A better life through information technology? The techno-theological eschatology of posthuman speculative science.

Michael W. DeLashmutt, B.A., M.A.T., PhD (Univ. Glasgow, candidate)
Teaching Fellow in Practical Theology
School of Divinity, History and Philosophy
King's College
University of Aberdeen
Aberdeen
AB24 3UB
United Kingdom

Email: m.delashmutt@abdn.ac.uk
Phone: +44 (0) 1224 27 2852
Fax: +44 (0) 1224 27 3750

Abstract

The depiction of human identity in the pop-science futurology of engineer/inventor Ray Kurzweil, the speculative-robotics of Carnegie Mellon roboticist Hans Moravec and the physics of Tulane University mathematics professor Frank Tipler elevate technology, especially information technology, to a point of ultimate significance. For these three figures, information technology offers the potential means by which the problem of human and cosmic finitude can be rectified. Although Moravec's vision of intelligent robots, Kurzweil's hope for immanent human immorality, and Tipler's description of human-like von Neumann probe colonising the very material fabric of the universe, may all appear to be nothing more than science fictional musings, they raise genuine questions as to the relationship between science, technology, and religion as regards issues of personal and cosmic eschatology. In an attempt to correct what I see as the 'cybernetic-totalism' inherent in these 'techno-theologies', I will argue for a theology of technology, which seeks to interpret technology hermeneutically and grounds human creativity in the broader context of divine creative activity.

Keywords

Artificial Intelligence; Cybernetics; Cybernetic Totalism; Cyborgs; Futurology; Imagination; Information technology; Techno-Theology; Technology; Kurzweil; Life extension; Moravec; Myth; Posthumanism; Robotics; Science Fiction; Speculative Science; Symbols; Tipler; Technology; Weiner;

Author's Note

Michael W. DeLashmutt is a teaching fellow in practical theology / theology and culture in the School of Divinity, History and Philosophy at the University of Aberdeen. He can be contacted by email at mwdelashmutt@yahoo.co.uk. A version of this essay was presented in the Philosophy of Religion Group at the Annual Meeting of the American Academy of Religion, Philadelphia, 19 November 2005.

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Introduction

This article will analyze the posthuman future described within speculative science. It will examine how information technology has become a conveyance for ultimate concern, inasmuch as it contributes to a techno-theology where human material culture serves as the foundation for eschatological hope. A techno-theology, unlike a theology of technology, grounds theological aspirations (e.g. hope for a better life, concern over human destiny, notions of the good) in technological realities. In contrast, a theology of technology seeks to situate one's interaction with technology within ecclesially embodied and historically mediated theological narratives.

Below, the pop-science futurology of engineer/inventor Ray Kurzweil, the speculative-robotics of Carnegie Mellon roboticist Hans Moravec and the physics of Tulane University mathematics professor Frank Tipler will be analysed with regards to their techno-theological eschatology. I will argue that within their posthuman speculative science, present and future technologies are viewed as the means of achieving ultimate salvation for both the cosmos and

the individual person. Yet, despite the prominence of these themes, and despite their frequent mention within contemporary posthuman literature, their work has received surprisingly little critical reflection within academic theology. The article hopes to rectify this abeyance, by exploring their work with specific interest in engaging with the latent theological implications of their thought.

As will be discussed, posthuman speculative science reflects an implied reductionistic philosophical anthropology. The complexity of the human subject – her spirituality, materiality, and sociality – is perceived as being reducible to a collection of patterns which can be decoded and re-embodied in whatever substrate a given future technology provides. Although Moravec's vision of intelligent robots, Kurzweil's hope for immanent human immorality, and Tipler's description of human-like von Neumann machines colonising the very material fabric of the universe, may all appear to be nothing more than science fictional musings, they raise genuine questions as to the relationship between scientific aspirations, technology and theology. Though I had originally assumed that the problem of posthuman speculative science was primarily its implicit acceptance of a reductionistic philosophical anthropology, in pursuing my research further I realised that although posthuman speculative science does promote radical reductionism, the more pertinent theological issue surfaces when one examines the role played by technology within posthuman thought, as a means of conveying ultimate concern.

In light of the admittedly obscure nature of this topic, before proceeding with our analysis of Kurzweil, Moravec, and Tipler, three concepts must first be defined. We must provide a definition for technology, speculative science, and posthumanism, and briefly discuss the relationship between posthuman speculative science and the recent history of information technology, cybernetics and artificial intelligence research.

Defining Technology

Technologies are objects which extend human agency and will whilst remaining ontologically differentiated from human being. I argue that the meaning of technology can

only be found at the nexus of a given technology's invention and application. There is therefore no 'essence of technology' nor 'essence of technologies' as talk of essences implies an immutability which is utterly foreign to the ever changing forms of technological development.[i] Technologies operate within prescribed notions of causality which are imposed upon them by their makers or users. They are intended for particular tasks and do these tasks in service to human will. Technologies are neither good nor evil, although the systems within which they operate – and the operators which establish and work within such systems and technologies – can be. My definition of technology seeks to wrestle responsibility and control away from the objects of technology themselves, and to place the onus of ethical liability firmly back in the hands of a given technology's human users and designers. I advocate approaching technology hermeneutically, where the meaning of a technology is discovered within an analysis of its situation. Likewise, its ethical weight is to be determined by one's self-reflexive examination of one's technology-use.

Given the above definition, how can something as straightforward as technology ever give rise to something as symbol-laden as discourse regarding ultimate concern? Given the transparent and predictable nature of technology, it would appear that technology and symbolic discourse share a natural antinomy. One could say that the contemporary situation is one that could be typified by a gradual decrease in the value of symbolic systems of discourse, corresponding to increased technical literacy in culture (Dillistone 1973, 6). Dillistone argues that symbols in a technological world loose their power for two reasons: a) shifting changes in the role of religion in explaining the meaning and origin of the cosmos, and b) the move away from a platonic metaphysic where earthly phenomena can be traced back to a perfect transcendental form (Dillistone 1973, 6). In contrast to symbols, technologies for Dillistone appear to operate as unambiguous signs which point to 'direct correspondence' between the thing being represented and its representation (Dillistone 1973, 163). Whereas symbols retain a high degree of ambiguity and rely upon interpretation in order for their underlying meaning to emerge, '[s]igns do not require anything transcendent or ultimate to under gird them'(Dillistone 1973, 168). The symbol is open to interpretation, yet

the sign closes-off possible future discourse by unambiguously pointing to the reality which it represents (Dillistone 1973, 163).

