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TRANSHUMANISM IN A COSMIC PERSPECTIVE

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Abstract

This paper presents transhumanism as a post-biological philosophy that can provide a theoretical framework for scientific programmes oriented towards the search for intelligent life in the universe. The long-term thinking inherent in transhumanism synchronizes evolution and technology, heralding the genesis of post-biological entities. The first part of the paper assesses the applicability of this scheme to possible alien civilizations older than our own. The second part considers the most intriguing fictional explorations of mind uploading as a possible resolution of the Fermi's Paradox.

Keywords: Transhumanism, SETI, post-biological evolution, technological civilization, mind uploading, simulation hypothesis, Fermi's Paradox, virtual escapism

1.On the Post-Biological Fate of The Universe: From Techno-Sapiens to Techno-Alien

In the short story *The Sentinel* (1948) Arthur C. Clarke (1917-2008) describes human exploration of the lunar soil. During one of the missions to *Mare Crisium* the expedition's selenologist comes across a mysterious mechanical sparkle in the distance. Tracing the source, he discovers a small crystal artefact with a pyramid structure, protected by an energy membrane. The operating mechanism demands an intelligence beyond the human technological horizon: the pyramid turns out to be a beacon,

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a sentinel – one of many scattered throughout the universe – built by a very ancient alien civilization to watch over all those worlds that, *in nuce*, promised the appearance of intelligent life, including the local portion of the Milky Way. How, however, to justify the sentinel's presence on the Moon and not directly on Earth?

> "They would be interested in our civilization only if we proved our fitness to survive – by crossing space and so escaping from the Earth, our cradle. That is the challenge that all intelligent races must meet, sooner or later. It is a double challenge, for it depends in turn upon the conquest of atomic energy and the last choice between life and death. Once we had passed that crisis, it was only a matter of time before we found the pyramid and forced it open. Now its signals have ceased, and those whose duty it is will be turning their minds upon Earth. Perhaps they wish to help our infant civilization." (Clarke 2001, 308)[3]

The protagonist's final consideration brings to light the nature of the cosmic census operated by the alien civilization, far from being a mere catalogue of the *scala naturae*. A biogenesis, the primitive presence of life (*e.g.*, microbial life), and not even *simpliciter* intelligence – rudimentary and pre-technological – both preordained mostly for mere self-preservation, was not enough: what was needed was a noogenesis[4], a technologically mature intelligence, capable of undertaking the challenges of space travel, manipulation of atomic energy, and interstellar communication. The narrative, in this way, concerns us closely: it emphasizes the mutual connection between extraterrestrial intelligence (ETI) research and the origin and future of human intelligence[5]. On closer inspection, in fact, the premise of the SETI (*Search for Extra-Terrestrial Intelligence*) research program is the same as that described in the story (but reversed in perspective): the recognition of an intelligence related to high technology,

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[3] The story forms the basis from which Arthur C. Clarke will derive the novel *2001: A Space Odyssey*. The theme of humans in transition is present in another famous work by Clarke, whose title – *Childhood's End* (1953) – refers to a question of an eschatological nature: is humanity at the twilight of its 'infancy' or is it already the pinnacle of evolution?

[4] This term is understood as the origin of intelligence and technological civilization. Ćirković 2009, 3.

[5] The prodromes of this link can be glimpsed as early as 1971, the year of the Soviet-American scientific conference held near Buryakan. See Sagan 1973, 3; Sagan 1975, 196 ff.

capable of building radio telescopes or other astro-engineering artefacts[6] (revealing at least a level of science equal to ours), active in communication over long distances (radio transmission and reception of signals). In the words of Paul Davies, "we will recognize them by their instruments"[7].

The first SETI project can be traced back to the early days of radio astronomy, in 1959, the year the article appeared in the journal *Nature* written by physicists Giuseppe Cocconi and Philip Morrison, with the title *Searching for Interstellar Communication*[8]. The article argued for the possibility of accomplishing this kind of communication through radio waves and suggested searching at a wavelength of 21 cm., that is, tuning the receiver of radio telescopes to frequencies adjacent to the neutral hydrogen emission line (1420 MHz)[9]. The American astronomer Frank Drake (1930-2022) – who recently passed away – put the idea into practice by establishing the *Ozma project* in 1960 and, a year later, during the meeting of experts that took place at the observatory where he worked, in Green Bank, West Virginia, he proposed the eponymous equation

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[6] ETI can be picked up by radio signals, but it is also possible to infer it through the discovery of anomalies around a planet, for instance indicative of the activity of a Kardashev Type II civilization. This is what M. Ćirković calls the *Dysonian approach to SETI* – a clear reference to the "Dyson spheres" – which emphasizes the search for technological manifestations. See Kardashev 1964, 217–20; Sagan 1975, 229 ff.; Ćirković 2009, 16).

[7] "[…] the principle of 'by their instruments ye shall know them'" (Davies 2010, 72).

[8] Cocconi & Morrison 1959, 844-846.

