

Transhumanism, Posthumanism, and the Catholic Church

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ABSTRACT In this essay, I engage the foreseeable consequences for the future of humanity triggered by Emerging Technologies and their underpinning philosophy, transhumanism. The transhumanist stance is compared with the default view currently held in many academic institutions of higher education: posthumanism. It is maintained that the transhumanist view is less inimical to the fostering of human dignity than the posthuman one. After this is established, I suggest that the Catholic Church may find an ally in a transhumanist ethos in a two-fold manner. On the one hand, by anchoring and promoting the defense of “the human” already present in transhumanism. On the other, rethinking the effectiveness of the delivery of sacraments in a humanity heavily altered by these technologies.

KEYWORDS artificial intelligence; Catholic Church; cyborg; emerging technologies; nanotechnology; posthumanism; sacraments; transhumanism

1. EMERGING TECHNOLOGIES AND TRANSHUMANISM

Towards the beginning of this millennium, a reasonably large and diverse group of scientists got together in California to discuss the near future of scientific research and technological developments. After a series of presentations and workshops, they reached a consensus, characterizing the techno-scientific horizon through its basis in breakthroughs in genetics, human-machine interfaces, robotics, synthetic biology, and artificial intelligence, all underpinned by nanotechnology. The official report that came out of it, *Converging Technologies for Improving Human Performance: Nanotechnology, Biotechnology, Information Technology and Cognitive Science*,¹ set the formal precedent for what later became known as the “Nano-Bio-Info-Cogno Convergence”—NBIC for short. The NBIC Convergence aimed to synchronize these *Emerging Technologies* (as they are often called now) towards a qualitative leap in science in particular and civilization in general:

We stand at the threshold of a new renaissance in science and technology, based on a comprehensive understanding of the structure and behavior of matter from the nanoscale up to the most complex system yet discovered, the human brain.... Developments in systems approaches, mathematics, and computation in conjunction with NBIC allow us for the first time to understand the natural world, human society, and scientific research as closely coupled complex, hierarchical systems. At this moment in the evolution of technical achievement, improvement of human performance through the integration of technologies becomes possible. This is a broad, cross-cutting, emerging and timely opportunity of interest to individuals, society, and humanity in the long term.²

This “new renaissance in science and technology” would entail a breakthrough in the understanding and living conditions of humanity, potentially surpassing the original Enlightenment moment. The novel technologies referred to would be pervasive enough so that “the definition of human enhancement may entail providing people with advanced capabilities of speed, language, skill, or strength beyond what humans can perform today.”³ The inevitability of these innovations would be identifiable from previous recent history, assuming that “as plastic surgery and pharmacology have given new choices to human beings today, enhancement treatments will no doubt shape

1. Mihail C. Roco and William Sims Bainbridge, eds., *Converging Technologies for Improving Human Performance: Nanotechnology, Biotechnology, Information Technology and Cognitive Science*, National Science Foundation (Dordrecht: Kluwer Academic Publishers, 2003).

2. *Ibid.*, 2.

3. *Ibid.*, 92.

tomorrow.”⁴ These scientists were as explicit as they were ambitious in setting up a clear agenda for what Habermas would call a “finalizationist” role of science, namely, the steering of scientific practice towards the solution of human ailments.⁵ In this case, however, therapeutics seemingly was not the driving criterion, but *enhancement*. The stated goal of improving the human condition through modifying its substratum was clear. The aims mentioned in this gathering were unapologetic in their manifest desire to alter humankind towards its betterment so that we gradually attain:

enhancing individual sensory and cognitive capabilities ... highly effective communication techniques including brain-to-brain interaction, perfecting human-machine interfaces including neuromorphic engineering for industrial and personal use, enhancing human capabilities for defense purposes.⁶

These striking targets were not original, however. Indeed, these ambitious goals were reminiscent of the grandiose promises put forward by classical cybernetics in the 1940s—that promising scientific movement that somewhat mysteriously died off within a decade.⁷ The cybernetic impetus carried the hopes of an enhanced humanity, at the time scarred in the aftermath of World War II. Norbert Wiener’s hopes were far-reaching, looking forward to a time where prosthetic implants would perform better than biological limbs and intelligent machinery would free up time for us by performing task, tasks we are currently paid to do.⁸ Interesting common themes notwithstanding, the “metaphysical research programme”⁹ behind these impulses is further recognizable from pre-cybernetic times. One could identify both cybernetics and Emerging Technologies as underpinned by a more profound vision.

4. Ibid.

5. Habermas advocates for the steering of science towards therapeutic advances in science and medicine, (see Gernot Böhme, Wolfgang Van Den Daele, and Wolfgang Krohn, “Finalization in Science,” *Social Science Information* 15, no. 2/3 (1976), doi:10.1177/053901847601500205), but rejects any attempt at enhancing the already healthy, see Jürgen Habermas, *The Future of Human Nature*, trans. Hella Beister and William Rehg (Cambridge, UK: Polity, 2003). However, the line between curing and enhancing is becoming increasingly blurred Carl Elliott, “Enhancement Technologies and the Modern Self,” *Journal of Medicine and Philosophy* 36, no. 4 (2011), doi:10.1093/jmp/jhr031.

6. Roco and Bainbridge, eds., *Converging Technologies for Improving Human Performance*, 1.

7. Alcibiades Malapi-Nelson, *The Nature of the Machine and the Collapse of Cybernetics: A Transhumanist Lesson for Emerging Technologies* (Cham: Palgrave Macmillan, 2017), ch. 8.

8. Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston: Houghton Mifflin, 1954).

9. This is Karl Popper’s term, coined when referring to the working metaphysics operating behind Darwinian natural selection Karl Popper, *Unended Quest: An Intellectual Autobiography* (Oxfordshire, UK: Taylor and Francis, 2005), 194–210.

Although one can find traces of this “up-lifting” sentiment towards human improvement in several periods within the history of ideas (e.g., the Enlightenment),¹⁰ during the last century a plethora of these human-enhancing attitudes has been housed under one conceptual umbrella: Transhumanism. Under this view, the “human” aims at being not ontologically confined, with a character of necessity, to its current physical and biological reality. Instead, the human ethos always aimed at (and indeed longed for) transcending its physical, biological, and cognitive boundaries via knowledge and personal transformation. One could refer to it as a cluster of:

Philosophies of life (such as extropian perspectives) that seek the continuation and acceleration of the evolution of intelligent life beyond its currently human form and human limitations by means of science and technology, guided by life-promoting principles and values.... [Transhumanism could be understood as] the intellectual and cultural movement that affirms the possibility and desirability of fundamentally improving the human condition through applied reason, especially by developing and making widely available technologies to eliminate aging and to greatly enhance human intellectual, physical, and psychological capacities.¹¹

As such, this movement, increasingly making inroads in science, philosophy, the social sciences, humanities, and theology, aims at the qualitative improvement of the human race. This improvement would take place through substantial biological and cognitive alterations made possible by disruptive innovations in science and technology (e.g., the NBIC Convergence alluded to above). It maintains a “human-first” attitude at its core, mastering nature responsibly, but having as a priority the thriving of “the human”—not the care of nature for the sake of itself. Any progress in science, technology, and the realms where these are applied, have as a primal aim the betterment of the “human condition.” One would welcome this transformation to the point in which the entity would not only have its biology and cognitive capabilities substantially altered but conceivably altogether surpassed. Key to this program is the non-negotiable tenet that humanity is not reduced to its current physical instantiation. *A fortiori*, it is assumed that humanity can survive the (perhaps inevitable) profound modification of it. This modification may arrive out of, among several reasons,

10. Malapi-Nelson, *The Nature of the Machine*, ch. 9.

11. Max More, “The Philosophy of Transhumanism,” in *The Transhumanist Reader*, ed. Max More and Natasha Vita-More (West Sussex: John Wiley & Sons, 2013), 3.

a sheer need for survival from environmental catastrophes. Moreover, the deep alteration of the human substratum, even the eventual replacement of its current biology, far from hampering humanity's survival, would help it prosper. Indeed, if homo sapiens were to be altered beyond recognition, or even become extinct, the human being would still prevail.¹²

Transhumanism advocates for the bold defense of this transcending human. As part and parcel of this defensive attitude, it understands the category "human" not as a descriptive, but normative. The set of properties that we ought to attain to enter humanity (e.g., what education meant during the Enlightenment) would underpin this normativity. As a consequence, the biological species in which the human is instantiated takes a backseat role in what pertains to the defining feature of human nature (or in metaphysical terms, in what concerns the "essence" of being human). Transhumanism aims at the flourishing of this "human," whatever its substratum (full homo sapiens, homo sapiens-machine hybrid, or even non-carbon-based) as its prime directive. And although the longing for transcending the confining characteristics of our embodiment can be recognized in writings throughout civilization as early as Plato, Emerging Technologies might be bringing unprecedented possibilities to realize some of these yearnings.

