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Some Remarks on the Concept of the "Intelligent Universe"

"Our CETI-SETI sky
is dark at night
and day!"

M. Subotowicz

INTRODUCTION

Is mankind unique in the Galaxy, or, on the contrary, we are just entering into a highly interesting world full of differently evolved alien civilizations? Nobody can give a definite answer yet, because there is no artifact or observation accepted by the scientific community as evidence of the existence of any form of extraterrestrial life or intelligence. The "intelligent universe" is a fiction only, but at the same time target of various scientific investigations.

The physics, distribution and even evolution of different members of

the "material universe" (like planets, stars, galaxies) are, however, successfully investigated in recent decades; observations, conclusions and theories are more and more accepted and integrated into a complex concept of the material universe. Similarly there is a certain agreement in the scientific community, how different life forms evolved on Earth, leading - at least in one distinguished case - to "homo sapiens". Finally millenia of lively history of mankind is also available for comparison and analysis.

Mankind is, however, the only case known to develop into a technical civilization. The long history of biological and social evolution is unique and therefore we are unable to distinguish between high probability and low probability steps of this evolutionary process. The lack of any evidence makes several factors of the famous Drake formula so uncertain that the result (N = the existing communicative civilizations in the Galaxy) can be anything between one and a million. It means that the structure and the history of the intelligent universe is at present completely unknown and until some new fact or observation will emerge, giving direct or indirect evidence of past or present extraterrestrial life, we are restricted to speculations based on analogies and extrapolations.

What is the "lesson" of history, astronomy, cosmology etc. to SETI research? Are there any messages in the well-known features of social and natural sciences referring to something essential for the SETI problem? Further an arbitrary set of analogies and consequences will be treated which - according to my subjective opinion - should be taken into consideration when speculating on the problem of SETI in general.

MESSAGE OF HISTORY

The evolutionary track of humanity had been deviating on the different continents in spite of the fact that mankind is a very homogenous species. The natural conditions surrounding European nations, African tribes or Asiatic people have more similarities than peculiarities (taking into account the identity of the atmosphere, water, soil etc.). Nevertheless it is a well-known fact that of all tribes and races only one, i.e. the European developed to a technical civilization capable of conquering almost the entire globe. Obviously this process of colonization changed the history of mankind (as well as the face of the Earth) completely. Another lesson is, however, that colonized countries developed usually to independent nations, some of them capable of subsequent colonization. (Evidently the limits of the terrestrial surface prevented the "second generation colonizers" from occupying huge territories.)

Consequence: Some arguments against a successful colonization of the Ga-

laxy stress the great number of obstacles to migration, like the vast distances, radiation hazard, loss of interest, catastrophes etc. If every migrating civilization encounters insurmountable difficulties during their interstellar travel, then, of course, there would be a lack of colonizers in the Galaxy. But history testifies that the chain of events is completely modified in the case of one successful mission and then the process of colonization continues. Therefore the question is whether one can find a compulsory force preventing every wave of colonization in the Galaxy. No such force has been discovered yet.

MESSAGE OF SPACE RESEARCH

The history of space exploration is a part of the history of mankind with some special consequences for our problem. It is obvious that space exploration may evolve into a program of interstellar travel and therefore could be considered as a preparation to migration into the Galaxy as well. Before the advent of the space age nobody could have been absolutely certain whether spaceflight is a real possibility. Although any launch of a manned spacecraft is an adventure even today, and obviously there are serious hazards connected with it, human expansion into outer space did not encounter any real limitation. This is a very important experience ignored completely by the media which is emphasizing almost exclusively the setbacks and technical difficulties of space exploration.

1. Consequence: Human expansion seems to be unlimited, space travel is a real chance at least in the Solar System.

Nevertheless one important chapter of astronautics, namely Program Apollo, gives another lesson. In spite of all expectations before and during the highly successful lunar missions, the program did not evolve into a continuous human presence on the Moon yet. Moreover both US and Soviet lunar programs stopped almost immediately after the successful return of the last Apollo astronaut from the Moon. The reason was lack of public interest and consequently lack of financial support. This set-back is often called the "Apollo effect".

2. Consequence: The interest of mankind can not be focused for a long time on a given space program if only curiosity and prestige are the motivating forces. There must be other, more important motives like economic demands or escaping from natural disasters. Interstellar migration probably continues infinitely only in cases when some important compulsory motives are functioning in the civilization in question.

MESSAGE OF ASTRONOMY

A few decades ago textbooks on astrophysics summarized their general view on the Universe as follows. Stars observed on the sky are more or less alike, their masses and dimensions varying only one, maximum two orders of magnitude. Most of them are single and stable light sources separated by enormous distances from their neighbours. There are no real interactions between celestial bodies (except weak gravitational forces). The standard star is very similar to our stable Sun; there are only a few, relatively unimportant cases of rapid evolution or catastrophic encounter in the whole eternal Universe.

