

Information ecology - a viewpoint

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INFORMATION ECOLOGY

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ABSTRACT INFORMATION ECOLOGY

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Information ecology is that science which studies the laws governing the influence of information

- on the formation and functioning of bio-systems, including that of individuals, human communities and humanity in general;
- on the health and psychological, physical and social well-being of the human being; and which undertakes to develop methodologies to improve the information environment.

Suggested areas of study in information ecology: quantitative and qualitative interaction between information and human health, aiming to formulate means to regulate the flow of information influencing the health of individuals and groups; identification of quantitative and qualitative criteria of information; Information requirements; Information values; Information storage; Information transmission and reception; emotional Information overload: (relevance, presumed volume, partiality); evaluation of Information services; Information responsibility and its social character; management of Information in the workplace, in organisations, in information-rich and information-poor communities, and in the world community.

Other subdivisions of Information Ecology: information ecology and politics, ecology of international information, information ecology and economics, informational linguistic ecology, public information ecology, the ecology of mass media/information, information ecology and transportation, information ecology in physiology and medicine, information ecology and hygiene, human information ecology.

KEY WORDS: information ecology; stress; politics; physiology; hygiene.

INFORMATION ECOLOGY

As early as 1938, using the hypothesis called "transformation of the means of communication and information exchange", V.I.Vernadsky substantiated the transition of the biosphere to the noo-sphere (noo = Greek "mind") 1. Since that time, a number of facts have come to light concerning the increase in both the quantity and variety of information 2, and the growing influence of information on health as a condition of the general mental, physical and social well-being of both individuals and of society as a whole.

The formation of such organisations as the United Nations Department of Public Information, the UN Environment Programme, Greenpeace, the International Informatization Academy, the International Academy of Ecological Science and Vital Security, extensive computer databases and the broad multinational network of their users, satellite communications and international television programming - all testify to the fact that information as well as the ecology movement, is taking on an increasingly international character.

It is noteworthy that in the last forty years, two potentially powerful ideas have emerged having radical implications for our relationship to the world and our interaction with it: the first is the concept that the world is undergoing an "information revolution". The second is the call for a "green revolution" to deal with growing threats to the natural environment. Obviously, these two ideas must converge 3. Development of a hybrid science of "information ecology" could change our thinking concerning the social and economic implications of computer and communication technologies. Moreover, it should be noted that there is a connection between information ecology and the application of computer and communication technologies in the environmental sphere.

By the term "information ecology" is meant the sum total of information quality, management, products and value, as well as the evaluation of information services and needs and liability 4. That is why, taking into consideration data of the materials and results of our own researches, real ground and actuality of perspective working outs, we suggested to define a special branch of knowledge — "Information ecology"⁵.

INFORMATION ECOLOGY AND POLITICS

"Information security" examines several aspects of government information policy: source material on information policies, the economics of government information policy, public access to government information and the security of government information networks. It should be noted that there is no unified body of U.S. law governing the co-ordination of information policies of various federal agencies⁶.

In situations where there is a decrease in the exchange of or an outright deficit in information, civil and military protests can lead to destructive revolutionary events, social upheaval and armed conflict, leading to diminished health and even the deaths of masses of people.

It is quite likely that shutting off electricity and telephone communications from the "defenders" of Russia's White House in 1993 led to an atmosphere of increased misunderstanding and confrontation, resulting in an escalation of militant actions on both sides. On the other hand, the timely exchange of information between the heads of the United States and Soviet Union promoted the successful resolution of the "Bay of Pigs" crisis". The absence of negotiations

between the British Government and the leaders of the Irish Republican Army has been conducive to numerous acts of terrorism, and the consequent loss of many lives, while in contrast, the timely exchange of information between the Prime Minister of Russia and the Chechen fighters, who had taken several hundred hostages in the hospital at Budyonovsk, may have prevented many more victims. However, even having information and its various interpretations about such factual situations, it is not known whether in real politics the priorities of information strategy for the prevention of conflict could be clearly identified and pronounced. In order to prevent war and terrorism, the international community urgently needs research into the significance of information in politics and the formulation of a code for international information strategy for the resolution of conflicts between states and governments and their representatives.