One common criticism against the transhumanist goals instantiated via the NBIC agenda regards their feasibility. This criticism would maintain that the transhumanist ethos, both in theory and in technological applicability, pertains to the realm of science fiction, not science. Leaving aside predictions,¹³ what many critics seem to miss is that these extrapolations are based upon ongoing scientific research and practice. In fact, should these projected innovations not come to fruition, substantial amounts of funding would be lost.¹⁴ A cursory look of the state of research and development of these Emerging Technologies reveals, beyond their transhuman character, the verifiable scientific cornerstones that are being reached.

12. Steve Fuller, *Humanity 2.0: What it Means to be Human Past, Present and Future* (Basingstoke, UK: Palgrave Macmillan, 2011); Francis X. Remedios and Val Dusek, *Knowing Humanity in the Social World: The Path of Steve Fuller's Social Epistemology* (London: Palgrave Macmillan, 2018), 34.

13. For the somewhat uncanny predictions by the transhumanist F.M. Esfandiary, regarding technologies that should be available by 2010, see Fereidoun M. Esfandiary, "Up-Wing Priorities," *Future Life*, 1981, <https://hplusmagazine.com/2012/12/12/2030-is-the-new-2012/>.

14. Although unforeseen developments may likely happen again, the Defense Advanced Research Projects Agency's (DARPA) eventual Internet being a classic example. For the story of the development and transition of DARPA's Advanced Research Projects Agency Network (ARPANET) into the Internet, see Janet Abbate, *Inventing the Internet* (Cambridge, MA: MIT Press, 1999).

Take nanoscience and nanotechnology, for instance. These operate at the scale of 1 billionth of a meter: the last realm down before quantum indeterminacy manifests itself. Since Newtonian laws still apply, we can, in a fairly straightforward manner, reorder physical reality atom by atom.¹⁵ Since “the ability to understand and control matter at the nanoscale leads to a revolution in technology and industry that benefits society,”¹⁶ investment in this area of science turns out to be fundamental. Short after the NBIC Report mentioned above was released, the National Nanotechnology Initiative was formed in the US. Subsequently, President Bill Clinton, speaking at the institution where the theoretical founder of research at the nano-scale, Richard Feynman, taught, had this to say:

My budget supports a major new national nanotechnology initiative worth \$500 million. Caltech is no stranger to the idea of nanotechnology, the ability to manipulate matter at the atomic and molecular level. Over 40 years ago, Caltech’s own Richard Feynman asked, what would happen if we could arrange the atoms one by one the way we want them? ... Just imagine, materials with 10 times the strength of steel and only a fraction of the weight; shrinking all the information at the Library of Congress into a device the size of a sugar cube; detecting cancerous tumors that are only a few cells in size. Some of these research goals will take 20 or more years to achieve. But that is why ... there is such a critical role for the federal government.¹⁷

Later on, President George Bush authorized the expenditure of \$3.63 billion on nanotechnology research over four years,¹⁸ and afterward, President Barack Obama funded it with \$1.5 billion.¹⁹ Canada²⁰ and the European

15. For the debate between the pioneer nanoscientist Eric Drexler and the Nobel Prize winner in Chemistry Richard Smalley regarding the difficulty of mechanically reordering atoms (and hence, the feasibility of a future “molecular assembler”) see K. Eric Drexler and Rick Smalley, “Nanotechnology: Drexler and Smalley make the case for and against ‘molecular assemblers,’” *Chemical & Engineering News*, December 1, 2003.

16. National Nanotechnology Initiative, *Strategic Plan* (Arlington, VA: National Nanotechnology Coordination Office, 2014).

17. Bill Clinton, “President Clinton’s Address to Caltech on Science and Technology,” news release, 2004.

18. George Allen, “The Economic Promise of Nanotechnology,” *Issues in Science and Technology* 21, no. 4 (2005).

19. National Nanotechnology Initiative, *Supplement to the President’s 2015 Budget* (Arlington, VA: National Nanotechnology Coordination Office, 2014).

20. *NBIC Disruptive Technology Watch*, Defence Research and Development Canada (April 2003).

Union followed suit with a report of their own,²¹ followed by the United Kingdom.²² Indeed, the powerful emergent economic block known as BRIC (Brazil, Russia, India, and China), at least in what pertains to sheer quantity, has been producing more scientific papers on nanotechnology than its Western counterparts.²³

This general support fostered some innovations. By 2005, a functioning “nano-car” was built, putting together four “fullerenes” (spherical carbon molecules), with a “frame” (united hydrogen molecules). Although this tiny “vehicle” lacked a self-propelling engine, it moved at relatively high speeds when the temperature of the surface where it was placed reached 200 degrees Celsius.²⁴ Something closer to an engine constituted by atoms put together came a decade later. The 2016 Nobel Prize of Chemistry was awarded “for the design and synthesis of molecular machines.”²⁵ Since funding for scientific research at the nanoscale has been one of the few areas of investigation that has received financial support in a fairly consistent manner, efforts towards a more profound manipulation of material reality, atom by atom, will unlikely slow down—let alone come to a halt.

Biotechnology has been experiencing significant advances on its own. The possibility of swapping DNA portions, from a species of bacteria to another, making the latter behave like the former, is now a reality.²⁶ Furthermore, isolating a bacterium’s DNA, storing it in a computer, modifying it *in silico*, and then inserting it into another bacterium, thus making it behave as programmed, is now also feasible.²⁷ Indeed, inroads in information and computer science have benefitted not only the field of synthetic biology but also that of Artificial Life. The complete recreations inside a computer, atom by atom, of a virus, and then of a full bacterium, were

21. Alfred Nordmann, *Converging Technologies: Shaping the Future of European Societies*, European Commission (Luxembourg: CORDIS, 2004).

22. Royal Academy of Engineering, *Nanoscience and Nanotechnologies: Opportunities and Uncertainties* (London: The Royal Society, 2004).

23. StatNano, *Annual Report 2015*, StatNano (2016), 4–17, <https://statnano.com/publications/3864>.

24. Yasuhiro Shirai et al., “Directional Control in Thermally Driven Single-Molecule Nanocars,” *Nano Letters* 5, no. 11 (2005), doi:10.1021/nl051915k.

25. “The Nobel Prize in Chemistry 2016,” Nobelprize website, October 5, 2016, <https://www.nobelprize.org/prizes/chemistry/2016/press-release/>.

26. Carole Lartigue et al., “Genome Transplantation in Bacteria: Changing One Species to Another,” *Science* 317, no. 5838 (2007), doi:10.1126/science.1144622.

27. Daniel G. Gibson et al., “Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome,” *Science* 329, no. 5987 (2010), doi:10.1126/science.1190719.

accomplished in 2004²⁸ and 2012²⁹ respectively. Although an array of more than a hundred computers was necessary, the full process of reproduction of the biological entity happened within a “virtual reality” environment. The virtual recreation was so exact, down to the atomic level, that questions regarding what counts as the model and the modeled expectedly arise. As computer power increases exponentially, this blurring will likely become more pronounced, effectively collapsing distinctions between the built model and the modeled object.³⁰

The widespread use of the relatively accessible gene-editing method known as CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) has made possible a gradual increase in efforts to edit the germline of organisms. The engineered changes in the germline of a biological entity are carried into its offspring, hence modifying the species for its foreseeable future. This method can be now applied to human beings with seemingly relative success. In November 2018, Lulu and Nana, the first genetically modified human beings³¹—who might have received cognitive enhancements (e.g., memory)³²—were born. Ethical concerns notwithstanding, the specter of human cloning and the growth of spare body parts seems to be closer to our reach.³³

While biosciences and biotechnologies are primarily funded by private entities due to the alleged possibilities of faster financial returns,³⁴ nanoscience and Artificial Intelligence (AI) are fields that receive relentless

28. Peter L. Freddolino et al., “Molecular Dynamics Simulations of the Complete Satellite Tobacco Mosaic Virus,” *Structure* 14, no. 3 (2006), doi:10.1016/j.str.2005.11.014.

29. Jonathan R. Karr et al., “A Whole-Cell Computational Model Predicts Phenotype from Genotype,” *Cell* 150, no. 2 (2012), doi:10.1016/j.cell.2012.05.044.

30. Malapi-Nelson, *The Nature of the Machine*, ch. 10.

31. Preetika Rana, “How a Chinese Scientist Broke the Rules to Create the First Gene-Edited Babies,” Wall Street Journal website, May 10, 2019, <https://www.wsj.com/articles/how-a-chinese-scientist-broke-the-rules-to-create-the-first-gene-edited-babies-11557506697>.

32. Antonio Regalado, “China’s CRISPR twins might have had their brains inadvertently enhanced,” MIT Technology Review website, February 21, 2019, <https://www.technologyreview.com/s/612997/the-crispr-twins-had-their-brains-altered/>.

