TAKSHASHILA INSTITUTION

The Evolution of Synthetic Thought

Takshashila Essay

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Views expressed in the essay are of the author and not of the Institution

Introduction

The world has never been enough. At least for us, humans. The endeavour to become more than what we are lies at the heart of human civilisation. We have overcome challenges of nature, obstacles of time, physical and mental impediments. Perhaps nothing reflects the culmination of this collective zeal to surpass our capabilities as much as Transhumanism.

Transhumanism is a belief that human beings can transcend the limits of physical and mental limitations through technology. For some, a Transhumanist is an ideal to strive towards, and for others, it is both a source and an answer to all of humanity's problems.

Borne out of a belief system that humankind should reach the pinnacle of its capabilities and beyond, Transhumanism comprises augmentations to overcome limitations. While technological augmentations may be a recent endeavour, primitive humans have utilised tools to augment their capabilities. From the wooden spears they used to hunt, the prosthetic wooden and iron legs to augment walking, all the way to lances in warfare, humans have employed augmentations throughout history. Eyeglasses, clothing, and ploughs signalled a rise in using tools to augment our capabilities.

The rise in medical technology, genetic science, and electronics from the 1990s, has opened new frontiers in human capabilities. We don't merely use technology as enablers but have started adopting it from within in the form of cybernetics. Armbands, deep-brain stimulators, physical and neural augmentations, mechanical and cybernetic implants, and potentially gene editing are technologies which humans can use to enhance themselves and achieve capabilities previously unheard of.

On one hand, science is driving innovation in augmentation, and on the other, Transhumanism has given rise to a significant amount of philosophical thought. Notions of challenging what it means to be human, virtues and vices of post-humanism, and the dangers of uncontrolled immortality provoke deep questions that do not have answers but encourage much debate and discourse. There is also an entire section of humanity that believes that the very notion of Transhumanism is irrelevant, for any such technological advancements are several decades away.

Transhumanism has generated fear and enthusiasm in equal measures. While proponents extol the virtues of embracing technology to enhance our lives, detractors fear what this will mean to be human at all. The widespread availability of Transhumanist technologies could result in radical life extension, overall well-being and improper perpetuation could create class divides, encourage oppression and even alter geopolitical landscapes.

For the first time in human history, we can radically alter our minds and bodies and take shortcuts to the various destinations of natural evolution. This essay looks at Transhumanism from an emerging technological paradigm and attempts to provide an objective view of where Transhumanism is headed and what it means to the rest of the world.

Defining Transhumanism

Transhumanism stands at the convergence of multiple fields; medical prosthetics, behavioural sciences, artificial intelligence, cybernetics, and gene editing, to name a few. As such, Transhumanism is imbued with definitions from scientists and philosophers, each coining different meanings for Transhumanism. The 'trans' is often substituted with 'transformative'[1], 'transcendental'[2] and the 'transitional'[3]. 'Humanism' per its definition is the philosophical and ethical stance that emphasises value and agency of human beings, individually and collectively. Humanism values critical thinking and evidence (rationalism and empiricism) over dogma or superstition[4].

Transhumanism is the intrinsic belief that humans, with the help of technology, can transcend their physical and mental limitations. Radical life extension and immortality form central tenets of Transhumanism. Transhumanists believe that through these technologies, humanity will be able to make death from an absolute to one of accidental and physical intervention[5].

For thousands of years, humanity used uncomplicated machines, and up until the late 20th century, man's reliance on machines was mostly external to nature, but instrumentally, transhumanism deeply intertwines technology with the human body. Beyond the 1990s, advancements in technologies have included prosthetics that enhance physical movements, surgical interventions that treat mental diseases to neural implants that can improve sensory perceptions like hearing and vision that far surpass normal human capabilities. Concurrently, advancements in gene sequencing like CRISPR have enabled potential enhancement of physical and mental traits, opening up new possibilities for human enhancement. While the discourse is mired between extremes of designer babies and the extinction of certain species, the potential of gene editing cannot be undermined.

Transhumanism is, however not limited to physical augmentations. Transhumanism structurally encompasses advancements in medicine and genetic science, physical, cybernetic, and neurological augmentations. Augmentations are devices that humans can attach to themselves. These devices can be attached physically and surgically. Examples of physical augmentations are smartwatches that can inform physical states to prosthetic legs that can help overcome disabilities. Surgically implanted augmentations include deep brain stimulators that can treat mental conditions like clinical depression and PTSD to implanted

antennae that can provide an alternative treatment to colour-blindness. Networked cybernetic implants, currently in conceptual stage, can enable direct access between the human brain and a computer.

The merging of human intelligence and machine intelligence will be a stepping stone in human evolution[6]. This merger will also be an incremental process as is evident from a variety of technologies that are developing concurrently.

Objectively, Transhumanism encompasses all technologies and developments geared towards the enhancement of human life. The technologies developed under the umbrella of Transhumanism are called Human Enhancement Technologies (HET).

History of Transhumanism

The history of Transhumanism was a sparsely documented one up until recent times. Some recent works shed significant light on the field of study. One of the principal challenges of documenting is the labelling of humankind's collective effort to be higher than other species, races and nature itself. The history is indeed a bright one and has equal measures of enlightening and reformative themes, but sometimes it has also been ruinous. There are thoughts and ideas, both scientific and philosophical that can be labelled Transhumanist in retrospect.

However, not all of them contribute to modern Transhumanism. But there are some seminal pieces of literature, events, and magnificent scientific breakthroughs that led to the emergence of modern Transhumanism. A colourful anecdote of Transhumanism's history is that the dualistic aspects of transcendence and dystopia have always accompanied every innovation or misfire, literature or event, declarations and failures.

Precursors - Origins of Transhumanist Thought

The roots of Transhumanist thought stretch all the way back to Russian futurism of the late 19th century, when Christian mystic philosopher, Nikolai Fyodorov, proposed that man's natural destiny was to take to the stars, to achieve immortality through science, to resurrect the dead with medical technology, and to colonise space[7]. Fyodorov's beliefs came to be known as Cosmism. Cosmism sought to achieve human perfection, to unite humanity in a commitment to overcome death and master the cosmos, as God had intended. Fyodorov's influence would later filter down to the establishment of the Russian space program directly in the 20th century, and the race to put the first man into orbit.

In the year, 1923, Daedalus: Science and the Future, a book by the British scientist, JBS Haldane, sowed the seeds of modern Transhumanism[8]. Haldane, a population geneticist, highlighted the role that eugenics would play in enhancing human life, calling the 'biological inventor', today's geneticist, as the most romantic figure in science[9]. Haldane was also one of the first scientists to highlight the ethical consequences of such capabilities.

Following closely on the heels of Haldane's work, John Desmond Bernal published The World, the Flesh and the Devil in 1929[10]. This work introduced several ambitious elements key to modern transhumanism, such as liveable space

habitats, and upgrades that science could bring to human physiology and intelligence[11]. Conversely, in 1932, Aldous Huxley's famous work of fiction, Brave New World, illustrated a Transhumanist dystopia replete with psychological conditioning, promiscuous sexuality, biotechnology, and the opiate drug "soma" keeps the population placid in a static, conformist caste society[12]. The 1930s saw human enhancement gaining traction at Cambridge University, who believed in the capacity of science and technology to improve human condition, with the bulk of development focusing on genetic enhancements[13].