Technologies-*cum*-signs point to no other reality than the causal effect to which a technology has been designed or applied. However, and perhaps paradoxically, both signs and technologies can become conveyances for the symbolic when their unambiguous meanings become obscured by their ambiguous applications. The relative clarity of a sign's message depends entirely upon the context within which the sign is read. As the Messianic secret in Mark's Gospel indicates, the symbolic significance of the 'signs' indicating the coming of the Kingdom, can only be accurately read by those in possession of the right hermeneutic.[ii] Likewise, the native un-ambiguity of technology becomes obfuscated when the effect of technology upon its object is confused with the affect of technology upon the subject. Technology itself may be both neutral and unambiguous, but its application is neither. Thus, to understand the cultural ambiguities of technology's use, one must differentiate between the effect of a technology (as regards its causality) and the affect of a technology (as regards its significance).

The effect of technology is caused by the design and operation of technologies imposed upon material objects by technology's creators and/or operators. The affect of technology is caused by the subjective appraisal of such technologies, where the awe and wonder of a technology's abilities eclipses the brilliance of a technology's creator or user. To use an example borrowed from Paul Tillich, it is entirely appropriate for one to experience a sense of awe in the presence of great seafaring ships, airplanes or other objects of technological production, but it is inappropriate when the '*eros*' which is directed towards the 'technical gestalt' becomes fixated on the technical object rather than the combination of subject and object which is combined within the whole of a technology (Tillich 1964, 274). To focus on the affect of technology is to merely praise the creation, to make the object itself the entity which is the source of one's admiration.

It is precisely this problem of misappropriated affection, or a technologically influenced concupiscence, that plagues the examples of the speculative sciences below. Regarded

hermeneutically, with a concern for their place within the human situation, the information technologies at play within speculative science would reflect the humanist interests of early cyberneticists who sought to use technologies, marshalled by culturally determined strong-values, to better society (Wiener 1948, 37-39; 187-8). Uncoupled from either governance or situated human need, the technologies that are speculated upon below, give rise to symbols and myths that offer immanently realisable solutions to existential hopes. Hence, the relatively straightforward sign-like behaviour of technology becomes obscured by the symbols which arise from a primarily affective reading of technology. In the speculative sciences, this mythological significance will lead to an inauthentic expression of ultimate concern, where technologies themselves point to what is mistakenly perceived to be a more authentic form of subjectivity.

Excurses into IT/Cybernetics

As early as 1964, Norbert Wiener, one of the foremost 20th century cyberneticists, argued that cybernetics 'impinged' upon religion. The three principal points of convergence for Wiener were: 1) the creation of machines which can learn; 2) the creation of machines which can reproduce themselves; and 3) the creation of machines which can engage in mixed-use applications, that is, machines which are integrated into social, cultural and biological life (Wiener 1964, 11). Despite his assertions, the impingement which Wiener refers to is not to religion or theology *per se* – nowhere does he argue that computers could themselves become or replace God, nor does he posit that they can or should become objects of veneration – rather, Wiener describes 'religious' impingement in terms of technology's potential ability to destabilise or challenge how subjectivity is traditionally understood within religion (and in the case of Wiener's definition of religion, the Judeo-Christian tradition). Wiener would argue that by destabilising traditional views of the subject, cybernetics or information technologies undermine many of the assumptions about self, world, and society which directly relate to the creation of a theological system of belief. For Wiener, inasmuch as the doctrine of the *imago Dei* preserved the unique creative purview of the Divine (in relationship to humanity), by

undermining human uniqueness, cybernetic technologies also undermine divine creative sovereignty. If humans are neither functionally unique (points 1 & 2) nor ontologically unique (point 3), for Wiener, the divine ceases to be magisterially unique in his creativity. Though this argument may seem somewhat crass Wiener's *God & Golem, Inc.* represents an important step in the religious critique of contemporary information technologies. Namely, Wiener's work points to the common ground shared by theological-self knowledge and the self-knowledge derived from one's encounter with culture, and specifically, the culture made possible by human technology. He argued that unless the study of cybernetics was carried out with humility and a concern for preserving the priority of the 'human' within its study of systems and organisms, cybernetics would become the sole purveyor of knowledge about world, God, and self.

Concurrent with the publication of Wiener's admonition for a humanist caution within his discipline, computer scientist Marvin Minsky began working toward an understanding of neural networks, electronic correlates to the human brain, and the pursuit of artificial intelligence (Minsky 1967). Whereas cybernetics in Wiener tended towards a realistic-interpretation of computer technologies and pursued inter-disciplinary dialogues between cybernetics as the so-called 'command-and-control science' and other soft-sciences; artificial intelligence research typified by Minsky's *Computation: Finite and Infinite Machines*, has promoted an idealised-vision of technology, which contributes to an ethos, if not a culture, that seeks to use computer science as a way of addressing topics ranging from the nature of cognition, the future of humanity, and the destiny of the cosmos. Though cybernetics still exists as an actively pursued scientific discipline, the ethos surrounding AI has prevailed as the cultural appropriation of information technology, as typified by posthuman speculative science.

Though often misunderstood as synonymous terms, research in the field of artificial intelligence differs drastically from cybernetics. Cybernetics, as envisioned by Wiener, is a descriptive discipline which seeks to uncover how feedback systems (natural or otherwise) work within the world. It is a discipline that is keenly aware of the place of the subjective

observer within the systems which s/he is observing. By contrast, AI is a prescriptive discipline which seeks to employ computational models as the basis for cognition. It is a discipline that seeks to remove the subjective observer from the task of discovery by replacing the subject through the implementation of computational abstractions.[iii]

Today, despite the presence of cybernetics, cyberspace, cyborgs and cybersex within our collective vocabularies, we live in an age dominated by the inherent philosophies of cybernetics' close relative, artificial intelligence. Thus, rather than using cybernetic methodologies to better understand feedback systems, AI research has sought to use information technology to better understand a contrived and technologically-mediated model of human intelligence. In sum, the ethos surrounding AI research promotes a kind of 'cybernetic totalism', whereby objects in the world are made to seem more real when they receive mediation through, or representation by, computer systems (Lanier 2000). We will note below that it is precisely this disposition towards IT that promotes the posthuman subjectivities in Kurzweil, Moravec and Tipler, leading ultimately towards their techno-theological eschatology

What is Speculative Science?