33. Cryogenics (biopreservation for future medical resuscitation) may deserve an honorable mention, as a current biotechnology with goals firmly set in the future. Despite its gradual advances (e.g., vitrification or flash-freezing instead of slow freezing, in order to avoid the formation of crystals when the body is eventually thawed, or “nano-scanned”), and the more than a thousand people already “cryopreserved,” this field is arguably still in its infancy. For a brief description of the endeavor and its ethical implications, see David M Shaw, “Cryoethics: seeking life after death,” *Bioethics* 23, no. 9 (2009), doi:10.1111/j.1467-8519.2009.01760.x.

34. Fuller, *Humanity 2.0*, ch. 3.

public funds in industrialized nations—particularly in China.³⁵ AI is no longer an area of wild forecasting, but an aspect of engineering that is already shaping societies. The famous transhumanist Raymond Kurzweil is now the head of Engineering at Google—the branch under which the company’s efforts at developing AI is hosted. Google’s latest AI machine Duplex can now make a human being believe, in a phone conversation and with relative ease, that she is talking with another human³⁶—arguably eroding the famed efficiency of the Turing Test for spotting “Good Old Fashion Artificial Intelligence” (GOFAI).

Autonomous robots in the military already have the decision capacity to exert lethal fire on enemy forces, but technical concerns regarding the functioning programming³⁷ and ethical considerations for keeping humans “in the loop,”³⁸ stop them from being deployed. As AI progresses, and as the fast-responding autonomy of future weapons demand faster-than-human decision making, the fighting scenario will increasingly become automated, fostering an already ongoing AI arms race.³⁹

AI software applied to finance, and the law, are already replacing white-collar workers⁴⁰—but also opening up opportunities for creativity, critical thinking and a renewed value of the “human touch.”⁴¹ In this context, Elon Musk, after admitting that the race against AI—in which he was involved⁴²—is a lost cause, formed Neuralink, a company that has as an aim the eventual seamless interface between human and machine at the cognitive level. This was a necessary move for Musk, since in his estimation, “we’re going to have the choice of either being left behind and being effectively useless or like a pet ... or eventually figuring out some way to

35. Sarah O’Meara, “Will China lead the world in AI by 2030?,” *Nature* 572 (2019), doi:10.1038/d41586-019-02360-7.

36. Yaniv Leviathan and Yossi Matias, “Google Duplex: An AI System for Accomplishing Real-World Tasks Over the Phone,” Google AI Blog website, May 8, 2018, <https://ai.googleblog.com/2018/05/duplex-ai-system-for-natural-conversation.html>.

37. Paul Scharre, “Killer Apps: The Real Dangers of an AI Arms Race,” Foreign Affairs website, May/June 2019, <https://www.foreignaffairs.com/articles/2019-04-16/killer-apps>.

38. Peter Asaro, “Algorithms of Violence: Critical Social Perspectives on Autonomous Weapons,” *Social Research: An International Quarterly* 86, no. 2 (2019).

39. Greg Allen and Taniel Chan, *Artificial Intelligence and National Security* (Cambridge, MA: Belfer Center for Science and International Affairs, 2017), 12–26.

40. Alec Ross, *The Industries of the Future* (New York: Simon & Schuster, 2016).

41. Steve Fuller, “Technological Unemployment as a Test of the Added Value of Being Human,” in *Education and Technological Unemployment*, ed. Michael Adrian Peters, Petar Jandrić and Alexander Means (Singapore: Springer, 2019).

42. Nature Editorial, “Anticipating artificial intelligence,” *Nature* 532, no. 413 (26 April 2016), doi:10.1038/532413a, <https://www.nature.com/news/anticipating-artificial-intelligence-1.19825>.

be symbiotic and merge with AI.”⁴³ Although the “cyborgization” of the human has arguably been a reality since the beginning of civilization,⁴⁴ qualitative leaps may happen thanks to the NBIC Convergence. Were this Neuralink interface technology to thrive, not only cognitively enhanced humans (so that they can cope with AI-infused functioning society) may become feasible, but the possibility of cognitively controlled prosthesis, robots, or “avatars” may be fulfilled.⁴⁵

The possibility of saving human consciousness, should a major catastrophe—technological, ecological, or celestial—come upon us, seems reachable within a decade or so. Expanding humanity into celestial bodies beyond earth is no longer a fictional prognostication. The Artemis program⁴⁶ is a carefully designed stage by stage plan, with financial budgets⁴⁷ and deadlines, carried on by an already successful joint collaboration of the National Aeronautics and Space Administration (NASA), the European Space Agency, the Japan Aerospace Exploration Agency, the Canadian Space Agency, and private American enterprises (SpaceX, Boeing, Lockheed Martin, Blue Origin and others).⁴⁸ Although it will start with a lunar gateway, placing an orbiting station in lunar orbit and a permanent base on the Moon, it plans to bring humans to Mars by 2033.⁴⁹ It is not farfetched to think that within the next two decades, the first colonies of humans on Mars will be adventuring into a new era of human civilization no longer tethered to one planet.⁵⁰ Fellow humans of extra-terrestrial birth will confront biological and cognitive challenges that may benefit from the current research being done in Emerging Technologies. However, these advances will arguably benefit humanity as a whole.⁵¹

43. Samantha Masunaga, “A quick guide to Elon Musk’s new brain-implant company, Neuralink,” April 21, 2017, <https://www.latimes.com/business/technology/la-fi-tn-elon-musk-neuralink-20170421-htmlstory.html>.

44. Andy Clark, *Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence* (New York: Oxford University Press, 2003), ch. 1.

45. Elon Musk, “An integrated brain-machine interface platform with thousands of channels,” bioRxiv website, August 02, 2019, <https://www.biorxiv.org/content/10.1101/703801v4>.

46. www.nasa.gov/specials/artemis

47. Kenneth Chang, “For Artemis Mission to Moon, NASA Seeks to Add Billions to Budget,” *The New York Times* 13 May, 2019.

48. National Aeronautics and Space Administration (NASA), “NASA Taps 11 American Companies to Advance Human Lunar Landers,” news release, May 16, 2019, <https://www.nasa.gov/press-release/nasa-taps-11-american-companies-to-advance-human-lunar-landers>.

49. www.nasa.gov/specials/moontomars

50. Elon Musk, “Making Humans a Multi-Planetary Species,” *New Space* 5, no. 2 (2017), doi:10.1089/space.2017.29009.emu

51. Perhaps the most pressing question against the Emerging Technologies’ agenda and the transhumanist ethos underpinning it, from an ethical perspective, is how these improvements

As we can see, important breakthroughs are happening in nanoscience and nanotechnology, biotechnology and genetics, robotics, and artificial intelligence, paving the way for a different (better) life on earth and beyond. As the Emerging Technologies' restructuring of society is gradually normalized, fellow-citizens may increasingly choose to undergo biological and cognitive alterations. These alterations would take place so that they can keep up with the challenges of a technologically fluctuating society. These challenges will stem from the automation of several fields of the workforce, our merging with cognitive prosthetics (to keep up with the pervasive infusion of AI in every aspect of knowledge-production), and the widespread familiarization, acceptance, and adoption of genetic and bio-mechanical enhancements. Moreover, these very challenges may redefine the technological disruptions as essential means needed for a healthy existence and everyday social survival.

In a heavily NBIC-based reordered society, these modifications would become a requirement to attain quotidian practical functioning. Given this new social context, we are unlikely to pursue the alienation, let alone the discrimination, of individuals who choose to alter their bodies and cognitive abilities substantially. One should be open, however, to the prospect that some individuals may adopt these "nano-bio-info-cogno" modifications to express their inner impulses in a more "authentic" manner. This exercising of their "morphological freedom"⁵² would be fostered by new-identity recognition, personal ambition, solidarity with fellow altered humans, or indeed the attainment of specific spiritual goals. Furthermore, transhumanism counters bioconservative voices claiming a "yuck factor"⁵³ criterion for rejection of these alterations. This critical stance often comes from Aristotelian champions of rigid "natural kinds," where substantial alterations of the human substratum are to be opposed.⁵⁴ Under this view, some natural occurrences, such as homo sapiens, represent the culmination and completion of a natural process. It assumes that the ongoing evolution of the species (as natural selection demands of every species) would somehow

will be distributed throughout the world—or whether they may end up being monopolized by a powerful few. Although attempts have been made to circumvent that probable scenario Steve Fuller and Veronika Lipinska, *The Proactionary Imperative: A Foundation for Transhumanism* (Basingstoke: Palgrave Macmillan, 2014), the question arguably remains. However, it may be in essence not dissimilar to the question of world poverty in general.