ECOLOGY OF INTERNATIONAL INFORMATION

Throughout human history up to the present day, inter-ethnic and inter-religious armed conflicts involving masses of victims have and are occurring, vis. Ulster, Bosnia, Nagorno-Karabakh, Tadzhikistan, Chechnya, Afghanistan, Iran, Somalia and Algeria... Ethnic groups currently see themselves as groups of people who exist, somewhat like energy systems, by virtue of their differentiation from other groups, according to an unconscious "feeling" of mutual sympathy (or antipathy), and dividing themselves into "us" and "them" ⁷. This "feeling" is often based on available information. Thus, the intercultural and international exchange of information can play a significant role in preserving the health of large numbers of people. In relation to this situation, there is no available data examining the causes of inter-ethnic hatred, religious intolerance or individual aggression in relation to the quantity or quality of information available to one group about another group, culture or religion. Possibility, researches on the optimisation of information exchange between cultures, ethnic groups, religions in order to formulate information strategies to eliminate false assumptions and prejudices which can lead to armed conflict.

INFORMATION ECOLOGY AND ECONOMICS

Information, as an economic factor, is one of the most important characteristics of the post-industrial age. An example of its influence is seen in the consequences of the sudden and unexpected change in the financial markets in Moscow on "Black Tuesday" in 1994, when the sudden, unexpected rise in the dollar exchange rate was matched by a sudden rise in the number of heart attacks (from 75 the day before to 172), strokes (from 70 to 181), and highway accidents (from 50 to 77, increase of victims in accidents - from 104 to 141), number of traumas (from 618 to 813)⁸. Thus, we can see that economic information is having an increasing influence on the health of both individuals and society in the contemporary world. We can propose research on information as an economic factor and the economic indicators of its influence on individuals and groups.

INFORMATIONAL LINGUISTIC ECOLOGY

We have a number of facts proving that linguistic environment can be a source of conflicts as well as factor of ecological stability of a region. On the one hand - possible conflicts within bilingual countries, for example in case of infringement of balance between Flemish and French languages in Belgium; English and French in Canada (Quebec conflict); English and Hindi in India, etc. On the other hand, for a long time Russian, being the language of international communication, has been a guarantee of common information space on the "Caucasian Bridge" - space between Black and Caspian seas. However after collapse of the Soviet Union in 1991, ousting of Russian language from the Baltic countries, Ukraine and Transcaucasia has being

taken place. For all that in Azerbaijan Russian alphabet was replaced by the Latin one; in Armenia and Georgia Russian language was ousted from official and government agencies, majority of schools and higher educational establishments. The result could be vividly seen in emerging problems of Russian-speaking refugees, break of business, economic, cultural ties, infringement of succession in educational programmes, absence of common regional mass media.

We are not aware of published research data on the effects of multi-linguistic informational environments on human health. While each national language is, on the one hand, a means of communication as well as the bearer of the national culture, the unfortunate social consequences of linguistic misunderstandings are graphically depicted in the Biblical legend of the tower of Babel and in many present-day situations. Along with the introduction in the 20th century of the "noo-sphere" came the concept of "the unity of humanity" ¹. In order to overcome language barriers, the United Nations specified 6 languages for its official communications. There were other efforts to establish Esperanto as an international language. With the development of a world civilisation, it could be critical to determine the advantages and disadvantages of multi-versus mono-linguistic environments so as to recommend means for the promotion of human mutual understanding, security and health.

PUBLIC INFORMATION ECOLOGY

The main street of Tskhinval, a capital of South Ossetia, up to now is called Stalin street; one of the schools of the city is still named after Stalin; in 1995 a calendar with Stalin's portrait was also published. Observing the real Tskhinval situation we can see what is going on - on the one hand, cessation of information exchange with Georgia, on the other hand - division of South Ossetia from North Ossetia by Caucasian ranges. We can presume that, on a level with other factors, the fact of absence of information from the other regions, where the Stalin's regime was fully blamed, became a cause of the present situation in South Ossetia.