The term 'speculative science' is used in this article to refer to a form of scientific reflection where the future of scientific discovery is the primary object. This may be sound like 'science fiction', but one should be careful to differentiate between the role played by imagination within science fiction and the role played by speculation within speculative science. The imagination in science fiction is patently fictive, and is employed primarily for the purpose of entertainment, though it can be regarded as a form of social critique (Broderick 1995). The fictive imagination is not made dependent upon technology, real or otherwise, for the communication of its story. Technology, unencumbered by history or fact within the fictive world, forms a connection to the reader's present as established from the perspective of the fictive future (as if looking back on to he present from afar) rather than from the perspective of the present (as if looking ahead to the future). Thus, the imagination of

posthuman science fiction is an imagination of the future which reaches back into the present, and in so doing confronts the present with a picture of otherness that encourages reflective critique. By contrast, speculation, at least in the way in which the term is employed in posthuman speculative science, is grounded in a familiarity with the present which projects onto the future an informed guess of what *could* be in light of what *is*.

Perhaps speculative science would be better understood if juxtaposed with the well-established scientific practice of the thought experiment, where a line of questioning is pursued en lieu of empirical observation.. The well known example of Schrödinger's cat is a thought experiment which describes the problem of simultaneity in quantum states. No one would ever argue that Schrödinger's cat actually existed as simultaneously alive and dead,[iv] yet in the context of speculative science an outlandish claim of this ilk could be made. Speculative science could argue that our knowledge of quantum mechanics is presently incomplete, but perhaps in the future simultaneity will be more fully understood, whereby there could be such things as alive-dead cats. Though crippled by the possibilities of science and technology in the present, speculative science holds out hope for the future as the place where the mysteries of science can be resolved, and the limits of technology can be exceeded.

Unlike the role played by imagination in posthuman science fiction, speculative science grounds its future on a trajectory that is set by the present. It represents an unwavering faith in the myth of progress (in this case, scientific and technological progress) which prompts the speculative scientists described below to read through their formidable scientific expertise, a hope for a technologically improved future. Whereas thought experiments can usefully produce theories that may later be proven or disproved, it would seem that speculative science only promotes a futurological outlook which invests the future, as an extension of the present, with utmost significance. Speculative science looks to the future for its ultimate goal and in so doing views the present only in terms of its ability to procure this future goal.

What is Posthumanism?

Posthumanism follows speculative science into the future and regards the future destiny of human being to be the ground for present-day human identity. It is the belief that through a union of human technical ability and human will, human beings will progress towards (or be the progenitors of) the next stage of human evolution, resulting in the 'post-human'. Although, for the purpose of this article my concern with posthumanism is primarily centred on the more theological dimension of posthuman discourse, the term also connotes post-*Humanism* in the sense of a critique of Humanist philosophy. The posthuman, cyborg or so-called 'non-modern' critique of humanism cites the historical use of technology and its ubiquitous presence in contemporary life to argue that human goals, the 'good life', society, and value can only be understood in terms of the human use and creation of technology (Feenberg 2002, 28-30). To this end, posthumanism as anti-humanism argues that human being can only be understood in terms of hybridisation, rather than in terms of the 'purely' human. Whereas humanism tends to advance the cause of the individual and his or her place within the community, posthumanism is characteristically oriented towards the dissolution of the individual in favour of a networked vision of society (Latour 1987, 258). Despite the anti-humanism of posthuman *theory,* I argue that posthuman discourse – whether posthumanism *as* anti-humanism or posthumanism *as* futurology – is simply an extension of the broader posthuman condition which is identified as a striving after that which is beyond the human (as in *Homo sapiens*) and not simply that which is beyond Humanism, as a philosophy.

In practice, posthumanism is facilitated by a desire to improve upon the human condition by implementing advanced technologies which generally fall under the category of cybernetic or information technologies. In science fiction novels such as Philip K. Dick's *Do Androids Dream of Electric Sheep?,* or William Gibson's *Neuromancer,* information technology is used to confuse human subjectivity by contrasting present-day images of the human with posthuman scenarios. In films such as *The Matrix* trilogy, *eXistenZ,* or *Lawnmower Man,* information technology mediates reality to such an extent that the fusion of humans and their technologies represents a next step in human evolution. In critical theory and feminism, the

cyborg is employed as an amalgamation of cybernetic technologies and organic life, which destabilizes assumptions regarding gender, sexuality, and control, as set within what is regarded to be a technological age. In terms of speculative science and engineering, robotics, strong-AI, von Neumann machines and computer simulations of consciousness all feature in the posthuman vision of a post-biological future.

A common theme in the myth of posthuman speculative science is the belief that advanced forms of information technology will, in the future, be able to accommodate radical forms of life extension. The ability to employ technology to stave off death as long as possible has given the posthuman speculative scientists noted below a sense of confidence in their craft's ability to bring an ultimate solution to the problem of finitude, especially when cast in terms of personal mortality. As we shall see, however, the possibility of eliminating death is rather different than the possibility of systemic redemption or salvation (Fukuyama 2003, 67, 71).

Posthuman Speculative Scientists

Above, we have defined technology as an non-essential cultural entity which must be approach hermeneutically, explored the history of 20th century information technologies, defined speculative science as a future-oriented form of scientific reflection, and described posthumanism as an unwavering faith in future human-technology co-emergence. For the remainder of the article we will engage with specific examples of posthuman speculative science in Moravec, Tipler, and Kurzweil, noting the techno-theological eschatology revealed by each.