[9] "Mankind's first serious attempt to communicate with extraterrestrial civilizations occurred on March 3, 1972, with the launching of the *Pioneer 10* spacecraft from Cape Kennedy. […] The message is etched on a 6-inch by 9-inch gold-anodized aluminum plate, attached to the antenna support struts of *Pioneer 10*. […] The message itself intends to communicate the locale, epoch, and something of the nature of the builders of the spacecraft. It is written in the only language we share with the recipients: Science. At top left is a schematic representation of the hyperfine transition between parallel and antiparallel proton and electron spins of the neutral hydrogen atom. Beneath this representation is the binary number 1. […] Since hydrogen is the most abundant atom in the Galaxy, and physics is the same throughout the Galaxy, we think there will be no difficulty for an advanced civilization to understand this part of the message." (Sagan 1975, 17-19). As is well known, the golden plaque also contains the mapping of pulsar stars (*pulsating radio sources*), which, with their regular period radio emissions, act as cosmic clocks; and the stylized depiction of man and woman.

containing the probabilistic estimate of the number of extraterrestrial civilizations capable of establishing radio communications that we would expect in the Milky Way. From that meeting the SETI research program received the status of a scientific discipline[10]. The famous formula combines a long series of specific factors (believed to play a role in the development of such civilizations), which, multiplied together would produce *N*, the number of technological civilizations potentially in communication in our galaxy. In this sense, more than an equation, it is an organized quantification of our ignorance in the search for extraterrestrial intelligence[11]. Drake's approach is usually written in the following terms[12]:

$$N = R^* \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L$$

Where R^* denotes the rate – the rapidity (rate) – of formation of Sun-like stars suitable for the development of intelligent life; f_p denotes the fraction of those stars endowed with planets (so-called exoplanets); n_e is the number of habitable planets in a solar system that has planets, those capable of harboring life forms; f_l refers to the fraction of biocompatible planets on which life actually appears; f_i expresses the fraction of life-hosting planets in which intelligent life emerges; f_c corresponds to the fraction of planets in which intelligent life develops a technological civilization and, consequently, the development of technology suitable for interstellar communications. This is the factor that mainly interested the alien guardians in Clarke's story. Finally,

[10] Since then, many projects have been carried out to intensify the research program. From the Arecibo radio telescope, decommissioned in 2016; to the "shared computing" project between private individuals around the world SETI@home; to contemporary projects in collaboration with other states: ATA (*Allen Telescope Array*), the Chinese single-parabolic FAST (*Five Hundred Metre Aperture Spherical Telescope*) radio-telescope and the international SKA (*Square Kilometer Array*) observatory. For a historical survey of the project see <https://www.seti.org/>; see Sagan & Drake 1975, 80–89.

[11] Rather than an estimate, one should speak of conjecture, since the only available example of a biocompatible planet in which life has emerged is Earth. A single sample containing only one element makes any scientific account difficult.

[12] See Drake 2013, 173-176; Dick 2013, 31-32.

L should answer the question "how long do technological civilizations last?" and indicate the average life span of a civilization capable of communication. This last factor – aside from embodying the cultural element in the formula[13] – is the most controversial and dominates over all others: the greater the assumed average life span of a technological civilization, the more civilizations will populate the galaxy and, consequently, the higher the probability of intercepting its signals[14].

Carl Sagan (1934-1996) – a pioneer in astrobiology – popularized the SETI project – including through the novel *Contact* (1985), whose protagonist, Ellie Arroway, is loosely inspired by the astronomer and former SETI director Jill Cornell Tarter. The scientific enterprise of SETI and astrobiology find their justificatory rationale in the Copernican cosmological assumption – repeatedly invoked by Sagan himself, so much so that he called it the "principle of mediocrity" (Sagan 1994, 372) – which argues in favor of the non-specialty of human existence[15]. Our place in the universe is not privileged. This would suggest, first, that the state of evolution on Earth is framed within a galactic average[16], in a context

[13] According to Steven J. Dick, the Drake equation incorporates astronomical (the first two factors); biological (third and fourth factors); and social-cultural (the last two) elements. See Dick 2003, 67.

[14] It should be noted that the ability to transmit signals and the possibility of self-destruction through nuclear weapons appeared in human history at the same time. Newman and Sagan suggest a social control of technologies to avoid nuclear self-destruction. During the Cold War, with the constant danger of a nuclear conflict, Sagan decided to estimate the L-factor with a low value. See Sagan & Newman 1983, 113-121; Shostak 2009, 399-414.

[15] "[…] We humans have emerged from a common evolutionary process with all the other plants and animals on Earth. We do not possess any uniquely valid locale, epoch, velocity, acceleration, or means of measuring space and time" (Sagan & Newman 1983, 113). According to the cosmological principle, derived from the Copernican principle, the universe is homogeneous (the general properties of the universe appear the same for any observer at any cosmic epoch) and isotropic (equal in all direction) on a large scale. On the epistemological value of the principle see Fano & Macchia 2020, 309-324.

[16] "Since our evolution to technological ability occurred within five billion years after the formation of our planet, it follows from this principle that other technological species would typically evolve in a similar time period" (Barrow & Tipler 1986, 586-587).

where life is a common phenomenon in the universe[17]; secondly, under this assumption, we should expect that the radio-transmitting civilizations sought by SETI are, for the most part, extremely older than our own[18].

Astronomer and philosopher M. Ćirković argues that astrobiology and ETI research are of paramount importance to transhumanist thought, as they form its scientific basis (Ćirković 2003, 2). The opposite is equally true: transhumanism can be considered preparatory to any ETI research, providing a philosophical background in which to place it. The heuristic value that the hermeneutic framework (Larrey & Puleio 2021, 14) of transhumanism suggests to the SETI research program should not be underestimated, since it embodies a long-term, large-scale thinking methodology that educates us to cultivate a cosmic horizon for the future evolution of intelligence in the universe. Transhumanism has as its perspective, cultural evolution and its technological aptitude on a cosmic scale, a thought neglected by astrobiology and SETI, intent on focusing more on the biological element. In the absence of a theory of cultural evolution[19], astronomer and historian of science Steven J. Dick proposes to acquire, in line with the theoretical framework of transhumanism, a "Stapeldonian" attitude, referring to the sci-fi epics narrated by Olaf Stapledon (1886-1950), the first, along with H. W. Wells, to preconceive a cosmic perspective for biological and cultural evolution[20]. Novels such as *Last and First Men* (1930) and *Star Maker* (1937) anticipate the possible nature of a post-biological universe, in which cultural

[17] If the Copernican principle invites one to consider all natural phenomena in their context of cosmic vulgarity; the alleged uniqueness of the human phenomenon, on the contrary, would reinforce an anthropic view of the universe.

