

A Rapture of the Nerds?

A Comparison between Transhumanist Eschatology and Christian Parousia

Roberto Paura

ABSTRACT Transhumanism is one of the main “ideologies of the future” that has emerged in recent decades. Its program for the enhancement of the human species during this century pursues the ultimate goal of immortality, through the creation of human brain emulations. Therefore, transhumanism offers its followers an explicit eschatology, a vision of the ultimate future of our civilization that in some cases coincides with the ultimate future of the universe, as in Frank Tipler’s Omega Point theory. The essay aims to analyze the points of comparison and opposition between transhumanist and Christian eschatologies, in particular considering the “incarnationist” view of Parousia. After an introduction concerning the problems posed by new scientific and cosmological theories to traditional Christian eschatology, causing the debate between “incarnationists” and “eschatologists,” the article analyzes the transhumanist idea of mind-uploading through the possibility of making emulations of the human brain and perfect simulations of the reality we live in. In the last section the problems raised by these theories are analyzed from the point of Christian theology, in particular the proposal of a transhuman species through the emulation of the body and mind of human beings. The possibility of a transhumanist eschatology in line with the incarnationist view of Parousia is refused.

KEYWORDS emulations; eschatology; singularity; transhumanism

✉ Roberto Paura, Italian Institute for the Future, Via Gabriele Jannelli 390 – 80131 Napoli, Italy
✉ r.paura@futureinstitute.it ☎ 0000-0002-0246-4920

©  FORUM PHILOSOPHICUM 24 (2019) no. 2, 343–67
ISSN 1426-1898 E-ISSN 2353-7043

SUBM. 2 September 2019 ACC. 25 September 2019
DOI:10.35765/forphil.2019.2402.15

ESCHATOLOGISTS VS. INCARNATIONISTS: A THEOLOGICAL QUARREL

In his *Principles of Christian Theology*, the Scottish-born Anglican theologian John Macquarrie wrote that

if it were shown that the universe is indeed headed for an all-enveloping death, then this might seem to constitute a state of affairs so wasteful and negative that it might be held to falsify Christian faith and to abolish Christian hope.¹

To better explain Macquarrie's thought and the problem he poses for Christian theology, one can refer to the words of Ignazio Sanna, now president of the Pontifical Theological Academy: how is it possible to "express an eschatology, that is, a promise of salvation, based on the Word of God," within a scientific framework "whose predictions seem inauspicious both for the survival of the human species (in the short as well as in the long term) and for the future of the cosmos?"²

In the Christian conception, the universe has not only a beginning in time but, with the Parousia, an end in time, when the advent of the "new heavens" and the "new earth" (Rev 21:1³) occurs, and the time comes to an end. The Parousia, or the advent of the Kingdom of Heaven, represents a radical break with respect to the linear unfolding of time. Since the nineteenth century, scientific progress, in particular the theory of the heat death of the universe and, in the twentieth century, the open cosmological models that provide for a gradual, interminable depletion of the energy of the universe up to the remote *Big Freeze*, have provided an image of the ultimate end of all things very different from the Christian vision. Hence, the difficulties involved in reconciling scientific and Christian eschatology. This topic was addressed on the eve of the Second Vatican Council in the debate that divided the theologians between "eschatologists" and "incarnationists." For the former, Parousia represents a breaking point in the history of the world, which therefore will not necessarily involve the universe, considered as a mere background of human events; for the latter, the entire universe should instead be transfigured into the Kingdom of Heaven.⁴ More precisely, for incarnationists, the physical environment

1. John Macquarrie, *Principles of Christian Theology* (New York: Charles Scribner's Sons, 1966), 318.

2. Ignazio Sanna, *Fede, scienza e fine del mondo. Come sperare oggi* (Brescia: Editrice Querini-ana, 1996), 79.

3. All Bible references come from New International Version Bible.

4. Francesco Brancato, *Il futuro dell'universo. Cosmologia ed escatologia* (Milan: Jaca Book, 2017), 93.

that surrounds us is not a passive background of God's providential design, but it is through our relationship with Nature that our person acquires full fulfillment: therefore, one cannot imagine that, in the aftermath of the Resurrection, there is no room for this environment, albeit in a different form from that we experience today. For eschatologists, the universe is instead only a temporary home of humankind, subject to decay and corruption as everything that exists in time, so it will be replaced by the Kingdom after the end of the world.

Critics of incarnationism include some important theologians who played an important role at the eve of the Second Vatican Council. For the Swiss theologian Hans Urs von Balthasar, the idea that the Parousia involves a transformation of the universe is affected by the ancient and medieval cosmological conceptions, where God inhabited a physical place in the farthest heaven, and hell was physically wedged in earth's bowels. Since this conception has long been completely abandoned, it makes no sense to insist that the universe should participate in the transfiguration of the risen bodies promised by Christ: rather, eschatology will concern only humankind in its direct contact with God, who does not reside in any physical place from which he will come to inhabit the universe transformed into the Kingdom, but who represents a dimension of existence where the relationship between humankind and God will be direct and immediate, without intermediaries, and will restore meaning and authenticity to the relationships between risen human beings.⁵

Similarly, for Ignazio Sanna theological eschatology has nothing to do with physical eschatology, just as theological creation has nothing to do with creation in the physical sense: if cosmology says that the universe was born 13.8 billion years ago, this moment of creation from nothing (more precisely, from a quantum fluctuation) should not be identified with the creation told in Genesis, since creation should be considered as a constant process in time, something happening at a relational level, binding all living things to God as the ultimate cause of their existence. Similarly, the end of the universe has nothing to do with the end of the world announced by the Scriptures, because this latter is embodied in the coming of the Kingdom, that is, in the "fulfilment of the world in the peace of God."⁶ According to Sanna, who refers to Karl Rahner, the temporality of creation is different from the one we experience. We live a "three-dimensional" temporality,

5. See Hans Urs von Balthasar, *Escatologia del nostro tempo. Le cose ultime dell'uomo e il cristianesimo* (Brescia: Editrice Queriniana, 2017).