52. Nick Bostrom, "In Defense of Posthuman Dignity," *Bioethics* 19, no. 3 (2005), doi:10.1111/j.1467-8519.2005.00437.x.

53. Kass Leon R. "The Wisdom of Repugnance," *The New Republic* 2 June 1997, 17–26.

54. *Ibid.*

stop and remain as such indefinitely. Thus, humans are “good” as they are (that is what is “natural”) and we should not tinker with its physical being. Transhumanists, in response, claim that the human world might become not only viable after environmental and technological threats but improved—albeit considerably different in form. They sustain that we are going to remain human—although we may not “look” as we do now. Being alive, perhaps even thriving, will always beat respecting “Mother Nature” all the way to our extinction.

However, there is a potentially more significant threat to transhumanist hopes. The outcome of this rivalry may have profound consequences for how the upcoming technological disruptions—and for that matter, potential environmental disasters—will shape humanity. Let us take a look.

2. POSTHUMANISM AND TRANSHUMANISM AS COMPETING ALTERNATIVES FOR HUMANITY’S FUTURE

Articulating the several conceptual and semantic narratives of what *posthumanism* stands for falls outside the scope of this article.⁵⁵ We could, however, arguably recognize that such a view has come to constitute a “default” position in many, if not most, institutions of higher education in the West.⁵⁶ The situation should not come as a surprise. On the one hand, an army of intellectuals still inspired by Marxian and socialist ideas had to find a dwelling space after the collapse of the Soviet Union and the subsequent end of the Cold War.⁵⁷ This social phenomenon transformed campuses into hotbeds of secularist, anti-Enlightenment positions, suspicious of the “Modern Project,” and imbued with anti-Western defiance. Progressively evident ecological changes (and in some cases, straight-up environmental catastrophes) seem to have redeemed cash value to the attempted erosion of “the human” as a privileged phenomenon in the world. The works of Charles Darwin and Michael Foucault arguably accelerated this deconstruction.⁵⁸ These intellectual impulses generated an almost fashionable “anti-humanist” stance, in practice celebrating the death of humanity, so that nature as a whole

55. A reasonable place to get a bird’s eye view of the theoretical landscape of posthumanism is Neil Badmington, ed., *Posthumanism* (Hampshire: Palgrave Macmillan, 2000).

56. For a study of the situation of education *vis à vis* postmodernity, see Jean-François Lyotard, *The Postmodern Condition: A Report on Knowledge*, trans. Geoffrey Bennington and Brian Massumi (Minneapolis, MN: University of Minnesota Press, 1984).

57. Fuller, *Humanity 2.0*, ch. 3.

58. Steve Fuller and Giuseppe Tanzella-Nitti, “A debate between Steve Fuller and Giuseppe Tanzella-Nitti on ‘scientific progress, human progress and Christian theology,’” *Church, Communication and Culture* 4, no. 2 (2019), doi:10.1080/23753234.2019.1616584.

can finally thrive. The survival of the planet was gradually epitomized as dichotomous: Either humans prosper, or nature dies.

Particularly among the youth, a renewed awareness of animal rights and ecological concerns is becoming sharper. Indeed, the political landscape is starting to feel the pressure (i.e., the slow but steady growth in “Green Party” supporters throughout the Northern Hemisphere). Higher education, fulfilling its mandate for shaping engaged future citizens, collaborates in distributing this outlook under a rubric of ecological responsibility. The results are already being felt, as most of Europe’s science policies are mostly precautionary.⁵⁹ The precautionary principle advocates for a slowing down or halting of scientific research and its subsequent technological implementation until the various multi-level side effects are better known. An aversion to risk implemented in restraints against scientific innovation, influenced by this view from the angle of the preservation of the planet, can end up, however, countering efforts to save, promote and foster human prosperity—and for that matter, helping the planet itself, as we will see below.

Both in academia and science policy, these two entrenched stances (post-humanism and the precautionary principle) risk leaving some defining features of the human, such as possessing some form of “dignity,” in a precarious position. How? Let us recall that Darwinian evolution does not conceive of any “special place” in nature for any species whatsoever. Species come and go, evolutionary fitness determining their fate. Random mutations make some members adapt; the rest gradually vanish from the evolutionary landscape. Eventually, every species will be replaced by a fitter one. In the big picture of evolution, we have no more worth than spiders. *Homo sapiens* carry no intrinsic value. Also, we may well be the least adaptive species in the great chain of natural beings, and the earth and the rest of creatures will pay the price as a consequence. The celebration of the “death of man” becomes especially meaningful in this context.

Still, it is widely claimed that there exist some inalienable rights that pertain to our humanity. Further, they allegedly qualitatively differentiate us from other creatures in nature. It is believed that these rights spring from either our capacity to reason, our perceived autonomy, our divine inheritance (having been created *in imago Dei*), or a combination of these. Much of our narrative on “human rights” is based upon these “intrinsic” features. However, these “value sources” have no “rightful place” in nature, evolutionarily speaking. Neither of these sources of rights have a biological

59. Fuller, *Humanity 2.0*, ch. 3.

anchoring so that it would place one species (ours) above the rest. Homo sapiens is just but one species that will emerge, coalesce, and die off, as any other species—and perhaps being the least felicitous species at that, ecologically speaking. *Stricto sensu*, we can claim that humans have rights, but we cannot claim that homo sapiens have them. Thus, locating “the human” in a tight isomorphic relationship with “homo sapiens” would place humanity in a situation where the defense of its purported dignity becomes intellectually blunted. It also situates humans in an empirically perilous position when confronted with natural or artificial disasters, due to the precautionary attitude that it assumes.

On the opposite end, a special place of humans in nature has been recognized by transhumanists from the beginning of the movement.⁶⁰ Transhumanism embodies the nemesis of the posthuman impulse towards the erosion and eventual vanishing of the human race. This human-centered counterforce is gradually gaining traction, perhaps emboldened by late breakthroughs in the sciences and technologies of the disruptive sort alluded to above. Indeed, there are those for whom the celebration of the “death of man” or the “end of humanity” is nothing to be cheerful about. Posthumanism espouses fair and sharp points; the general feeling of malaise regarding the rocky road leading to the notion of “the human” can be indeed understood. However, the moment this intellectual reaction begins to affect scientific practice, it should perhaps be contained. These *anti* “anti-human” detractors would claim that when posthumanism generates precautionary science policies, the pernicious consequences (for humanity) can become too empirically clear and present to be left unfazed. In that vein, even granting truth to the claim that a global ecological catastrophe would place humanity and the environment at risk—the rationale behind precautionary policies—would still not justify constraining scientific practice “until the side effects are better known.” Instead, further scientific research and experimentation would be favored, precisely to avert the said dire consequences.

The opposite view regarding scientific practice, namely, an approach *proactionary* in nature, could arguably be found to be correctly anthropocentric—specifically, more in consonance with the defense and promotion of humanity. Under the proactionary principle, the emphasis is placed on the risk that the scientist has to take in order to put an empirical insight through the paces of experimentation. Arguably more in sync with the

60. Julian Huxley, “Knowledge, Morality, and Destiny,” *Psychiatry* 14, no. 2 (1951), doi:10.1080/00332747.1951.11022818.

spirit of the scientific revolution (and the scientific method within it), a risk-friendly approach to experimentation would create a fertile ground for discovery. An increasing amount of paralyzing red tape often found in precautionary stances would otherwise hamper scientific innovation and discovery.⁶¹ A proactionary approach would rely more on furthering science and technology to subvert ecological degradation. Most importantly, it would be open to modifying the subject of suffering itself. Indeed, this purview would contemplate the potential for the radical modification of the human being itself. This position is underpinned by a character of urgency regarding the future of the human race.

Given that these environmental (or man-made) harmful developments are arguably already becoming ubiquitous (e.g. the growth in the number of cancerous diseases), the human, despite the unforgiving character of the natural world it confronts (whose dangerous outcomes might partly be triggered by us in the first place), would under a proactionary approach not only have more chance of surviving but, if things go relatively well, flourish. In that context, transhumanism's human-centered view stands in stark contrast with the posthumanist stance of celebration of the earth through the peril of the human. It would seem that all things considered, transhumanism is a movement that might carry the hope for the defense of both human dignity and its survival.

3. THE CHURCH IN THE SERVICE OF A TRANSHUMAN WORLD?

These biologically altered humans, despite their modified or swapped substrata, would still possess, according to transhumanism, every bit of whatever we call "humanity." This *human 2.0*, as per its humanity, will have spiritual needs to be attended to. As such, the Church will attend to their needs, both in terms of spiritual guidance and defense of this humanity. Perhaps more to the point of the Church's existence, it will attend its sacramental needs. Indeed, a sort of *aggiornamento 2.0* may take place, so that this extended humanity has its dignity defended and its sacraments received. The Church, expert in humanity,⁶² will face this challenge not without successful precedents found within its 2000 years of continued existence.

The Church is better referred to as a mystery, rather than as an entity that can be rigorously defined.⁶³ In Catholic theology, after Christ completed the

61. A system of social insurances would likely have to be put in place in order to protect the citizen from experiments go wrong. See Fuller and Lipinska, *The Proactionary Imperative*, ch. 4.

