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POSITIVE CONSEQUENCES OF SETI BEFORE DETECTION

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Abstract—Even before a signal is detected, six positive consequences will result from the scientific search for extraterrestrial intelligence, usually called SETI. (1) *Humanity's self-image*: SETI has enlarged our view of ourselves and enhanced our sense of meaning. Increasingly, we feel a kinship with the civilizations whose signals we are trying to detect. (2) *A fresh perspective*: SETI forces us to think about how extraterrestrials might perceive us. This gives us a fresh perspective on our society's values, priorities, laws and foibles. (3) *Questions*: SETI is stimulating thought and discussion about several fundamental questions. (4) *Education*: some broad-gage educational programs have already been centered around SETI. (5) *Tangible spin-offs*: in addition to providing jobs for some people, SETI provides various spin-offs, such as search methods, computer software, data, and international scientific cooperation. (6) *Future scenarios*: SETI will increasingly stimulate us to think carefully about possible detection scenarios and their consequences, about our reply, and generally about the role of extraterrestrial communication in our long-term future. Such thinking leads, in turn, to fresh perspectives on the SETI enterprise itself. © 1998 Elsevier Science Ltd. All rights reserved

1. INTRODUCTION

Within a few years, scientists may successfully discover clear-cut evidence of the presence of extraterrestrial intelligence in our galaxy. Such a discovery will be a major landmark in the history of science—perhaps in the history of all humankind. The more information that we receive, the larger the impact of the discovery. Simple evidence of existence will affect humanity deeply, but the consequences of a richly detailed encyclopedic message will be even more powerful, widespread and long-term.

Several positive consequences result from the search for ETI even before a signal, message or other evidence is successfully detected. Six clusters of positive consequences are explored in this paper.

At present, most SETI efforts look for radio or optical signals from far beyond our solar system. Perhaps fairly soon we will increase our search efforts inside our solar system—searching for an automated probe or surveillance device, for instance, or for signs of asteroid mining [1]. These additional efforts could be very valuable.

Even before any of these search efforts are successful, six positive consequences will result. Some of these benefits are already provided or stimulated by the SETI community itself. Other benefits will probably occur soon as more and more scientists, philosophers, students, citizens, and leaders become familiar with the SETI perspective.

2. HUMANITY'S SELF-IMAGE

Cosmic evolution over billions of years has led to our present period, which is characterized by diverse life on Earth and probably throughout the universe. Eric Chaisson calls this period "the Life Era" [2] and Steven Dick calls this view "the biological universe" [3].

The SETI enterprise makes the likelihood of intelligent life throughout the galaxy feel more tangible and real. Instead of just talking or writing about the possibility, someone is actually *doing* something about it.

As a result, humanity is gradually shifting toward a fresh image of who we are as a species. Increasingly we see ourselves as one of the abundantly diverse intelligent species that have arisen in the universe. That is how we fit into the universe. We feel part of the cosmic family; we feel a bond or kinship with others. We are one of the species that have developed a civilization marked by curiosity, inquiry, knowledge, meaning and purpose. We are not alone in the universe. Although we are unique, we may be one of billions of civilizations in the universe (just as each person and each snowflake is unique, but is also one of billions).

As they learn about cosmic evolution and SETI activities, more and more people are developing a deeper sense of themselves as citizens of the universe—as part of intelligent life and evolving culture throughout the cosmos. We begin to move from forlorn isolation to a "feeling of genuine biological and spiritual unity with the universe" and that universe feels "friendlier" [4]. We begin to see ourselves within a galactic frame of reference.

To use Michael Michaud's words, we are about to "leave the era of Earth history, and enter an era of cosmic history" [5]. More recently he noted that "many of us are involved in SETI because we hope

that detection, and even the search itself, will introduce a new and positive factor in human affairs. We are involved because SETI defines us as a species with shared interests. We are involved because SETI forces humanity to think big" [6].

According to Frank White, SETI may be, at its deepest levels, an effort to achieve a new kind of connection with the universe—to regain an integration or connectedness that has been shattered by standing apart from the cosmos and examining it as something that is not alive, not intelligent, and separate from ourselves [7].