Progress in this arena was gradual. However, the Second World War brought Transhumanist concepts to a grinding halt. The ideas and applications purported by the Nazis in the 1940s, and the subsequent racially-targeted war crimes brought forth a hiatus for eugenics, and consequently all human enhancement technologies for a short period[14]. Looking back, one can still spot tiny slivers of the idea tearing through, like Robert Ettinger's The Jameson Satellite in 1948[15], which proposed cryonics as a one-way medical time travel to the future, and Pierre Teilhard de Chardin's Omega Point, which presented the idea of man 'transhumanising' himself and the genesis of Singularity[16].

But the year, 1951, was a vital year for Transhumanism, where Julian Huxley first used the term 'Transhumanism' in a lecture titled Knowledge, Morality and Destiny[17]. Six years later, in 1957, Huxley's seminal work, Religion without Revelation[18], was a major milestone in which he stated:

Up till now, human life has generally been, as Hobbes described it, 'nasty, brutish and short'; the great majority of human beings (if they have not already died young) have been afflicted with misery… we can justifiably hold the belief that these lands of possibility exist, and that the present limitations and miserable frustrations of our existence could be in large measure surmounted… The human species can, if it wishes, transcend itself—not just sporadically, an individual here in one way, an individual there in another way, but in its entirety, as humanity.

Technology and the Academia's Inculcation of Transhumanism

Cryostasis, the idea of freezing people up so that they can be brought back to life, became popular in 1964, with Robert Ettinger's The Prospect of Immortality[19]. The idea was well-received then and led to the establishment of several cryonics

societies across the United States. Three years later, Robert Nelson, a TV repairman, became the first person to be cryogenically frozen, giving much needed narrative boost for the technology, however, the experiment was deemed unsuccessful[20].

In 1972, Fred and Linda Chamberlain, established the Alcor Society for Solid State Hypothermia, which was later renamed as the Alcor Life Extension Foundation[21]. This foundation has since remained a frontrunner in radical life extension. Just a year later, Professor Feridoun M Esfandiary (who named himself FM-2030) published Up-Wingers - A Futurist Manifesto[22], and subsequently a book titled, 'Are You a Transhuman?: Monitoring and Stimulating Your Personal Rate of Growth' in a rapidly changing world[23].

Natasha Vita-More published the first Transhumanist Manifesto in 1983. An ambitious declaration, the manifesto provided many tenets of Transhumanist technology, philosophy, and the endeavours of its practitioners[24]. A year later, William Gibson's 'Neuromancer' gets published, marking a distraction from Transhumanism's optimistic outlook[25].

In 1986, Eric Drexler proposed an interesting theory of nanotechnology as 'molecular assemblers' that could position atoms and molecules for desired reactions with utmost precision. Assemblers were proposed as a potential solution for the dwindling resources and growing population[26]. This was followed immediately by the establishment of The Foresight Institute, whose principal objective was to ensure beneficial implementation of nanotechnology.

Max More and T.O. Morrow published Extropy: Vaccine for Future Shock, in 1988, which was later renamed as The Journal of Transhumanist Thought[27].

The Extropians Mailing list, the first major online hub for Transhumanist ideas, was established in 1991. This portal is still active with several theorists, writers, and technologists regularly contributing to the boards[28]. Vernor Vinge, a science fiction author, computer scientist, and a mathematician, published The Coming Technological Singularity in 1993. This book further improved the idea of Singularity which has caught on ever since and continues to propagate via modern futurists.

In 1994, the Extropy Institute held its first conference in California. A year later, Peter Diamandis established the X Prize, an organisation dedicated to fund

"radical breakthroughs for the benefit of humanity." The Hedonistic Imperative, the first edition of David Pearce's seminal work was published in 1995, introducing the idea of how technology may be used to abolish all suffering in sentient life. A year later, Natasha Vita-More published an updated version of the Transhumanist Manifesto, which was sent with the Cassini Huygens space probe to Saturn[29].

The World Transhumanist Association was established in 1998 by Nick Bostrom and David Pearce. The same year, the first iteration of the Transhumanist Declaration was created. In 1998, the first Transvision Conference was held in the Netherlands. The conference is now a constant feature that encompasses various ideas of Transhumanism. In the year, 2000, FM-2030, entered cryonic suspension at Alcor Life Extension.

From the year, 2000, technological advances gave a significant boost to human enhancement technologies, bringing forth several new scientific, philosophical, and foundational ideas that are central to modern Transhumanism.

In 2003, The Methuselah Foundation was established to create new technologies for radical life extension. In 2004, Nick Bostrom and James Hughes, founded the Institute for Ethics and Emerging Technologies, which publishes the Journal of Transhumanism[30]. The same year, James Hughes also published the Citizen Cyborg and the position of Democratic Transhumanism, a piece of literature that merged Transhumanist and leftist political positions. The same year, prominent technologist and futurist, Francis Fukuyama, labelled Transhumanism as the 'world's most dangerous idea'.

Ray Kurzweil published his most popular book, The Singularity is Near, in 2005. This book extolled the idea of Singularity proposed by Vernor Vinge. The book discusses several key concepts on which research is underway. The same year, Nick Bostrom, established the Future of Humanity Institute, a multidisciplinary research institute that is investigating how to live a long flourishing life. A key idea being explored by the Institute is that of "existential risk", a risk where an adverse outcome would either annihilate Earth-originating intelligent life or permanently and drastically curtail its potential[31].

In 2008, Nick Bostrom and Anders Sandberg published the "Whole Brain Emulation Roadmap," a manifesto for mind-uploading, an idea that has since gained a lot of attention. A year later, Eliezer Yudkowsky published the blog, LessWrong, where a discussion on artificial intelligence resulted in the thought

experiment, Roko's Basilik, and the subsequent banning of its debate on the forums. The same year, Aubrey de Grey founded the SENS Foundation, an institute pursuing research to cure ageing.

Several institutes have sprung up since then that pursue research on reversing ageing. Many pieces of literature have emerged, the prominent among them, Nick Bostrom's Historical Overview, Greg Egan's many science fiction novels, the Transhumanist Wager, by Zoltan Istvan in 2013, and to some extent Cixin Liu's Three Body Problem.

The dynamics of Transhumanism are accelerating in recent years with more and more people being drawn to its technological prospects[32].

The Many Themes of Transhumanism

Themes of immortality and endless progress have enlivened Transhumanism throughout history. Science fiction pulp magazines like Startling Stories, Astounding Science Fiction, and Amazing Stories told tales of humans colonising foreign solar systems, being suspended in cryogenic caskets and woken up in the far future, and devising powerful technologies in order to become immortal superhuman figures of derring-do. A symbiotic relationship that remains foundational to transhumanism came forth in this era: taking ideas from science fiction and attempting to make them real.

Modern Transhumanism's most direct progenitors were the extropians of the late 1980s, like Max More and Eric Drexler. More is a Transhumanist philosopher and the CEO of the Alcor Life Extension Foundation. Extropy got more envisioned, standing in opposition to the natural law of entropy: the inevitable decline of all energy in the universe into disorder and chaos. The extropians believed that humans could overcome entropy through technology and practical 'rational optimism[33].' The ideas central to extropy found their way online mailing, which continues to this today as the longest continually running Transhumanist message board on the internet.