62. John Paul II, *Sollicitudo rei socialis*, accessed December 12, 2019, Vatican.va, 7, 41.

63. Vatican Council II, *Lumen Gentium*, accessed December 12, 2019, Vatican.va, ch. 1.

work tasked by his Father, the Holy Spirit was sent to jump-start the community that would proclaim the salvific message to the nations until the end of times, “proclaiming and establishing among all peoples the Kingdom of Christ and of God, and [that] she is on earth the seed and the beginning of that kingdom.”⁶⁴ In order to fulfill this mission, “the Holy Spirit ‘bestows upon [the Church] varied hierarchic and charismatic gifts, and in this way directs her.’”⁶⁵ Thus, some aspects of her nature and mission can be laid out. “The Church is at the same time: „society structured with hierarchical organs and the mystical body of Christ; the visible society and the spiritual community; the earthly Church and the Church endowed with heavenly riches.”⁶⁶ These “charismatic gifts” or “heavenly riches,” necessary for fulfilling its mission, were gradually understood in terms of nature and distribution. Indeed, the Church:

has gradually recognized this treasure received from Christ and, as the faithful steward of God’s mysteries, has determined its “dispensation.” Thus the Church has discerned over the centuries that among liturgical celebrations there are seven that are, in the strict sense of the term, sacraments instituted by the Lord.⁶⁷

These sacraments constitute an integral part of the Church’s mission. Their purpose is “to sanctify men, to build up the Body of Christ and, finally, to give worship to God. Because they are signs they also instruct. They not only presuppose faith, but by words and objects they also nourish, strengthen, and express it.”⁶⁸ They provide the thrust and energy to complete the ultimate human task: holiness⁶⁹—which in Catholic parlance equates to human flourishing itself, impossible without communion with God.⁷⁰

Although the Church emphasizes an existing unity between mind and body, it is remarkable that in no current authoritative document of the Magisterium (e.g., Canon Law, Catechism, Vatican Council II, etc.) the “human” is inextricably linked with a determinate corporeal feature of the species homo-sapiens. Namely, although both are profoundly united, one does not depend on the other. Although we are profoundly related to

64. *Catechism of the Catholic Church*, accessed December 12, 2019, Vatican.va, 768.

65. *Ibid.*

66. *Ibid.*, 771.

67. *Ibid.*, 1117.

68. *Ibid.*, 1123.

69. Vatican Council II, *Gaudium et Spes*, accessed December 12, 2019, Vatican.va, 40.

70. *Ibid.*, ch. 1.

our bodies,⁷¹ these human bodies, are not declared as being exclusively belonging to the species *homo sapiens*.⁷² This ambiguity is, in fact, reasonable, since the soul (spirit) comes *directly* from God—not from our biology.⁷³ What defines us as humans has less to do with the body and its features and more to do with the mind, spirit, and will.

The Church is an institution that thinks, plans, and strategizes in terms of centuries. A cursory study of its previous positions regarding the nature of humanity reveals that the idea of “the human” was never a monolithic and static notion. Indeed, it is a fluid one that has been sponsored and defended under different guises, pressed by sui-generis apostolic needs, in previous eras.⁷⁴ A case in which the notion of humanity is currently explored and extended by the Church is the question of evangelization of extraterrestrial intelligence. Although the question of the “plurality of worlds” itself is not particularly new, having emerged in Medieval theology (e.g., Nicholas of Cusa) and philosophy (e.g., William of Ockam),⁷⁵ it is lately, due to the discovery of exoplanets (planets potentially habitable by humans) and more data on UFO sightings, that the question became present again. The treatment of the issue seems to be so far occurring outside official definitions and articulations by the Magisterium. Certainly, it merits a more extended treatment than what can be said in this piece, particularly regarding what concerns the creative powers of God, the possibility or impossibility of His Incarnation in other worlds, His reconciliation plan at a genuinely universal level, among other issues.⁷⁶ However, the line of speculation currently taking shape seems to confirm this treatment of the human as once again a “fluid notion.” For instance, the question whether a

71. “The unity of soul and body is so profound that one has to consider the soul to be the ‘form’ of the body” (*Catechism of the Catholic Church*, 365).

72. “The human body shares in the dignity of ‘the image of God’: it is a human body precisely because it is animated by a spiritual soul” (*ibid.*, 364).

73. “The Church teaches that every spiritual soul is created immediately by God—it is not ‘produced’ by the parents—and also that it is immortal” (*ibid.*, 366).

74. For the Church’s struggles in asserting the humanity of the people found in the New World in the fifteenth century, see Pope Paul III, “Sublimis Deus. On the Enslavement and Evangelization of Indians,” <https://www.papalencyclicals.net/paul03/p3subli.htm>. Juan Frede, and Benjamin Keen, eds. *Bartolomé de las Casas in History: Toward an Understanding of the Man and his Work* (DeKalb: Northern Illinois University Press, 1971), and John Crow, *The Epic of Latin America* (Berkeley: University of California Press, 1992).

75. Steven J. Dick, *Plurality of Worlds: The Extraterrestrial Life Debate from Democritus to Kant* (Cambridge, MA: Cambridge University Press, 1984).

76. George V. Coyne SJ, “The Evolution of Intelligent Life on The Earth And Possibly Elsewhere: Reflections from A Religious Tradition,” in *Many Worlds: New Universe Extraterrestrial Life*, ed. Steven J. Dick (Radnor, PA: Templeton Foundation Press, 2000).

non-human intelligence, correctly informed of the mysteries of salvation, should be granted baptism if it asked, seems to elicit a positive answer in terms of its delivery. If we extend sacramental reception to intelligent non-humans, are we extending humanity to them? Is the provision of sacraments to be reserved for *homo sapiens* only, even if such entities shows signs of conversion and a life of charity and prayer?⁷⁷ It would seem that in extending sacramental life to entities who would desire to enter the status of “human,” the Church is already having the right intuitions on how this would work out.⁷⁸ However, we do not have to hypothesize alien encounter scenarios in order to begin seeing these intuitions in practice. Let us see.

Most accounts of transhumanism coming from Catholic circles show a mild to radical rejection of the idea of a profound alteration, utilizing pervasive Emerging Technologies, of whatever we take “human nature” to be. These criticisms come from both progressive and conservative Catholic flanks. However, as it is increasingly becoming evident, the left/right divide is no longer capturing ethical, political, and philosophical stances accurately.⁷⁹ There are cross-linked concerns which transcend such a traditional dichotomy. The Church, insofar as it is also a human institution, is not immune to this ongoing rotating axis. The perceived Catholic unfriendliness to transhumanism stems from views that do not take into account the very mission that, as we have seen, constitutes an organic aspect of the Church’s existence.⁸⁰

To be sure, there are aspects of transhumanism that may find fundamental rejection when confronted with Church doctrine—particularly in relation to human dignity. In this context, attempts to accomplish indefinite life extension will probably not find fertile ground in Catholic milieus. The more vulgar aspects of the transhumanist movement—such as the fashionable militant atheism sponsored by some,⁸¹ or the attempt to replace religion

77. José Gabriel Funes, “The Extraterrestrial is my Brother,” *L’Osservatore Romano* website, May 14, 2008, http://www.vatican.va/news_services/or/or_quo/interviste/2008/112q08a1.html.

78. Sabrina Arena Ferrisi, “Of UFOs, Space Aliens and the Catholic Faith,” *National Catholic Register* website, June 20, 2019, <http://www.ncregister.com/daily-news/of-space-aliens-and-the-catholic-faith>.

79. Steve Fuller, “Ninety Degree Revolution,” *Aeon Magazine* website, October 24, 2013, <https://aeon.co/essays/left-and-right-are-over-the-future-is-up-and-down>.

80. A notable exception being the work of the Franciscan Sister Ilia Delio “Why Transhumanism Will Transform the Church,” *National Catholic Reporter: Global Sisters Report* website, November 17, 2014, <https://www.globalsistersreport.org/why-transhumanism-will-transform-church-14956>.

81. Zoltan Istvan, “Is it Time for Fast Track Atheist Security Checks at Airports?,” *Huffington Post* website, October 2015, https://www.huffpost.com/entry/is-it-time-for-fast-track_b_7549062?gucounter=1.

with technology⁸²—would not find sympathy either. However, precisely due to an idiosyncratically Catholic attention to human dignity, attempts at the improvement of the human experience will likely attract the attention of the Magisterium. Perhaps more importantly, and not unrelated to a distinctly Catholic understanding of personal self-realization, the Church will have to cope with the needs that a profoundly altered human condition will entail. Indeed, as seen above, one fundamental aspect of the Church's mission is underpinned by the fulfillment of a particular service to humans: The dispensation of sacraments.⁸³ A sacramental life does not only help towards one's eternal salvation but dramatically improves the chances of a life of flourishing. Thus, the Magisterium would be interested in at least two realms of investigation for its apostolic mission: one ontological (i.e., pertaining to what counts as human, towards a better coping with foreseeable transhumanist alterations), and one pragmatic (i.e., to ensure both adequate evangelization and the fulfilling of its sacramental directive).

