

THE QUEST FOR IMMORTALITY AND ITS INFLUENCE ON THE DEVELOPMENT OF A FUTURE INTERPLANETARY CIVILISATION

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ABSTRACT

There will come a time when humans will be able to control the ageing process and perhaps even prevent death. Through genetic engineering and CRISPR technology, developments are afoot to eventually allow humanity to achieve the seemingly impossible, immortality. Multiple future pathways are feasible to achieve this pursuit, including those based on AI, man-machine interfacing, brain implantation, partial cloning and transplant procedures, the human connectome project, and soul/consciousness quantum storage and processing systems. As technology becomes increasingly more sophisticated, and humanity expands into the cosmos, the progression of these projects will induce significant changes to human functioning and human civilisation. The impossible will become a daily reality. This will potentially create new opportunities for individual growth and development, financial incentivization and investment, social programs to improve public services and education, and fantastical ways in which personal relationships will be developed and maintained. However, ethical concerns will preside over new forms of crime, known as consciousness crimes. New forms of law enforcement and social regulation will be essential to stem the tide of social discordance and potential implosion. Instances of mental illness will dramatically increase, placing further strain on pandemic stricken global health services. There are three viable eventualities that will transpire in reference to these current and prospective developments. Firstly, life extension methods through the genetic manipulation of telomerase will unleash a mutated cancer pandemic upon the world (and/or worlds), which will intensify pre-existing deleterious environmental and socio-economic processes that are potentially leading to human extinction. Secondly, initial social issues will be remedied, and an immortal future version of humanity fuelled by renewable energy technology will develop, eventually reaching a state of enhanced consciousness that will facilitate a peaceful, cooperative interplanetary society. Thirdly, this second scenario will be partially actualised, yet immortality will not render humanity immune to its animalistic competitiveness and violent proclivities, leading to a warring galactic civilisation. Immortality will force humanity to develop an interplanetary presence, where it will become the cosmic equivalent of a plague of locusts or a force of technological and existential progress. However, due to the complex ambivalence of human nature, it is highly likely both these eventualities will transpire, creating a fragile and potentially catastrophic psycho-social equilibrium that could prove disastrous for potentially extant life throughout the galaxy.

KEYWORDS

Genetics, Consciousness, Interplanetary, Existential, Catastrophic.

1. INTRODUCTION

The concept of immortality has existed for millennia. It was pursued by ancient alchemists and was the focus of numerous mythological legends, such as the Fountain of Youth, the Peaches of Immortality, life enhancing elixirs and the ideological traditions of Ancient Egyptian Pharaohs. Modern science has maintained a concept of immortality as predicated through the use of

cryogenics, since the publication of Robert Chester Wilson Ettinger's book, *'The Prospect of Immortality'* (ETTINGER, 1962). Ettinger is known as the father of cryogenics. Ettinger founded the Cryonics Institute and the Immortalist Society (immortalistsociety.org, n.d.), professional cryonicists who continue research into this field.

In the 2020's, Cryogenic research has been renamed 'Biostasis'. This term is utilised by Tomorrow, a Berlin based life extension company founded in 2019, which offers active membership plans of 40 Euros a month (www.tomorrow.bio, n.d.). Membership entitles a person to be swiftly extracted from their place of death and relocated to a 'long term storage facility' based in Zurich, Switzerland (www.tomorrow.bio, n.d.). The 'patient' will be brought back to life when medical technology has advanced to an extent necessary to allow a person to be safely thawed and revived (www.tomorrow.bio, n.d.). The membership plan that is currently offered by Tomorrow (and likely other companies in the future), is literally a description of a scene from the Tom Cruise and Kurt Russell film, *Vanilla Sky* (Crowe et al., 2001). Something that was considered to be a plot device for a science fiction film only 21 years ago, is now a reality.

Other respected scientific research companies operating in this field are the SENS Research Foundation, founded in 2009 (SENS Research Foundation, n.d.), Human Longevity Inc. founded in 2014 (Wikipedia, 2022), and Alcor Life Extension Foundation in Arizona, founded in 1972 (Alcor, n.d.). Research in this field is also actively carried out in a number of world leading universities, such as Harvard, UCLA, and Oxford and Murray Edwards College, a division of Cambridge University.