Many of the tenets of transhumanism - overcoming death, cryonics, mind uploading, nanotechnology, advanced computing, and alternative forms of currency - was widely discussed on the list, which gained both influence and notoriety once its top members were profiled in Wired magazine issue, "Meet The Extropians[34]." By the mid-90s, the techno-utopian vision of modern

transhumanism had found a fertile breeding ground in Silicon Valley, where incredible wealth appeared from private investment, and technology never before imagined seemingly came online overnight. The idea that technology could remake society at every level became a focal point of enormous investment[35].

Since 2000, many of Silicon Valley's biggest companies are pursuing aims that can be called Transhumanist in nature: Google, through its incorporation of Calico Labs invests in research into curing ageing. Mark Zuckerberg and Sir Strand, among other tech elite, the fund Breakthrough Prize, which awards $3 million to fund advances in life extension technologies. Peter Thiel co-founded the Sea Steading Institute "which will allow the next generation of pioneers to peacefully test new ideas for government."

Google hired Singularity theorist Ray Kurzweil to work on the company's machine-learning artificial intelligence project, Google Brain. Jeff Bezos, Elon Musk, and Peter Diamandis are gearing to pour billions into private space exploration, in the case of SpaceX, with the goal of one day populating Mars. To aid in SpaceX's quest, Larry Page wants to leave his private fortune to Musk.

These are just a few of Silicon Valley's labs, institutes, foundations, prizes, think-tanks, and boards advocating for the fulfilment of transhumanism's dreams. Though they may not call themselves transhumanists, these companies and their CEOs share a common vision with many elements of its worldview: to many of them, redefining the meaning of "human being" is not hubris, but innovation. It is not impossible, but unlikely. It's only a matter of time.

Medicine, Eugenics, and Genetics, and Transhumanism

There are many theories from medicine, eugenics, and gene modification theories, that make genetic science a key component of human enhancement.

Humans have employed medicine for ages. However, it was merely enough to assuage pain, relieve symptoms, and cure a few diseases. Over the last 200 years, medicine has seen considerable advancements, and has been a key component in radical life extension[36].

Applications of medicine were merely reactive, applied only when people were afflicted by maladies, inflicted with wounds, or suffered pain. Preventive care was

unknown for a long time. But when preventive care evolved, human lifespan increased by manifolds. Advancements in science and research helped in the creation of vaccines, eradication of several chronic diseases, curing chronic illnesses. Subsequent commercialisation of medicine paved the way to wider availability of these medicines, improving human life expectancies at scale.

Recent advancements in medical science have given rise to stem-cell therapies. Although some of these procedures have their own share of controversies, the ambition is quite clear. In the middle of all this came a curious school of thought of Eugenics.

It is often argued that eugenics became the negative twin of a progressive mindset. The negative connotation of eugenics is attributable to its history of wrongful enforcement[37]. Theories of eugenics have been in existence since ancient Greece. However, the more famous ones, that even had attributed scientific thoughts to themselves, began in the late 19th century. Francis Galton, a scientist, cousin of Charles Darwin, coined the term eugenics.

Galton's theory brought forth the ideas of eliminating 'undesirables' and multiplying the 'desirables' in the human race[38]. The ideas circulated far and wide in the early 20th century as a drive for social improvement, and was used as a tool for potential racial cleansing. The idea of eugenics eventually became a tool for manipulating heredity and breeding to produce better people and eliminate biologically inferior people[39].

In the 1920's, the United States passed eugenic sterilisation laws across 24 of its states, and similar laws were passed in Canada and Sweden as well. While race was an important factor in the Scandinavian and British iteration of eugenics laws, it played a significant role in American and Canadian iterations. Forced sterilisation in the United States targeted minorities, criminals, women, physically handicapped and the mentally ill[40]. By 1936, as many as 60,000 people had been forcefully sterilised. The subsequent Nazi Party's racial and ethnic cleaning actions are a permanent scar on the name of eugenics[41].

The scenario has changed since then. Advancements in medical and genetic science has helped in the treatment of several medical conditions. One such advancement is a molecule that can enhance healthspan, the amount of time any living thing remains healthy[42].

Another breakthrough is the CRISPR technology. Researchers have tested CRISPR Cas-9 on several species of microbes, plants, and animals. Some promising results include hindering cancer cells from multiplying, making cells more resistant to diseases, altering the nature of yeast that can create sustainable biofuel, and making plants resistant to fungus[43].

Jennifer Doudna, from the University of California and Emmanuelle Charpentier, a French microbiologist from Ume University Sweden, teamed up and published an article in Science describing the native principle of the CRISPR Cas-9 system[44]. CRIPR allows DNA sequence alterations and modified gene functions.

Advancements in CRISPR Cas9 technology has brought forth the prospects of treating diseases which previously had none. It has also brought forth the potential to curb inheritable diseases. Apart from medical applications, the systematic editing of genes can allow humans to overcome certain physical and mental limitations. Some advances posited by gene editing include enhanced strength, endurance, motor skills, as well as heightened perception, alertness, and so on. Gene editing advancements can help humans live longer and healthier lives[45].

The ability to overcome physical and mental limitations is a key objective of Transhumanism. Up until now, evolution has held sway over human life. Therefore, Transhumanists view gene editing as one of the paths towards controlled evolution. The ability to manipulate genes to extend life and overcome physical limitations therefore garners much enthusiasm among Transhumanists.

The Rise of Human Augmentation

Augmentations are not new. Humans have been augmenting themselves since the primitive ages. While the word 'augmentation' implies becoming bigger and better, all augmentations are instruments that help us overcome our deficiencies. Humans have been using sticks to support our movement, spears to hunt, and animal cloaks and palisades as protection from the cold and hostile creatures respectively. The primitive human was smart enough to supplement his incapability like the lack of claws, only two legs, and the lack of fur. As our intelligence evolved, we started creating better instruments to make up for our deficiencies.

Armours, footwear, helmets, and gauntlets are instruments that people attached to themselves while going off to war. Our ingenuity allowed us to extend these instruments to war animals as well, making them near impervious to damage. From the Middle-Ages, advances in physics and optics helped us understand light better, leading to the invention of eyeglasses. Eyeglasses have remained one of the longest standing augmentations in human history. A relatively recent invention, the hearing aid, is also an instrument that has since remained constant.

Through centuries, these instruments have evolved significantly even though their core functions remain the same. Armours evolved to exoskeletons, eyeglasses to contact lenses, gauntlets to sophisticated gloves, and wired hearing aids to tiny earpieces. Footwear too evolved, each fulfilling a specific purpose – sports, adventure, casual, formal and occasional. And to this day, these external instruments supplement our deficiencies and help us perform our daily tasks better. But these prosthetics are not limited to people with physical disabilities.

One of the biggest inventions in human augmentation is the creation of neural augmentation[46]. Neural augmentations are not mere attachments to the human body. These instruments are surgically implanted in the human body and can interface with the human neurology, with the help of a catalyst.

In 1972, the first commercial cochlear implant was developed and to this day, remains a successful clinical neuro-prosthetic device[47]. In the 1980's, deep brain stimulation came into existence. Deep brain stimulation began as an option to treat Parkinson's disease and through the years, variations of this technology have been used to treat patients with deep clinical depression and post-traumatic stress syndrome[48].