Once people begin to radically and ubiquitously change their physical existence, to the point where most of their being would be constituted by non-human parts (artificial or biological), the Church will have to be prepared to extend the notion of humanity to them. Not only they will need salvation, but they will also need to flourish in this life as self-realized individuals—something that according to Catholic doctrine, is solidly helped by sacramental reception. Moreover, if widespread physical alteration of humans were to occur, the Church has a mandate of evangelization to them as well. This mandate will likely encourage apostolic agents to become familiarized with these novel ways of corporeal existence in order to better understand them—even embrace them in order to turn them into vehicles of evangelization themselves. We have a plethora of historical examples in related contexts, from the Jesuit grammaticalization of the Inka language—which led towards a deep inculturation of the Catholic faith among indigenous populations, actively present up to these days—to Marshall McLuhan's prophetic expertise in human communications—which

82. Transhumanism has been compared to a type of "religion of technology" where humanity aims at being its own savior. For a criticism of transhumanism linking it to the gnostic heresy, and a reply, see Mark Shiffman, "Humanity 4.5," First Things website, November 2015, <https://www.firstthings.com/article/2015/11/humanity>; and Alcibiades Malapi-Nelson, "Transhumanism, Christianity and Modern Science: Some Clarifying Points Regarding Shiffman's Criticism of Fuller," *Social Epistemology Review and Reply Collective* 5, no. 2 (2016), respectively.

83. "Thus the Church's mission is not an addition to that of Christ and the Holy Spirit, but is its sacrament: in her whole being and in all her members, the Church is sent to announce, bear witness, make present, and spread the mystery of the communion of the Holy Trinity" *Catechism of the Catholic Church*, 738.

arguably influenced the Second Vatican Council's *Inter Mirifica* document on the same topic. Indeed, the above alluded to "morphological freedom" might become for the Church what philosophy of communication became for McLuhan, or what the in-depth study of astronomy facilitated for the Jesuit Order, garnering them worldwide scientific recognition.

Thus, the chances are that the Church will need to embrace a particular instantiation of a transhuman future, given that the institution will have to cope with a radically changed receptacle—humanity 2.0—of these grace-granting devices—the Sacraments. Indeed, this would be done in order to be consistent with the reason for its very existence as mandated by Christ: guaranteeing the constant flow of these efficacious means which collaborate towards both a fulfilled existence in this life and salvation in the next one. The question remains as to how we would judge these entities regarding entrance into the human realm. Steve Fuller foresees a possible scenario where one could consider:

A re-specification of the "human" to be substrate-neutral (that is to say, a "human" need not be the descendant of another member of *Homo sapiens* but rather could be a status conferred on any suitably qualified entity, as might be administered by a citizenship test or even a Turing Test).⁸⁴

No doubt, the above criterion would be substantially improved by Catholic theology to account for a better image of what entering humanity might entail. Judging from its track record, the Church will problematically but ultimately successfully raise to the challenge. A substrate-neutral re-specification of the human may indeed be the route taken by the Church—perhaps after justifiably calling a *Concilium*. The challenge will be variously instantiated in correlation with the sacraments to be delivered. However, all seven of them share one feature that will be problematized with the implementation of transhumanist technologies: Sacraments perform metaphysically what they do physically.⁸⁵ The material function performed in this world (e.g., the pouring of water on someone's head) mirrors their efficacy in the spiritual one (e.g., performs a baptism). Since our bodies may change at

84. Steve Fuller, "Beyond Good and Evil: The Challenge of Trans- and Post-Humanism," ABC Religion and Ethics website, December 20, 2016, <https://www.abc.net.au/religion/beyond-good-and-evil-the-challenge-of-trans--and-post-humanism/10096240>.

85. "The sacraments are efficacious signs of grace, instituted by Christ and entrusted to the Church, by which divine life is dispensed to us. The visible rites by which the sacraments are celebrated signify and make present the graces proper to each sacrament," *Catechism of the Catholic Church*, 1131.

a fundamental level, maintaining the efficacy of sacraments, which need physical substrata to work, will be the common problem. It should be clear that I am not attempting to suggest solutions. The Church will develop them. Instead, I would like to point out the likely scenarios that will raise challenges to be met by the Church in order to fulfill its sacramental duty. Let us see how these transhuman challenges could variously obtain.

4. THE SACRAMENTAL LIFE OF HUMANITY 2.0

As the current notion of humanity stands (an entity created in *imago Dei*),⁸⁶ not much would have to change in order to extend it to an altered entity claiming to maintain, or asking to receive, human status. A deep alteration of our bodies constitutes no fundamental reason for not participating in the realm “human” and thus, enter the Church through Baptism, the elimination of the legacy of Original Sin with which humans are born—either by natural means, cloned, or harvested. Holy water can be poured on flesh, metal, or a new alloy constituting someone’s forehead. As indicated above, the Church does not mention “flesh” as a *sine qua non* condition for humanity to obtain.

On the other hand, there is a scenario, more posthuman than transhuman in nature, that may emerge as a side effect out of the attempts to ameliorate the human condition: The previously mentioned GOFAI (Good Old Fashion Artificial Intelligence). If entities that share none of the features—bodily, historically, cognitively—that we usually associate with humanity, begin to claim human status on account of displaying both rationality and autonomy, then the Church may have to go through one of its most profound *aggiornamenti*, in two millennia of operation. Individual tests administered by local bishops on a case-by-case basis (after a universal directive coming from the Holy See) would likely have to be put in place—which would aim to assess, for instance, the sincerity of the entity’s prayer. It is a canonical signature of divine presence in an individual that there is a persistent witnessing of an ongoing *metanoia* (conversion). A consistent life of self-giving and spiritual warfare could be the required accepted signs for this entity being declared a child of God, equal to the rest of us, granting its entrance into the Church with all the entailing spiritual perks (i.e., access to the full array of sacraments).

There is a caveat that is less problematic for Catholic doctrine than for modern society: Sex assignation. Just as the “natural machine” (a human) already comes with one, the artificial one could have it as well. Male or female could in principle also happen in *silico*. Failure to do so would carry the

86. Genesis 1, 26–8.

issue to realms not dissimilar from current disputes of “sex reassignment” and its proper recognition by society: It might be a problem, but it would not be a *new* problem. The same reasoning would apply to “post-gender” approaches to transhumanism.

Given that the sacrament of Reconciliation has to be obligatorily performed, literally, *vis à vis*, what if environmental catastrophes reduce our physical mobility so that we can no longer face a priest? Will the Church accept telepresence? Will the Church establish unhackable protocols of unbreakable encryption? After all, it is an actual confession that we are talking about: Only a priest can hear it—and only the Pope, on exceptional cases, can hear it from him. Breaking the confessional seal entails *excommunicatio ipso facto*. As we previously saw, the prospect of humans permanently living on another planet is a situation that we may well see within 20 years, thanks to the collaboration of private companies with public agencies (i.e., SpaceX with NASA). How will they receive this sacrament? Even if the Church permanently bans the possibility of approaching confession via a virtual environment (necessitating priests being sent to these extra-terrestrial locations—e.g., a permanent base in the moon), what would happen if people eventually start to inhabit physical avatars? Would that count as being physically, present, and thus, next to a priest?

The provision of the most important of all sacraments, the Eucharist, will not be void of issues either. The Latin Rite of the Catholic Church (the portion of Catholics who are properly “Roman”) mandates that only unleavened bread shall be used as the physical substratum so that it later transubstantiates into the body of Christ. The Church is unusually strict on this, as evinced in cases where alternative breads have been used (e.g., when stranded for long periods on a deserted island), not recognizing those events as properly Eucharistic: the sacrament never took place on such occasions. Nevertheless, we will have to confront situations where the actual bread cannot be sent to remote locations of future human dwelling (e.g., Mars), nor a priest be present to perform the said metaphysical swapping. Facing this, would nanotechnology provide the solution? Would something coming out of a 3D printer or an aforementioned “molecular assembler”⁸⁷ qualify as the “real” unleavened bread? (Would a “new” thing coming from the mechanical reorganization of its atoms count as an ontologically different thing?) Alternatively, would married priests from the Byzantine Catholic Church (whose Eucharist is not based on unleavened bread, and thus, likely easier to obtain) be sent to these locations instead, so that *any* Catholic may take communion from them?

87. Drexler and Smalley, “Nanotechnology.”

The sacrament of Marriage will likely confront two main challenges: one fundamentally novel and the other an extension of already occurring issues. Regarding the latter, let us take into consideration a particular theme in certain transhumanist circles: The pursuit of indefinite life extension. It is understood that once people either become healthier longer (or stop aging), the creation of new life via offspring may become an after-thought. Canon Law stipulates that those who consciously decide *not* to procreate cannot enter this sacrament. In that sense, a childless society would be constituted by sacramentally unmarried people. Once again, this issue is a variation of already occurring scenarios—which could be extended, for that matter, to sex-reassigned people.

