and for goal-directed systems tactical versus strategic goals. Four cybernetic properties of complex systems are formulated, which must come together in any realization of coherent behavior.

These are "reliability," "noise immunity," "controllability," and "self-organizability"; they meet in different combinations. A distinction is made between Heisenberg's uncertainty principle in physics, which "establishes limits of measurement accuracy at the microlevel," and the situation in systemology, where "the mesolevel is considered the microlevel and ... principles of objective teleology ... allow for the identification of optimal model structures and behaviors at the macrolevel." In other words, systemology applies at the higher end of the complexity scale, whereas thermodynamics is appropriate to the lower end. And at the higher end, goals become relevant. Fleishman's treatment of optimality in complex system dynamics has "effectivity" as its central concept, "defined as the conditional probability of gaining goal A by the system A interacting with the environment B." Adaptation and preadaptation are formulated in a stability context, and the key characteristic of adaptive and preadaptive processes is regeneration. "Unlike simple systems with material (energetic)' stability, it is more important for complex systems (biological among them) to be structurally and behaviorally stable in spite of variable material composition, Their specific property, therefore ... is the regeneration of dying elements and adaptation to changing environmental conditions." The reader will find this chapter mathematically challenging, but the rigor is not just arcane theory. Fleishman's systemology is motivated by practical concerns, and the second half of his chapter illustrates this through an application to fisheries management.

Reviews of the author's students are not given here because of clear causes.

Professors Ferdinand Mkrtychyan (see his «Optimal differentiation of signals and problems of monitoring». Science, Moscow, 1982) and already mentioned Semyon Ruderman are closer to the author in directions of their investigations. The most independent in his creative activity is chronologically the first pupil of the author professor Vladimir Krapivin (see his «On the theory of power of survival of complex systems». Science, Moscow, 1972), because of his inclination to big imitational computer models, taking position between systemology of the author and cybernetics of G. J. Klir, the follower of W. R. Ashby [26]*

* Disagreements of the author with V. Krapivin are fixed in the review (B.S. Fleishman. Stochastic models of biocenoses, grand total of science and technics. Common ecology, biocenology, hydrobiology. V. 5, VINITI,

The author about himself

I was born two months before Lenin's death on November 21, 1923 in Moscow near Khitrow Market, described by Gilyarovskiy. My family was not religious, but the newborn child was attached to the faith of patriarchs by the head rabbi of the city at that time – Mazo. My early years were in the basement overlooking the Patriarshiye Ponds, described by Mikhail Bulgakov. My first recollection is feeling that I crawl into the unknown room and see a man, sitting on the table. Further my mother affirmed that our neighbor was a tailor, working on the table as many of his colleagues. My mother Nekhama (1899 – 1969), maiden name Khusid, revealed formally and by her mood Chasidic origin. My father Shimon Fleishman (1894 – 1954) differed of his wife by very compliant character and all his life was «henpecked», which did not bother him at all. Both of them were comers from the town Elizavetgrad – Zinovievka – Kirovograd (Ukraine), and as many people of their generation, rushing out of settled way of life, came to live to Moscow in 1920. It predetermined standard Soviet destiny of my parents and their single offspring. So, of interest may be circumstances that prevented their deaths in young age. (My father lived to 60, my mother – to 70 and the author outlived his parents, preparing himself to be buried between them in the silence of Vagankovsky cemetery).

Two generations of the author's direct line of descent died not «by natural death». At father's line, my grandfather Shimon Fleishman (traveling salesman) died in Losanne because of unsuccessful kidney surgery, being not yet 35. My grandmother (the same line) Rahel poisoned herself in the beginning of 30th in Odessa unable to bear «focuses» of her beloved younger son (working in N.K.V.D.).

On the mother's line my grandfather Erukhim Chusid (factory owner) poisoned himself at home, before fascist shooting on July, 1941. My grandmother Fryma (the same line) died of starvation during Great starvation of the beginning of 30th together with millions Ukrainians.

My father died after the 3^d infarction (heart attack), climbing with heavy burden by staircase to the 5th floor of his apartment. My mother died in the result of medical «fault» on the surgeon table of suffocation caused by swallowed throat after negligent extraction a tooth.