6. Sanna, *Fede, scienza e fine del mondo*, 17.

which includes past, present and future; creation presupposes instead a two-dimensional temporality, because “the beginning has no past and the end has no future. There is a before without before and an after without an after.”⁷

Incarnationists replied with St. Paul’s statement that “the whole creation has been groaning as in the pains of childbirth” (Rom 8:22), so the final redemption should not only concern humankind within a cosmos that will be abandoned to itself, but will involve the whole of creation, even the furthest subatomic particle. It is in fact within creation transfigured into the Parousia that the resurrection of bodies will take place, so that the universe is not something destined to be preserved only for as long as human history lasts, but is destined to host the Kingdom of God. By contrast, the Jesuit Jean Galot interprets the concept of “creation” employed by St. Paul as referring to the whole of humanity, with a distinction between Christians and pagans. Those who groan in pain are above all those who have not yet known the Gospel and the hope it offers them, consisting in the possibility of becoming authentic children of God. The distinction is therefore not between the destiny of the material universe and the destiny of humanity, but between the pagans and the Christians. Moreover, the sentence “heaven and earth will pass away, but my words will never pass away” (Mt 24:35) would suggest—according to Galot—that eschatology would not concern the physical universe, which is destined to be completely replaced by the new creation.⁸

In his book *Theology of Hope*, Jürgen Moltmann suggests a third way: not a cosmological interpretation of eschatology, but an eschatological interpretation of the cosmos. In his conception, the boundaries of our reality should be considered as mobile and temporary, so that the Parousia will cause an overcoming of these boundaries, making the previous creation appear as little compared to the new creation that will come. The cosmos is absorbed in the process of the eschaton, albeit at a moment historically situated in time. Moltmann proposed this intermediate solution under the influence of Ernst Bloch’s *The Principle of Hope*: but while Bloch (a Marxist philosopher) exhorted an intra-worldly future transformation of humanity, Moltmann proposed adding to Bloch’s “principle of hope,” that is, to the utopian projects for a better future in the world, the “trustful certainty” of the resurrection and the advent of the Kingdom. The result would be

7. *Ibid.*, 58.

8. Jean Galot, “Il Destino Finale Dell’universo,” *Accenti* 6 (2018).

an overcoming of the intra-world utopias in the direction of the promise through which God orients the history of humankind.⁹

However, at the end of the Second Vatican Council the incarnationist interpretation of eschatology prevailed. According to this vision, the “new heavens” and the “new earth” will concern not an otherworldly spiritual dimension, but our very universe, since Christian eschatology promises the resurrection of the bodies transfigured within *this* world and that Christ, incarnated in *this* world by obeying the physical and biological laws that govern it, continued to move on earth with his physical body after his resurrection. At the same time, the resurrection of Christ violates physical and biological laws, so it seems to anticipate the final transfiguration that awaits the universe with the Parousia, so that it can be said that “Statements such as «end of the world,» «universal judgment» or «return of Christ» cannot be put in direct relation to the time which the sun will spend to exhaust the hydrogen burning in its core, or with the time we humans have at our disposal to migrate towards more hospitable planets.”¹⁰ The Pastoral Constitution *Gaudium et Spes*, one of the main doctrinal documents issued by the Second Vatican Council, recalls (quoting Mt 24:36) that “we do not know the time for the consummation of the earth and of humanity, nor do we know how all things will be transformed,” although we can certainly deduce that our world, “deformed by sin,” will be transformed or replaced by

a new dwelling place and a new earth where justice will abide, and whose blessedness will answer and surpass all the longings for peace which spring up in the human heart.¹¹

According to the American physicist and theologian Robert J. Russell, director of the Center for Theology and the Natural Sciences, “if the universe theologians describe corresponds to the Creation of God, then it is the universe that must become eschatologically the new creation.”¹² This vision was promoted by Pierre Teilhard de Chardin with his well-known theory of

9. Jürgen Moltmann, *Theologie der Hoffnung* (München: Chr. Kaiser Verlag, 1964).

10. Giuseppe Tanzella-Nitti, “Creation,” in *Inters—Interdisciplinary Encyclopedia of Religion and Science*, ed. Giuseppe Tanzella-Nitti, Ivan Colagè and Alberto Strumia (2002), Accessed August 24, 2018, <http://inters.org/creation>.

11. Vatican Council II, *Gaudium et Spes*, accessed December 12, 2019, Vatican.va, 39.

12. Robert J. Russell, “La dottrina della creatio ex nihilo in relazione al Big Bang e alle cosmologie quantistiche,” in *L’uomo alla ricerca della verità. Filosofia, scienza e teologia: prospettive per il terzo millennio. Conferenza internazionale su scienza e fede. Città Del Vaticano, 23-25 Maggio 2000* (Milan: Vita&Pensiero, 2005), 139.

the Omega Point. Teilhard was guided by the conviction that evolution was not a random process at all, but “an ascent toward consciousness” destined to “culminate forwards in some sort of supreme consciousness.”¹³ Consequently, evolution can only be teleological and tending towards a growing complexity whose apex is represented by the Omega Point, coinciding with God at the end of time. Teilhard distinguishes five stages of the evolutionary process: the formation of atoms and molecules (“corpuscularization”), the formation of unicellular and multi-cellular beings (“vitalization”), the birth of the brain and intelligence (“cephalization”), then the emergence of Man (“hominization”) and, finally, the rise of complex social structures (“socialization”). At the end of this last stage, the biosphere is replaced by a noosphere, i.e. the intelligence fills all Creation, transforming it.

This process would be guided by a radial energy, of a spiritual nature, opposite to the tangential energy of a physical type: a sort of *negentropy*, that is, an equal and opposite force to entropy expressed by the second law of thermodynamics as a measure of disorder and progressive degradation of closed systems. The radial energy, on the contrary, with the passing of time becomes more concentrated and available, pushing living forms towards a teleological evolution in time. Teilhard therefore imagines a Parousia that takes place on a cosmological scale, with a transfiguration of the physical world subjected to the pressure of intelligence. The Omega Point, the end point of history, acts retrospectively, guiding the flow of things towards the eschaton. However, the Omega Point should not be understood as the final point of the unification of humanity, but something different from the human species to come. God is not an aggregation of human personalities, but a transcendent and autonomous center. Not a center destined to appear at the end of time, but something who already exists, which in the present acts to achieve its ultimate purpose. The Omega Point is therefore God, the same God who created the universe, the God of the Old and New Testaments, who is Alpha and Omega. Christianity is therefore an authentic “religion of the future” for Teilhard, and there is no conflict or separation between science and religion: Revelation can also be understood in a scientific key. For Teilhard, Christ, already identified in John’s Gospel as the *lógos* existing at the beginning of all things, who is incarnated in the world “in the fullness of time” and who will return at the end of the world, is also an evolver, a teleological orientation “forward and upward,” as he will write in the last page of his diary three days before his death.

13. Pierre Teilhard de Chardin, *The Phenomenon of Man* (New York: Harper Perennial, 1955), 258.

Definitely, we can define Teilhard as “incarnationist:” for him, the Parousia, the advent of the Omega Point, will take place in the future of this universe. At the fulfillment of this evolutionary process, Christ will raise and save all the matter of the cosmos, including our bodies, transforming them up to their authentic glorified dimension. While admitting that the Parousia does not wait for the completion of cosmological times to occur, Teilhard could not prevent himself from supposing the existence of a certain relationship between the fulfillment of the process of noogenesis and the advent of the Kingdom. This conviction stemmed from his observation that the moment of the Incarnation occurred at a time when humanity was “anatomically developed, and socially advanced, up to a certain degree of collective consciousness.”¹⁴ Therefore, Teilhard was led to suppose

that in the case of his second and final coming *too*, Christ is waiting to reappear until the human collectivity has at last become capable (because fully realized in its natural potentialities) of receiving from him its supernatural consummation.¹⁵

Teilhard considered the emergence of intelligent life extremely unlikely. It was generated only once on Earth and, should the human species become extinct, it will not be replaced by other intelligent forms of life. Similarly, the universe is sterile in intelligence. Therefore, Man’s ultimate goal is to fill the entire universe with intelligence, to extend the noosphere to the entire cosmos. “Man is irreplaceable. Therefore, however improbable it might seem, *he must reach the goal*, not necessarily, doubtless, but infallibly.”¹⁶

Similarly, theoretical and cosmological physicists John Barrow and Frank Tipler have coined a “final anthropic principle” that states that, once it emerges, intelligent life can never become extinct.¹⁷ Already in 1979, in an article entitled *Time without end: Physics and biology in an open universe*, physicist Freeman Dyson questioned the perspective of life in the universe in an open cosmological model.¹⁸ How long can life last in such a universe? We know that already within 10^{23} years all the stars, even those not yet

14. Teilhard de Chardin, “Two Principles and a Corollary (or a Weltanschauung in Three Stages),” in *Toward the Future* (New York: Harcourt, 1975), 154.