The former challenge mentioned would be unprecedented. Would the Church marry a human and a machine? Bear in mind that this question is fundamentally different from the already occurring question regarding the Church refusing to marry humans and non-human animals. The difference here is that the refusal is arguably partly based upon the lack of *autonomy* and *rationality* shown by the latter. However, machines could one day show *both* (admittedly Kantian) human-defining features. The Church may find, in principle, no obstacle to marry a human “1.0” and a human “2.0” (e.g., a cyborg) provided that the humanity of the new lifeform, following the guidelines established by the requirements for Baptism, is well established.

As with Marriage, the Holy Orders will likely face a twist both on an already occurring scenario and a new one. On the one hand, the physical requirement of a bishop placing his hands on someone’s head to ordain him a priest, has carried problematic cases for the Church (e.g., during missions where bishops were not available). With rare exceptions, this requirement has always been observed. A possible counter case is the ordination of Stylite monks between the third and sixth century. These hermits made vows to not come down from their solitary pillar until death. Reportedly, sometimes bishops ordained them via an “action at a distance” of sorts—but still from a few meters away. The Church will have to establish whether ordaining someone via telepresence (or inhabiting an avatar) would count as sacramentally valid. (A similar reasoning could be applied to the sacrament of Confirmation.) On the other hand, the current requirement for a candidate for priesthood to have all his limbs—particularly his hands—up until the moment of ordination might face softening situations. At the moment where a prosthetic limb not only seamlessly becomes an extension of the individual, but a better functional extension of him, the Church may reconsider this pre-ordination requirement.

The Last Rites will likely confront two challenges in a transhuman world. One would not constitute in itself a problem for its deliverance, but rather a questioning of the point of its existence. The other will entail a possible redefinition of what is considered to be “dead.” In what refers to the consequences of indefinite life extension, this sacrament may be considered by Catholics of no use. Perhaps the sacrament would stay put for those who choose to end their lives “naturally” (in itself a problem for transhumanism: What to do with those who do not want to get “enhanced”?). Alternatively, the Church will ban this particular transhumanist choice of life for Catholics, period⁸⁸—as much as it now forbids euthanasia and abortion.

On the other hand, the prospect of mind uploading may push to redefine the notion of what it means to leave this body, given that such experience may not necessarily entail death. If having consciousness inside a super-computer is defined as being alive—which as seen above may be in principle accepted by the Church—then the delivery of the sacrament would have to be performed without physicality, perhaps via a link between the software-giver and the software-receiver. This extension could even open up possibilities for sacrament-delivery to remote locations.

5. CONCLUDING REMARKS

Emerging Technologies and the transhumanist metaphysics underpinning them are likely here to stay. When contrasted with posthumanism, transhumanism seems to be the least unfriendly platform for the promotion of both human dignity and the exploration of its physical survival. This theoretical platform, however, will foster the already ongoing profound transformation of what we consider to be the material anchoring of human nature. If we consider humanity not to be reduced to its unmodified physical anchoring, the possibilities for humanity to flourish are significant. This transformation will, in turn, pose fresh new challenges for fulfilling two fundamental aspects of the Church’s mission, namely, the defense of human dignity and the distribution of sacraments. Although more study has to be done, it is suggested that all things considered, transhumanism is a better choice for the Catholic Church to be used as a platform for its future service of humanity.⁸⁹ This attitude of acceptance shall emerge mo-

88. Richard Morgan’s science fiction novel *Altered Carbon* specifically explores this possible scenario Richard K. Morgan, *Altered Carbon* (London: Gollancz, 2002).

89. As a possible counterpoint, it has been surmised that Pope Francis’ is one of the strongest current advocates for a precautionary stance Steve Fuller, “Which Way is Up for the Human Condition? A Response to Clive Hamilton,” ABC Religion and Ethics website, August 26, 2015, <https://www.abc.net.au/religion/which-way-is-up-for-the>

tivated by two primary sources: On the one hand, a vital option towards the development of human dignity—which by default would associate the Church more to a transhumanist philosophy than to a posthuman one. On the other, a fundamental concern for the uninterrupted fulfilling of its mission *and* reason of existence—the delivery of sacraments to a radically altered human recipient. As shown above, the Church, given its history, philosophy, and prime mandate, has all the right reasons to thrive in a transhuman future. After all, if humans ultimately flourish, the Church, physically conformed by the people of God, will do so as well.

BIBLIOGRAPHY

- Abbate, Janet. *Inventing the Internet*. Cambridge, MA: MIT Press, 1999.
- Allen, George. “The Economic Promise of Nanotechnology.” *Issues in Science and Technology* 21, no. 4 (2005): 55–6.
- Allen, Greg, and Taniel Chan. *Artificial Intelligence and National Security*. Cambridge, MA: Belfer Center for Science and International Affairs, 2017.
- Asaro, Peter. “Algorithms of Violence: Critical Social Perspectives on Autonomous Weapons.” *Social Research: An International Quarterly* 86, no. 2 (2019): 537–55.
- Badmington, Neil, ed. *Posthumanism*. Hampshire: Palgrave Macmillan, 2000.
- Böhme, Gernot, Wolfgang Van Den Daele, and Wolfgang Krohn. “Finalization in Science.” *Social Science Information* 15, no. 2/3 (1976): 307–330. doi:10.1177/053901847601500205.
- Bostrom, Nick. “In Defense of Posthuman Dignity.” *Bioethics* 19, no. 3 (2005): 202–14. doi:10.1111/j.1467-8519.2005.00437.x.
- Catechism of the Catholic Church*. Accessed December 12, 2019. Vatican.va.
- Chang, Kenneth. “For Artemis Mission to Moon, Nasa Seeks to Add Billions to Budget.” *The New York Times*, May 13, 2019.
- Clark, Andy. *Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence*. New York: Oxford University Press, 2003.
- Clinton, Bill. “President Clinton’s Address to Caltech on Science and Technology.” News release, 2004.
- Coyne SJ, George V. “The Evolution of Intelligent Life on the Earth and Possibly Elsewhere: Reflections from a Religious Tradition.” In *Many Worlds: New Universe Extraterrestrial Life*, edited by Steven J. Dick, 177–90. Radnor, PA: Templeton Foundation Press, 2000.
- Crow, John. *The Epic of Latin America*. Berkeley: University of California Press, 1992.
- Delio, Iliia. “Why Transhumanism Will Transform the Church.” National Catholic Reporter: Global Sisters Report website, November 17, 2014, <https://www.globalsistersreport.org/why-transhumanism-will-transform-church-14956>.

-human-condition-a-response-to-clive-hami/10097946—a position being traditionally associated with post-human leanings. The Pontiff’s *Laudato Si* encyclical on the environment certainly seems to point to this direction. That may be part of a—so far seemingly successful—strategy put in place by the Church for decades to come (e.g., perhaps in order to establish closer communication and dialogue with non-Abrahamic traditions, where the exaltation of the human over and above nature is not shared). Addressing the reasoning behind this strategy escapes the scope of this piece.