[18] "Thus, all lines of evidence converge on the conclusion that the maximum age of extraterrestrial intelligence would be billions of years, specifically, A ranges from 1.7 billion to 8 billion years. Even uncertainties of a billion years would not affect the argument for taking seriously cultural evolution" (Dick 2009, 468.) This is not the same as claiming that all life evolves to intelligent and technological stages. Whether intelligent life, given an extremely long time, inevitably encounters science is debated.

[19] "[…] the problem of cultural evolution among extraterrestrials (and partially explaining why it has not been taken seriously before) is our lack of knowledge about the mechanism and direction of cultural evolution on Earth" (Dick 2009, 579).

[20] Today we can find this perspective in the novels of Greg Egan (*Diaspora*, 1997) and Charles Stross (*Accelerando*, 2005; *Singularity Sky*, 2003), for example.

evolution plays a key role and which "is one in which the majority of intelligent life has evolved beyond flesh and blood intelligence, in proportion to its longevity, *L*"[21].

Put in these terms, transhumanism is not only a philosophy of self-directed evolution; it is also a philosophy of the post-biological. If, in fact, we adhere to the first formulation proposed by Julian Huxley (1887-1975), we learn that the emblematic figure of the movement is not the unidirectional quest for immortality – which, moreover, is to be understood only in a metaphorical sense, given the underlying naturalist ontology shared by much of the movement (Sorgner 2022, 28) – but rather the attempt to transcend one's biological roots, the organic limits of the body, a burden to be technologically amended (regenerative medicine, "cyborgization", mind uploading)[22] because it is subject to entropic decay, disease and, ultimately, death.

> "Perhaps the term transhumanism will fit: man remaining human, but transcending himself, realizing the new potentials of his human nature, for his human nature" (Huxley 1957, 17).

Emphasis is placed on the verticality of the bios, on its "upward thrust"[23]. For this reason, the terminological meaning of "*trans-organic*" would be more appropriate, insofar as it accommodates a very broad definition of bios, detached from the biological substratum.

Therefore, can the reflections on the future of the human species inaugurated by transhumanism be extended to possible technologically advanced alien civilizations? If the human being is not the apex of the evolutionary scale, but only a transitional stage destined to be passed over until the "singularity" is reached, what about the possible existence of civilizations billions of years older than ours? Is it plausible that they are already in a post-Singularite and, therefore, post-biological condition?

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[21] Dick outlines three scientific premises for a post-biological universe: "(1) the maximum age of ETI is several billion years; (2) the lifetime (L) of a technological civilization is >100 years and probably much larger; and (3) in the long term cultural evolution supersedes biological evolution, and would have produced something far beyond biological intelligence" (Dick 2009, 66).

[22] For this tripartition see Larrey & Puleio 2021, 17-20; Waters 2011, 166 ff.

[23] "[...] Interpreting evolution as an upward spiral, as a movement that is both forward and upward" (Campa 2019, 20).

Speculative fiction has accustomed us to thinking of the inhabitants of other worlds as a biological puzzle: "little green men" with thinned limbs and a highly developed brain. This is a biological version of the alien, whose technological element, while highly refined, remained foreign to exobiology and was confined to engineering instrumentation, such as spaceships. It is reasonable to expect, once the mystery of the origin of life is unraveled, that most advanced alien civilizations would be in a form of artificial superintelligence far removed from their original biological version[24]. Should there be contact, it would be with their emissaries and artificial vanguards. On this subject the literature is beginning to become important. For example, Hans Moravec – a forerunner in the field of robotics – in the prologue of *Mind Children* (1988) speaks of "children of the mind", as those who will have transcended the limiting biology of their "parents" and inherit the Earth, in the sense in which Marvin Minsky understood it in the essay *Will Robots Inherit the Earth?* (1994):

> "What awaits is not oblivion but rather a future which, from our present vantage point, is best described by the words 'post-biological' or even 'supernatural'. It is a world in which the human race has been swept away by the tide of cultural change, usurped by its own artificial progeny. […] But within the next century they will mature into entities as complex as ourselves, and eventually into something transcending everything we know—in whom we can take pride when they refer to themselves as our descendants. Unleashed from the plodding pace of biological evolution, the children of our minds will be free to grow to confront immense and fundamental challenges in the larger universe" (Moravec, 1988,1).

Then again, the fifth-dimensional entities that build wormholes and manipulate gravity in *Interstellar* (Christopher Nolan 2014) are referred to as "Them" throughout the film, except to discover at the end that they were the humanity of the future evolved beyond four dimensions. Our evolutionary descendants, in short. The implications for SETI research would be disruptive, starting with the nature of what we are looking for. There is no doubt that a key role will be played by the *GNR* (Genetics, Nanotechnology, Robotic) *revolution*[25].