There are other groups of scientists and researchers who are currently working towards realising the goal of immortality. These include Transhumanists, who advocate that the human condition can be improved upon, if not rectified, through body enhancements, such as cybernetic implants, the incorporation of artificial limbs and organs, and genetic engineering procedures. One notable Transhumanist, who promoted this philosophy since the 1970's, was Fereidoun M. Esfandiary, later known as FM-2030 (Shermer, 2018). After expiring from pancreatic cancer in 2000, his body was transported to Alcor Life Extension Foundation in Scottsdale, Arizona, where it remains frozen in liquid nitrogen (Shermer, 2018). In this regard, FM-2030 was both a transhumanist and a cryonicist.

Another notable group of immortality researchers are the Singularityists. The singularity, explored by futurist Ray Kurzweil, in his book, *The Singularity is Near* (Singularity.com, 2019), is a hypothetical future moment in time when technological growth becomes exponential, irreversible and ultimately absolute (Shermer, 2018). This will theoretically produce virtually unknowable consequences, yet one result could be the fulfilment of the quest for immortality. I.J. Good, a British mathematician who worked as a cryptologist at Bletchley Park, produced the intelligence explosion model (mindstalk.net, n.d.). According to this, an upgradable intelligent entity will eventually experience a 'runaway reaction' of self-improvement cycles, with each cycle occurring exponentially faster, resulting in an 'explosion' in intelligence (mindstalk.net, n.d.). This will lead to the entity attaining multilateral super intelligence, qualitatively surpassing humanity in every regard (mindstalk.net, n.d.). Through reaching this level of evolution, the entity, which could feasibly be artificial, biological or a transhumanist combination of both, will surpass the limitations entropy previously imposed upon it, allowing it to reverse the deleterious effects of time, and become immortal.

Futurist and sci-fi novelist, Arthur C. Clark, once said ‘magic's just science that we don't understand yet’ (www.goodreads.com, n.d.). Clark's three laws¹ were prognostications of a current movement that is occurring in mainstream science, as it incorporates subjects usually termed as esoteric. This union of mainstream science with esoteric subjects is why concepts such as immortality are no longer being seen as mere footnotes in science fiction productions, yet rather tangible future realities.

2. THE PATH TOWARDS IMMORTALITY

Immortality will eventually be achieved in the future through digital means, whereby a person's consciousness will be uploaded into a digital world via AI augmentation and appropriation (www.psychologytoday.com, n.d.), leading to a state of digital immortality. There are now a variety of methods through which this objective is starting to become actualised.² However, frontiers are being crossed without appropriate research as to what the long-term consequences may be both for an individual and society. The 1993 film, *Jurassic Park*, clearly presented the ethical problem at the heart of these technological progressions: ‘your scientists were so preoccupied with whether or not they could, they didn't stop to think if they should.’ — Ian Malcolm, *Jurassic Park* (Green, n.d.). Not all companies are taking an ethical approach to this field, and the future consequences could be potentially catastrophic.

Digital immortality is a concept postulated through fictional expression in films, such as the *Tron* and *Matrix* film series, as well as academic postulations concerning transhumanism, which, if enacted, (and this process has begun with implantable technology utilised by office workers in Sweden³), will effectively transform humanity into a race of cyborgs. In addition, the Human Connectome Project is a scheme to map all the neurons and connections in the human brain, which will allow scientists to instil the connectome in a laser beam and project it on the moon

¹1) When a distinguished but elderly scientist states that something is possible, he is almost certainly right... When he states that something is impossible, he is very probably wrong.

²2) The only way of discovering the limits of the possible is to venture a little way past them into the impossible.

³3) Any sufficiently advanced technology is indistinguishable from magic. (M. S. and B. A., n.d.).

²A company called StoryFile has developed technology that allows AI to allocate and synchronise pre-recorded video answers with future questions. This produces a real-time conversation with deceased individuals, as if they were still alive (VentureBeat, 2022). This system, titled Project December, is being presented as a form of digital resurrection, the first system in the world of its kind. The company's web page states that:

‘using patent-pending technology, in conjunction with deep AI running on one of the world's most sophisticated super-computers, we can now simulate a text-based conversation with anyone. Anyone. Including someone who is no longer living.’ (projectdecember.net, n.d.).