The most part of parents relatives stayed in Kiev and were annihilated by Nazis in 1941. The most part of the author's friends just the same age was killed on the fronts of the World War II. Author, being not healthy had «white ticket» and worked for some time for defense industry. Post-war escalation of state anti-Semitism transferred after Stalin's death into its ominous glimmering form. The author only afterwards understood those multiple salutary landmarks, which did not allow clouds to deepen over his head and all he reached in the period of stagnation was not thanks to but contrary to regime and is really wonderful.

Really, me, being Jew, non-member of the Communist Party and what is the most important, not being in a sphere of official scientific schools and even in constant confrontation with them, received complete «gentleman set» of Soviet fillister from the science – Professor – Doctor of Physics and Mathematics and being «not permitted to exit» to capitalist countries in the literal sense of the word traveled all over the world.

But let us see how academic career of the author and his parents was made. The later had only secondary school education. Multiple attempts to receive High Education failed. Here is one of them. On his studying in the Private Petersburg Psycho-Neurological Institute my father overcame five percent norm. However, October Revolution finished with private High Schools. Continuing his education in the 2nd Moscow State University, Medical Faculty, my

Moscow, 1980, p. 48). They did not influence upon their good personal relationship, what was not characteristic for soviet reality of that time.

father, together with ten thousands other students was very soon deprived for it having non-proletarian roots.

The author in his youth underwent great influence of friend of the family – Gleb Ivanovich Grishkovsky (1905 – 1962). His fate in Sovdepiya was predetermined by the fact that he was son of Leib-Doctor of Nikolai the 2nd family. Not having High Education as his parents, he had professional knowledge in mathematics and music and was secret follower of theosophy. Passion of the author to study the noted subjects inspired by him was not in vain. The author received musical education in famous Dunaevsky school in Moscow (piano) and before entering the University knew elements of High Mathematics.

The first year of Physical-Mathematical Faculty of the University the author finished in Saratov, to which he was evacuated with his family in 1941 and where he got acquainted with his future first wife Evgeniya Nikolaevna Vasilyeva, who was student of Philological Faculty at that time.

Finishing his education on Mechanical- Mathematical Faculty of Moscow State University after re-evacuation to Moscow, the author together with composition tried to create original mathematical theory of music.

He is absolutely sure that it may be only theory of probability. This predetermined his choice of the chair of theory of probabilities for his diploma. That chair, founded in 1944 under leadership of outstanding mathematician of our days Andrey Nikolaevich Kolmogorov, was the first chair in the country on this specialty. To attract students the course of lectures on the theory of probabilities read the Head of the Chair himself. But it was so unsuccessful that he simply scared off the students, so the first graduation of the chair in 1947 consisted only of three professional followers of the theory of probabilities in the whole country.

The first was Dmitriev later mentioned in A. Sakharov's memoirs as an outstanding scientist.

The second was author's friend Andrey Lapin, who entered the chair, which guaranteed post-graduate education with the only goal to go over under the wing of his all-life friend, subsequently sadly known algebraist Shafarevich.

The third was the author, not knowing that time that he was the object of unremitting attention to his person from the side of Lubyanka (head office N.K.V.D –KGB), with a goal to use him in cryptology. Refusal of distribution to the job noted by State was considered to be a crime and punished that time and such a distribution of the author took place.

We have to give due attention to the first author's job. Those experience of active work on development of discrete combinatory-probability methods to solve theoretical problem of cryptology, which the author received during 7 years of work as «lieutenant without promotion», he could not receive at that time in no one place of Earth, it might be in CIA only. Development of only those experience in solving of relative tasks of potential noise immunity, systemology, ecology and kabbalistics made the author's scientific image.

At the author's first job he had active help (to the detriment of their career many scientific unknown for wide world and among them early passed away Ivan Nikolaevich Sanov, reviewer of the author's first dissertation. Afterwards it received very high evaluation from Academician Yury Vladimirovich Linnik. But the author disturbed unwritten laws of Soviet reality – he did not subdue to marketeering order of his scientific chief – half shortening of dissertation for practical appendixes. And author's and dissertation fate were predetermined.