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[24] Davies calls such post-biological entities ATS (*Auto-Teleological Super-Systems*). (Davies 2010, 161)

[25] On the potential of gene or cyborgs technologies as a realistic and more mature option for the future well-being of humanity than mind uploading see Sorgner 2002, 22-29. It is often forgotten that one of the matrices of transhumanism – which, like all movements,

Philosopher of mind Susan Schneider also comes to the same conclusion:

> "[...] the technological developments we are witnessing today on Earth may have all happened before, elsewhere in the universe. That is, the universe's greatest intelligences may be synthetic, having grown out of civilizations that were once biological. The transition from biological to synthetic intelligence may be a general pattern, instantiated over and over, throughout the cosmos. If a civilization develops the requisite AI technology, and cultural conditions are favorable, the transition from biological to post-biological may take only a few hundred years." (Schneider 2019, 98)

Such a pattern could be a universal attractor – an ultimate destiny of development – to which all civilizations with techno-scientific knowledge go. Is it possible that life, although germinating in different places and contexts, arrives at the same outcome, tracing the phenomenon of evolutionary convergence[26] in nature?

Let us try to identify an outline of the development of these possible civilizations through three taxonomies.

2.Eras, Lifetimes, Civilizations

We have seen that the hypothesis underlying SETI estimates that billions of civilizations exist in our light cone of universe, including thousands or millions in our galaxy alone. As Kurzweil notes, "[t]hese civilizations must be at different stages over billions of years of development. Some would be behind us, and some would be ahead" (Kurzweil 2005, 348).

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is not unitary – both in the context of space exploration. It is when faced with the possibility of probing places unfriendly (such as deep space) to human metabolism that reflection on *cyborgs* is born, man's ultimate symbiosis with A.I., which opens up the possibility of "deliberately incorporating exogenous components that extend the organism's function of control and self-regulation in order to adapt to new environments" (Clynes & Kline 1960, p. 27). The cyborg – short for "cybernetic organism" – is the physical (and symbolic) representation of man's taking leave of his organic structure as the exclusive support for his survival: it is a man who has undertaken a metamorphosis into a machine perspective, carried out through bionics, robotics and nanotechnology.

[26] *e.g.* the wings of birds, bats and insects perform the same function, even though they belong to distant phylogenetic lines.

Drawing on the nineteenth-century social positivism of Nicolas de Condorcet, Henri de Saint-Simon and August Comte, he interprets history as a progressive succession of paradigms, an evolutionary pattern – "Evolution is a process of creating patterns of increasing order" (Kurzweil 2016, 153) – that is divided diachronically into "Six Eras", where each uses the information-processing methods of the phase that preceded it to structure the next era.

- the first Era (*Physics and Chemistry*) is that which represents the information in the fundamental structures (of the universe) of matter and energy, from which atomic structures and, later, molecular aggregates were formed;
- the second Era (*Biology and DNA*) is marked by the presence of organic life and biological systems that have developed over time an information-preserving mechanism: DNA;
- the third Era (*Brains*), under evolution driven by DNA, sees the formation of complex structures capable of processing information and creating abstract models of the world;
- the fourth Era (*Technology*) is characterized by the advent of technology and its catalytic function with regard to biological evolution;
- the fifth Era will see the fusion of human intelligence and technology achieved;
- the sixth and final Era will be that of the awakening of the universe: "In the aftermath of the Singularity, intelligence, derived from its biological origins in human brains and its technological origins in human ingenuity, will begin to saturate the matter and energy in its midst" (Kurzweil 2016, 159).

It is in the penultimate epoch that a new evolutionary syntax emerges. Transhumanist literature is wont to point to the apogee of this process in a narratively evocative event – known as the "Technological Singularity"[27] – which, according to Kurzweil himself will occur in 2045 and will constitute:

[27] The term is first used by Vernor Vinge – a sci-fi writer and mathematics professor – in the novel *Marooned in Realtime* (1986). However, the "official" technical meaning will come a few years later (1993), at a symposium organized by Nasa. See Vinge 1993, 11-21. "[...] Vinge thinks that a singularity is likely as a consequence of advances in artificial

> "[…] a future period during which the pace of technological change will be so rapid, its impact so deep, that human life will be irreversibly transformed. Although neither utopian nor dystopian, this epoch will transform the concepts that we rely on to give meaning to our lives, from our business models to the cycle of human life, including death itself. Understanding the Singularity will alter our perspective on the significance of our past and the ramifications for our future. […] It will represent the culmination of the merger of our biological thinking and existence with our technology, resulting in a world that is still human but that transcends our biological roots. There will be no distinction, post-Singularity, between human and machine or between physical and virtual reality" (Kurzweil 2005, 7-9)[28].

According to Kurzweil's model, therefore, once a species reaches the fourth era, it would only be a matter of a few centuries before it reaches the great intelligence explosion of the Singularity. Billions of civilizations, according to SETI estimates, should lie beyond the fourth and fifth eras.

Another interesting scheme – dependent on the hardware/software dialectic dear to computational functionalism – is that of Max Tegmark, professor at the Massachusetts Institute of Technology and co-founder of the *Future of Life Institute*. In an attempt to lucidly scan the stages of this progression, he outlines a taxonomy of life – defined as "a process that can preserve its complexity and replicate itself" (Tegmark 2017, 25) – that unfolds in three evolutionary stages: in the biological stage, life's hardware and software are determined by its DNA, and change only through evolution over many generations (Life 1.0); in the cultural

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intelligence, large networked computer systems, computer-human integration, or some other form of intelligence amplification" (Bostrom 2003, 19) (Available at <https://www.nick bostrom.com/ views/transhumanist.pdf> last time accessed in 4 December 2022).