Since the 1990's, augmentations acquired a new dimension. Modern augmentations comprise prosthetic legs with motor skills that can match and sometimes exceed normal performance. Wooden limbs have been replaced with mechanical limbs that have superior range of motion and can perform walking and running actions with the same efficiency as normal biological limbs[49]. Similarly, bionic arms have improved strength, durability, and range of motion, that allow people to lift objects heavier than normal hands can. There are muscular augmentations that allow people to exercise better, limb attachments that augment running, and wearable protection equipment used in fields involving manual labour[50].

Cybernetics and neural augmentations gave rise to a new generation of human beings that challenge the nature of responses to stimuli and neural perceptions.

Neil Harbisson, a British-born individual and currently an avant-garde artist, was born with a condition called achromatopsia, a form of extreme colour-blindness. In 2004, Harbisson was equipped with a specialised cybernetic eye that can render preconceived colours as sounds on the musical scale—in essence allowing him to 'hear' colour. Harbisson claims that his adaptation to this implant has resulted in the development of a highly advanced perception of colours. Harbisson has since achieved worldwide renown for officially being the first human being to be recognised as a cyborg by the British government[51].

Nigel Ackland, a precious metal smelter, lost a part of his arm because of an industrial accident. After the amputation, Nigel's lost arm was replaced with a cosmetic one without functionality and later with a body-powered hook with a limited range of motion. After using an electric arm for a short period, Nigel was given a bebionic3 hand. This hand has a superior range of motion and possesses incredible dexterity. The prosthetic boasts of a particularly alarming grip, dubbed as the 'trigger grip'. Nigel can independently move each of his fingers and grip objects, just like healthy biological hands[52].

Humanity is now at the stage of merging seamlessly with technology. The internet opened up new avenues for human augmentation. Post 2010, augmentations have made steady inroads into our lives by way of wearable devices. Armbands and smartwatches that can tell our pulse rates, calories burnt, and bodyweight differentials have enabled us to understand our bodies better, something we could only do by visiting a doctor. Their networking ability allows people to communicate, stay in touch on social media, and allows radical customisation of

their lifestyles. There are some who have taken the functionality of implants to the next level.

Kevin Warwick, professor of cybernetics at the University of Reading, has experimented with various implants. Warwick has implanted several microchips in his arms that allow him to operate doors, lights, heaters and computers remotely[53].

There are several examples; Jerry Jalava's USB thumb, Claudia Mitchell's bionic limb[54], and Jesse Sullivan's robotic hands[55], all point to the collective endeavour of using technology to overcome physical disabilities, gain new perceptions, and even improve body functionalities. All augmentations involve complex surgical procedures. While neural augmentations may be difficult and expensive to replace, mechanical augmentations have their advantages i.e. long life and relatively easier replacements.

The Future of Transhumanism

Computers, smartphones, and wearable devices are great examples of technology shaping our way of life. However, a lot of them are comparable to the major developments in information and communication technologies[56].

The future of Transhumanism promises many developments that will make humans stronger, resilient, and more intelligent. Wearable technology, body augmentation will extend beyond simple armbands today. Developments in the field include universal translators, contact lenses that can take photographs and capture videos, subdermal implants for biometric security, and concept technologies like mind-controlled prosthesis[57]. On the other hand, advances in gene editing can potentially help us eradicate chronic and heritable diseases[58].

One such instance of public trial of human augmentation is the Cyborg Olympics, a competition that tested the performance of exoskeletons and augmented people[59]. Although mechanically replaced arms and limbs don't match up to biological arms and legs in their full capacity, they are quite competitive and the ability to reach up to biological standards does not seem far.

Few fields are as influenced by science fiction as much as Transhumanism. However, human augmentation is still in the nascent stage. But for a few science experiments and rare cases of prosthetic replacements, augmentation is still not

mainstream. A few upcoming inventions in the sphere are poised to change the way we humans operate technology and our communication perceptions.

Brain-Machine Interfaces (BMI) have opened up new frontiers in communication between humans and machines. Some theoretical applications include controlling objects, accessing computers, issuing commands to robots, and objects that we can control with our thoughts. A range of devices are being developed by companies like Facebook, Neuralink, and agencies like DARPA[60]. These interfaces are networked and implanted on the human body, and have multidisciplinary applications ranging from neuroscience, engineering, computer science, and clinical rehabilitation. Commercial applications include wireless communication, interfacing directly with computer systems, and allowing unfiltered articulations at the speed of thought.

Virtual Reality is another form of augmentation with many applications in the fields of education and entertainment. Computer simulations are widely employed today in the field of skill development such as driving and performing complex repairs. The next step in virtual reality is haptics – the sense of touch. Haptics will serve to bridge the gap between virtual and objective realities. VR advances include developmental initiatives, training programmes, skill development, and even creating real-world scenarios to see the impact of major policy changes[61].

A combination of Virtual Reality and BMIs can improve human empathy[62]. If we can understand a new perspective, not just from an information outlook but from a straight, visceral, experience of another individual's brain, then our understanding of fellow humans may increase. VR is a great technology that can make life fun, intuitive, visceral, and can bring about a cultural shift in the way people perceive the world.

Personalisation has become an important keyword in modern society. The information we consume digitally is highly personalised to our tastes, based on the frequency with which we habituate certain information spheres. Neural implants embedded in the human brain are usually networked and can transmit and receive a variety of information. Although neural implants have not advanced that far, they present a world of opportunity for content developers to create and deliver highly personalised information to people.

An interesting development is a universal translator earbud, which can eliminate barriers in communication. The idea that people can talk to one another without learning another language holds significant promise[63]. However, there are still some barriers on the way. Natural Language Processing needs to advance significantly before we see such changes, but the prospects are interesting.

Most of these developments are near-future developments. Some ambitious developments that are still in the realm of science fiction but garner enthusiasm include cross-species genetics to help humans breathe underwater, augmented bodies that can live off less food and oxygen which could be a major advantage in space exploration, and uploading of the brain onto a computer, and achieving cognitive immortality.

The all-encompassing nature of Transhumanism cannot be ignored. Very soon, most fields in the world will be interlinked through human enhancement. Multipurpose augmentations that can be interchangeable across different fields will hold sway eventually.

Transhumanist Schools of Thought

There is no clear moment where humanity emerges as Transhuman. Our integration with technology in the Information Age has always been an extension of ourselves. This is evident in our reliance on computer technology which has seamlessly integrated into almost every field. But understanding the potential hybrid of man and machine has many lessons.

Transhumanism is a definitive step towards controlled human evolution. It will converge multiple fields together, which will affect behaviours, thought processes, and economic situations worldwide. Society may be altered permanently but before we hit the stage of the ultimate transhuman, which Humanity+ calls Human 2.0, there is a significant technological, philosophical, and regulatory gulf that needs bridging.

In a hypothetical scenario, if one nation decides on the creation of physically and neurally augmented military, how long before another nation follows suit? These choices will philosophically question what we humans value most. Our ability to engineer outcomes per our needs will call to question whether we value fulfilment, happiness, success, technological prowess, or something else entirely. Up until now, geopolitics and capitalism has held sway over most technological

trends, but Transhumanism signals a change in which humanity perceives technology.