Moravec's Mind Children and the Future of Human Evolution

Hans Moravec, a research professor at the Robotics Institute of the Carnegie Melon University, specialises in autonomous robot mobility. An established and highly regarded robotics engineer with an extensive list of patents and academic publications to his name; Moravec's work is driven by a desire to see autonomous self-mobile robots commercially available by the end of the decade.[v] Despite the highly pragmatic nature of his primary area

of research, Moravec's more speculative work centres on the broadly sweeping implications of evolving robotic intelligence and dexterity. In his principle writings on speculative science, *Mind Children* (1988) and *Robot* (1999), Moravec describes the technical obstacles which must be overcome in order for the posthuman evolution of robots to ensue. He describes with great clarity the trajectory of developments within information technology which he believes will lead to the creation of artificially intelligent robots. In addition to creating autonomous forms of artificial life, Moravec believes that robot evolution will eventually provide the technology for the re-instantiation of human consciousness into a computerised and robotic medium.

Consistent with other contemporary applications of robot technology, from the Mars Rover to industrial manufacture, the robots being developed currently by Moravec are intended to be put to use in environments where humans have traditionally been unable to thrive. Such robots liberate their human users and designers from the lethal repercussions of fate or bad judgment. As devices which extend the horizon of human action, Moravec views robots as more than tools for the manipulation of the physical world, but as devices which enable their human operators (or programmers) to skirt around the basic limits of human finitude. By plunging robots into outer-space, distant planets, or even in the forges and assembly lines of contemporary industry, he would argue that human will and agency are extended into domains which are only knowable through their technological mediations. Seen as extensions of human being, robots in the present are only quantitatively distinct from what Moravec describes as a 'postbiological' future.

Yet Moravec's vision of future robotic technology hopes for more than the extension of agency and will, but a time when robotic 'life' will surpass human life as the more durable and malleable incarnation of human evolution.: 'What awaits is not oblivion but rather a future which, from our present vantage point, is best described by the words "postbiological" or even "supernatural". It is a world in which the human race has been swept away by the tide of cultural change, usurped by its own artificial potency' (Moravec 1988, 1).

Moravec views this future as the consummation of humanity's historical courtship with technology. From the first stone tools to the most advanced forms of robotics and artificial intelligence, humanity has lived as a hybrid species, whose will and agency have been partly instantiated within a biological body and partly instantiated within an ever developing technological body. Put tersely, Moravec describes present-day humanity as 'uncomfortable halfbreeds.' Thus in the future, faced with an increasingly inhospitable environment and an unquenchable desire for longevity, humanity will be forced to divest itself from its natural situation in the world and surrender completely to a purely technological mode of being, created *by* humanity *for* humanity.

Moravec's primary reason for pursuing robotic technology and artificial intelligence as the ultimate solution to the problem of human finitude, reflects what he sees as the inherently inhospitable nature of contemporary technological life. Humans live in a world which outpaces the finite limitations of the human physiology and psychology. Moravec writes:

> We have a Stone Age brain, but we don't live in the Stone Age anymore. We were fitted by evolution to live in tribal villages of up to 200 relatives and friends, finding and hunting our food. We now live in cities of millions of strangers, supporting ourselves with unnatural tasks we have to be trained to accomplish, like animals who have been forced to learn circus tricks (Moravec 1995).

Accordingly, the only way for humanity to endure the speed and the depth of contemporary existence is to increasingly rely on technologies to mediate the world in a way which compensates for the limitations of our 'Stone Age brain.' The externalising of cognitive function in the use of computers to think with and for humans, coupled with the extension of human activity through the use of robots, prosthetics and other tools, is for Moravec the first step towards an eventual abandonment of the physical biological body for a new body which will be crafted with the needs of the technological world in mind. Despite the many changes in temporality, spatiality, sociality and interiority which would accompany a radical reinstantiation of human being into posthuman physiology (Moravec 1988, 110, 114), Moravec would argue that posthuman beings are our 'mind children', descended from the

human drive to self-perfection, and related to us by sharing with us our basic intelligence. For Moravec, the space between the human and the posthuman is a continuum of human evolution coupled with technological development.

Resurrection into Continued Finality

Moravec has developed a theme which will be echoed below in the other two posthuman speculative scientists. It is an image of a technologically mediated eternal kingdom. Like the Christian Kingdom of God which exists as a partial reality in the present and a full reality in the future, the techno-Kingdom of posthuman speculative science is read as an emerging reality which will be consummated in a not-too-distant future. Though a posthuman eschatology attempts to wrestle with similar themes present also within Christian eschatology, a Christian eschatology is ever aware that the fulfilment of its hope lies in the hands of the God who is in control of history, in contrast to a posthuman eschatology which places the onus of control upon human technologies.

Furthermore, Moravec's posthuman future raises serious question regarding one's persisting identity after having been resurrected into a cybernetic body. Like so much Christian theology which has appealed to a dualism between body and soul to 'reasonably' argue for the persistence of identity following death; posthuman speculative science also appeals to a notion of dualism which separates the body and the mind as two distinct entities. Thus, for Moravec, the 'essence' of humanity is the human mind; an epiphenomenon which is produced by the brain to functions as the body's software. As software, mind is as transferable (portable and interoperable) as any other piece of software that I might load onto a disk and move from one computer to the next. For Moravec, neither the body, nor the world, nor community, affect the subjective experience of mind. Indeed, any subjective experience is merely 'an abstract property shared by all patterns', meaning that whether instantiated in a computer or in my own body, 'a person would feel the same' (Moravec 1988, 178). In order for Moravec to advocate a posthuman future with some form of continuity between one's old embodiment in the flesh and one's new embodiment in a technological-

body, he must reject any notion that the physical body is somehow required for human consciousness. He asserts that if the patterns and processes of the mind are preserved, 'I am preserved. The rest is mere jelly' (Moravec 1988, 117). Rather than the body, it is patterns which constitute identity and codes which define persons; thus humanity is ultimately reducible to a collection of bits and bytes.