[28] The singularity event is presented by resorting to the cosmological metaphor of the black hole, whose gravitational attraction is so intense that it alters all matter/energy structures that accelerate, with no possibility of escape, toward the event horizon. Moreover, it has been keenly observed how the matrix of the current scientist wing (Kurzweil, More, Bostrom *et al*.) of the movement is purely religious-eschatological in nature, where the concept of technological singularity itself would be nothing more than the secularization of Jesuit Teilhard de Chardin's *Omega Point*, the finalistic convergence of the Noosphere (sphere of human thought implemented by technology that permeates, enveloping it like a unitary membrane, the geosphere) with the historical-evolutionary apogee of the universe. In Teilhard there is thus a *Parousia* on a cosmological scale. See Paura 2019, 348 ff.

stage, software is subject only to human design, *i.e.*, culture: humans can redesign their software through learning new complex skills, such as learning a language (Life 2.0); finally, in the technological stage, life becomes able to design its own hardware and software, without having to wait for it to gradually evolve over generations (Life 3.0) (Tegmark 2017, 27-29). Thus, a more technologically mature civilization should definitely stick to versions after Life 2.0 (2.1,2.2, etc.) to approach Life 3.0.

The last taxonomy is the one most concerning a technological civilization. Soviet astronomer Nikolai Kardashev in 1964 published an article entitled *Transmission of information by extraterrestrial civilizations* (Kardashev 1964, 217-19) in which he proposed a criterion for classifying technological civilizations according to energy consumption. Specifically: a Type I civilization is a planetary civilization, capable of extrapolating all the energy resources of its home planet, about $4 * 10^{19}$ erg/sec. The technological level is close to that currently achieved on Earth; a Type II civilization is able to fully harness all the energy radiated by its star (about $4 * 10^{33}$ erg/sec). How? For example, through monumental technical designs, such as Dyson spheres or Penrose mechanisms for extracting energy from a star or a rotating black hole (Kerr metric) respectively. Finally, the Type III civilization would dominate the energy of its own galaxy (about $4* 10^{44}$ erg/sec).

We can conclude that a post-biological civilization lives in a Kurzwelian Era that straddles the fourth and fifth; faces a Life 3.0; is definitely a Type II civilization not far from becoming Type III.

3. Can the Simulation Hypothesis Solve the Fermi Paradox?

3.1 Mind Uploading and Simulation Argument

The choice to place the topic of simulation in the section on mind uploading is due to the fact that the latter constitutes a presupposition, very often implicit, of the former (Sorgner 2022, 25-27).

The purpose of the more techno-euphoric (or techno-gnostic) wing of transhumanism is to detach from "primitive" organic life, to arrive at "substratum-independent minds" (Koene 2013, 146-156), and to instantiate

oneself, through the technique of mind uploading, into extra-biological structures – thus long-lived and/or otherwise replaceable (*e.g.*, silicon) – or into purely digital forms within a Gibsonian cyberspace. On the potential of consciousness data transfer, Kurzweil states the following:

> "Uploading a human brain means scanning all its salient details and then re-instantiating these details in a suitably powerful computational substrate. This process would capture a person's entire personality, memory, abilities and history. If we are truly capturing the mental processes of a particular person, then the re-instantiated mind will need a body, since much of our thinking is directed at physical needs and desires. [...] by the time we have the tools to capture and re-create a human brain with all its subtleties, we will have plenty of options for 21st century bodies for both non-biological humans and biological humans using extensions of our intelligence. The human body version 2.0 will include virtual bodies in fully realistic virtual environments, physical bodies based on nanotechnology, and more" (Kurzweil 2005, 198-199).

Bostrom, who seems more aware than Kurzweil about the inherent limitations in uploading, nevertheless lists its possible benefits for humanity in the future (Bostrom 2003, 18-19):

- we will no longer be subject to biological senescence;
- back-up copies of uploads will allow us to have a life expectancy potentially as long as that of the universe;
- economically it will be more advantageous than maintaining an organic ballast, such as the body, to feed, regenerate and transport;
- we will be able to travel at the speed of light as a pattern of information, which will be convenient for future large-scale space colonization;
- there would be a radical expansion of cognitive faculties, facilitated by the continuous implementations of uploads, which are more effective than the enhancements of a simple organic brain;
- it could serve patients undergoing cryopreservation.

Mind uploading in virtual environments[29], such as simulations, does not currently appear to be a realistic option on par with other

[29] Here we will focus exclusively on simulation as the specific *locus* of the broader concept of virtual reality of cyberspace (*i.e.*, cybernetic space), for which we refer to Silvano Tagliagambe's effective, if dated, definition: "a new universe, an artificial, 'virtual,' multidimensional reality, generated, fed and made accessible by computers

hypotheses (Sorgner 2022, 25); however, it has become the subject of intriguing fictional extrapolations. Under such hypotheses, simulations would take the form of a virtual Eden (there is also talk of "paradise engineering"[30]) capable of guaranteeing a digital eternity to the contents of consciousness poured into it: "this, then, is the physical mechanism of individual resurrection: we will be emulated in the computers of the distant future" (Tipler 1995, 211). Thus, one of the "new" planes of existence considered by transhumanists is the virtual – insofar as it simulates reality or even unleashes phenomenally impractical possibilities[31] – this is because the physiological functioning of the senses is replaced by cybernetic mechanisms that generate/stimulate computerized simulations of perceptions, producing refined multisensory experiences. It is precisely in the different way of understanding the relationship between perception and experience that resides one of the most prominent philosophical spin-offs in the field of virtual reality[32].