15. *Ibid.*, 153–4.

16. Teilhard de Chardin, *The Phenomenon of Man*, 276.

17. John D. Barrow and Frank J. Tipler, *The Anthropic Cosmological Principle* (New York: Oxford University Press, 1986), 23.

18. Freeman J. Dyson, “Time without End: Physics and Biology in an Open Universe,” *Reviews of Modern Physics* 51, no. 3 (July–September 1979).

born, should be dead, so that all chemical processes that rely on the energy provided by the stars (including, of course, the chemical processes at the basis of life) can no longer take place.¹⁹ In the enormous amount of time that will follow, the universe should be inexorably sterile. However, Barrow and Tipler argue that intelligent life can reverse this process. Their proposal leads them to imagine an intelligence that gradually fills the whole universe, similar to Teilhard's vision, to the point of modifying the same basic physical laws.

They observe how the growth of the human species over the millennia has led it, starting from a living species similar to many others belonging to the class of mammals, to become a true "geological force" in recent centuries or decades, since the technological civilization has become able to impact radically on the entire biosphere. While these considerations do not sound very encouraging in the current age of the Anthropocene, Barrow and Tipler, in their optimism, assume that human civilization (or rather, what will follow, since they take into account a cybernetic evolution of our species) will be able to perform the same process on a cosmological scale. By identifying life with information, they affirm that, no matter how the human organism evolves, there will be a way to preserve and produce information eternally. Since information does not necessarily require matter for its conservation and processing, even the electrons and positrons that will fill the universe in the distant future when matter will have given way to radiation may be able to guarantee these processes, provided that heat death is prevented by a process of contraction, such as to generate a conical singularity similar to Teilhard's Omega Point. Even if physical laws were contrary to this possibility, the intelligence of the remote future could modify them:

Finally, the time is reached when life has encompassed the entire Universe and regulated all matter contained therein. Life begins to manipulate the dynamical evolution of the universe as a whole, forcing the horizon to disappear, first in one direction, and then another... If life evolves in all of the many universes in a quantum cosmology, and if life continues to exist in all of these universes, which include *all* possible histories among them, then *all* of these universes, which include *all* possible histories among them, will approach the Omega Point. At the instant the Omega Point is reached, life will have gained control of *all* matter and forces not only in a single universe, but in all universes whose existence is logically possible; life will have spread

19. Barrow and Tipler, *The Anthropic Cosmological Principle*, 653.

into *all* spatial regions in all universes which could logically exist, and will have stored an infinite amount of information, including *all* bits of knowledge which it is logically possible to know. And this is the end.²⁰

Tipler extended this proposal in the following years, starting from the observation that Teilhard's Omega Point can be compared to a conical singularity of the type envisaged by closed universe models, a point on the boundary of space-time in a universe with a finite spatial extension. In his controversial book *The Physics of Immortality*, Tipler elaborated a modern version of the Omega Point theory equipped, in his view, with scientific criteria, i.e. capable of providing empirically testable predictions. Starting from the assumption that human consciousness can be essentially traced back to information, so to be emulated on a computer, he imagines the Omega Point as a sort of futuristic universal Turing machine, i.e. a machine able to emulate any type of computer, including the very peculiar one represented by the human brain. Therefore, the final resurrection promised by Jesus will take place through a computer simulation where, however, we will not live as disembodied consciousnesses, but endowed with some kind of corporeality, although not of organic nature. Actually, an effective computer simulation would be able to give us back the sense organs and all the sensations we experience through our biological body, but without the biological body. For Tipler (who defines himself a Catholic worshipper), this should safeguard the promise of a resurrection "of the flesh," and not only of the spirit.²¹

UNDERSTANDING TRANSHUMANIST ESCHATOLOGY

Although often minimized or dismissed as a minority ideology, transhumanism can be defined as the mainstream philosophical orientation of "technological solutionists," a term used by Evgeny Morozov to identify Silicon Valley's gurus,²² but that more generally defines the supporters of the "Californian ideology," based on the belief that radical technological innovation will have disruptive effects on society as a whole, even redefining the very connotations of the human being.²³ It is therefore an ideology

20. *Ibid.*, 676–7.

21. Frank J. Tipler, *The Physics of Immortality: Modern Cosmology, God, and the Resurrection of the Dead* (New York: Anchor Books, 1995).

22. Evgeny Morozov, *To Save Everything, Click Here: The Folly of Technological Solutionism* (New York: Public Affairs, 2013).

23. Richard Barbrook and Andy Cameron, "The Californian Ideology," *Science as Culture* 6, no. 1 (January 1996).

destined to become very popular, especially in the years to come; and if, in their daily work, technological solutionists are not particularly interested in the philosophical debate of transhumanism, in the long run it offers them a convincing and, above all, intra-worldly eschatological vision, that is, an eschatology without the transcendental aspects of traditional religions. This vision is based on the conviction that by extrapolating toward the future the accelerating pace of technological progress (as Moore's law on the capabilities of microprocessors suggests), the advent of a "technological singularity" is very close. The singularity is envisioned as a watershed event beyond which the predictive capabilities of the human being fail, since the guidance of our evolution will be assumed by artificial intelligences or by a hybridization between humankind and machines.

The main theorist of technological singularity is the technologist and futurist Ray Kurzweil, who estimated its occurrence just before the middle of the century, between 2040 and 2045, and also tried to provide some hypothesis about the path that will lead to its achievement.²⁴ According to Kurzweil, towards the end of the third decade of the 21st century our civilization will become able to achieve a complete reverse-engineering of the human brain, so to emulate it on a dry hardware (including the whole range of human emotions) and to overcome its complexity. Subsequently, we will become able to upload the entire pattern of a human being into a non-biological thinking substrate. As a result, humans will be freed from their wet, biological component, so that only their consciousnesses will survive, virtually forever, provided backup copies are made in case of accidental or intentional destruction of the hardware support. In Richard Morgan's science fiction novel *Altered Carbon* (2002) this is the event that starts the narrative plot: the attempted murder of a man through the destruction of his backup copy (it's interesting to note that inside the novel Christians oppose the possibility of mind-uploading, therefore dying permanently).