There are also indications from available data to the effect that problems of "information ecology" arise in information-saturated societies as well as in their interaction with those which are information-starved. It should be emphasised that one measure of the ecological quality of information may be its social, linguistic and historical character. By linguistic is meant its relevance, assumed volume and partiality. It has been noted that it is these aspects which may have given rise to the conception of "information pollution". Moreover, there is growing awareness of the distinction between information-rich and information-poor countries ⁹. It is interesting to note that along with the information explosion has come a new form of pollution - information pollution.

Where a discrepancy occurs between the intended and the real use of information, there is a "fault" in information ecology. It is proposed that information standards be developed which will distinguish between information itself, and its user and uses. The dissemination of information can be controlled by observing the six essential characteristics of information: subject, reach, unit measure (e.g. man-hours), time, source and quality (completeness and timeliness). Any system designed to combat information pollution requires a) a plan of information requirements, b) management of the collection, storage and withholding of information and c) the evaluation of the use of information ¹⁰.

Some authors interpret the term "information ecology" to mean the condition of the information system within particular organisations. In this sense, it is emphasised that changes to this condition can be harmful because of their neglect of the interconnection with various related information sub-systems. It is clear that information management must take in the whole of a

given information field. Thus, the principles of ecology are used to draw attention to the potential of ecological thinking, to focus on the interconnection of subsystems in the information space of an organisation ¹¹.

"Information ecology" may also be seen as an approach to the management of information in working groups. On the one hand, both the technology already deployed within the organisation and the available technologies in the external technology marketplace, can drive planning and the day-to-day effectiveness of the information environment. Technology provides access to information, and such adequate access is essential. On the other hand, a technological model can only exist where there are highly qualified human resources. In order to be successful, plans for information management must take into account the role of each individual. Information merely informs. It is vitally important that there be a particular individual who not only has access to information, but who receives it and attends to it, is receptive to it and acts in accordance with it.

There are already several organisations which have been applying the concept of "information ecology" to their own information space. A British insurance firm is using principles of information ecology in order to function more effectively in their environment, which includes not only their consumers but also their competitors. An aerospace agency is taking an ecological approach, in particular when they have to deal with information politics and behaviour. Two research organisations are concentrating on increasing the exchange of information at all levels in the process of new product development ¹².

THE ECOLOGY OF MASS MEDIA/INFORMATION

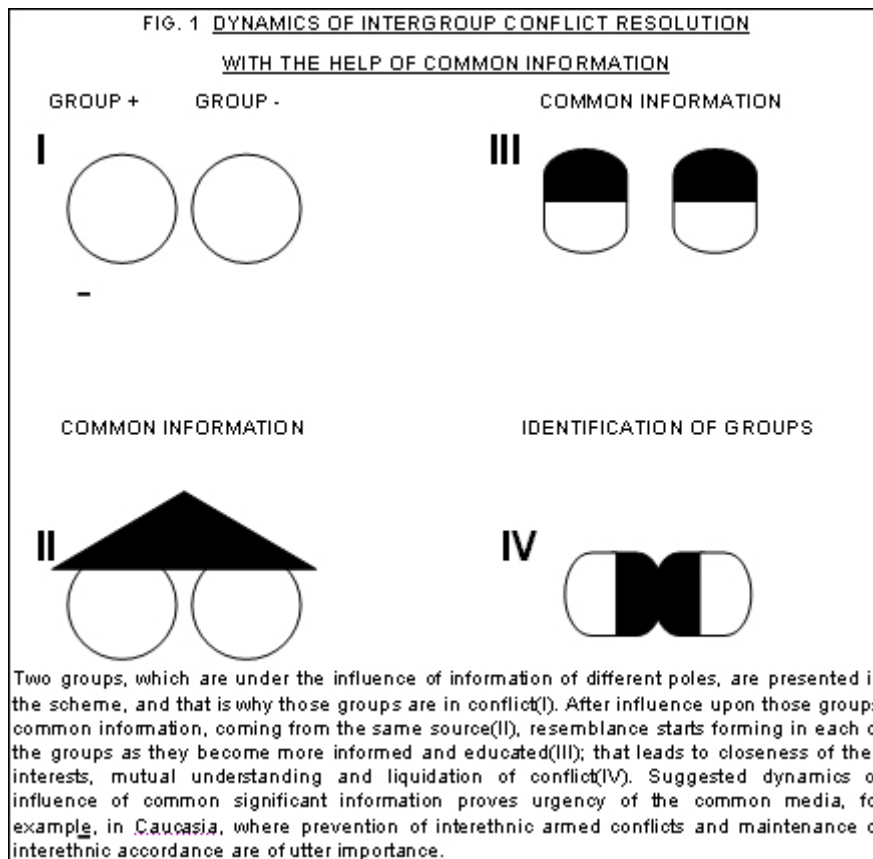
The mass media, especially film and television have become increasingly filled with scenes of deliberate violence, banality and indecency ¹³, with repeated impressionistic special effects and authors' fantasies. From television news, viewers receive a daily dose of real human blood, horrible mutilations and murders, dead bodies and catastrophes from every part of the world. And the mass media has not yet defined precisely what volume and kind of "mass" information is good for people and which is harmful to their health. Study of the positive and negative effects of "mass information" on health, aiming at recommendations for the mass media.