Mind uploading is a prodigal topic from speculative science fiction, cinematic and otherwise. More or less recent productions on the subject, such as *The Lawnmower Man* (Brett Leonard, 1992), *Virtuality* (Brett Leonard, 1995), *Strange Days* (Kathryn Bigelow, 1995), *Nirvana* (Gabriele Salvatores, 1997), *Existenz* (David Cronenberg, 1998), *The Matrix* (Wachowski Brothers, 1999), *The Thirteenth Floor* (Josef Rusnak, 1999), *S1mone* (Andrew Niccol, 2002), *Serenity* (Steven Knight, 2019), *Devs*[33]

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through global communication networks" (Tagliagambe 1997, 39). Simulation, on the other hand, as a computer-mediated epistemological tool added to theory and experiment, is a kind of *tertium organon*, a worthy successor to the Aristotelian *organon* of deductive logic and the Baconian *Novum Organon* of induction. Cf. Longo & Vaccaro 2013, 29; Deutsch 1997, 90-111.

[30] See Pearce *The Hedonistic Imperative*, available at <https://www.hedweb.com/hedethic/tabconhi.htm.> last time accessed in 2 December 2022.

[31] Consider "Embodied Simulation", a model used within neuroscience.

[32] The oxymoron "virtual reality" emerges in full force should one analyze the outcomes of research on the *Second Life* game system, in which artificial avatars "live" a virtual existence parallel to that of their real physical counterparts see Gottschalk 2010, 501-525.

[33] Project *Devs* (to be read *Deus*) embodies the "quantum Laplace demon." The series explores – implicitly following the line of research traced by physicist David Deutsch, a staunch defender of Everett III's many-worlds interpretation of quantum mechanics – the potential of quantum computers (based on qubits) to retrospectively and predictively simulate the whole of reality, including realistic quantum systems, with considerable

(Alex Garland, 2020), *Bliss* (Mike Cahill, 2021), all move from the inescapable difficulty of the protagonists to discern reality from the sophisticated simulation in which they are immersed. The idea that we are *simulacra* resulting from a reality generated by a computer simulation is today one of the most suggestive intents to explain our universe from a scientific point of view, as well as a hypothesis harbinger of consequences as metaphysically bold as they are fascinating: it may not mean the absence of an extra-simulated reality; but only that the nature of the real – unlike what we used to think – is digital, rather than physical, in deference to the Wheelerian principle of the *it from bit*[34].

The film, *The Thirteenth Floor* – a transposition of the well-known novel *Simulacron-3* (D. F. Galouye, 1964) – is a *mise en abyme* of simulated planes, where the protagonists, creators of a perfect virtual replica of 1937 Los Angeles, discover that they themselves live in a simulation designed by a technologically advanced civilization of the future. The story's twist coincides with the conclusion that Bostrom's simulation argument reaches:

> "A technologically mature 'post-human' civilization would have enormous computing power. Based on this empirical fact, the simulation argument shows that at least one of the following propositions is true: (1) The fraction of human-level civilizations that reach a post-human stage is very close to zero; (2) The fraction of post-human civilizations that are interested in running simulations of ancestors is very close to zero; (3) The fraction of all people with our kind of experiences living in a simulation is very close to one" (Bostrom 2003, 255).

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implications for determinism and free will (See Feynman 1982, 467-488; Deutsch 1985, 97-117).

[34] "Simulation is a true creation of alternative worlds, governed by formal rules (algorithms), the phenomenal richness of which is limited, in principle, only by the nature and potential complexity of these algorithms and the amount and precision of the data on which they operate. Many questions arise in this regard: what is the relationship between a phenomenon and its computer simulation? And, more generally, what is the relationship between our world and the world inside the computer? Can it be said that our world is itself a giant-sized computer? The last question suggests a metaphysical vision in which the first principle of reality is not the *archè* of the pre-Socratics, but information, or rather algorithmic computation [...]" (Longo & Vaccaro 2013, 159-160). Concerning the informational nature of reality and/or the possibility that the universe is a quantum-mechanical computer that computes itself see Steinhart 1998, 117-125; Wheeler 1989, 354-368; Davies 2010, 65-91; Lloyd 2006; Deutsch 2004, 90-102).

Through statistical inference, Bostrom concludes that it is highly likely that we are within a simulation. For: either the human species will never reach a technological maturity to perform simulations of past eras (and, even if it does, it will still prove recalcitrant or disinterested in performing them); or we almost certainly live in a simulation. In this third hypothesis, should a posthuman civilization decide to simulate past epochs, the "original" physical universe would host such a large number of simulations that it would end up, for example, with many more simulated people from the 21st century than there are in the actual 21st century. Such a hypothesis, among others, would justify the "fine tuning" of the physical constants of the universe (*e.g.*, the fine structure constant, the intensity of the gravitational force, the electron charge, etc.), which would be precisely "calibrated" by a demiurgic superintelligence in order to generate a warp of the cosmos suitable for our existence to emerge.

> "A mature superintelligence could create virtual worlds that appear to its inhabitants much the same as our world appears to us." (Bostrom 2003, 316)

The alternative to the proposed scenario, Bostrom argues, is to suppose that a "great filter" operates on the development of a technological civilization: once a certain threshold is reached, expansion would stop, with the consequence that Fermi's paradox would be explained by the fact that no intelligent species is able to go beyond a certain rate of technological expansion (Bostrom 2008, 72-77).

Bostrom's fear leads us to the *vexata quaestio* of ETI research, exemplified by the famous, seemingly innocuous question posed by the Italian physicist Enrico Fermi in the summer of 1950, during a lunch at the *Los Alamos National Laboratory*: *Where are they?*

3.2 Silentium Universi

If the probabilistic hydra expressed by Drake's formula, optimistically interpreted, conjectures the existence of billions of alien civilizations present in the cosmos (millions in the Milky Way), many of them with a more sophisticated level of technoscience than ours, how come they have not colonized or explored the galaxy (*e.g.*, through self-replicating von Neumann probes) or we have not yet come across

any trace of them? The Fermi's paradox is otherwise known as the Great Silence[35] (or *Silentium Universi*): our galaxy is supposed to be a cacophonous cluster of signals from the most disparate places in the cosmos (but still within our cone of light), yet it is surprisingly "silent."