His blind belief in information technology as the means by which future humanity will experience radical life extension, confirms him as a cybernetic totalist who believes that reality is better understood through cybernetic mediation. Though philosophically we can dismiss Moravec's optimism, and perhaps even technologically we could undermine the feasibility of his plans, a more pressing question is one which explores the intent behind such a blatantly eschatological reading of future information technologies. . Indeed, Moravec singles a trend followed by the other posthuman speculative scientists discussed in this essay, by investing present-day technologies with eschatological significance. In so doing, posthuman speculative scientists aim to fulfil existential concerns with immanently realisable solutions.

Tipler's Immortality as the Colonisation of the Cosmos

The technological landscape of the posthuman future described in Moravec (above) and Kurzweil (below) finds an interesting compliment in Tulane University physicist Frank Tipler's *Physics of Immortality.* Like Kurzweil and Moravec, Tipler takes up the possibility of a posthuman future through the rubric of technology-enabled life extension. Human finitude – and indeed, for Tipler, cosmic finitude – is an existential concern to which information technology may provide an ultimate solution. Rather brashly he begins his study by arguing that 'theology is a branch of physics and that physicists can infer by calculation the existence of God and the likelihood of the resurrection of the dead to eternal life…' (Tipler 1994, iv). In an attempt to arrive at a 'universal' theological language, Tipler appeals to what he sees to be a sense of universal eschatological hopes that are reflected in all the 'great religions of the world'. This is the starting point for his physical theology. Yet, rather than turning to

transcendental symbols or religious discourse, Tipler seeks to ground his eschatology in scientifically verifiable and technologically feasible realties.

As was the case with Moravec, in order to promote a form of life extension where one's subjective experiences and consciousness can be instantiated in a substrate different from one's own physical body, Tipler appeals to a pattern-based understanding of identity. Accordingly, one's mind is understood as a composite of one's neuropathology. Echoing Moravec he writes, 'the pattern is what's important, not the substrate'(Tipler 1994, 127). Human mind can exist forever, assuming that the machines which house and embody the human mind can last forever as well (Tipler 1994, 125). Again like Moravec, embodiment – which is contingent upon ever-changing biological and technological realities – is not constitutive of the individual. Tipler defines sentient life as follows:

> I claim that a "living being" is any entity which codes information (in the physics sense of this word) with the information coded being preserved by natural selection. Thus, "life" is a form of information processing, and the human mind – and the human soul – is a very complex computer program. Specifically a "person "is defined to be a computer program which can pass the Turing test… (Tipler 1994, 125)

Making 'life' synonymous with information processing, allows Tipler to reduce the complexities of subjectivity into a form which can be readily modelled by computers, and therefore easily replicated within other information technology devices, of which the human mind is but a simple form. The posthuman future for Tipler is filled with Voyager-like space probes that contain and process living posthuman human intelligences. These devices, which in the future will be launched from our planet as the natural end of our Sun comes to its close, and will seek to transform the material fabric of the universe into a cosmic posthuman information processing device. For Tipler, it is only natural that the 'next stage of intelligent life would be quite literally information processing machines' (Tipler 1994, 218).

His eschatological speculations are grounded in a technological myth which resists any appeal to a transcendent divinity (Tipler 1994, 125). He seeks to make 'heaven as real as the electron' (Tipler 1994, xv) by appealing to the most 'up-to-date knowledge of modern

mathematics and physics' (Tipler 1994, xvi). This approach differentiates Tipler from Moravec or Kurzweil, inasmuch as Tipler aims at exploring the long-range implications of posthuman life-extension by casting a technological eschatology as both individual *and* cosmic destiny. He argues that in order for humanity to fully embrace its own self-made immortality, the cosmos must be implicated in this pursuit (Tipler 1994, xiii).

To achieve immortality in the face of certain cosmic finality, what for Tipler is the real challenge of posthuman speculative science, requires one to devise a way to persist the 'computer program' of the human soul in an incorruptible medium. But how can anything created in a finite cosmos truly be incorruptible? Even beyond the death of our own solar system, there exists yet an even *more* problematic boundary, which in Tipler's physics is termed the 'Omega Point' – the end of the Cosmos itself. For Tipler, the greatest obstacle to immortality is the collapse of the universe and the return to singularity – the moment wherein all matter and energy converge to a single infinitesimal point (Tipler 1994, 154). Yet Tipler's 'Omega Point' is strikingly different from the use of the same concept by early 20th century French theologian and palaeontologist, Teilhard de Chardin. Teilhard understood the Omega Point to be the end of cosmic history, both in terms of its completion/fulfilment and its ultimate goal (DeLashmutt 2005). The Omega Point was seen to be a term roughly synonymous with the being of Jesus Christ, and not dissimilar to the role of Ultimate Concern in Paul Tillich's theology (as ground of being) or Kingdom of God in Pannenberg's (as prolepsis of the cosmic end). Tipler's use of the concept is divested of Teilhard's theological teleology, as for Tipler Omega Point is nothing more than the absolute boundary of space and time, the fixed horizon at the end of existence. For Teilhard, surviving the Omega Point meant the fusion of spirit and matter into Christ. For Tipler, there is no spiritual undercurrent, only a mathematical formula which seeks to prove that at the point of singularity one could subjectively experience eternal life.[vi]

Tipler in Dialogue with Theology

Tipler describes his so-called 'physics of immortality' as a new kind of natural theology, which resists metaphysical or transcendental claims in lieu of what he regards to be a thoroughly materialistic and scientifically verifiable system He is aware that his physical theology seriously impacts confessional theological belief, but argues that his thesis resonates deeply with 'contemporary protestant theology.' In particular he cites the work of Wolfhart Pannenberg, noting that Pannenberg believes that the identity of the 'present-day person is coded not only in the present-day spatio-temporal structure, but also in God' (Tipler 1994, 293). Tipler sees Pannenberg's understanding of eschatological personhood to be the same as his own 'Omega Point Theory', where information about the person will be reconstructed at the Omega Point (end of the universe). Though one may bristle at what appears to be the co-opting of Pannenberg's theology for the purposes of Tipler's posthuman speculative science; it would appear that Tipler's interpretation of Pannenberg may not be that far from the truth, as on his website he refers to personal correspondence with Pannenberg where Pannenberg offers the following veiled endorsement of Tipler's theories:

> Christian believers and their resurrection hope need not the difficult path towards resurrection via a change of the basis of intellectual life from old-fashioned organic life to a computer based life that might finally dominate in the universe. Communion with the crucified and risen Christ, who according to the Christian faith at present already participates in God's rule of the universe, is sufficient for the Christian as basis of the hope in their future participation in the resurrection of the dead. That does not exclude that the development of life in the universe may indeed take the course which Tipler describes (Pannenberg 1997).