The conviction that our future will be characterized by the advent of a technological singularity and by the transformation of human beings into transhumans who can free themselves from the physicality (and mortality) of their body is extremely widespread in transhumanist ideology. In 2008 Anders Sandberg and Nick Bostrom of the Future of Humanity Institute at Oxford University signed a technical report entitled *Whole Brain Emulation: A Roadmap*, where they analyze the different possibilities to achieve a perfect emulation of the human brain. The two authors distinguish between

24. Ray Kurzweil, *The Age of Intelligent Machines* (Cambridge, MA: MIT Press, 1990); Ray Kurzweil, *The Singularity Is Near* (New York: Viking, 1990).

the concept of “simulation,” which imitates the output results of a system, from that of “emulation,” which imitates the internal causal dynamics of a system. The emulation of a human brain would be successful if it were able to produce the same output behavior and results as the original, possibly at a higher speed.²⁵ These considerations have partially inspired the ambitious Human Brain Project, launched in 2013 with funding of one billion euros by the European Commission, to achieve a computer-based emulation of the human brain, with the main objective of understanding the mechanisms underlying neurological diseases, but with the explicit belief that such a path would pave the way for the realization of a strong or self-conscious artificial intelligence. In the following years the project has been subject to countless criticisms resulting in consequent changes to the approach used. This has impacted the timeframe, with the result that it will fail to achieve the desired outcome by 2023, as originally planned.²⁶

In his book *The Age of Em: Work, Love, and Life When Robots Rule the Earth*, Future of Humanity Institute’s economist Robin Hanson analyzed the scenario of a future ruled by *ems*, from *emulations*. These are artificial intelligences based on the emulation of the human brain, to which humans will assign the tasks once considered the exclusive prerogative of human intelligence, in order to free themselves from work and fatigue, and to entrust these more advanced intelligences with the task of pushing forward technological progress. A part of these ems would live in our physical world, inside robotic bodies; but a majority would live in the form of disembodied intelligences within virtual worlds. According to Hanson, human beings in this future might not exist at all or rather might be an endangered species. Actually, the ems would represent the next step in the evolution of intelligence, able to replace our species and become the dominant race of the planet (and then of the Solar System).²⁷

Physicist Max Tegmark, co-founder of the Future of Life Institute based in Cambridge, Massachusetts, defines life 3.0 as this new form of life that would emerge from the hybridization of human and artificial intelligence. Tegmark cites the “prophecy” of technologist and futurist Hans Moravec, whose book *Mind Children* (1988) was one of the founding texts of transhumanism:

25. Anders Sandberg and Nick Bostrom, “Whole Brain Emulation: A Roadmap,” (Technical Report #2008-3, Future of Humanity Institute, Oxford University 2008), 7.

26. Ed Young, “The Human Brain Project Hasn’t Lived up to Its Promises,” *The Atlantic*, July 22, 2019.

27. Robin Hanson, *The Age of Em: Work, Love, and Life When Robots Rule the Earth* (Oxford: Oxford University Press, 2016).

We humans will benefit for a time from their [intelligent emulations] labors, but sooner or later, like natural children, they will seek their own fortunes while we, their aged parents, silently fade away.²⁸

Although it is only one of the possible scenarios of future life outlined by Tegmark, and one of the only three in which the human species is destined to disappear (together with the scenario where AIs violently destroy our species, and the scenario where our species extinguishes before developing AIs), he appears substantially at ease with the idea that emulations represent our future descendants, as they can prove to be much more capable of facing the coming challenges and spreading in the universe, even to the point of changing its evolution.

These ideas owe a lot to the influence of Tipler's Omega Point theory. One of the theoretical premises of the Omega Point theory are John von Neumann's cellular automata. According to von Neumann (one of the founders of modern computer science), life can be considered basically the result of a series of laws replicable on a computer, able to evolve a system from the simplest possible level to self-conscious complexity; therefore, if consciousness is an emerging phenomenon replicable computationally, it is reasonable to expect that in the future the spread of intelligence in the universe will occur through self-replicating machines that will colonize the different planets, filling the whole universe.²⁹

A similar conception has been more recently promoted by the historian and futurist Yuval Noah Harari, who distinguishes transhumanist ideologies into two types: techno-humanism and dataism (or "data religion"). Both start from the consideration that "once authority shifts from humans to algorithms, the humanist projects may become irrelevant," but while techno-humanism suggests using technology to significantly enhance the human being to achieve an improved version (the *Homo Deus*), dataism is based on the principle that "the universe consists of data flows" and that "the same mathematical laws apply to both biochemical and electronic algorithms."³⁰ With the rise of the modern data-driven society, where more and more functions once the competence of human intelligence are entrusted to algorithms programmed and able to learn autonomously (*machine*

28. Max Tegmark, *Life 3.0: Being Human in the Age of Artificial Intelligence* (New York: Doubleday, 2017), 239.

29. John Von Neumann and Arthur W. Burks, *Theory of Self-Reproducing Automata* (Urbana, IL: University of Illinois Press, 1966).

30. Yuval Noah Harari, *Homo Deus: A Brief History of Tomorrow* (London: Harvill Secker, 2015), 367.

learning), dataism is based on the belief that in its essence the human being is indistinguishable from von Neumann's cellular automata and therefore it is preferable to replace the current human species with something different, a self-conscious version of the Internet-of-Things where autonomous algorithms will act by forming a collective intelligence to optimize data processing. "Once this mission is accomplished, *Homo sapiens* will vanish."³¹

While the transhumanist movement initially excluded explicit religious references from its ideology, over the years some organizations of Christian faith have emerged in the United States that have tried to propose a conciliation between transhumanist and Christian eschatologies. In 2006 the Mormon Transhumanist Association (MTA) was founded, joining in the same year the World Transhumanist Association, whose current name is Humanity+ (but it does not have official affiliations with the Church of Jesus Christ of Latter-Day Saints). The MTA claims to believe in the Gospel of Jesus Christ, and in its compatibility with and complementarity to many religions and philosophies, "particularly those that provoke strenuous pursuit of compassionate and creative exaltation," because the invitation of Jesus would consist in becoming "compassionate creators." From this derives the search for "the spiritual and physical exaltation of individuals and their anatomies," through scientific knowledge and technological power, which are "among the means ordained of God to enable such exaltation, including realization of different prophetic visions of transfiguration, immortality, resurrection, renewal of this world, and the discovery and creation of worlds without end." The MTA defines Transfigurism as the religious version of transhumanism, exemplified by the syncretization of Mormonism and transhumanism. According to MTA, the term "transfigurism" alludes to a concept that is found in different religious traditions, such as Hinduism (Krishna's universal form), Judaism (Moses' radiant face after his encounter with God), Buddhism (the enlightenment that leads Siddhartha Gautama to become Buddha), and Christianity (the Transfiguration of Jesus Christ).³² Moreover, according to former MTA president Lincoln Cannon, God could be considered an advanced form of man-machine hybridization, a status we would achieve in the future and which would possess capacity for retro-causality (something very similar to Tipler's Omega Point).³³

31. *Ibid.*, 380.