The SETI and astrobiology research programs – which have the Copernican principle as a presupposition[36] – seem to suffer from anthropocentric biases, chief among them that intelligent life should emerge wherever earth-like physical environmental conditions are given, expressed by the conditional probability assembled by Drake and encoded by the hierarchical sequence:

star ⟶ biocompatible planet ⟶ life ⟶ intelligence ⟶ science.

We have no reason to expect that where life emerges, after a given period of time, science is inevitable. It is objected that making a prognostic judgement about other species from the model of our own – the only species we know of so far – is an unjustified generalization; an implicit assumption of anthropocentrism (Davies 2010, 31-32). Even for the theoretical framework postulated by transhumanism – at least as it is understood here – that is, the future genesis of post-biological entities. Yet, within reflections that unfold on such a time-dilated scale (millions and billions of years), human categories themselves may lose actual consistency. Conjectures and deductions, whether rigorous or not, about the evolution of other species, at the moment, can only be made from the only data available that is truly certain, namely, that there is a technological civilization in the universe: ours.

The problem involves the *an sit* of life in the context of cosmic evolution: is it a *unicum* (Monod), a highly probable event (Sagan) or even a cosmic imperative (De Duve)? (see Monod 1996; Sagan 1995, 1-4; De Duve 1995). This leads us to one of the most curious approaches to Fermi's Paradox, reformulated by economist Robin Hanson under the

[35] Like the title of a wonderful Ted Chiang story on the subject or Stanislaw Lem's classic *Il pianeta del silenzio* (1986). Variation on the theme of the Fermi's paradox is the recent film *Ad Astra* (James Gray, 2019).

[36] "The Copernican reasoning suggests that we should expect evolution to occur faster at some places than on Earth (and, of course, slower at other sites as well) – where are our interstellar siblings, then?" (Ćirković 2009, 9).

hypothesis known as the "Great Filter"[37], a term that designates a "statistical probability barrier" (Bostrom 2008, 72), a wedge of fundamental evolutionary transitions that must be traversed by a life form in order for the path from lifeless matter to lead to organisms capable of mastering the technology for the exploration and mass colonization of space. Even life on Earth has had to overcome multiple obstacles in its nearly four billion years history. This evolutionary/technological check-point imposes itself as a very harsh selective criterion, suggesting that biocompatible planets are in fact filtered out before they become a niche of intelligence.

A crucial question arises: at what point in our evolutionary journey is the Great Filter? Behind or in front of us? The reason why Bostrom hopes that no (micro)organisms will ever be discovered on Mars (or anywhere else in the Solar System) is that this would imply that life is not so rare in the cosmos (Bostrom 2008, 72). In this case the filter would be in front of us, and what would be unlikely would not be the appearance of life in the universe, but the fact that no intelligent species would be able to go beyond a certain stage of technological development, for instance because it self-destructs.

As we have already seen, this is the alternative considered by Bostrom to justify the absence of past simulations by technologically mature civilizations. The *L*-factor of the Drake equation would be extremely low: technological civilizations would not only be rare but also short-lived. For us, the Great Silence would be the prelude to imminent extinction. Conversely, should the filter be located behind us, it would mean the improbability of life being a widespread phenomenon in the galaxy, or even in the entire universe. Our existence as an intelligent species would be accidental, an exceptional combination of unlikely events bordering on the unbelievable. It is the "Rare Earth" hypothesis.[38]

While it is true that "absence of evidence is not evidence of absence" (Sagan 1997, 213), the inconsistency between estimates and

[37] See Hanson 1998, available at <http://hanson.gmu.edu/greatfilter.html>, last time accessed in 3 December 2022; Hanson's is a refinement of an argument originally proposed by Brandon Carter in the context of the anthropic principle. See Carter 1983, 347.

[38] See Ward & Brownlee 2000; Ćirković 2018, 147.

factual reality, between the abundance of Earth-like planets in the Milky Way and the absence of ET visitors apparently persists.

Stephen Webb, in an essay with the iconic title *If the Universe Is Teeming with Aliens ... Where Is Everybody?* lays out a series of possible solutions to Fermi's conundrum, some of which Ćirković also contemplates, grouping them into three categories: 1) ETIs do not exist; 2) They exist and are already here; 3) They exist, but we have not yet discovered them (Webb 2015)[39].

The hypothesis that they simply do not exist (Fermi, Tipler, etc.) or that they are beyond our observable universe[40] (not causally connected with us) is accompanied by the range of catastrophic scenarios, from self-destruction for nuclear reasons or due to potentially risky technologies beyond our control (bioterrorism, birth of super-intelligence with purposes not aligned with ours), to ecological holocausts, and natural hazards (super-volcanoes, asteroid impacts). Among the most curious scenarios are:

- *The zoo hypothesis*. They observe us but do not contact us, perhaps because of an ethical diktat, so as not to influence our evolution or because they are disinterested in us. Much of the speculation about UFOs – criticized by Sagan – is based on this scenario;
- An *intentional panspermia*, as the film *Prometheus* (Ridley Scott, 2012) teaches us from the opening scene: our life is the grafting of genetic material from an alien race. *Ergo*, we are of alien origin!
- We are inside a simulation generated by an alien super-intelligence, *Matrix*-style, with all the skepticism around the nature of reality that goes with it.
- There is incommensurability in communication (we cannot pick up their signals and/or vice-versa), in theoretical assumptions about the universe, in their use of different physics or mathematics unknown to us, or in their better understanding of how the cosmos works.