Societal opinions on Transhumanism range from embracing the technology wholeheartedly, making cautious and judicious use, to subjecting it to stringent legislation. There is also deep philosophical thought attached to Transhumanism with its own dualities; one promising that technology will be the greatest good for mankind and the other warning dire consequences of morality as the only compass for humanity, which has resulted in disastrous outcomes in history. These are surface-level arguments however there are deep schools of thought that have given rise to these opinions. The following sections will address these in more detail.

Transhumanism as a Religion

A central idea of Transhumanism is the evolving human nature. An idea popularised by Huxley and later made famous by Nick Bostrom, who stated:

Transhumanists view human nature as a work-in-progress, a half-baked beginning that we can learn to remold in desirable ways. Current humanity need not be the endpoint of evolution. Transhumanists hope that by responsible use of science, technology, and other rational means, we shall eventually manage to become posthuman, beings with vastly greater capacities than present human beings have[64].

Technological progress has often resulted in dispelling of myths, superstition, and an observable decline of religious thought. A flipside of this progress however, has been the attachment of religious connotation to Transhumanism itself.

Transhumanism was a matter of serious intellectual debate throughout the 20th century. But the first decade of the 21st century has seen several established religions taking Transhumanism seriously[65].

A significant portion of the Transhumanist discourse veers towards theological views of Transhumanism. Transhumanists like Eric. K Drexler, believe technology itself to be divine, and scientists wielding godlike power to structure matter and recreate nature. We now live in an age where technology constructs our worldview. The extent to which human interaction has evolved has resulted in newer perceptions of how human beings conceive religion[66].

Anthony Levandowski, an engineer working on self-driving cars, recently founded Way of the Future Church, a religious organisation. Working on the premise that a superintelligence is inevitable, the Church is in pursuit of developing godlike artificial intelligence[67].

Yuval Noah Harari, in the book, Homo Deus, states that "Technology defines the scope and limits of our religious visions, like a waiter that demarcates our appetites by handing us a menu. New technologies kill old gods and give birth to new gods[68]."

In the same vein, several organisations have sprung up in the form of churches of Transhumanism – The Church of Perpetual Life, Terasem, the Mormon Transhumanist Association, The Turing Church, and the Christian Transhumanist Association. A feature common to all these religions is the foundation of technology.

Religious narratives and fervour have sustained the advance of science across most spheres. It might be a bit premature to say that this is the result of conditioning borne from centuries that attaches these connotations to Transhumanism. For through history, science and religion have been at loggerheads.

Conversely, Transhumanism may be the first phenomenon to pave the way for a harmonic future where both science and religious thought are deeply intertwined and give rise to a technocratic worldview, one where both are encouraged.

Transhumanism as a Technological Utopia - Proponents

There are many scientists, inventors, and technologists attracted to the idea of Transhumanism as a perfect response to all of human deficiencies. These people imagine a world characterised not by scarcity, but one by abundance.

Transhumanism is a definitive step towards controlled human evolution. Proponents assess different theories, technologies, and social systems that can improve all life. From a proponent's perspective, enhancements made available to all of humanity could be key to ending the squabbles of legal and political inequality. Some hold the view that all sentient beings deserve sapience[69]. The ability to reason being a threshold of intelligence that is not arbitrary, and can be potentially quantified.

Proponents of Transhumanism include a veritable mix of technologists, futurists, and philosophers who postulate technologies like genetic engineering, and eugenics will hold sway over biological evolution. Visions of a future, where hunger, disease, war, poverty, ageing, and death itself will be things of the past, where environmental degradation will be solved, and climate change will not be a thing of worry. Work will be a thing of the past, as intelligent machines allow us to indulge our dreams and live with absolute, unbounded freedom. Humans will be unrecognisable to our present-day selves. Advanced medical science will ensure we never fall sick[70]. Human cells will never age, and so they will never die[71]. People long dead will be brought back to life. Smart drugs, primitive in their enhancements today, will grant humans a perfect mind with a genius IQ, for the price of a pill[72].

In a world without wants, violence may become archaic. With human intelligence having ascended to rational perfection, politics and religion will lose their current meaning and be forced to evolve and governments, as we know them, maybe rendered obsolete, and disbanded. Concepts of race, gender, and power will acquire new meaning and importance.

Transhumanist enhancements can make interstellar travel viable. Robots will mine asteroids for resources to bring back to Earth, just one of thousands of planets that our new technologies will have terraformed and made habitable for the hundreds of billions of immortal human beings living in the universe. When machine intelligence reaches the point at which it can infinitely improve itself, we will have reached the Singularity and there will be no more natural or physical limits to humankind[73]. Anything will be possible. Everything will be plentiful. All this and more is the fantastical dream vision of the future according to Transhumanist proponents.

The stakes are high and so are the benefits. Understanding and applying tech solutions to increase longevity and quality of life are worthy goals of science. Several proponents like Zoltan Istvan, Ray Kurzweil, and David Pearce, the co-founder of Humanity+, have been vocal about the technology. David Pearce says:

If we want to live in paradise, we will have to engineer it ourselves. If we want eternal life, then we'll need to rewrite our bug-ridden genetic code and become god-like … only hi-tech solutions can ever eradicate suffering from the world. Compassion alone is not enough[74].

Transhumanism as a Dystopia – Detractors

Transhumanism is an interdisciplinary field. As such, it is difficult to come up with a set of possibilities as the scientific and ethical constraints as their respective dispositions are not yet set in stone. Besides, the nature of Transhumanist thought attracts severe criticism and controversy from ethical perspectives, political and the traditionally religious schools of thought.

Detractors of Transhumanism are two-fold. The first is the philosophical question of what Transhumanism will do to human values. The other is the potential class-divide this might engender, either via the high cost of procedures limiting its reach or the unfair advantage that enhanced humans may possess.

Based on these developments, it is not difficult to imagine professional job opportunities which could be suitable only for those who have augmentations. Similarly, it is also not difficult to imagine potential espionage opportunities in an increasingly geopolitical world and stratification of humanity based on people who can or cannot afford human augmentation. Several science fiction elements that have used this trope, some of them even being commented upon by scientists for their plausibility[75].

The nature of the field has drawn several critics that are highly vocal such as Francis Fukuyama, who vehemently believe that it will only cause social instability and alter the very fabric of what makes us human.

Fukuyama, in his famous book, Our Posthuman Future, outlines his argument against human enhancement technology. Using gene editing as an example, Fukuyama laments on the technology's potential to alter our emotional states permanently. Fukuyama says how good characteristics of human beings are deeply intertwined with bad ones. In essence, a positive trait in one person can be a negative trait in another. Our lack of knowledge of how deeply these traits are intertwined and depend on one another is something Transhumanists ignore. Humans haven't figured out the inner workings of how and why people behave. On the other hand, Transhumanists take it upon themselves to determine what is good and bad. While this is harmless in the context of debate, the fact that these debates point the way forward for Transhumanism is a worrying premise.