32. All the quotations are from the official MTA website: <https://transfigurism.org/> accessed August 25, 2019.

33. Lincoln Cannon, "Theology May Become a Science of Superintelligence," on Lincoln Cannon official website, <http://lincoln.metacannon.net/2017/08/theology-may-become-science-of.html>.

In 2014, the Christian Transhumanist Association (CTA), also affiliated to Humanity+, was founded. The CTA is based on the belief that God's mission involves "the transformation and renewal of creation including humanity," and that people have been "called by Christ to participate in that mission," fighting against illness, hunger, oppression, injustice and death. Becoming like Christ implies "using science and technology ethically to improve the world." The CTA considers Teilhard de Chardin a forerunner of transhumanism, and among the texts recommended by the CTA to understand the relationship between Christianity and transhumanism is Frank Tipler's *The Physics of Immortality*.³⁴

Similarly inspired by Tipler's theory is the "Turing Church," a current of thought founded by former executive director of the World Transhumanist Association Giulio Prisco. The Turing Church (whose name is based on a play on words: Alonzo Church and Alan Turing proposed the Church-Turing thesis on the possibility of building a computer capable of solving problems solvable by the human mind) is inspired by Russian "cosmism," founded by the philosopher Nikolaj Fedorovic Fedorov in the nineteenth century and based on the idea of a self-directed evolution through scientific and technological progress. The cosmists believed in the possibility of achieving the resurrection of bodies by bringing the disposition of the atoms of the dead back to the configuration prior to death.³⁵ Similarly, Prisco argues that, with future technological development, it will become possible to retrieve the information of dead people even long ago and bring them back to life. Prisco also argues that our reality is a computer simulation, that God should be assimilated to a computer super-programmer (probably a superintelligence) and that the afterlife could be either another simulation or the real world in which we will wake up after death or after the resurrection.³⁶

TRANSHUMANIST AND CHRISTIAN ESCHATOLOGY IN COMPARISON

A first problem that emerges in the confrontation between Christian eschatology and transhumanism concerns the role of the human being. In fact, transhumanism states that the current mortal condition of the human being is destined to be overcome through a process of enhancement made

34. All the quotations are from the official CTA website: <https://www.christiantranshumanism.org/>, accessed August 25, 2019.

35. George M. Young, *The Russian Cosmists: The Esoteric Futurism of Nikolai Fedorov and His Followers* (Oxford: Oxford University Press, 2012).

36. Giulio Prisco, "Christianity and Transhumanism Are Much Closer Than You Think," The Turing Church website, <http://turingchurch.com/2016/04/04/christianity-and-transhumanism-are-much-closer-than-you-think/>.

possible through next technologies. But if one accepts the doctrine of the *imago Dei*, whose starting point is Genesis 1:27 (“So God created man in His own image; in the image of God He created him; male and female He created them”), it follows that within the evolutionary process, since the beginning, a project exists aimed at creating the human being “in the image of God.” The transhumanist principle of a self-directed evolution, by which the human species must assume a leading role in the evolutionary process, clashes with the Christian idea that human evolution already possesses a precise direction, willed by God. In the document of the International Theological Commission on this subject (*Communion and Stewardship: Human Persons Created in the Image of God*) the irreconcilability of these two points of view is well emphasized:

The view of the universe advanced by modern science displaced the classical notion of a cosmos made in the divine image and thus dislodged an important part of the conceptual framework supporting the theology of the *imago Dei*.³⁷

A possible solution has been proposed by Philip Hefner, professor emeritus of systematic theology at the Lutheran School of Theology in Chicago and first director of the prestigious Zygon Center for Religion and Science, with the concept of *created co-creator*: humankind was created by God to participate in Creation in an active way, intervening in the world in order to adapt it to the divine design; the overcoming of our biological limits would therefore be part of this design.³⁸ But this idea is in clear contradiction with the doctrine of the *imago Dei*. If humankind was created in the image of God, then *Homo sapiens* represents the pillar of creation and should not be considered further perfectible (also because Christ chose to incarnate himself in a “non-enhanced” human body). In the above-mentioned document of the International Theological Commission this very concept is reaffirmed, stating that if it is accepted that human beings can fully dispose of their own body then people “could determine the finality or teleological value of the body”; but the “right to dispose of something” applies only to objects “with a merely instrumental value,” not to “which are good themselves, i.e., ends in themselves.” The human being belongs to this latter category. It follows that:

37. International Theological Commission, “Communion and Stewardship: Human Persons Created in the Image of God,” (2004), § 19.

38. Philip Hefner, “The Evolution of the Created Co-Creator,” *Currents in Theology and Mission* 15, no. 6 (December 1988): 512–25.

Given that man was also created in God's image in his bodiliness, he has no right of full disposal of his own biological nature. God himself and the being created in his image cannot be the object of arbitrary human action.³⁹

The question becomes even more complex when it turns to the eschatological conception of a future technological singularity that would guarantee immortality in a sort of simulation at the end of time, as in Tipler's theory. The basis of the Christian doctrine of immortality is that the resurrection takes place only after death, a passage that cannot be avoided. Referring to St. Paul's Second Epistle to the Corinthians, the Catechism of the Catholic Church says:

To rise with Christ, we must die with Christ: we must "be away from the body and at home with the Lord." In that "departure" which is death the soul is separated from the body. It will be reunited with the body on the day of resurrection of the dead.⁴⁰

Moreover, according to Christ's revelation, resurrection will not occur in a ghostly form, but preserving one's own body, although in a "transfigured" form. This passage is solved by some, such as the transhumanist Mormons, affirming that the task of transhumanism is precisely that of carrying out a transfiguration of the physical body through technologies. Eventually, mind uploading would only be an intermediate step, in which the fragile human body is abandoned to wait for the moment when the disembodied consciousness can re-incarnate in a new perfect and immortal body.