We think that mass media could play a very important role in prevention and resolution of intergroup conflicts in society. That can be shown in the following scheme (Fig. 1).

INFORMATION ECOLOGY IN PHYSIOLOGY AND MEDICINE

"Information security" in the field of medicine implies the confidentiality of patient histories, the rights of patients to protect the security of this information and the development of a culture of secure information ¹⁴. However, there is a number of other aspects.

According to the P.V.Simonov's "Information theory of emotion" ¹⁵, emotional tension rises as a result of an individual's estimate (at a given moment) of information about the projected means to satisfy a particular demand in relation to the existing means at his/her real disposal. There are many known methods for the relief of stress, using the influence of various types of information, such as colour, music, etc. ¹⁶. Moreover, real-life emotional stress considerably lowers the reliability of a machine-operator, leading to accidents and irreparable damage; in addition, it is one of the significant risk factors in a number of cardio-vascular, neurological and immune-system diseases, cancer ¹⁷. Further development of the information theory of emotion; study of the link between information and a number of type pathological processes (stress - psychological shock), diseases (heart disease, diseases of the circulatory, nervous - and immune-systems and others).



INFORMATION ECOLOGY AND HYGIENE

As a result of the complexity of contemporary labour processes, involving the operation of complicated machinery and high-speed technology, the increased speed of transportation, the demands for work under extreme conditions (e.g. military aggression, sealed environments, at extreme heights or below-ground, underwater or in outer-space), the computerisation of the workplace and the establishment of new methods of communication, there has been a significant increase in the number of workers whose labour involves emotional stress^{18,19,20,21,22}.

It is now well accepted that risk information is a basic human right²³. Currently people in many countries are being inundated with information about the many kinds of risks they are being subjected to, including those from environmental pollution. Numerous accidents, such as those in Chernobyl, Bhopal, Sevezo and others, have received wide press coverage and sharpened public sensitivities concerning ecological dangers. In addition, the press continues to publicise the dangers of toxic waste, solar radiation, radon, asbestos²⁴, harmful ingredients in food, water and air. In a sociological survey in Austria, it was found that the population feared acid rain (58%), job loss (57%), cancer (56%), AIDS (56%), chemical pollution (52%), air pollution (50%) and terrorism (47%)²⁵.

The United States National Research Council's Committee on Perception of Risk and Risk Information defines a "danger" as "that action or phenomenon causing potential damage or harm to persons or objects"; "magnitude of danger" is expressed as "the number of people or objects subjected to a given danger and also the seriousness of its consequences"; "risk" is "that quantitative measurement of a danger in relation to the likelihood that harm or undesired consequences will become a reality"²⁶. The perception on the part of people of "danger", "a magnitude of danger" or "risk" can lead to increased fear, emotional tension and consequent emotional stress. Perhaps a matter of topical interest is the following - continuation of the study

of information as a professional hazard; the role played by information in the incidence of work stress, professional health hazards, trauma, transportation and industrial accidents.