Despite Pannenberg's guarded approval of Tipler's work, there are serious issues which prohibit confessional theology from closely aligning itself with this approach. The least of which is the apparent elevation of human technique to the point of ultimacy. This is a tendency which seems endemic to Tipler's theology.

Much like Moravec and Kurzweil who regard the digital transformation of human being as the inevitable next step in human evolution, Tipler posits that 'the creation of such

intelligent machines will be a matter not of "man playing God," but rather, of humanity ensuring a union with God' (Tipler 1994, 21). This is to say, that upon enveloping the whole of the cosmos with intelligent life, humanity will become omnipresent, omniscient, omnitemporal, and as far as it is allowed for within the omega point, omnipotent (Tipler 1994, 153f). Thus, humanity itself, by using its technology to seed intelligence into the cosmos, becomes God. Tipler's God is no monolithic divine, but rather an emergent characteristic which develops within the evolving life forms of the cosmos. For Tipler, God only exists in as much as humanity possesses the potential to become God.

In a critique of Pannenberg's acceptance of Tipler, Sjored L. Bonting notes that the theology argued for by Tipler is inherently inauthentic because it confuses the roles of science and theology. Theology, according to Bonting, is concerned only with transcendental ideas whereas science is 'by definition limited to this world' (Bonting 2005). Bonting goes on to argue that Tipler is unable to construct a valid theology, because his scientific language is unable to discuss the transcendental object of theology. Pannenberg rightly sees the limits of Bonting's critique: if science is the language of the world and cannot speak of the divine, it follows that theology, the language of the divine, is limited in its ability to speak to the world. Such an impotent theology contradicts the cosmic implications of Christian eschatological hope which demands universal import (Pannenberg 2005). Though I agree with Pannenberg's assessment of Bonting, I cannot follow his endorsement of Tipler, no matter how caged it may appear. Principally, I believe that Tipler's 'science' is merely a capitulation to an essentialist philosophy of technology that has led Tipler into a form of cybernetic totalism. As such, his work, though clearly a significant intellectual exercise, is more a reflection of an uncritical reading of technology than it is a lasting bridge between science and theology.

By making the human or posthuman subject a potentially infinite entity, and by making the means of this transformation human technical aptitude, posthuman speculative science advocates a purely immanentist theology which grounds hope (theological or otherwise) on speculated technological mythologies rather than hoped-for transcendental symbols. A

Biblical cosmic eschatology, places as a mark over future human history the ultimate power of God as the source and sustainers of life, and the determined yet unknowable plan of God to control the ends of history. It is, to echo the words of Hans Schwarz, a countermeasure against the contemporary obsession with the present (Schwarz 2000, 2). The techno-theological eschatology of posthuman speculative science transforms eschatology itself into a technology which is controllable, controlling, and de-mystified.

Kurzweil's Spiritual Machines and the pursuit of the Singularity

We conclude this investigation of posthuman speculative science by briefly looking at the work of futurologist and entrepreneur Ray Kurzweil. Like Moravec and Tipler, Kurzweil approaches the inevitability of the posthuman union of technology and humanity as the next step in human evolution and, significantly, as the solution to the problem of personal human death. Also consistent with others discussed in this article, despite his extreme faith in the future capacity of technology, Kurzweil is no crack-pot futurologist, but an established and highly respected engineer, entrepreneur, and inventor.[vii] As is attested to by his early work, the majority of Kurzweil's life has been spent imagining and developing technologies aimed directly at improving deficiencies in human physiology. His work in recent years has transitioned from research into the palliative application of cybernetic technologies to alleviate visual and auditory disabilities, to the more systematically curative application of technology enlisted to overcome personal death. The trajectory of his thinking can be traced in his three principal works: *The Age of Intelligent Machines* (1989), *The Age of Spiritual Machines* (1999) and most recently, the ambitiously titled, *The Fantastic Voyage: Live Long Enough to Live Forever* (2004).

Technology, for Kurzweil is an essential element of human being and is intimately connected with human evolution. Distinct from a tool – a device which according to Kurzweil is fashioned only to attend to the needs of a particular job – technologies are objects that are interwoven with human culture and destiny, persisting beyond the needs of the moment. They are the bearers of cultural information, inasmuch as the development of

technology implies the progression and development of ideas from one successive generation to the next. He writes:

> Technology goes beyond the mere fashioning and use of tools. It involves a record of tool making and a progression in the sophistication of tools. It requires invention and is itself a continuation of evolution by other means. The "genetic code" of the evolutionary process of technology is the record maintained by the tool-making species (Kurzweil 1999, 14).

Like Moravec, who considered humanity to be a 'half-breed' species partially composed of a technological body and partially composed of a biological body; Kurzweil points to a twofold evolutionary process which, in creating humans and technology, anticipates the synergistic human-technology merger of the 'technology-inventing species with the computational technology it initiated the creation of' (Kurzweil 1999, 255-6). This event is described by Kurzweil as the singularity, the point at which human-technology evolution will converge and accelerate to infinite progress.

For Kurzweil, this human-technology merger will result in the creation of two distinct types of mind: an artificial mind which will emerge from the computer itself and a subjective mind which is transferred from the substrate of the human brain to the substrate of the computer. Thus, the title of his principal book, *The Spiritual Age of Machines,* reflects both the emergence of an independent machine-mind and the spiritual instantiation of the human mind in the computers of the future. Such machines, for Kurzweil, would consider themselves to be fully human, 'although their brains are not based on carbon-based cellular processes, but rather electronic and photonic "equivalents"' (Kurzweil 1999, 234). More than simply artificial intelligence (an attribute which he believes can be ascribed to current computers), Kurzweil argues that his spiritual machines will possess a true self awareness and consciousness which he regards as being functionally equivalent to the human mind. Eventually into such machines, human mind itself could be uploaded.