A \$10 fee is required to have an hour conversation with a simulated version of the deceased person you wish to ‘speak’ with, and is paid following a questionnaire that includes questions pertaining to the date of birth, date of death, personality traits and a quote from the person (projectdecember.net, n.d.). The psychological impact of this is prospectively ambivalent yet potentially harmful. In April 2017 Microsoft filed a patent for a technology that would recreate a digital version of a deceased person in both visual and aural form. This was deemed ‘too disturbing for production’ (Business, n.d.), and the company now operates an Office of Responsible AI, and an AI, Ethics, and Effects in Engineering and Research Committee, which monitors its inventions (Business, n.d.).

³ Sweden has pioneered the use of implantable microchips, used for tasks such as accessing smart devices, opening doors and setting alarms. The microchips are the size of a grain of rice and will be administered in Italy through companies such as Biohax Italia (Chadwick, 2020).

(Anon, n.d.; NBC News, n.d.). This will theoretically allow human consciousness to be directed to any point in space, and will engender an exceptionally advanced mode of space exploration. Whether that is what will occur through such a feat, is unclear.⁴

However, is there a real, tangible possibility that immortality can be achieved biologically? Can humans live forever without having to freeze/vitrify themselves? Theoretically, yes. In 1984, a ribonucleoprotein called telomerase was discovered by Carol W. Greider and Elizabeth Blackburn, who both received the Nobel Prize in the Physiology of Medicine in 2009 for this achievement (Herbert, 2011). Telomerase provides a species-dependent telomere repeat sequence to the 3' end of telomeres (Herbert, 2011; Shay, n.d.). A telome is a region of repetitive sequences at the ends of the chromosomes present in the vast majority of eukaryotes; organisms whose cells contain a nucleus that is encapsulated by a nuclear envelope (Herbert, 2011; Shay, n.d.).

Ultimately, Telomeres protect the end of the chromosome in a cell from DNA damage through oxidative stress or fusing with neighbouring chromosomes (Herbert, 2011; Shay, n.d.). The role of telomeres and telomerase in cell aging and cancer was realised through research at the biotechnology company, Geron, through cloning the RNA and catalytic components of human telomerase and developing a polymerase chain reaction for telomerase activity called the TRAP assay (Wikipedia Contributors, 2019). The structural composition of human telomerase was discovered in 2018, through the process of cryo-electron microscopy, an advanced method of flash freezing also used to preserve virus vaccines for Covid 19 treatment at UC Berkeley (Wikipedia Contributors, 2019).

The most prominent scientist and futurist at the forefront of this field is Michio Kaku, whose book, *'The Future of Humanity: Terraforming Mars, Interstellar Travel, Immortality and Our Destiny Beyond Earth'* (Kaku, 2018) deals with this subject extensively. During an interview published on March 2nd, 2018, on NBCnews.com to promote this book, Dr Kaku stated that:

In the area of biotechnology, I think we're going to extend the human lifespan. We're now isolating the genes that control the aging process... I think our grandkids will have the option of hitting the age of 30 and maybe stopping for many, many decades at age 30... We can reset the clock with telomerase. But there's a problem why we don't do this now. It's because cancer cells also immortalize themselves (using telomerase) (NBC News, n.d).

This technology, if used stringently and professionally, could extend the human lifespan for many decades, and potentially indefinitely. However, it could also unleash a mass cancer pandemic. This is a probability that must be taken very seriously, should scientists continue to research the practical applications of utilising telomerase in genetic augmentation projects. Dr Kaku revealed a potential method that may allow scientists to circumnavigate this potential catastrophe:

Artificial intelligence will seal the deal. We'll take millions of genomes from old people, millions of genomes from young people, and see where the aging takes place, and we'll

⁴Consciousness is an ephemeral and complex phenomenon. It may not be dependent on a brain (biological/mechanical/virtual/AI/laser projection). This endeavour may very well create a new super entity that exists as a laser light form; one that will be the embodiment of the consciousness of every human ever to have lived. Consequently, this means of attaining immortality is exceptionally controversial.

do that using artificial intelligence to recognize millions and millions of sequences of DNA (NBC News, n.d).

Considering the future appropriation of AI for use in biotechnology, it is reasonable, through reflecting upon the neutral, computational design of AI, that the process of utilising telomerase in life extension projects will be mediated and managed by an intelligence not prone to moral corruption, financial incentives and human incompetence. Ageing is essentially the accumulation of DNA replication errors, a deleterious aspect of biology intensified by radiation, including solar radiation. If the technologies that are being developed in regard to attaining immortality prove successful, there will undoubtedly be consequences for human populations on Earth, and in effect, every other aspect of civilisation.