Another major argument by Fukuyama is our political right to equality. The fundamental human essence that transcends sex, class, and race. Since human

values are deeply rooted in our ability or inability to do certain things or surpass natural limitations, altering our biology could result in an irreversible change in human values as well. In this regard, Fukuyama says:

"*What is ultimately at stake with biotechnology is the very grounding of the human moral sense. We therefore need international regulation to obstruct any technological advance that might disrupt either the unity or the continuity of human nature, and thereby the human rights that are based upon it*[76]."

A critical element of Transhumanism is its anti-ageing premise; improved medication adherence, better immune system, and embedded physical and neural augments that enhance mental and physical performances of the human body. As regards the potential cost of these procedures, Fukuyama highlights the potential economic divide this will engender.

"*The dividing line between the First and Third Worlds in two generations will be a matter not simply of income and culture but of age as well.*[77]"

Transhumanism's Ethical Conundrum

Radical life extension and immortality play central roles in Transhumanism. However, eternal life poses a serious moral dilemma which calls to question the very foundations of modern society, labour, social services, healthcare, pension, insurance, individual rights and liberty, food scarcity, social and economic divides. And yet, this may be a Malthusian argument whose effects have been kept at bay for most the part of modern history via economics.

Another challenge is one of quantifiable intelligence. Mark O'Connell, in an interview about his book, To be a Machine, explains how reducing human values merely to intelligence is a dangerous idea, and a shallow way of conceiving human beings. A techno-Darwinism as opposed to a techno-utopia, this optimisation of intelligence may end up in our own values becoming obsolete[78].

In a Transhumanist society, the only disabled will be the ones without any augmentations. When is it justified to replace a healthy human arm or a limb, with a bionic arm that is superior to the biological one? Additionally, with superhuman performance, immortality, and augmentations, unless the affordability of the tech becomes feasible, will it result in a class divide between the rich and the poor? A robotic heart currently costs $200,000, which is not an affordable sum for many[79].

Throughout history, mankind has employed scales to measure intelligence and even used some of them to justify acts of cruelty. But this school of thought has had numerous critics all the way from David Hume, Nietzsche, and Freud. Despite this, there are several schools of thought that place intelligence as the highest virtue.

Plato, in his seminal work, The Politics, states, "That some should rule and others be ruled is a thing not only necessary, but expedient; from the hour of their birth, some are marked out for subjection, others for rule. What marks the ruler is their possession of 'the rational element[80]". This is a common ethical conundrum throughout history, but the consequences of artificially enhanced intelligence are largely unpredictable[81].

Transhumanism also suffers from another ethical issue of implantation of technology within our bodies. Devices embedded in our bodies will be networked. These will be devices that register our emotional, physical, and mental states. As human beings implant more and more devices, these devices can be leveraged to make subtle alterations in messages to trigger emotional reactions, which is not all that bad. If neural implants can alter human emotional states then they can potentially be a cure to a plethora of mental illnesses. These implants can hinder the emission of specific enzymes which result in different moods. A happiness filter or a dopamine emitter garners significant enthusiasm. These 'synthetic thoughts' present new opportunities and challenges.

The flipside being unlawful exploitation of these devices for advertisements, lack of issues with privacy, and potential security risks by hacking these neural augmentations. Newer security standards for neural augmentations will be necessary, giving rise to devices incompatible with other augmentations, very similar to computer technology.

Using technology to improve, to become more than what we are when human morality itself is a subjective notion that changes with time might result in irreversible social dynamics. Brute physical strength has waned in popularity due to the advent of technology. Regardless, a physically augmented military can have a significant advantage over an unaugmented adversary. Similarly, intelligence meritocracy has always been an influential account of social worthiness. A neurally augmented person may have an unfair advantage over his peers. Professions might develop which might require only augmented individuals, putting others at a significant disadvantage.

Workers' rights may come under fire, and this might create a whole new set of issues. Technology shifted the dynamics of power in the workforce, which was entrenched in unionisation up until the late 20th century. However, creation of a physical and neural barrier for professions might bring about dire and highly unpredictable consequences.

Crystallising the Positive and Negatives, and Ethics of Transhumanism

Technology	Effects	Optimistic Scenarios	Pessimistic Scenarios
Radical life extension	We will have longer lives, there will be reduced disease (Natasha Vita-More), Nanobots will be used to potentially reverse ageing, starting our journey towards immortality (Ray Kurzweil), Increased population could pose dangers previously not thought of.	Economic growth can be spurred as expertise stays around for longer. We can preserve important personalities. Space exploration will spur transhumanism and help mitigate existential risks (Zoltan Istvan)	Problems in affordability will limit technology to the financially elite. (Francis Fukuyama) This will alienate the financially poor and draw up political and economic structures that favour only the rich. Decision to preserve specific individuals might give rise to corrupt, self-fulfilling practices.
Neural augmentations	There will Increased intelligence, better reaction times, and connection to	There will be Improved learning, better knowledge retention, and	There will be blurring of lines between natural intelligence and

	computing. Augmented Reality and Virtual Reality will be accessible neurally (NeuraLink/Elon Musk)	improvement of collective human knowledge (Elon Musk)	augmented intelligence. There will no longer be a measure of achievement. This might give rise to hedonistic tendencies in policymaking
Physical augmentations	There will be better quality of health, and the ability for disabled to play on a level-playing field. Humans can surpass the natural limits of physical strength.	There can be augmented armies which don't feel pain or fatigue. (Frost and Sullivan Study) Powered exoskeletons can be used in disaster management and space exploration. (Frost and Sullivan Study)	Augmentations can give people the ability to oppress the physically weak. There will be a new spectrum of crimes (hacking neural augmentations, erasing DNA traces). There can be potential addiction to agents that act as augmentation catalysers
Gene editing	We will live longer lives, eliminate	This is a great opportunity to	There can be blatant misuse of gene

	diseases. We can permanently alteration human physiology	become healthier. Improved medication response can also aid treatments. We can potentially eliminate heritable diseases.	therapy due to lack of regulations. Designer babies is a popular ethical argument against gene editing Will changing our genetic makeup change what makes us human permanently?

The table represents some of the main technologies under Transhumanism and its effects, potential optimistic and pessimistic scenarios. These are in no way limited to the ones mentioned in the table.

Albert Einstein said, "Technological progress is like an axe in the hands of a pathological criminal."

It is human nature to overcome obstacles. Human ingenuity has enabled technology which in turn has enabled us to dominate earth's food chain. Yet, our collective genius has not yet been able to surpass death.

Technology has always been an extension of our selves. It is difficult to demarcate a time period where we have not relied on technology. There is a perception that technology was something separate from us however, one look at the history tells us otherwise. After weapons were invented, there hasn't been a time when wars were waged without them. After computers came, there are only a handful of fields that do not use computers. The lines have blurred with the advent of smartphones, social media, and augmented devices.

Gamification has become an important component of encouraging human engagement[82]. For instance, the UI of an Uber driver has changed considerably from 'Collect Cash' to 'Collect Reward'. Similarly, rating tags such as 'Hero' and

complimentary feedback mechanisms have encouraged significantly more work than ever before, especially in this segment. As such, when financial incentives aren't enough, behavioural changes are instrumental in achieving desired outcomes. Many new companies are now adopting behavioural nudges to encourage productivity. And this is not just limited to businesses but on a fundamental level where people modify their lifestyles significantly.