Both as a society and as individuals, our sense of meaning and purpose can be enhanced by tangible SETI efforts to detect communications from other civilizations, or other information about them. Today's efforts may be the beginning of centuries of interaction with other intelligent beings in our galaxy. As the significance of SETI's potential sinks in, some people come to feel a deeper sense of meaning and purpose in the universe. Humanity may be on the threshold of finding its place among the variety of intelligent life in our galaxy. Being alive just when humanity is beginning its serious efforts to detect other advanced civilizations provides a special perspective for some people. It is an especially meaningful and hopeful moment in human history. Perhaps humanity's ultimate purpose is to be a happy and successful part of the cosmic evolutionary process—the continuing evolution of life, culture, communication and cooperation throughout the galaxy [8].

As Carl Sagan said during the *Encyclopaedia Galactica* episode of his Cosmos television series, "In a cosmic setting vast and old beyond ordinary human understanding, we are a little lonely. In the deepest sense, the search for extraterrestrial intelligence is a search for who we are."

3. A FRESH PERSPECTIVE

Photographs of the whole earth from the early space missions gave us a fresh perspective. A more recent photograph from even further away in our solar system gives us the sense of being a small fragile planet—a pale blue dot surrounded by space [9]. SETI provides a third fresh perspective by encouraging us to think about how extraterrestrials might perceive us. As we view ourselves through the "eyes" of distant extraterrestrials, this fresh perspective leads in turn to a fresh way of looking at our society's values, goals, priorities and foibles.

Three aspects of SETI stimulate this fresh perspective by encouraging us to put ourselves "in the shoes" of remote extraterrestrials. (a) In order to choose search strategies, scientists must first think through the likely characteristics of whoever is out there, and their likely behaviour toward all other civilizations—in particular toward us since they may somehow be aware of our existence or even have some information about us. (b) During the past few years, at astronautics and SETI meetings, some attention has focused on what we should do about sending a reply after we detect a signal. Such thinking inevitably requires attention to how "they" might react to various sorts of replies that we might send. (c) In general, the whole SETI enterprise stimulates a wide variety of people to begin thinking more seriously about who might be out there and how they might view our society.

By thinking about how a remote civilization might view us, we gain a fresh perspective on our own civilization. Various specific implications may occur to us. We may wonder why our society places such emphasis on differences among people when, compared with any extraterrestrial species, we are all quite similar and should feel deeply connected. We may see more sharply the importance of such priorities as ensuring our long-term survival and flourishing, caring about future generations, accumulating significant knowledge, protecting that knowledge from potential catastrophes, developing a set of universal goals and laws that might apply throughout the galaxy, and reducing our worst foibles and errors (warfare, population growth, environmental degradation). Surely extraterrestrials would wonder why we have not shifted our attention, resources, and efforts towards these key priorities.

4. QUESTIONS

SETI is already stimulating thought and discussion about several fundamental questions. Because its applied portion—the actual search—is at least as strong as its theoretical portion, SETI seems more "real" to people and as a result has a stronger impact on their curiosity, questioning, and feelings.

For some people both inside and outside the SETI community, the concrete search activities trigger thought and discussion of the following questions. Who is out there? What are they like, what are their fundamental values and priorities, where are they heading, what do they know about us, and what sorts of detectable communications might they be using? What role will they play in our long-term future? Might some extraterrestrials be so alien, so deeply weird, that we cannot even imagine their thought patterns, communications, and behaviour? Where is cosmic evolution heading, and where is human civilization heading?

Both the applied and theoretical sides of SETI not only stimulate such questions, but also evoke certain feelings. Excitement at the prospect of actually detecting a signal or message. Fear of failure to ever detect a message, and the fear of feeling deeply inferior if we do receive one. The fear of hostile or ineffective human responses if we do detect a message, as often happens when the two cultures interact at the annual CONTACT conference. A bond,

kinship, or deep spiritual connection with the beings whose signals we are trying to detect. A sense of awe, wonder and mystery.

5. EDUCATION

Some universities and schools offer single courses on SETI or "Life in the Universe". Courses on cosmic evolution can include life in the universe and SETI.

In addition, some *broad-gauge* educational programs begin with SETI or are centered around SETI. This focus then leads to the necessity of understanding many scientific concepts from a wide range of disciplines. The broad appeal of extraterrestrial life attracts students to educational programs that then teach them about astronomy, geology, biology, and linguistics.

At the 1993 Bioastronomy Symposium, specific educational projects were described by Thomas Pierson [10] (the SETI Institute's "Life in the Universe" guidebooks for grades 3–9), Andrew Fraknoi [11] (classroom and teachers' materials from the Astronomical Society of the Pacific), Roberta Vaile [12] (a course at the University of Western Sydney, Macarthur), and Carl Helmers [13] (the educational role of a periodical such as his own SETIQuest™). And of course the Planetary Society and other organizations might also be viewed as highly effective educational efforts whose influence reaches far beyond schools and universities.