INFORMATION ECOLOGY AND TRANSPORTATION

Annually as a result of traffic accidents in the CIS and the US 40 thousand people are lost. According to information from the United Nations 300 thousand people are lost each year because of traffic accidents in the whole world. In a number of countries road accidents are the main cause of death for young people at the age to 25 and it takes 3d place among causes of death for the whole population.. The risk of being involved in a road accident because of drivers is about 80-90% and is brought about by a number of factors; the most important one is nerve-emotional tension^{19, 27}. The cause is a busy street with its traffic and pedestrians' streams, cross-roads, type of surface, its width, traffic signs. Also the constant responsibility for maintaining a person's security (passenger as well as pedestrian), good state of preservation of means of transportation and lack of time for making decisions are of great significance. As for increased emotional tension, caused during evaluation of information, it can lead to the break-down in a person's activity, provided with narrowing of volume of perception and attention, and sometimes a strong stress "knock out" a goal of a person's activity. Besides some people sink into a state of shock and make chaotic motions and actions. All of these can be as conducive to traffic accidents as the unpunctual switching over of attention, unskilled actions in an emergency, are all basic causes of traffic accidents. In connection with it, perhaps, from the information ecology point of view, working out of a number of measures at the traffic lines are quite necessary. The author proved that all the drivers with a high level of power working capacity make less road accidents¹⁹. People are bombarded daily with masses of information. Does the human being have an internal mechanism with which to counteract this flood?

HUMAN INFORMATION ECOLOGY

The author has proposed a hypothesis that information perceived from internal environments (interoception) participate in increasing of the resistance of that organism to harmful influences from the external stream of information²⁸. Research on how information perceived from internal environments (interoception) participate in increasing of the resistance of that organism to harmful influences from the external stream of information holds promise for increasing human resistance to stress.

Based on analysis of the results of my own researches and on the literature dates, one can draw some CONCLUSIONS. A special multidisciplinary field called "information ecology" needs to be established, drawing on the wide range of information theory, ecology, physiology, medicine, public health, security, conflict studies, political science, linguistics, management, etc.

INFORMATION ECOLOGY IS THAT SCIENCE WHICH STUDIES THE LAWS GOVERNING THE INFLUENCE OF INFORMATION

- **ON THE FORMATION AND FUNCTIONING OF BIO-SYSTEMS, INCLUDING THAT OF INDIVIDUALS, HUMAN COMMUNITIES AND HUMANITY IN GENERAL;**
- **ON THE HEALTH AND PSYCHOLOGICAL, PHYSICAL AND SOCIAL WELL-BEING OF THE HUMAN BEING;**

AND WHICH UNDERTAKES TO DEVELOP METHODOLOGIES TO IMPROVE THE INFORMATION ENVIRONMENT.

Suggested areas of study in information ecology:

- quantitative and qualitative interaction between information and human health, aiming to formulate means to regulate the flow of information influencing the health of individuals and groups;
- identification of quantitative and qualitative criteria of information;
- Information requirements;
- Information values;
- Information storage;
- Information transmission and reception;
- emotional Information overload: (relevance, presumed volume, partiality);
- evaluation of Information services;
- Information responsibility and its social character;
- management of Information in the workplace, in organisations, in information-rich and information-poor communities, and in the world community.

Other subdivisions of Information Ecology:

information ecology and politics, ecology of international information, information ecology and economics, informational linguistic ecology, public information ecology, the ecology of mass media/information, information ecology and transportation, information ecology in physiology and medicine, information ecology and hygiene, human information ecology. **In future the information ecology may have the following branches:** information ecology - in politics and economics, inter-ethnic information ecology, mass information and information-linguistic ecology as well as information ecology in a man's physiology, medicine, hygiene.

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