Some have argued that with larger populations present in the modern, technological age, there is evidence to suggest that not only do people live longer, they also reproduce less, having smaller families. Although there is evidence for this when analysing population data curves in regard to countries like Japan, a basic fact remains; the global population is fundamentally increasing at a rapid rate. According to the United Nations, the global population will reach 8.5 billion by 2030, 9.7 billion by 2050 and 11.2 billion by 2100 (Martin, 2015). These are extremely modest projections.

Resources on Earth are finite. According to worldometer.info, humanity has just over 56,000 days of natural gas, around 147,000 days of coal production and little over 40 years of oil left (Worldometer, 2022). However, as clarified, continued use of these non-renewable resources will only increase global temperatures, extreme weather conditions, drought, pollution, poverty, illness and general catastrophe, which will nullify the aforementioned UN population prediction, as potentially billions of people will die through the environmental destruction that will lead to the end of human civilisation (as we know it) on Earth by the 2050's, at the latest. Therefore, with the implementation of life extension technologies and the consequent rise in populations, where will humans settle to acquire the natural resources and physical space they need to survive? The answer: space.

3. INTERPLANETARY IMMORTALITY

Life extension technologies will increase populations. This will make it inevitable to move to the stars. Mars, Europa, IO, Enceladus, Ceres, Triton and Titan (amongst other planetary moons) will be future habitats where human civilisation will settle, if it is to limit and hopefully reverse the environmental degradation it has caused, and consequently survive the next 30 years. If people are augmented, through genetic engineering, CRISPR technology and gene therapy, to live lifespans of 300-3000+ years, and continue to reproduce, (which considering the human impetus for sex is inevitable), this will create a constantly increasing working population to settle the stars. Coupled with future advances in robotic automation, android technology, AI and mechanic transportation, this will dramatically enhance the human ability to colonise other planets and moons not only in this solar system, but in many others.

This process could expand humanity across the galaxy and the universe, transforming it into an inter-galactic, type 3 civilisation 100,000's of years from the current age. However, there are pitfalls. The levels of solar radiation beyond Earth are much higher. The surface environment of Mars provides a pertinent example of this fact. This increase in receiving radiation increases the risk of developing cancer to potentially 53% (Cancer Research UK, 2015; published, 2021), and this number could be far higher if a person is augmented by telomerase gene therapy, as like Michio Kaku stated, telomerase is utilised by cancer cells to allow them to live indefinitely.

Ultimately, these prospects represent a scientific tightrope that will need to be carefully traversed if the objective of immortality via this gene-based method is to prove successful.

Extended human longevity, in association with advancing technology, will have significant effects on the way we interact, think, relate to each other and ourselves. Our entire identity as a species will be altered at the most intrinsic level. Individuals will have both the time and resources (in theory) to achieve all their goals and become the fully fledged and actualised people they wish to be. Dreams will literally become realities. Hopes will be experiences. Beliefs will be founded in an ever-present consciousness network comprised of potentially trillions of individuals augmented through AI and genetics in a fashion presented by the famous scientist Isaac Asimov in his *Foundation Trilogy (1942–1993)* (Asimov, n.d.), where entire planets will become the equivalent of what countries are currently on Earth, and humanity stretches across 92 billion light years of space.

This will augment everything that makes humanity what it is: science, maths, religion, the arts, agriculture, language, architecture, economics, industry and technology. However, the capricious and volatile aspects of human nature must again be noted. The extension of human life does not necessarily preclude a reduction in violent propensities and consequential results, such as war, famine, rape, murder, torture, abuse and environmental destruction. Immortality will either enhance humanity and transform it into what the ancients would have considered to be a race of Gods, or it will simply spread a pre-existing, often violent and duplicitous temperament throughout the stars. In this latter case, entire planets will be effectively strip mined and exploited, whilst powerful planet engulfing civilisations will endlessly compete with one another.