The situation was intensified by naïve believing of the author to coming thaw with Khrushchev's leadership. The author sent to him in 1954 the letter with sharp critics of situation in cryptology. The letter immediately was returned to the author's administration. And the reaction came soon – demobilization with following 1,5 years of unemployment. And when Vladimir Alexandrovich Kotelnikov, being less naïve asked at the end of 1955 General Kopytsev (only few people knew that he was Berea's son-in-law) if his collaborator

Fleishman to defend dissertation, written in the Department of General at the new place of job and respected Academician was sent «as far as possible».

In 1955 began from zero externally 40 years period of unruffled existence of the author in the lap of Academy of Sciences of the USSR. But the year itself was critical. Father of the author died after three infarctions just after reception of long-awaited diploma of High Education.

The author divorced with his first wife, who left him for well-known follower of Lysenko Iosif Aronovich Khalifman. And the author's second wife Mira Iosifovna Etingof gave birth to their son Semen, who inherited not the worse qualities of his parents.

That period was gloomed only in 1968 by forced transfer of the author from Institute of Radio–Engineering and Electronics to the Institute of Oceanology and soon after that by already mentioned ridiculous death of the author's mother.

And both in the Academy of Sciences and in the Institute of Radio–Engineering and Electronics they began more and more investigate problems, connected with construction of counter-rocket defense (CRD) including radars of early detection (RED). Even in «Steklovka» (so far from real life Steklov Mathematical Institute) they left «smell of fried».

Here we need to make small historical excursus. Bursting of A.A. Markov provided to Russia leading position in the field of theory of probabilities, connected with names of S.N. Bernshtein, A.Ya. Khinchin, A.N. Kolmogorov and V.I. Romanovsky. But A.A. Markov himself had no correct evaluation of Karl Pearson's works in mathematical statistics, caught by Anglo-American school of R.A. Fisher, Yu. Neuman and E. Pearson and A. Wald, joined to them.

As a result the USSR in the post-war period stayed to be outsider in that the most important practical field and it reflected in lagging behind also in cryptology and in CRD because of RER no less than obvious lagging behind computing machinery. And yet there appeared «bourgeois» cybernetics with theory of information.

In such circumstances differing of progressive organizer of Soviet cybernetics Aksel Ivanovich Berg and with him only A.N. Kolmogorov understood in its essence the causes of coming collapse. He paid attention of his students onto paramount importance of mathematical development of C. Shannon and A. Wald's works, but they took his appeals very specially, hardly having time to translate the flow of corresponding literature in English.

But it was not enough mathematical laurels for Steklov mathematicians – they needed practical success «to increase» Wald's algorithm as well to reveal signals on the background of noises. To affirm this success specialists in applied sciences working in the same direction in Institute of Radio–Engineering and Electronics were invited. They were: corresponding member Yu.B. Kobzarev, A.E. Basharinov and the author. However neither affirming of practical success of mathematicians, nor alliance could not be between competing organizations.

On this background in the existence of VAK, The Highest Attestation Committee, the author's defense of candidate's and then doctor's dissertation seemed to be very problematical.

However both these unbelievable events happen in some seven years of the author's work in the Institute of Radio–Engineering and Electronics with complete monographic provision (two monographs), including combinatorial starts of cryptology.

Principal role in the success of these events played Andrey Sergeevich Monin, Alexey Georgievich Postnikov and Alexey Andreevich Lyapunov, whose disinterested help to the author often was not good for their career in Soviet conditions.

Changing his job for the Institute of Oceanology were his old friend A.S. Monin was director was not voluntary to the author. Many people considered that bad condition in the Institute of Radio–Engineering and Electronics for recent «minion of fortune» was the result

of this bad mood. Analysis of circumstances would take a lot of space, but the author is sure that he made a right decision by not participating in provocation of Party Bureau trying to slacken out «two Jews»: the author and his elderly chief, and left the field of fight.

Conclusive almost twenty-year period of being the author in the country before his emigration to USA different by even more paradoxical situations with some tropical exotics. That period covered the time of unrelieved totalitarian stagnation in the USSR, when a year before reconstruction (perestroika) downfall of Evil Empire could not be discussed even in the frame of bold fantasy. The atmosphere in the field of mathematics was especially oppressive. About it wrote, for example Academician Sergey Petrovich Novikov in the article «Mathematicians – Gerostrats of the History?» on the Internet (February, 2nd, 1999). I will give concrete example from my sad practice.