He couches his analysis of future technologies within a speculated trajectory of future computer developments, which are based upon his understanding of the past rate at which

computer technology has advanced. Important to his argument is the constancy of what is referred to as Moore's Law, an informal rule of computer technology which predicts that the number of transistors per square inch of an integrated circuit will double every 24 months (Moore 1965). Graham Moore, the co-founder of the microprocessor manufacturer Intel, made this prediction in 1965 based upon the increased density of integrated circuits since their inception in 1959. Although Moore predicted that this trend would continue into the foreseeable future, most experts (including Moore himself), do not hold this law to be an eternal constant (See also: Dertouzos 2000, 26). Kurzweil, however, bases the entirety of his speculative science on the constancy of Moore's Law, which he believes will allow for development in technologies leading to the rise of spiritual machines.

Kurzweil promotes his argument by predicting a gradual internalisation of computer technology into the human subject. For Kurzweil, as was the case with Moravec, the clunky material interfaces which separate one's consciousness from the activities going on within one's computer will continue to disappear as technologies develop. What began with the erasure of wires connecting computer peripherals and computer networks will, in Kurzweil's speculation, lead to the eventual disappearance of keyboards (Kurzweil 1999, 277). The present-day drive to develop increasingly unobtrusive computer displays, will lead to immersive virtual environments made possible first by ocular implants then finally brain implants (Kurzweil 1999, 279). This will be accomplished as the division between flesh/blood and copper/silicon becomes ever confused as one's experience of the 'real' world slowly becomes indistinguishable from one's emersion within the 'virtual' world. Subjectively it is then only a matter of making a final jump from the mind's instantiation within the physical body to the mind's instantiation within a machine (Kurzweil 1999, 51-4). This is, for Kurzweil, '*when we become software*' (Kurzweil 1999, 150).

Critique of Kurzweil's Speculative Science

Kurzweil, like Tipler and Moravec, appeals to the problem of human finality as the impetuous for his technological eschatology. He defends his radical hope by arguing that in

light of the general antipathy towards death evidenced by the contemporary anti-death industries of medicine and life-extension, the pursuit of a final technical solution to death is simply inevitable. Thus, Kurzweil arrives at something like the 'cosmological argument' for the existence of spiritual machines: Because we need to overcome death, our technology must be able to facilitate our need. Kurzweil never doubts the ability of technology to develop to a sufficiently robust state where it can accommodate and resolve this need. Indeed, he predicts that in the 21st century, with the help of strong AI and advanced computer technology, 'the human species, along with the computational technology it created, will be able to offer succour to human needs and desires, and will be in a position to change the nature of mortality in a postbiological future' (Kurzweil 1999, 2).

Thus, salvation for present humanity is to be found not in some distant eschaton, but in the move towards a posthuman and postbiological future. Whereas Tipler oriented his physical eschatology towards the Omega Point, Kurzweil's eternal kingdom fixes its gaze on the far more immanent goal of what he terms the 'singularity'. For Kurzweil, the postbiological age will reach its climax at a moment of rapid technological change which culminates in a vast dispersal of 'immortal software-based humans, and ultra-high levels of intelligence' into the whole of the cosmos travelling, 'at the speed of light' (Kurzweil, 2001). This idea resonates with both Moravec and Tipler, and signals not only the ultimate salvation of human consciousnesses, but more profoundly, the universal significance of human technology which when dispersed into the cosmos will begin rectifying even the problem of cosmic finitude, *a la* Tipler. Thus it would seem that Kurzweil's Manichean vision, like that of the other posthuman scientists discussed here, places its hope on the pure dispersal of human mind into the cosmos as the goal of evolution and the key to cosmic salvation (c.f. Asimov [1956] 1990)

> I regard the freeing of the human mind from its severe physical limitations of scope and duration as the necessary next step in evolution. Evolution, in my view, represents the purpose of life. That is, the purpose of life -- and of our lives -- is to evolve (Kurzweil 2001).

Unlike Christian eschatology, Kurzweil's immortal posthuman and postbiological future circumvents the need for the divine, by giving the individual the ultimate degree of 'power and depth' in shaping this future (Kurzweil 1999, 153). For Kurzweil, human technology is the medium by which human mind can be liberated from its bondage within an ever decaying body. Evolution is the means by which pure spirit is freed into the cosmos.

Though *The Age of Spiritual Machines* was written over six years ago, Kurzweil still maintains his commitment to this vision of the postbiological future. In his recent work, *The Fantastic Voyage,* Kurzweil frames his futurological speculations within easily-applicable common sense health practices which are aimed at assisting the living to survive until the future day when spiritual machines are able to host human minds. The book lays out a holistic strategy of diet, weight-loss, and smart lifestyle choices that can extend human life until 'radical life-extension' technologies become available. For Kurzweil wise, 'lifestyle choices will maximise' one's ability to live long enough to 'take full advantage of the radical life-extending therapies that lie just ahead' (Kurzweil and Grossman 2004, 260).

Conclusion

The examples from posthuman speculative science discussed in this article can be critiqued on a variety of grounds – technical, socio-political, psychological, biological and philosophical (de Mul 2003, 247; Fukuyama 2003, 168). With regards to theology, we have illustrated three principal mistakes made by posthuman speculative science: 1) a positivistic certainty in the future abilities of information technology to facilitate a techno-theological eschatology; 2) an uncritical acceptance of the myth of technology and technological progress; 3) the view that technology, as myth, can facilitate ultimate concern. The problem underlying these three principal errors is the elevation of the individual's life over and against the life of others. The belief in radical life extension within posthuman speculative science is an active denial of death which reveals what is an ultimately selfish and self-centred enterprise. As Fukuyama notes: 'A person who has not confronted suffering or death has no

depth. Our ability to experience these emotions is what connects us potentially to all other human beings, both living and dead' (Fukuyama 2003, 173).