Although our reliance on technology has always been absolute, humans have mostly held sway over how it is applied. But now the tides are changing. Our fitness trackers motivate us to do things we would otherwise not do. The progress and status bars that we see on our smartphones that inform our physical states compel us to perform better. To-do lists, diet plans, and that are reward-based motivate us to become better every single day. While science and technology have changed the way humans think in the past, never before has science integrated into our lives with on such an intimate level.

Benedict Anderson's Imagined Communities, presents the idea of how the printing press allowed for the same ideas across a region to permeate and led to the creation of a community[83]. The shared knowledge and information led to the appearance of nationalism. Human communities changed with the advent of the internet. Our interactions from the advent of social media and other smartphone applications have changed the way humans communicate. Information flows from one place to another more efficiently than ever before.

Today, the barriers of communities are no longer restricted by region. Although nationalistic sentiments prevail in certain areas, the concept of nationalism is slowly and steadily being accompanied by shared experiences across the world. Movies, memes, and media have led to the creation of worldwide fan followings, social media groups have spread across nations, and ideas, ideologies, and strategic messages are broadcast across these groups. The use of English has increased drastically, and regional language penetration remains low.

Here is where universal translators come into play. Natural Language Processing still has a long way to go but slowly and steadily, translation services like Google Translate are bridging the gap between English and other languages. If one were to envision several steps further, there could be a time when a simple implant or a wearable device is able to instantly translate anything language. If one were to create a neural augmentation with this capability, it would change the way people communicate across the world.

Enter the world of artificial intelligence. While there are many technological benefits to AI, one of the most important benefits this has given rise to is the ability to parse large amounts of data and draw inferences from them. From stock markets, to defence, to behavioural sciences, AI is now helping humans generate insights at a rate much faster than ever before. As a result of which, machines have become more reliable in their performance, and tasks that used to take months due to the high amount of processing have now become faster. So much so that speed is now taken for granted. Our ability to make split-second decisions based on actionable insights is now better than ever before. And this ability is driving the engines of modern human spending. Personalised advertisements, strategic placement of information are some ways humans are being nudged towards spending or performing certain actions. With sensors in every device that humans use, this opens up pathways for obtaining real-time behavioural data and tailor solutions accordingly.

Virtual Reality applications with sharing capabilities are being developed every day. With advancements in haptics, this will serve as a platform to share vivid visual, auditory, and sensory experiences with other people, each of them responding in their own subjective and unique way. As the boundaries between shared experiences disappear, as information permeates throughout the world, it could well result in the dispelling of several long-held beliefs about different cultures. On the flipside the chances of developing and propagating echo chambers across borders will become higher.

Concepts like brain uploading and immortality are still far away. But the rate at which technology is driving, altering, and expanding our daily lives is much higher than the rate at which human beings are able to cope with the legal, economic, and climatic outcomes or consequences. The nature of balance that mankind will need to strike will determine the civilisational structures of the next century.

Taking control of Synthetic Thoughts

It is an inescapable fact of the Earth that all its resources are finite: there will be a time when planes no longer fly, unless an ever-renewable fuel source is discovered. There will be no more concrete buildings made of construction sand. We only have so much arable land on which to grow our food. There is no future in which our growing population can enjoy our current rates of consumption forever; we will one day come up against our planet's limits.

We will one day come up against our planet's limits[84]. But this will not deter civilisation.

Many transhumanists who advocate for physical immortality, like Zoltan Istvan, are always careful to stress that eternal life would be available to everyone[85], and it will not be the purview of tiny, wealthy elite, but a medical enhancement available commonly and cheaply. If we take these Transhumanist predictions of the Singularity at their word, and it comes to pass by the middle of this century with physical immortality shortly to follow, it would raise an extraordinary set of problems: how will so many immortal people, and their immortal offspring, compete for the planet's limited economic resources without wreaking total havoc? The limits may not be physical in nature, but the economic conditions of the world will need to consider longer lifespans and different scales of work.

The inevitability of Transhumanism is not to be ignored either. In October 2014, the Pentagon presented a report detailing the many ways in which climate change will pose an increasingly significant global security threat: escalating military tensions over rising disease outbreaks, food and water shortages, and growing numbers of displaced persons whose lands will no longer be liveable[86].

Temperatures in the Persian Gulf are set to rise to 35 degrees Celsius by 2100, making parts of that area periodically uninhabitable. Well before then, in the next 10 years, desertification could uproot as many as 50 million of the world's poorest people, and pose an enormous challenge to the sustainability of drinking water reserves. A recent paper in the Proceedings of the National Academy of Sciences proposed that climate change, in the form of severe drought, forcibly displaced Syria's farming population, and became a contributing factor in that country's civil war[87].

Some prominent transhumanists believe that these are not the kinds of existential risks we should be concerned with. Nick Bostrom, one of the philosophers most closely associated with transhumanism today, founder of the Future of Humanity Institute and advisor to the Centre for the Study of Existential Risk, says that climate change is a "very, very small existential risk." Bostrom says climate predictions only mean that conditions in some parts of the world will be "a bit more unfavorable[88]."

Bostrom argues that the most pressing threat to the future of human life is an out of control artificial intelligence that could destroy us. To illustrate his point,

Bostrom sometimes invokes what's come to be called the "paperclip maximizer" thought experiment; a hyper-intelligent, sentient, and infinitely powerful machine is tasked with making as many paperclips as it can. What's to stop it from turning all matter in the universe into paperclips, destroying everything in its wake[89]?

Bostrom says that ensuring AI will be friendly towards future human beings is a moral imperative, "an enormous good that will tend to outweigh even immense benefits like eliminating poverty or curing malaria" today[90]. For people so concerned about living to see the future, many transhumanists are profoundly ambivalent about the present.

"The AI does not hate you, nor does it love you, but you are made out of atoms which it can use for something else." Eliezer Yudkowsky.

In 1972, the Club of Rome published The Limits to Growth, a report produced by MIT that laid out multiple scenarios for population increase, and the future management of the world's available resources. The report's models indicated that barring major changes to consumption levels and emissions, global collapse would be a likely economic and environmental outcome beginning in the mid-21st century[91]. A 2008 update to the original report found its "business as usual" scenario, in which no resource management changes were made, to have tracked fairly closely to real-world data.

The first comprehensive report of its kind to suggest that unlimited post-industrial economic growth was undesirable for sustainability; The Limits to Growth received significant pushback, particularly from free-market economists. But it would come to influence two significant strains of Transhumanist thought, both of which are active areas of research and development today: molecular nanotechnology and outer space mineral mining.

Physicist and engineer, K. Eric Drexler, while still a student at MIT, offered a two-fold solution to Earth's resource strain: mining in space and developing atomic scale, self-replicating machines that could mechanically position reactive molecules in order to make everything from anything. This was laid out in Drexler's book Engines of Creation: The Coming Era of Nanotechnology, and its microscopic robots soon became an excitable point of Transhumanist discussion[92].

Intelligent Nanomachines are nowhere near close to becoming a reality

Nanotechnology is today the focus of billions of dollars' worth of research investment. So far, its payoff as salve for our resource crunch has been scant: nanotech developments in energy production have been rebuked by some, and so far, its carbon manufacturing processes are some of the most energy intensive in existence. Drexler's intelligent Nano machines ("assemblers") are nowhere near close to becoming a reality, if they are physically possible at all. Nonetheless, Ray Kurzweil believes Drexler's nano assemblers will be here within the next five to 10 years[93].