- Dick, Steven J. *Plurality of Words: The Extraterrestrial Life Debate from Democritus to Kant*. Cambridge, MA: Cambridge University Press, 1984.
- Drexler, K. Eric, and Rick Smalley. "Nanotechnology: Drexler and Smalley Make the Case for and against 'Molecular Assemblers.'" *Chemical & Engineering News*, December 1, 2003, 37–42 suffix.
- Elliott, Carl. "Enhancement Technologies and the Modern Self." *Journal of Medicine and Philosophy* 36, no. 4 (2011): 364–74. doi:10.1093/jmp/jhr031.
- Esfandiary, Fereidoun M. "Up-Wing Priorities." *Future Life*, 1981. <https://hplusmagazine.com/2012/12/12/2030-is-the-new-2012/> suffix.
- Ferrisi, Sabrina Arena. "Of Ufos, Space Aliens and the Catholic Faith." National Catholic Register website, June 20, 2019, <http://www.ncregister.com/daily-news/of-space-aliens-and-the-catholic-faith>.
- Freddolino, Peter L., Anton S. Arkhipov, Steven B. Larson, Alexander McPherson, and Klaus Schulten. "Molecular Dynamics Simulations of the Complete Satellite Tobacco Mosaic Virus." *Structure* 14, no. 3 (2006): 437–49. doi:10.1016/j.str.2005.11.014.
- Fuller, Steve. "Beyond Good and Evil: The Challenge of Trans- and Post-Humanism." ABC Religion and Ethics website, December 20, 2016, <https://www.abc.net.au/religion/beyond-good-and-evil-the-challenge-of-trans--and-post-humanism/10096240>.
- . *Humanity 2.0: What It Means to Be Human Past, Present and Future*. Basingstoke, UK: Palgrave Macmillan, 2011.
- . "Ninety Degree Revolution." Aeon Magazine website, October 24, 2013, <https://aeon.co/essays/left-and-right-are-over-the-future-is-up-and-down>.
- . "Technological Unemployment as a Test of the Added Value of Being Human." In *Education and Technological Unemployment*, edited by Michael Adrian Peters, Petar Jandrić and Alexander Means. Singapore: Springer, 2019.
- . "Which Way Is up for the Human Condition? A Response to Clive Hamilton." ABC Religion and Ethics website, August 26, 2015, <https://www.abc.net.au/religion/which-way-is-up-for-the-human-condition-a-response-to-clive-hami/10097946>.
- Fuller, Steve, and Veronika Lipinska. *The Proactionary Imperative: A Foundation for Trans-humanism*. Basingstoke: Palgrave Macmillan, 2014.
- Fuller, Steve, and Giuseppe Tanzella-Nitti. "A Debate between Steve Fuller and Giuseppe Tanzella-Nitti on 'Scientific Progress, Human Progress and Christian Theology.'" *Church, Communication and Culture* 4, no. 2 (2019): 123–36. doi:10.1080/23753234.2019.1616584.
- Funes, José Gabriel. "The Extraterrestrial Is My Brother." L'Osservatore Romano website, May 14, 2008, http://www.vatican.va/news_services/or/or_quo/interviste/2008/112q08a1.html.
- Gibson, Daniel G., John I. Glass, Carole Lartigue, Vladimir N. Noskov, Ray-Yuan Chuang, Mikkel A. Algire, Gwynedd A. Benders, et al. "Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome." *Science* 329, no. 5987 (2010): 52–6. doi:10.1126/science.1190719.
- Habermas, Jürgen. *The Future of Human Nature*. Translated by Hella Beister and William Rehg. Cambridge, UK: Polity, 2003.
- Huxley, Julian. "Knowledge, Morality, and Destiny." *Psychiatry* 14, no. 2 (1951): 129–40. doi:10.1080/00332747.1951.11022818.
- Initiative, National Nanotechnology. *Strategic Plan*. Arlington, VA: National Nanotechnology Coordination Office, 2014.
- . *Supplement to the President's 2015 Budget*. Arlington, VA: National Nanotechnology Coordination Office, 2014.

- Istvan, Zoltan. "Is It Time for Fast Track Atheist Security Checks at Airports?" Huffington Post website, October 2015, https://www.huffpost.com/entry/is-it-time-for-fast-track_b_7549062?guccounter=1.
- John Paul II. *Sollicitudo Rei Socialis*. Accessed December 12, 2019, Vatican.va.
- Karr, Jonathan R., Jayodita C. Sanghvi, Derek N. Macklin, Miriam V. Gutschow, Jared M. Jacobs, Benjamin Bolival Jr., Nacyra Assad-Garcia, John I. Glass, and Markus W. Covert. "A Whole-Cell Computational Model Predicts Phenotype from Genotype." *Cell* 150, no. 2 (2012): 389–401. doi:10.1016/j.cell.2012.05.044.
- Lartigue, Carole, John I. Glass, Nina Alperovich, Rembert Pieper, rashanth P. Parmar, Clyde A. Hutchison III, Hamilton O. Smith, and J. Craig Venter. "Genome Transplantation in Bacteria: Changing One Species to Another." *Science* 317, no. 5838 (2007): 632–8. doi:10.1126/science.1144622.
- Leon R, Kass. "The Wisdom of Repugnance." *The New Republic* 2 June 1997 suffix.
- Leviathan, Yaniv, and Yossi Matias. "Google Duplex: An Ai System for Accomplishing Real-World Tasks over the Phone." Google AI Blog website, May 8, 2018, <https://ai.googleblog.com/2018/05/duplex-ai-system-for-natural-conversation.html>.
- Liotard, Jean-François. *The Postmodern Condition: A Report on Knowledge*. Translated by Geoffrey Bennington and Brian Massumi. Minneapolis, MN: University of Minnesota Press, 1984.
- Malapi-Nelson, Alcibiades. *The Nature of the Machine and the Collapse of Cybernetics: A Transhumanist Lesson for Emerging Technologies*. Cham: Palgrave Macmillan, 2017.
- . "Transhumanism, Christianity and Modern Science: Some Clarifying Points Regarding Shiffman's Criticism of Fuller." *Social Epistemology Review and Reply Collective* 5, no. 2 (2016): 1–5.
- Masunaga, Samantha. "A Quick Guide to Elon Musk's New Brain-Implant Company, Neuralink." April 21, 2017, <https://www.latimes.com/business/technology/la-fi-tn-elon-musk-neuralink-20170421-htmlstory.html>.
- Mihail C. Roco, and William Sims Bainbridge, eds. *Converging Technologies for Improving Human Performance: Nanotechnology, Biotechnology, Information Technology and Cognitive Science*. National Science Foundation. Dordrecht: Kluwer Academic Publishers, 2003.
- More, Max. "The Philosophy of Transhumanism." In *The Transhumanist Reader*, edited by Max More and Natasha Vita-More, 3–17. West Sussex: John Wiley & Sons, 2013.
- Morgan, Richard K. *Altered Carbon*. London: Gollancz, 2002.
- Musk, Elon. "An Integrated Brain-Machine Interface Platform with Thousands of Channels." bioRxiv website, August 02, 2019, <https://www.biorxiv.org/content/10.1101/703801v4>.
- . "Making Humans a Multi-Planetary Species." *New Space* 5, no. 2 (2017): 46–61. doi:10.1089/space.2017.29009.emu.
- National Aeronautics and Space Administration (NASA). "Nasa Taps 11 American Companies to Advance Human Lunar Landers." news release, May 16, 2019, <https://www.nasa.gov/press-release/nasa-taps-11-american-companies-to-advance-human-lunar-landers>.
- Nature Editorial. "Anticipating Artificial Intelligence." *Nature* 532, no. 413 (26 April 2016). doi:10.1038/532413a. <https://www.nature.com/news/anticipating-artificial-intelligence-1.19825>.
- Nbc Disruptive Technology Watch*. Defence Research and Development Canada, April 2003.
- "The Nobel Prize in Chemistry 2016." Nobelprize website, October 5, 2016, <https://www.nobelprize.org/prizes/chemistry/2016/press-release/>.
- Nordmann, Alfred. *Converging Technologies: Shaping the Future of European Societies*. European Commission (Luxembourg: CORDIS, 2004).

- O'Meara, Sarah. "Will China Lead the World in Ai by 2030?". *Nature* 572 (2019): 427–8. doi:10.1038/d41586-019-02360-7.
- Paul III, Pope. "Sublimis Deus. On the Enslavement and Evangelization of Indians." <https://www.papalencyclicals.net/paul03/p3subli.htm>.
- Popper, Karl. *Unended Quest: An Intellectual Autobiography*. Oxfordshire, UK: Taylor and Francis, 2005.
- Rana, Preetika. "How a Chinese Scientist Broke the Rules to Create the First Gene-Edited Babies." Wall Street Journal website, May 10, 2019, <https://www.wsj.com/articles/how-a-chinese-scientist-broke-the-rules-to-create-the-first-gene-edited-babies-11557506697>.
- Regalado, Antonio. "China's Crispr Twins Might Have Had Their Brains Inadvertently Enhanced." MIT Technology Review website, February 21, 2019, <https://www.technologyreview.com/s/612997/the-crispr-twins-had-their-brains-altered/>.
- Remedios, Francis X., and Val Dusek. *Knowing Humanity in the Social World: The Path of Steve Fuller's Social Epistemology*. London: Palgrave Macmillan, 2018.
- Ross, Alec. *The Industries of the Future*. New York: Simon & Schuster, 2016.
- Royal Academy of Engineering. *Nanoscience and Nanotechnologies: Opportunities and Uncertainties*. London: The Royal Society, 2004.
- Scharre, Paul. "Killer Apps: The Real Dangers of an Ai Arms Race." Foreign Affairs website, May/June 2019, <https://www.foreignaffairs.com/articles/2019-04-16/killer-apps>.
- Shaw, David M. "Cryoethics: Seeking Life after Death." *Bioethics* 23, no. 9 (2009): 515–21. doi:10.1111/j.1467-8519.2009.01760.x.
- Shiffman, Mark. "Humanity 4.5." First Things website, November 2015, <https://www.firstthings.com/article/2015/11/humanity>.
- Shirai, Yasuhiro, Andrew J. Osgood, Yuming Zhao, Kevin F. Kelly, and James M. Tour. "Directional Control in Thermally Driven Single-Molecule Nanocars." *Nano Letters* 5, no. 11 (2005): 2330–4. doi:10.1021/nl051915k.
- StatNano. *Annual Report 2015*. StatNano (2016). <https://statnano.com/publications/3864>.