Fraknoi also mentioned the annual CONTACT meeting founded by Jim Funaro several years ago. That meeting includes not only papers and symposia, but also a portion called "Cultures of the Imagination". Long before the conference, an alien planet and culture are meticulously developed. The conference itself often involves contact on the third day between the alien team and a human team. The CONTACT group is also exploring how to foster similar exercises of the imagination in schools.

6. TANGIBLE SPIN-OFFS

Like any scientific enterprise, SETI provides jobs for dozens of people.

In addition, SETI provides various spin-offs, such as search methods, highly sophisticated computer programs, uniquely capable signal detection hardware (possibly useful in medical diagnosis), and a remarkable degree of international scientific cooperation. Also, the search for extraterrestrial life is often used as a justification for other scientific projects, such as the search for planets beyond the solar system and the investigation of star and planet formation.

7. FUTURE SCENARIOS

Compared to most other scientific enterprises, SETI stimulates an extraordinary amount of thought about various possible future scenarios.

Here are the six types of scenarios that SETI stimulates all of us to think about and discuss. Simulations, social science research, and the methods of future studies can play important roles in our exploration of these various scenarios over the next few years.

7.1. Detection scenarios

At one extreme, our first discovery might be simply some evidence that extraterrestrial intelligence did exist at some time in the past, and perhaps its location (via a monotonous signal or uninformative artifact, for instance). At the opposite extreme, SETI might discover a richly detailed, encyclopedic, easy-to-decipher message (via radio or optical/laser signals from afar, for instance, or contained within a probe stationed in our solar system or our oceans). Frank White has spelled out 12 broad detection scenarios, and within them several micro-scenarios. "The scenarios move the discussion out of the contact/no contact domain, and the real importance of SETI emerges" (Ref. [7], p. 106).

7.2. The short-term and long-term consequences of each detection scenario

Much has been written about the likely consequences during the first few hours and days (and about how "the announcement" should be made). Less has been written about the enduring consequences. Even less discussion focuses on how the consequences will be affected by the particular detection scenario that occurs, by the ease or difficulty of detecting a message attached to the signal, and by the particular contents of any message that is eventually detected and decoded.

7.3. Preparation scenarios

Various possible ways of preparing for contact can be based on the various detection scenarios and the various consequences. Preparing for the slight possibility of an unpleasant or hostile message should be included among the preparation scenarios.

7.4. Reply scenarios

Several people have already been stimulated to think through the possible scenarios for one or more human replies after a signal is detected [14]. These scenarios range from a disastrous cacophony of national and religious replies to an orderly process involving a few key scientific organizations or the prompt sending of humankind's key encyclopedias [15].

7.5. The role of extraterrestrial communications in our long-term future

For future generations, some sort of interaction with other civilizations in our galaxy may be a central part of life and thought. A pool of shared galactic knowledge and values, along with ongoing cooperative galactic projects, may also be a part of humanity's future. Disciplined thought about these various possibilities is just beginning.

7.6. Various possibilities for the future of the SETI enterprise itself

SETI has made remarkable progress over the past 20 years, despite occasional setbacks caused by the mixed emotional reactions that the concept of SETI provokes in politicians, university officials, and the general public. Will the size of the SETI field grow, shrink, or remain static over the next 20 years? Will its funding become more reliable, and more adequate for such a significant quest? What sorts of messages and other data will it contribute over the next 20 years? During which decade will the breakthrough discovery occur?

What will the field be called 20 years from now—SETI, bioastronomy, life in the universe, social cosmology, the study of extraterrestrial civilizations, or simply ETI? Or will the social sciences wholeheartedly turn their attention to the psychology, sociology, anthropology, history and potential futures of extraterrestrial civilizations? In that case, astronomy may unite with the social sciences to form a new field called social astronomy or astrosociology.

Perhaps the SETI field of inquiry will expand even farther, into philosophical and humanistic realms. *The SETI Factor* recommends that "the philosophical dimensions of SETI ought to be explored as well as the technical aspects. The philosophical and humanist aspects of contact are what interest most people, and it is in this domain that the most important results will be felt. A major university ought to start an institute for this purpose, or perhaps the SETI Institute, CONTACT, or others should begin research in this area" (see Ref[7], p. 174). Perhaps the philosophical and humanistic impact of SETI, along with its impact on humanity's self-image, will turn out to be an especially significant contribution to future generations.

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