As for space mineral mining, no human has set foot on a foreign celestial body since 1972, the year The Limits to Growth was published. Successfully launching the Rosetta mission, which put a lander on a comet for the first time last year, costing more than $1.4 billion. Any program to bring back essential resources to Earth from a comet or asteroid would pose a significant question of cost vs. benefit. In spite of the enormous engineering challenges, private space initiatives like these remain a well-funded pet project in Silicon Valley.

Between 1950 and 2050, the global population may have quadrupled. By 2100 — total annihilation at the hands of malevolent AI not withstanding — there will be 11 billion of us, all vying for whatever is left of the world's resources. Everything we now know about the carrying capacity of the planet indicates that we will have to make drastic changes to our consumption habits well before then in order to avoid disaster. But Transhumanism's visions of human immortality largely disregard this, promising a world in which there will only ever be more of us — never less.

But this assumes very little credit to human ingenuity[94]. Mankind has been great at overcoming odds that would have made us extinct. Science, economics, and political intervention will become vital in the future to ensure workarounds and sustainability of life. Augmentations may become an important component of our future, if only to beat the potential scarcities and existential risks[95].

Faced between humanity's imperative to survive, the notion of moral bio-enhancement features prominently, where they assert humanity's risk of annihilation should it choose to not get enhanced[96]. However, our transition to a Transhumanist society will test the evolving ecological, scientific, and political structures to their limits.

Conclusion

Where humans should put their efforts into?

It would be improper to view Transhumanism as a mere philosophy that is growing day by day. The technology that enables the merging of man and machine will be a major turning point in human evolution.

Unfortunately, many of the technologies that Transhumanism will encompass are still considered emerging tech – a result that encourages discourse with harmful rhetoric that veer away from practicality. Many of the developments that are fuelling the growth of Transhumanist thought are also principal developments in many different fields, i.e., nanotechnology, artificial intelligence, gene sequencing, and so on. Additionally, governance of emerging technology is difficult, as the risks and consequences cannot be predicted until these technologies reach a certain level of maturity.

What is essential to the Transhumanist thought paradigm are models that can create governance and potential regulatory mechanisms to bring the best out of emerging technologies, and keep negative consequences to a minimum.

Governance Gaps

Adaptation is one of the hallmarks of governance. For instance, transgenic pest-protected plants were developed in 1987, whereas a year before, the United States adopted the Coordinated Framework for Regulation of Biotechnology. Since then, transgenic pest-protected plants have been an essential biotechnological product[97]. The USDA proposed changes to the programme more than two decades later, and since then, the regulation includes the import, movement, and environmental release of genetically modified organisms[98].

As emergent technologies are rapid in their development, governance must also be flexible and adaptable to account for these changes in due time. Mechanisms that can allow incremental changes in legislation to incorporate new technologies could help mitigate legislative lag. Improved stakeholder involvement, involving smaller companies, and the tech diaspora, could lead to periodic updates keeping the world abreast of developments. For instance, the Flash Crash in 2010 was the first time a significant portion of the world became aware of artificial intelligence used in High-Frequency Trading, although AI has long been used before then[99].

Models

Nanotechnology has always sparked widespread concern, and most countries view nanotechnology with a sense of wariness, although funding into this area has increased in recent years. This is in large part attributable to potential unintended consequences on human health and the environment. Similarly, a portion of the onus lies on public agencies to identify research needs, and provide advice and direction in the way technology progress occurs.

An example of one such intervention is the creation of risk assessment frameworks and tools that can assess the potential harms posed by engineered nanomaterials (ENM)[100]. Since data gathering is a key issue with emerging technology, particularly due to their confidential nature or lack of progress, theoretical frameworks like these can help put in place adequate checks and balances to ensure that human beings or the ecology are not exposed to harm. The risk assessment framework classifies engineered nanomaterials on a threshold of low, medium, and high scales and allows adequate freedom for ENMs classified as low threat and suggests regulatory intervention for ENMs labelled 'high threat'.

A similar model of regulatory framework model was framed around gene editing. A three-level framework for governing three broad categories, corresponding to three stages of development of the gene editing. The first Fundamental R&D, the laboratory stage where research can be freely conducted under lab conditions, the second 'trial' stage where clinical trials and field trials can be conducted, provided they meet all regulatory approvals, and finally, the 'Public Release' stage where once the technology has met safety, disclosure, and other regulatory standards, it can be sold openly in the market.[101]

With the public, it is important to create better information channels for Transhumanist technologies. One such example is a 'commitment' level for people interested in augmenting themselves. This commitment level ranges from high - surgical implantation, to medium - an external detachable augmentation, to low - something akin to plugging earphones[102].

All said and done, today's bioethics should take into account the future prospects of Transhumanism and create an essential toolkit for moral bioenhancement[103].

Nudges for a scientific discourse

A growing divide growing amongst the tech diaspora and the common man seems prevalent today. The language used in the discourse and a dearth of real-world examples and benefits creates an opportunity for widespread misinformation.

Companies developing transhumanist technologies, while fairly rational in their explanations, are quite verbose in extolling the benefits—an eternal life, freedom from disease, elimination of suffering, or 'transcending' physical barriers.

Arguments on potential 'cyborg' revolutions and a backlash by 'purists' are opinions projecting far into the future. There is a significant gulf to be bridged before Transhumanism becomes an ethnicity unto its own. But it is interesting to note that what began as an intellectual movement rooted in technology has evolved into a philosophical movement with debates inducing more fear than enthusiasm for technology.

Beth Singler, of the Faraday Institute of Science and Religion, points out how discussions amongst AI and Transhumanist enthusiasts signal thoughts of people waiting for a god[104]. Singler draws parallels between religious vocabulary pervading futuristic depictions of technology and technologists—Ray Kurzweil, being anointed as a 'prophet' and sometimes as a 'prophet of doom' and 'superintelligence' as a sapience surpassing human capabilities. The rhetoric sometimes become so dense that it is difficult to connect it to reality and the direction in which technology is progressing[105].

A principal reason for this is that whenever people are faced with a situation which requires predicting the unknown, they always lapse into vocabulary used to describe the supernatural. As Singler points out, the stories and forms that religion takes are still predominantly driving the narratives behind AI and Transhumanist philosophy. And so, people use the same language as they do to define the ethereal, the metaphysical, and the unknown, rooted in technology though they may be.

A strong nudge towards using scientifically descriptive analogies is important. A lot of anxiety about attaining godhood, and immortality are sometimes victims of poorly articulated intuitions and social arrangements.

Transhumanism, at its core, is the idea that technology can lead to better quality of life, physically and mentally. The technological objectives can and should fall under the umbrella of modern scientific trends, as a continuation of the advances

the world has been witness to. The key determinants of Transhumanism will always be the success rates of its constituent technologies. More research and academic intervention are necessary to counter these unhealthy debates.

Narratives that embody pluralism sans intrinsic biases are the need of the hour, for they are necessary steps for a society heading towards the convergence of man and machine. Transhumanism, on one hand, will question what it means to be a human, while on the other, is an open invitation for humanity to shape the world on a strong scientific edifice.

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