The modern view of the astronomical universe is completely different. Most astronomical (observational and theoretical) efforts concentrate on highly peculiar objects like neutron stars, interacting close binaries, supernovae, active galactic nuclei and quasars. Although these are relatively rare phenomena, they play undoubtedly an important or even decisive role in the drama of the astronomical universe. The death of a single star in a supernova outburst influences the entire population of the galaxy sending heavy elements into the planetary systems of newly born stars. Interaction between neutron stars and their companions plays also an important role giving rise to intensive X-ray bursts. The total radiation of the X-ray sky is dominated by such very peculiar objects.

Consequence: Speculating on extraterrestrial civilizations we are generally supposing a homogeneously distributed population in the Galaxy - not taking into account the consequences of interactions or the existence of extraordinary (super)civilizations. The reality may be completely different. As Finney [1] points out: "The Galaxy and its sapient populations may turn out to be much stranger and more wonderful than our limited imagination can now conceive."

MESSAGE OF COSMOLOGY

The "Anthropic Principle" in its general form, as formulated by Carter [2], is the following statement: "What we can expect to observe must be restricted by the conditions necessary for our presence as observers." Although it was formulated in the frame of cosmology of the material universe, it is obviously valid also for the intelligent universe. As Hall [3] points out: "Since we exist as observers, our existence is in some way a necessary feature of the universe, or, at least, our view of the universe". Consequently "an understanding of the existence of man is the key to an understanding of the universe" (i.e. the intelligent universe).

Martin and Bond [4] came to the same conclusion after analysing

systematically all possible aspects of SETI and the Fermi Paradox. The anthropic principle means that our efforts should be concentrated on the analysis of the evolutionary path of mankind addressing objectives like

- the probability of the formation of relevant polymers and, in particular, the genetic transcription mechanism
- evolutionary mechanisms leading to intelligence
- economics and resources and their role in the future history of mankind
- social control problems (wars, stagnation, degradation etc.) influencing the lifetime of a civilization.

The results of such investigations may be as important as the search after radio signals of extraterrestrial intelligence.

MESSAGE OF THE OLBERS' PARADOX

Formulated by Olbers in 1826 this famous astronomical paradox is a simple local observation (the darkness of the night sky) being in contradiction with the global static and isotropic 19th century concept of the universe. The explanation of the paradox was given more than hundred years later based on the theory of relativity and the results of cosmology. The darkness of the night sky is above all the consequence of the fact that the travel-time of light of distant galaxies is comparable to the ages of these galaxies, therefore very distant sources have practically no influence on the brightness of the local sky.

As I have pointed out in a recent paper [5] the Fermi Paradox, a disquieting fundamental problem of SETI, has a very similar structure. A simple local observation - the absence of alien civilizations in the Solar System - is incompatible with an intelligent universe fulfilling all of the following conditions:

- many technical civilizations have been evolved
- a substantial part of them reached the state of development needed for interstellar flight long ago
- there is no natural or social factor which could stop the wave of colonization in every case.

Several attempts have been published to resolve the Fermi Paradox, but they can neither be proved nor disproved [6,7,8].

Consequence: Based on different analogies between Olbers' Paradox and the Fermi Paradox, it seems for us possible that there is a general slow down of any migration wave of extraterrestrial civilizations as a consequence of some unknown universal law of Nature. Let us suppose that every developed technical civilization starts to migrate, but after some new

settlements have been installed near suitable stars the expansion is slowing down, because of lack of a real motivation for further colonization. In such a case very distant "sources" of colonization would have practically no chance to reach the Solar System and their appearance would be improbable.

The recognition of such a "drag factor" of migration in interstellar space is impossible nowadays with our present limited experiences in space travel. (Like the global expansion of the Universe was unrecognizable for 19th century astronomers trying to resolve the Olbers' Paradox.)

CONCLUSION

These selected analogies in history, astronomy and cosmology do not permit to give a definite answer to any of the crucial questions of SETI research. The consequences point only to the conclusion that our primitive preconditions concerning the "intelligent universe" are inadequate as a firm basis of any search strategy. We are in a situation like astronomers of a hypothetic planet totally embedded in a non-transparent, always cloudy atmosphere, who try to point their orbital telescopes towards interesting celestial targets, but based on assumptions instead of star maps. Any a priori restriction of the pointing is needless and may result in missing the most interesting objects. Similarly, despite of all difficulties to interpret the Fermi Paradox, the search for extraterrestrial intelligence with all available means and methods (including both the radio search and the investigation of our own evolution) is certainly one of the most important scientific missions of mankind.

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