In pre-reconstruction years, the author, after study of VAK's «topography» learned how to overcome those «mine fields» for receiving degree by his post-graduates and doctorants. Mechanical-mathematical Committee of VAK headed by Vladimirsky underwent many-year investigations.

Couples were fixed (chief and post-graduate student) to reveal their national belonging. Many-year dynamics of «non-confirming» of dissertations by Committee had clear direction: (Jew, Jew), (non-Jew, Jew) and, at last (Jew, non-Jew). The author participation in the «experiment» in the last situation. After not-confirming the same text of dissertation was confirmed according to agreement with «minimal» correction – the name of the chief was taken out of abstract. And the author did not «assume a pose» for sake of his post-graduate student.

But let us come back to the less sad saying.

Management of A.S. Monin in the Institute of Oceanology looked like reign of enlightened monarch. The author was always safe by not and never having administrative positions. And in that very case he did not use his close relation to director to come into his so-called «tea cabinet». On his eyes no less than dozen favorites fall down from Olympus, and even disappeared from the Institute.

The only cloud on the clean sky, same as in the Institute of Radio–Engineering and Electronics and was direct chief, who frankly believed in decency but poor mentality of newcomer «mathematician». This appeared by his opinion in skepticism of that mathematician towards big computer models of marine ecology and not playing the role of programmer at his chief. The chief and all the «nobility» were especially irritated by unexplainable extolling of the author's results by Monarch on Scientific Councils.

Institute of Oceanology was unique in the country and may be in the whole world, what was defined by discontinuously increasing number of scientific-research ships, floating in the World Ocean – if the ships were, there always be work for them. And also there were found not only scientific works, besides them for example «foreign clothes», exotic collections of shells and so on. And what «currency» was taking into scientific expeditions the high-ranking officials and their children? Also it is difficult to say if more or less than half of those working in the expeditions were Lubyanka spies. One may be said: «They worked well». In the whole non-interrupted forty year «water carnival», to the end of which at Gorbachev about dozen liners participated in it, only one «run away» and possibly he was mental. And to the author, who three times participated (in 1971, 1973 and 1995) in that not-currency enhancing spectacle with often coming into sea-ports it is sin to claim that he was «non-existing» to country of capitalism. And having good relations with assistant in political work it was possible also on the land, making groups of «four» to stay in very shaky places. In a whole the author visited all the continents of the world if to concern New Guinea to the part of Australia. He was not only in the Antarctic Continent and North America.

The author's expedition onto the Earth is coming to an end by his moving together with his wife on March 22, 1996 to the North-American continent. One year before that his son also came to New York with his wife Svetlana and his grandson Daniel. Here, after 75 years the author returned to Judaism (Tshuva) with help of Rabbi Arie Berdichevsky. Making a report on this 79 year long expedition took years. Now you have it, my reader.

And in future will be the Highest Report. I hope to the Mercy of the Eternal Judge!

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The following are annotation and table of contents of the author's new Russian book:
«Manual for Coming Back to the Faith of Fathers: Jews, Christians and Muslims »

Annotation

The manual presents Biblical and Post-biblical history of the Humankind as a series of tests imposed by G-d prior to coming of His Kingdom. The last test is the process of waiting itself. The basics of monotheistic religions: Judaism and two daughter religions: Christianity and Islam are presented. Necessary information is provided about Theosophy and Satanism. The original part of the manual addresses connections between religion and the modern science. It explains why Kabbalah (the science of monotheism) is a fundamental science similar to physics. In most details it presents the system insights of the kabbalists and system solutions to important questions of monotheism. The manual is addressed to the Russian-speaking atheists of the former Soviet Union who are secular educated and who are interested in returning to the faiths of their fathers -- Jews, Christians and Muslims. The basic familiarity of the reader with the Old Testament is as.

Contents

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Part 2. Judaism among other religions

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Part 3. Secular Science and Kabbalah

1. Secular science
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