4. TECHNOLOGICAL IMMORTALITY

In the future, likely before 2100, cellular regeneration via nanomedicines will become a common aspect of daily life, allowing wounds to be healed in a fashion that would be considered miraculous by contemporary standards.⁵ Cloned body parts including limbs, organs and bones, will be available to the wealthy who will have a full stockpile of every portion of their physical anatomy preserved and ready for transplantation should an emergency create the need for such an operation. This biological insurance transplant stockpile could also be genetically enhanced in various ways, depending on the activities of the recipient. For example, if a person had very fair skin and they wanted to settle on a planet in a trinary star system where they would be subjected to much higher levels of daily solar radiation, they would have their insurance transplant skin genetically altered to decrease susceptibility to ailments like skin cancer.⁶ In the same way one can take a vehicle into a shop to be enhanced with different components today, in the future, a wealthy person will be able to augment their own body with genetically and cybernetically enhanced lab grown cloned replacement portions of their physiology.

In addition, an individual's consciousness may be transferred from place to place as a means of operating daily business interactions. Rather than undertake a meeting via video conferencing or face to face, two people could connect to a consciousness telecommunications holographic projection communicator. This would project their minds, in real time, into a holographic virtual reality environment of their choosing, whilst maintaining actual likenesses of their physical selves. This technology could be adapted for brain implantation, allowing people to automatically

⁵See Arthur C. Clarke's three laws mentioned on page 2.

⁶ The inclusion of melanin and carotenes in the cloned transplant skin would facilitate this desired augmentation.

meet in this way, initiating this process by thought alone.⁷ This would equate this form of communication with entertaining a daydream, allowing the lines between imaginative fantasy and daily communication to dissolve.

Rather than undertake hazardous industrial activities that could risk death, especially in the dangerous pursuit of settling alien worlds, a worker's consciousness could be quantum projected into a quasi-biological neurological CPU within the industrial machinery required to complete a job. This would effectively merge both man and machine temporarily, facilitating the benefits of first-hand experience of the likely extreme working environment, whilst safeguarding that person's life should a geological or environmental catastrophe occur and destroy the operant machine.

If our understanding of consciousness progresses and it is confirmed that it can exist in certain conditions beyond the body,⁸ this technology could be advanced into a soul/consciousness quantum storage and processing system, whereby a person's consciousness could be stored whilst a designer clone is grown as a replacement for the person's deceased body. At the point of maturation, the person's disembodied self would be transferred into the designer body. The appearance of this lab grown body would have been previously drafted by the client and their design company at the start of an elaborate life insurance plan. The person would then live their life and this process could be repeated indefinitely, each time allowing the individual consciousness to experience themselves in a different or replica body. Theoretically, if a person wanted to live multiple lifetimes being a member of a different race in each, that would be possible. Realistically, this luxury would be set aside for the super-rich and influential.

Other applications for out of body consciousness manipulation or OCM, would include economic exploration. Extra solar prospecting would be undertaken by sending out high speed ion drive propelled space probes, and rather than take information from the probe directly, (which as has been observed in the case of the Voyager 1 probe, can be prone to mechanical corruption), a human explorer would have their consciousness projected into a probe. Following a successful synchronisation between man and machine, the person would be able to observe the region of space being surveyed, and zoom in on prospective habitats and the cosmic hazards⁹ that may prevent these regions from being deemed safe to settle. This would equate to a mechanically assisted form of remote viewing.¹⁰

With a self-healing, virtually immortal body, coupled with this transcendental consciousness technology, the concept of mind-body dichotomy will take on an entirely new meaning for future star traversing humans. Ultimately, the borders between what we consider our mental experience of the world and our subjective relationship to ourselves as physical sentient beings will become exceedingly thin, if present at all in any meaningful sense. Humans will no longer be restricted by

⁷The basis for this technology is already operational. In April 2020, Phillip O' Keefe, a man suffering with the degenerative and paralyzing condition ALS, had a brain implant embedded into his neural tissue (Venkat, 2022). This implant is called the *stentrode*, and converts thoughts into electric signals (Venkat, 2022). The stentrode operates an internal receiver transmitter unit which is placed in a patient's chest under their skin (Venkat, 2022). This transmitter records the signals sent by the stentrode and provides wireless transmission to external Bluetooth devices (Venkat, 2022). Mr O'Keefe is now able to send online communications via his thoughts (Venkat, 2022).

⁸Which has essentially been proven through the rigorous scientific near death experience research of Dr Parnia of NYU Langone, New York.

⁹Asteroid clusters, the behaviour of a sun and the potential for solar flares etc...

¹⁰This is the transcendental practice of separating one's mind from one's body for the purpose of surveillance. This method has been used for decades by intelligence agencies such as the CIA, NSA, and MI6.

the caution that the fear of death provides, considering the fact that such a phenomenon would have been relegated to history, eventually becoming a myth.