According to Elaine Graham, posthuman thinkers pursue through technology what can be characterised as the 'technological sublime' which is rooted in a 'fear of contingency and finitude.' Though posthumanism may appear to seek after the transcendent in a manner that is akin to Christian eschatology, the posthuman agenda is always channelled through human materiality and never allowed to constructively emerge as an authentic source of hope. Rather than authentic transcendence, the futurological emphasis of posthuman speculative science is ultimately unable to escape the world within which it is situated. The attempt to engage technology in transcendental purposes fails to situate human technology or 'human energies' in the productive 'activity of world-building' (Graham 2002, 17).

A final question to be explored here at the conclusion of this article is, How does the myth of this technological eschatology contrast with Christian eschatology? The final written words of Dietrich Bonhoeffer, 'This is the end – for me the beginning of life' (Bonhoeffer 1967, 225), reflects the mysterious relationship which Christian eschatology has to the reality of personal death. Death is not something to be scorned, rejected, or postponed for an indefinite amount of time. As intimated by Bonhoeffer, the Christian reaction to death is one of victory over death. Pauline eschatology hails the mystery of imperishablity for those in Christ for whom 'Death has been swallowed up in victory' (1 Corinthians 15.55).

Posthuman eschatological hopes are at best for a radical extension of life. Yet the postponement of death is quite a different from the idea of death being conquered or vanquished, as a whole. Paul's laud of victory over death is saturated in Christological overtones. Death is made impotent because it has been conquered by Christ's own movement through death to resurrection. It is by following Christ's example that Paul admonishes his readers to be confident in their own fate through death. Indeed, for the Christian the avoidance of death is tantamount to an avoidance of salvation. At the end of posthuman life extension, death postponed still awaits its claim. Christian eschatology paradoxically calls death a defeated foe and embraces death as the transition into life eternal, as it is the symbolic

means by which eternity is realised through the resurrection of the body. Unlike the Hebrew Bible which lauds mythic longevity as a sign of divine blessing (such as Melchizadek in Genesis 14, who in the story is said to have lived for over 900 years), Christianity needs death for the transformation that is a transfiguration of the fleshly body. It is hubris and an obsession with the present that encourages posthuman speculative science to avoid death at all possible costs.

Technology, when allowed to become the normative force by which humanity understands itself and its destiny, distorts the humanist or religious pursuit of the good. Despite claims reflecting a hope for a real technologically embittered future, the posthuman ideology has more to do with a general drive towards technological conversion – bespeaking the acceptance of a technological worldview – than it does with actual physical transformation. For theology, it represents a contradicting theological model, which reinterprets the message of salvation that has traditionally been offered to humanity in other more explicitly mythological (or religious) forms. According to N. Katherine Hayles, 'People become posthuman because they think they are posthuman' (Hayles 1999, 6).

Rather than denying the technologies which make posthuman rhetoric possible, society must embrace 'the possibilities of information technology without being seduced by the fantasies of unlimited power and disembodied immortality' (Hayles 1999, 5). As such, the place of technology must be grounded in life lived in community and governed by shard narratives and common values. The posthuman drive to undermine finitude as a defining characteristic of human life undermines present humanity for the sake of a distant posthumanity.

For theology, a productive engagement with technology starts by a move away from the blind faith of the posthuman myth of unceasing technological progress, and a move towards a hermeneutics of technology that centres on a concern for a technology's appropriateness. This indicates a transition away from the techno-theology of IT culture towards a theology of technology which roots technology in the symbols of faith, with a keen awareness of human fallenness.

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Endnotes

[i] Such technological essentialism can trace its post-war lineage back to Martin Heidegger's, "The Question Concerning Technology," ; Jacques Ellul's, *The Technological Society,* or even Albert Borgmann's *Technology and the Character of Contemporary Life.* In these three examples, technology is characterised by a dominative essence which controls the culture in which it is operated. An essentialist philosophy of technology curtails any hope for redemptive engagement with technologies, as the reified Technology is removed from particular representations in individual technologies, the very location from which one could constructively approach an ethics of technological practices.

[ii] Compare the demand for signs by the Pharisees in Mark 8.11-12, with the signs of false messiahs (Mark 13.22), and the sign of the betrayer (Mark 14.44). Contrast this with the signs of the Kingdom, given to the believers (Mark 16.17) and intelligible by believers (Mark 16.20).

[iii] Note the privileged place of computational models of information in Tom Stonier, *Beyond Information;* the computational models of consciousness advocated by Marvin Minsky, *The Society of Mind*; and similarly the component model of consciousness in Daniel C. Dennett, *Consciousness Explained*.

[iv] Apart from Andrew Crumey's *Mobius Dick,* which teases out the implications of such an outlandish claim.

[v] See Moravec's work with the SEEGRID corporation: http://www.seegrid.com/pages/about.html. In particular: Moravec's efforts to develop three dimensional navigation in automated mobile robotics has most recently explored the problems associated with colour perception in the artificial eye (Moravec 2001).

[vi] Subjective immortality is distinct from objective immorality in Tipler because he distinguishes between the real time of the cosmos and the subjective time experienced by life or the living. The former is bound by the cosmic horizon of the omega point, whereas the latter is bound only by the internal facilities of an information processing device. Thus, cosmic subjective immortality exists when the mind becomes persisted within a medium that is sufficiently robust enough to generate apparently endless experiences of subject temporality, which Tipler sees as

being possible if the mind is instantiated within fabric of the cosmos itself, at Omega Point (Tipler 1994, 138).

[vii] Kurzweil developed the first print-to-speech reading device utilising optical character recognition (OCR), the first character recognising flat-bed scanner, the first text-to-speech synthesizer, the first music synthesizer capable of recreating the grand piano and other orchestral instruments, and the first commercially viable speech recognition device. His foresight and innovation have earned him many awards and honours, including the Lemelson-MIT Prize, the world's largest award in invention and innovation; the 1999 National Medal of Technology, the United State's highest honour in technology awarded from former US-President President Clinton; the 1994 Dickson Prize (Carnegie Mellon University's top science prize), Engineer of the Year from Design News, Inventor of the Year from M.I.T., and the Grace Murray Hopper Award from the Association for Computing Machinery.