However, this interpretation poses many problems. According to Thomas Aquinas, the human person is inseparably composed of body and soul. When the body perishes, that is, when the soul is separated from the body, it retains the natural attitude and inclination to reunite with the body: the body is dead (*homo mortuus*) but the human person continues to exist even after separation, precisely because this separation is to be considered temporary.⁴¹ This conception has the function of explaining the Christian doctrine of the resurrection of the flesh: since eternal life takes place within a physical body, the soul will sooner or later have to rejoin our mortal "transfigured" body. Now, at the basis of this conception there is the principle that the mortal body must not be seen as a cumbersome material shell

39. International Theological Commission, § 81–4.

40. Catechism of the Catholic Church, accessed December 12, 2019, Vatican.va, 1005.

41. Thomas Aquinas, *Summa Theologiae*, I, Q.75, A.4.

that sooner or later will need to be discarded to allow the soul to rejoin God, but as the “temple of the Holy Spirit,” according to St. Paul’s statement in his First Epistle to the Corinthians. In the words of the apostolic constitution *Gaudium et Spes*:

Though made of body and soul, man is one. Through his bodily composition he gathers to himself the elements of the material world; thus they reach their crown through him, and through him raise their voice in free praise of the Creator. For this reason man is not allowed to despise his bodily life, rather he is obliged to regard his body as good and honorable since God has created it and will raise it up on the last day.⁴²

Transhumanist eschatology offers a possible solution through the idea of a perfect emulation of human minds inside a perfect simulation of the universe, as in Tipler’s Omega Point Theory. If, inside such a simulation, a human emulation accepts the world he/she live in as the real world, the “gnostic temptation” would be avoided, since the emulation would experience the simulated world through its emulated body and its emulated senses. Oxford philosopher Nick Bostrom is the main theorist of the simulation hypothesis, that argues that a sufficiently advanced technological civilization would sooner or later produce an emulation of the brain and then a completely simulated reality where brain emulations could live their “transhuman” existence.⁴³ Avoiding the implication of Bostrom’s argument, that is, the possibility that even our own reality could be a computer simulation,⁴⁴ it is interesting to note that Bostrom, initially one of the main theorists of transhumanism, later distanced himself from it, because of his fears about the “existential risks” associated with the rise of an artificial “superintelligence” that could lead the human species to extinction (“There is so much cheerleading of technology in transhumanism, so much unquestioning belief that things will just exponentially get better, and that the right attitude is just to let progress take its course. These are attitudes I have distanced myself from over the years.”⁴⁵) In his book *Superintelligence*, Bostrom considers different ways to reach superintelligence: the development of an artificial intelligence (we could say, the traditional

42. Vatican Council II, *Gaudium et Spes*, 14.

43. Nick Bostrom, “Are You Living in a Computer Simulation?,” *The Philosophical Quarterly* 53, no. 221 (April 2003).

44. Roberto Paura, “Living in the Matrix: How a Scientific Conjecture Was Turned into a Conspiracy Theory,” *Messages, Sages and Ages* 4, no. 2 (2017).

45. Mark O’Connell, *To Be a Machine* (London: Granta Books, 2017), 181.

way), the whole brain emulation (the one he explored in the study with Sandberg), biological cognitive enhancement, brain-computer interfaces (an approach currently studied by Elon Musk's Neuralink), the strengthening of networks and organizations that can spontaneously bring out a form of self-awareness. Bostrom considers the first two solutions more credible than the others, and in particular the first safer than the second. In fact, in the case of the development of an AI, we should be able to control its gradual development from a "seed" of artificial consciousness, guiding its evolution so that future superintelligence can have an ethics in line with human ethics. Conversely, the emulations of the human brain, relying on the "brute force" of calculation to produce imitations of our brain without really understanding its mechanisms, would risk escaping our control and acquiring objectives and aims that differ from ours.⁴⁶

Bostrom suggests that emulations have a very good chance of replacing the human species. The example he uses is that of horses, quickly replaced, with the rise of machines, to the point of significantly reducing the number of existing specimens: from 26 million in 1915 to only 2 million in the 1950s in the United States.⁴⁷ This is because emulations would be used to replace most of our jobs; if there is a link between population growth (or more precisely, between the fertility rate) and labour supply, the decreasing of the latter will inevitably decrease the population. Actually, this is what is already happening in western societies, where a highly labour-intensive economy such as subsistence farming and, subsequently, industry, which pushed families to give birth to a large number of children, has been replaced by a highly automated economy which makes children no longer a potential economic resource, but a burden. Bostrom believes that the emulations will be much more efficient than human workers, being able to operate 24/7 without holidays, work permits, illnesses, distractions of any kind. Considering that these are emulations, with a certain level of self-awareness, Bostrom admits that in such a scenario there will be voices against their enslavement, or that the same emulations could revolt. However, in this case it would be enough to reset the programming at the end of each day to make them forget the experience of the past, or instill in their programming a further stimulus to Stakhanovism, to overcome these problems.⁴⁸

46. Nick Bostrom, *Superintelligence: Paths, Dangers, Strategies* (Oxford: Oxford University Press, 2014), 50.

47. *Ibid.*, 161.

48. *Ibid.*, 169–73.

The essential question raised by these considerations is: do emulations really *exist*, that is to say do they *live* in a completely analogous way to how we live as living beings? In addressing this question, on whose affirmative answer his theory of the Omega Point is based, Frank Tipler argues that in a perfect simulation indistinguishable from the real world emulated people have no way of believing that their actions and thoughts are mere emulations of the actions and thoughts of real human beings, since they imitate them in all aspects. But is this imitation enough to sustain its *authenticity*? Tipler invokes the principle of the identity of the indiscernible, introduced by Leibniz in the 17th century: entities which cannot in any way be distinguished from one another must be considered identical. Therefore, in the presence of a sufficiently perfect simulation of a living being, it is correct to claim that this being is alive.⁴⁹ It follows that the emulation of myself, through the possibility of uploading my pattern on a far-future computer, is alive exactly as I am now and that, by possessing my own memories, it is actually a continuation of myself. Therefore, if at the end of time the Omega Point were to prove capable of creating perfect emulations of each of us even after eons from our death (since it should be able theoretically to retrace our information dispersed in the universe), this would be exactly the eternal life promised by the Parousia.

However, although there are several more or less serious projects demonstrating the technical feasibility of mind-uploading (the most famous and controversial is the Russian Dmitry Itskov's Initiative 2045), the scientific community is now faced with the problem of how to develop distinctly human intellectual abilities, such as ethics and empathy, within today's artificial systems, such as neural networks. These systems certainly partly emulate the mechanisms underlying human learning, but they prove effective only in the presence of routinely and easily automated tasks, for example facial recognition or text translation, in which the "brute force" of calculation counts more than intuition, the basis of human intelligence. Solving this problem is essential for those who hope for the possibility of developing the emulations through which our species will survive in the distant future.