5. CRIMINAL IMMORTALITY

The ethical concerns that will arise from the dramatic restructuring of human consciousness and its appropriation in reference to immortality are numerous. A person's mind could be hacked, manipulated and controlled to use the individual for a range of illegal purposes, including espionage, information extraction, financial crime, infringement into military systems and identity theft. A new kind of criminality could easily develop in this future era of mind based interaction: consciousness crime. Consequently, a Consciousness Communications Agency (CCA) would have to be established to globally oversee the development and implementation of this technology, limiting its activities in accordance with an internationally ratified, enforced industrial and legal ethical code of conduct.

However, although certain regulations could be enforced due to enhanced measurements and records made by the technology in use, (in the same way metadata on a web server records the identities, locations and times of communication between participating parties), the subtle complexities and unknowns within this fledging field would prevent even a moderate control of the system. This could lead to the literal corruption of a person's consciousness through accident or attack. In the latter instance, this process could feasibly be enacted en masse across communities or entire countries through the deployment of a new kind of armament, weapons of mass mind destruction (WMMD).

In the same way a hacker can use Blackhat techniques to access backdoor pathways to evade detection from targeted organisations, a consciousness hacker could wipe a person's memory, or possibly personality, if they were deemed to hold incriminating information on the hacker or their clients. The best weapon the CCA would have would be interception and geo location technology coupled with their own White hat hackers¹¹ who would work to counter the effects of their Blackhat counterparts. This would facilitate a consciousness based cyber arms race, whereby more advanced upgrades to the systems used to hold and transfer a person's consciousness would be constantly sought by both sides. Escalation and chaos would be virtually inevitable consequences.

6. CONCLUSION: THE EVENTUALITIES OF IMMORTALITY

The first possible future scenario derived from the implementation of immortality is that life extension methods through the implementation and manipulation of Telomerase will unleash a cancer pandemic upon the world (and/or worlds), worsening our already Covid 19 pandemic-stricken civilisation. This will only intensify the deleterious environmental and socio-economic processes that are potentially leading to the end of the human race. Another possibility is that renewable technologies will be fully implemented and prevent the destruction of civilisation during the mid-21st Century, facilitating the eventual creation of a (virtually) immortal future version of humanity that will reach a level of enhanced consciousness, allowing it to become a near divine race.

A third eventuality is that renewable technologies will be fully implemented and prevent the destruction of civilisation during the mid-21st Century, yet immortality will not render humanity immune to its animalistic competitiveness and violent proclivities, leading to a Star

¹¹A white hat is an ethical security hacker. Ethical hacking can help prevent or counter malicious hacking activities, and is undertaken on behalf of clients to reveal flaws in online security systems, amongst other applications.

Wars/Foundation/The Expanse form of galactic civilisation. It is possible that eventualities three and four will essentially exist simultaneously, whereby certain sects of human civilisation will spiritually, cognitively and physically evolve in isolation from their brethren that will maintain greed based, financial, warring space-based societies. These enlightened societies will protect themselves with highly advanced weaponry, which will act as deterrents against encroachment by hostile forces.

Whichever result transpires, humanity will be forced to adapt to both the developments it can control and those imposed upon it. Ultimately, the scientific quest for immortality is one of the aspects that constitutes a new age of civilisation in the 21st Century, and consequently, is indirectly facilitating other advanced projects. These include attempts to colonise the Moon and Mars, blur the lines between human consciousness and AI sentience, and enhance human physiology through mechanical augmentation. However, with increasing complexity, an unprepared society can buckle under the weight of its curiosity and egocentric compulsions.

It is highly feasible this destructive fate will be the actuality humanity will realise prior to granting itself the option to traverse a path towards immortality. However, in reference to the ambivalence that is at the core of human nature, in that it maintains an ineffable ability to harbour a capacity for exceptional benevolence whilst also a proclivity for extreme brutality and perversion, (often without awareness of the conceptual incompatibility of such), both eventualities could be realised simultaneously. This will create a fifth future scenario, whereby the destructive and constructive features of current terrestrial society will be transplanted into the cosmos, existing in unison as they do on Earth. This will lead to a complex, fragmentary and problematic interplanetary civilisation based on self-contention. As is the case with most conundrums involving humans, the problems are psychology and choice.

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