[39] See also Ćirković 2009, 7-13.

[40] As early as the Renaissance, Nicolas Cusanus (1401-1464) admitted the possibility of other worlds – which are themselves inhabited – but not accessible: "[...] since all that region of the stars is unknown to us, its inhabitants also remain completely unknown to us" (Cusano 2018, *De docta ignorantia II 12* § *171*, 201).

- We are within a time window in which the astro-biological clock of many civilizations is undergoing a major reset. We therefore live in the time horizon of their phase transition.

3.3 Virtual Escapism

Here we would like to briefly propose the thesis of *Virtual Escapism* (or Digital Diaspora)[41], a variant of the *Transcension hypothesis* originally formulated by John Smart. Both tread a ground that is in danger of collapsing into science fiction, but it is nevertheless worth exploring its fictional implications. The hypothesis of virtual escapism would have the merit of reconciling Fermi's paradox, the argument of simulation (of which mind uploading is a prerequisite) and the circumstance that the great filter is behind us (short duration of technological civilizations). Let us start in order. In brief, Smart's transcension[42] scenario involves

> "[…] that a universal process of evolutionary development guides all sufficiently advanced civilizations into what may be called "inner space", a computationally optimal domain of increasingly dense, productive, miniaturized, and efficient scales of space, time, energy, and matter, and eventually, to a black-hole-like destination." (Smart 2012, 55)

In other words, following a common trajectory of development (so-called *systemic teleology*), civilizations, once they have reached a critical threshold of technological expansion – presumably after the singularity –, mature the realization that transcending elsewhere – into the domain of inner Planck scale space, through the manipulation of Einstein-Rosen bridges and black holes – is a better choice than expanding. Indeed, Smart argues, the expansion hypothesis, as the standard expectation of SETI and Active SETI (or METI, *Messaging to Extra-Terrestrial Intelligence*) is impractical due to the physical constraint of the finite size of the speed of light. As a counterbalance to the Kardashev scale adopted by expansion theorists, Smart adopts the "Barrow-scale" where the reference metric is

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[41] The reference is to Greg Egan's 1997 speculative novel (*Diaspora*), one of the first to apply mind uploading to the entire human species. See Greg Egan 1997.

[42] "Transcension" seems to be the fusion of the terms "transcendence" and "ascension".

> "[…] the miniaturization (spatial localization) of a civilization's engineering, perhaps terminating at the Planck scale. Due to STEM (space, time, energy, matter) compression, intelligent civilizations can presumably continue to develop exponentially more localized, miniaturized, dense, efficient and complex structures and energy flows to generate greater computational and adaptive capacity, right up to the black hole limit and presumably even beyond, as black hole event horizons in stellar mass and supermassive black holes are still well above the apparent Planck-scale limits of universal structure. Thus, if the hypothesis is correct, the Barrow scale, and more generally, STEM efficiency, STEM density, and computational growth scales would be much more appropriate measures of civilization development." (Smart 2012, 59)

To saturate the local region of the universe, in its articulations of space, time, energy and matter, to create the densest and most efficient computational substrate possible and to exploit the (hypothetical) properties of black holes to shape the topology of surrounding space, to travel in time, through the mechanisms of wormholes[43]. As can be seen, the transcension hypothesis embraces numerous assumptions, including a civilization's mastery of the subatomic scale, its computational aspects (and limits), and those properties of the space-time fabric still being explored in cosmology: black holes[44]. Transcension remains a science-fictionally fascinating hypothesis.

If in Smart's escapism the diaspora occurs in Kardashev's counter-scale, in virtual escapism it occurs in the virtual realm of simulations. The idea is that having reached the stage of the singularity, a phenomenon of evolutionary convergence passes through the various civilizations at that level, leading them to the choice of transcending technologically into virtual platforms. Disconnected from their physical form, they would definitively embrace the consequences of mind

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[43] See Morris *et al.* 1998, 1446–49; Morris & Throne 1988, 395–412.

[44] One of these limits is related to the Bekenstein-Hawking entropy in the context of black hole thermodynamics: there is a maximum amount of information that can be stored in a region of space that depends not on the volume of the region but on the area of its surface (holographic or Bekenstein bound). In the case of the black hole, the entropy is proportional to the area of its event horizon, the surface within which even light cannot escape the gravity: the swallowed information would therefore remain confined to the surface (the area of the event horizon) of the black hole and not in its volume. See Bekenstein 2003, 58–65.

uploading (and its premise, computational functionalism[45]), becoming virtual post-biological entities or digitized civilizations.

There may be a narrow window of time (a few centuries) between the moment when a race reaches interstellar flight and the moment when it ceases to have corporeal existence due to the onset of the Singularitian stage. Compared to the Great Filter, then, each intelligent species either self-destructs shortly after the discovery of nuclear weapons or survives perhaps a couple of centuries and then decides to transcend. This explains why the search for intelligent beings using radio-telescopes is failing. The Great Silence would be the imperceptible hum of the computers in which they are running.

Ultimately, the possibility of a transformation of civilizations through mind uploading (and its underlying assumption, functionalism) and the simulation argument was examined, providing, among other things, a possible explanation for the Great Silence: it is not so much a question of whether or not we are inside a complex simulated reality (Bostrom's hypothesis), but rather of examining the possibility that having reached a certain degree of development, civilizations deliberately decide, for reasons of convenience or survival, to pour themselves into a virtual realm. It is "They" who are inside a simulation, not us.

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[45] On functionalism as an anthropological model of transhumanism see Larrey & Puleio 2021, 24-27.

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