In fact, a perfect emulation of a human being must not be limited to the reproduction of logical and cognitive inner processes but must be able to feel empathy and share ethical values with other emulations. Only in this case could the replicated human being be considered substantially indistinguishable from the original, and only in this case could the transhumanist

49. Tipler, 207–8.

eschatology avoid blatant contradictions with Christian eschatology. The philosophers of science Paul Dumouchel and Luisa Damiano have tackled the problem by analyzing the development of social robotics, the branch of robotics that deals with the creation of artificial human companions, essentially for purposes of medical and psychological care. Social robotics is based on the (questionable) assumption that care work, hitherto an exclusive duty of humans, can in the future be automated, given that, in a scenario of progressive population ageing, the number of people needing continuous care will increase inexorably, while the work supply in this sector will decline. Therefore, replacing human caregivers with robotic agents seems to be the most appropriate solution, while transhumanists see it as an intermediate step in the affirmation of a hybrid human-machine species. It is no coincidence that Dumouchel and Damiano use the term *substitutes* to refer to these artificial agents, although they specify that a substitute “covers the role of another person, but only partially—only in some cases, in certain aspects and at certain times.”⁵⁰

Be that as it may, the main obstacle to the realization of such substitutes is the feasibility of emulating human empathy. This stems from the fact that we do not yet have a real understanding of the mechanisms of the mind, in particular we do not have an agreed theory of mind, which can explain the physiological processes through which humans and different other animal species understand that others have different mental states from their own, capable of producing beliefs, intentions, desires, emotions and knowledge. Paro, a robot with the features of a baby seal, is used for therapeutic purposes in elderly patients or children who need emotional support (pet therapy). Paro behaves like a perfect pet, produces verses, is happy if you caress it and cries surprised if you treat it badly, makes funny expressions, is soft, responds if you call it. Unlike a pet, however, it doesn't run away, you don't have to chase it or look for it at home, it doesn't need to eat, it doesn't dirty, it doesn't get sick, it has antiseptic hair. Tests show that patients benefit from its presence. Yet, Paro can't exceed his programming, can't surprise its patients or do something unpredictable. It completely lacks the primary component that we attribute to other living beings, that is, an autonomous will, which derives from the possibility of possessing mental states that cannot be predicted by external subjects. A cat that, instead of playing with its master, prefers to lick its own hair, even though it represents a source of frustration, shows in that moment

50. Paul Dumouchel and Luisa Damiano, *Vivere con i robot. Saggio sull'empatia artificiale* (Milan: Raffaello Cortina, 2019), 39.

that it is equal to a human being, that is to say, like humans, it is a living being endowed with its own will.

But intentionality poses very serious problems: it means possessing intentions autonomous from the creator-designers as well as being able to conceal these intentions from external observers. There is no doubt that only in this case we would be faced with a complete substitute for a human being: Alan Turing, at the dawn of computer age, suggested that the key test for recognizing an authentic artificial intelligence was its ability to deceive an observer, effectively emulating the behavior of a human intelligence. Theorists of the existential risks are well aware of this problem. Nick Bostrom, in his book *Superintelligence*, deals precisely with the theme of how to endow AIs with intentionality while avoiding the possibility that they mislead human beings to the point of developing plans for becoming independent from their creator-programmers, a scenario that could lead to the intentional destruction of the human species, considered an obstacle to the full autonomy of superintelligence. To solve the problem, Bostrom argues that we should “load” onto emulations the shared ethical values of our species. Nothing more difficult: how to express these values, for example the aspiration to happiness, in programming language? In the case of emulations, which are based on the imitation of our mental processes, one solution could be to strengthen and increase mental states that correspond to the main values shared by our community.⁵¹

However, this is a risky solution, since shared values change over time: slavery was considered normal until the nineteenth century, racism was shared by most of the West for much of the twentieth century, and at particular times in recent history orientations such as eugenic selection or the death penalty were considered positively. In the future, our species could, for example, embrace anti-speciesism as a shared ethical value: should we keep this in mind when uploading (or strengthening) values on a computer emulation? Inevitably, we should let emulations be able to learn autonomously and choose autonomously those values they deem most appropriate. But this solution falls again on the risk of an intentionality different from the human one. In short, it seems evident that, in order to obtain a perfectly self-aware and intelligent emulation, it should be embedded with the capacity to become free from its programming and therefore from human control, with the serious risk of creating a new artificial species that, instead of being willing to accept the disembodied consciousness of human beings subjected to mind-uploading in a common virtual environment, replaces

51. Bostrom, *Superintelligence*, 201.

the human species as a whole. Dumouchel and Damiano observe that the uncanny valley hypothesis (that says that beyond a certain threshold of similarity of an artificial substitute to its human original, the human reaction is of horror and rejection) places constraints on the possibility of making complete substitutes, because it shows that humans are naturally hostile to the idea of living with perfect emulations of themselves.⁵² We should therefore consider the possibility that, for a series of reasons, not just of technical-scientific nature, the feasibility of an emulation with autonomy and intentionality will never be achieved.

CONCLUSIONS

What does this conclusion suggest for the perspective of transhumanist eschatology? As we have seen, this vision shares with the incarnationist view of Christian eschatology faith in a future transfiguration of humans and of the whole universe, likely through the achievement of a perfect human brain emulation, so as to allow the uploading of the pattern of each person on a computer support, ensuring their immortality, at least in a virtual environment. On a theoretical level, the feasibility of this idea is based on the conviction that a perfect artificial emulation is substantially indistinguishable from the original, so that a perfect emulation of a human person would be the natural continuation of their existence, albeit in a virtual environment. There is also a current of thought that argues that the human species can be replaced by a completely artificial species, based on emulations: *Homo sapiens* would leave the throne of creation to this new species, with the aim of extending intelligence to the whole universe until it changes the same fundamental laws of physics. Polish science fiction writer Stanislaw Lem, in his *Summa Technologiae*, imagined a future where our species transmits not the neural pattern of each individual, but its DNA (intended as a “source code”), to this new artificial species, so as to ensure survival within a virtual environment, a simulation that would run on huge supercomputers placed in orbit around the Sun, where the efficiency of calculation processes would be optimized.⁵³

Still, undeniable obstacles to this scenario persist. So far, all the emulations that we are able to create or imagine are only trivial imitations programmed for this purpose. Social robots imitate human emotions, and although certain positive effects have been demonstrated in the well-being

52. Dumouchel and Damiano, *Vivere con i robot. Saggio sull'empatia artificiale*, 32.

53. Stanislaw Lem, *Summa Technologiae* (Minneapolis: University of Minnesota Press, 2013), 284–7.

of people assisted by such substitutes, such a programmed imitation has nothing to do with genuine emulation. Far from being close to creating a new intelligent species, technology is now able to create *homunculi*, which in the alchemical tradition were imagined as “miniature” versions of human beings, pathetic and disturbing imitations created to be placed at the service of their creators. At the same time, should we be able to obtain self-conscious, autonomous and intentional emulations, they would become something totally different from the original, to the point of creating a new species that is unlikely to have any intention of hybridizing with ours.

Transhumanist eschatology is doomed to clash with the problem of the emulation of what most authentically defines the human person. If the intra-worldly immortality promised by transhumanism can only be guaranteed through an escape into the virtual reality of cyberspace, the simulation we will obtain would be inexorably inauthentic, because the emulations that will live there would never be really alive, but only pale imitations, similar to puppets, as such linked to their creators and animators in order to function. The future of transhumanism is therefore a non-human future, where the intelligence that will survive, of an artificial nature, will be condemned to repeat endlessly a programming set by programmers who have disappeared, to imitate the thoughts and behaviors of irreplaceable extinct beings: it will be a false intelligence, which will not be able in any case to guarantee our survival in time.

This conclusion seriously questions the idea of a reconciliation between transhumanism and Christian eschatologies, but it also undermines the coherence of the incarnationist vision. Undoubtedly, the techno-scientific progress of human civilization aims at the growth of automation, the reduction of the human person to algorithms, and the technological enhancement of body and mind to better compete with the rise of artificial intelligence. This vision of the future is far removed from that of the Christian Parousia, in which the human being is called to become an imitation of Christ: rather, it offers an earthly utopia that does away with any space for transcendent, even reducing the transcendent to physical laws, as in Tipler’s Omega Point theory. On the other hand, if one were to accept the eschatologist’s vision of Parousia, which completely ignores the events of history by imagining the advent of the Kingdom completely independently of the cosmological reality we live in, the risk would be that of a reckless disregard for the different trajectories the human future could assume in the coming decades and centuries, depriving Christians of any responsibility from their earthly choices.

Between these two visions, Moltmann’s intermediate proposal emerges as a possible solution. As Moltmann affirms, the intra-world utopias,

exemplified in Bloch's "principle of hope," urge Man not to take the present for granted, but to oppose "the presumed ineluctability of its laws of evil and death," similarly to what transhumanism pursues; however, these utopias acquire meaning, from the Christian point of view, only if they are integrated by the "trustful certainty" given by God's promise:

In the utopian horizons open to any possibility, it will recognize and show the necessary things. In this way eschatological hope becomes a driving force of history in favour of the creative utopias of love for the suffering man and his imperfect world, moving towards the unknown but promised future of God.⁵⁴

BIBLIOGRAPHY

- Balthasar, Hans Urs von. *Escatologia del nostro tempo. Le cose Ultime dell'uomo e il cristianesimo*. Brescia: Editrice Queriniana, 2017.
- Barbrook, Richard, and Andy Cameron. "The Californian Ideology." *Science as Culture* 6, no. 1 (January 1996): 44–72.
- Barrow, John D., and Frank J. Tipler. *The Anthropic Cosmological Principle*. New York: Oxford University Press, 1986.
- Bostrom, Nick. "Are You Living in a Computer Simulation?" *The Philosophical Quarterly* 53, no. 221 (April 2003): 243–55.
- . *Superintelligence: Paths, Dangers, Strategies*. Oxford: Oxford University Press, 2014.
- Brancato, Francesco. *Il futuro dell'universo. Cosmologia ed escatologia*. Milan: Jaca Book, 2017.
- Cannon, Lincoln. "Theology May Become a Science of Superintelligence." On Lincoln Cannon official website, <http://lincoln.metacannon.net/2017/08/theology-may-become-science-of.html>
- Dumouchel, Paul, and Luisa Damiano. *Vivere Con I Robot. Saggio Sull'empatia Artificiale*. Milan: Raffaello Cortina, 2019.
- Dyson, Freeman J. "Time without End: Physics and Biology in an Open Universe." *Reviews of Modern Physics* 51, no. 3 (July–September 1979): 447–60.
- Galot, Jean. "Il destino finale dell'universo." *Accenti* 6 (2018): 20–34.
- Hanson, Robin. *The Age of Em: Work, Love, and Life When Robots Rule the Earth*. Oxford: Oxford University Press, 2016.
- Harari, Yuval Noah. *Homo Deus: A Brief History of Tomorrow*. London: Harvill Secker, 2015.
- Hefner, Philip. "The Evolution of the Created Co-Creator." *Currents in Theology and Mission* 15, no. 6 (December 1988): 512–25.
- International Theological Commission. "Communion and Stewardship: Human Persons Created in the Image of God." 2004.
- Kurzweil, Ray. *The Age of Intelligent Machines*. Cambridge, MA: MIT Press, 1990.
- . *The Singularity Is Near*. New York: Viking, 1990.
- Lem, Stanislaw. *Summa Technologiae*. Minneapolis: University of Minnesota Press, 2013.

54. Jürgen Moltmann, "Il 'principio speranza' e la 'teologia della speranza': dialogo con Ernst Bloch," in *Teologia Della Speranza* (Brescia: Queriniana, 1970), 372–3.

- Macquarrie, John. *Principles of Christian Theology*. New York: Charles Scribner's Sons, 1966.
- Moltmann, Jürgen. "Il 'principio speranza' e la 'teologia della speranza': dialogo con Ernst Bloch." In *Teologia Della Speranza*. Brescia: Queriniana, 1970.
- . *Theologie der Hoffnung*. München: Chr. Kaiser Verlag, 1964.
- Morozov, Evgeny. *To Save Everything, Click Here: The Folly of Technological Solutionism*. New York: PublicAffairs, 2013.
- Neumann, John Von, and Arthur W. Burks. *Theory of Self-Reproducing Automata*. Urbana, IL: University of Illinois Press, 1966.
- O'Connell, Mark. *To Be a Machine*. London: Granta Books, 2017.
- Paura, Roberto. "Living in the Matrix: How a Scientific Conjecture Was Turned into a Conspiracy Theory." *Messages, Sages and Ages* 4, no. 2 (2017): 18–30.
- Prisco, Giulio. "Christianity and Transhumanism Are Much Closer Than You Think." The Turing Church website, <http://turingchurch.com/2016/04/04/christianity-and-transhumanism-are-much-closer-than-you-think/>.
- Russell, Robert J. "La dottrina della creatio ex nihilo in relazione al Big Bang e alle cosmologie quantistiche." Translated by Monica Rimoldi. In *L'uomo alla ricerca della verità. Filosofia, scienza e teologia: prospettive per il terzo millennio. Conferenza internazionale su scienza e fede. Città del vaticano, 23–25 Maggio 2000*, 161–86. Milan: Vita&Pensiero, 2005.
- Sandberg, Anders, and Nick Bostrom. "Whole Brain Emulation: A Roadmap." Technical Report #2008-3, Future of Humanity Institute, Oxford University 2008.
- Sanna, Ignazio. *Fede, scienza e fine del mondo. Come sperare oggi*. Brescia: Editrice Queriniana, 1996.
- Tanzella-Nitti, Giuseppe. "Creation." In *Inters—Interdisciplinary Encyclopedia of Religion and Science*, edited by Giuseppe Tanzella-Nitti, Ivan Colagè and Alberto Strumia, 2002.
- Tegmark, Max. *Life 3.0: Being Human in the Age of Artificial Intelligence*. New York: Doubleday, 2017.
- Teilhard de Chardin, Pierre. *The Phenomenon of Man*. New York: Harper Perennial, 1955.
- . "Two Principles and a Corollary (or a Weltanschauung in Three Stages)." In *Toward the Future*. New York: Harcourt, 1975.
- Tipler, Frank J. *The Physics of Immortality: Modern Cosmology, God, and the Resurrection of the Dead*. New York: Anchor Books, 1995.
- Vatican Council II, *Gaudium et Spes*. Accessed December 12, 2019. Vatican.va.
- Young, Ed. "The Human Brain Project Hasn't Lived up to Its Promises." *The Atlantic*, July 22, 2019.
- Young, George M. *The Russian Cosmists: The Esoteric Futurism of Nikolai Fedorov and His Followers*. Oxford: Oxford University Press, 2012.