

IS TECHNOLOGICAL CIVILIZATION THE UNIVERSAL CULMINATION OF INTELLECTUAL EVOLUTION? IMPLICATIONS FOR SETI AND THE FAR POSTHUMAN FUTURE

Olev Vinn

ABSTRACT: The assumption that technological civilization is final stage of evolution of intellect and the universal indicator of advanced ETI is not well justified. For a hypothetical unlimited intellect, technological civilization would be unnecessary if immortality, flawless and boundless memory, unlimited capacity for information processing, perfect communion between minds, and infinite sensory perception were already given. Intelligent entities sufficiently close to such an intellect may exist in the universe without developing technological civilizations, yet still be scientifically and culturally more advanced than any society that relies on them. Presumably, all successful technological civilizations eventually create entities approaching this hypothetical unlimited intellect, at which point the technological framework becomes redundant and is abandoned. Alternatively, unknown evolutionary pathways of matter may give rise directly to such entities, entirely bypassing the technological stage of development. It is therefore possible that the most advanced minds and the least advanced minds in the universe share a common trait: the absence of technological civilization.

KEYWORDS: SETI; Technological civilizations; Evolution of intelligence; Unlimited intellect; Great silence.

INTRODUCTION

Much of the discourse in the philosophy of science, astrobiology, and the search for extraterrestrial intelligence (SETI) is predicated on the assumption that technological civilization is both the natural and universal outcome of advanced intellect. This assumption manifests in the reliance on detecting technological artifacts—radio signals, megastructures, or atmospheric modifications—as

primary strategies for discovering extraterrestrial intelligence (Tarter, 2001; Wright, 2018). Yet, this assumption may be anthropocentric. It risks mistaking the specific historical trajectory of human civilization for a cosmic norm. The present paper challenges that view by considering the possibility that advanced intellect, once it transcends certain biological limitations, no longer requires civilization as conventionally understood (Clark and Chalmers, 1998; Fukuyama, 2003; Bostrom, 2005).

I adopt the following working definition: civilization is a set of technologies that help intelligent entities to exist, to think, and to explore the universe. This definition is deliberately functional and anthropologically modest. It avoids cultural or moral connotations and instead foregrounds civilization's role as a compensatory structure. On this basis, I argue that technological civilization is not a universal marker of advanced intellect. Instead, it may represent a transitional phenomenon, characteristic only of beings with significant cognitive, sensory, and mortal limitations. Advanced minds that transcend such limitations may exist without technological civilization, or may eventually abandon it altogether.

The argument proceeds in four steps. First, I analyze the human case, in which civilization functions as a compensation for limitations. Second, I consider an unlimited form of intellect, and argue that civilization would be redundant in such a case. Third, I examine the astrobiological implications of this hypothesis, including the possibility of undetectable advanced minds and transitional civilizations. Finally, I situate these ideas within the philosophy of technology and SETI literature, highlighting how they challenge conventional assumptions.

THE HUMAN CASE: CIVILIZATION AS COMPENSATION

Human civilization emerged not as an inevitable expression of reason but as a response to vulnerabilities. Biological mortality, the fragility and fallibility of memory, the boundedness of sensory perception, and the difficulty of transmitting knowledge across individuals and generations gave rise to a need for external supports. In this sense, civilization functions as a scaffold built around human limitations (Mumford, 1934; Basalla, 1988).

Writing, for instance, extends memory across time and space. Scientific instruments amplify the senses, granting access to realms—from the microscopic to the galactic—that are otherwise inaccessible. Computers and algorithms

enhance information processing, augmenting finite cognitive capacities. Communication networks extend intersubjectivity, allowing communities to function as collective minds. As McLuhan (1964) observed, technologies are “extensions of man.” Civilization, understood in this framework, is not a universal good but a prosthetic response to human deficiencies.

This insight undermines the presumption that all advanced intellects would construct civilizations similar to ours. If the very need for civilization arises from limitation, then the absence of those limitations may render civilization unnecessary.

AN UNLIMITED INTELLECT: BEYOND CIVILIZATION

Consider an unlimited intellect—one for whom mortality, limited memory, finite cognition, and bounded senses are absent. Imagine a being for whom immortality is natural, whose memory is boundless and unfailing, whose cognitive processing is limitless, who can commune directly with other minds, and who possesses senses unrestricted by human biology. For such an intellect, the core functions of civilization would be innately fulfilled.

In this case, civilization would lose its *raison d'être*. There would be no need for tools to extend memory, no scientific instruments to extend the senses, no computers to amplify reasoning, no institutions to preserve intersubjectivity. Civilization, as defined above, would be redundant. To build one would be, in effect, to build scaffolding around an already complete structure.

This thought experiment is not idle speculation. In the philosophy of technology, questions about the redundancy of technology once its functions are internalized have been discussed under the rubric of “posthumanism” (Fukuyama, 2003; Bostrom, 2005). In cognitive science, speculation about “extended mind” theories (Clark and Chalmers, 1998) similarly point toward the possibility of minds that integrate functions now outsourced to civilization. The unlimited intellect simply radicalizes these discussions.

ASTROBIOLOGICAL IMPLICATIONS

The possibility of non-technological advanced intellects has direct implications for astrobiology and SETI. Traditional SETI strategies have historically been organized around the assumption that advanced intelligences will necessarily

leave behind detectable technological signatures. These include radio transmissions, large-scale engineering projects such as Dyson spheres, and detectable atmospheric pollutants or energy waste (Tarter, 2001; Wright, 2018). In fact, the very origin of the modern SETI program in the 1960s—epitomized by Cocconi and Morrison’s (1959) famous suggestion that interstellar communication might be achieved via narrow-band radio signals—was premised on the idea that advanced beings would share both our technological trajectory and our interest in communication. Frank Drake’s 1961 experiment at Green Bank further institutionalized this expectation, inaugurating what became the so-called “radio window” era of SETI (Drake, 1965). The central presupposition has been that civilizations remain technological for long enough that their artifacts can be detected across interstellar distances.

This view has been challenged repeatedly. For example, Stapledon (1984) and Sagan (1973) both speculated about non-technological or post-technological forms of intelligence, suggesting that beings of radically different biology or modes of cognition might not produce the kinds of signals SETI searches for. Subsequent philosophical debates have highlighted the anthropocentric bias inherent in equating technological activity with advanced intelligence (Dick and Lupisella, 2009). Indeed, SETI has often been criticized for committing what philosophers call the “projection fallacy,” namely, extrapolating from a single species’ trajectory to universal principles (Ćirković, 2012).

Moreover, the assumption that advanced civilizations will continue to produce detectable signals indefinitely is undermined by both empirical and theoretical considerations. The lifespan of technological signatures may be brief relative to cosmic timescales. For instance, radio leakage from Earth peaked in the mid-20th century and has since declined due to the increasing efficiency and directionality of communication technologies (Tarter, 2001; Shostak, 2010). If similar processes occur elsewhere, then radio signals may represent only a transient phenomenon in the life of a civilization. Dyson spheres or other megastructures may also not be universal. Even if such constructs are possible, they might be quickly abandoned, dismantled, or rendered obsolete as entities evolve beyond the need for external energy harvesting (Wright et al., 2014).

Some SETI scholars have already gestured toward the possibility of “non-technological” or “post-technological” intelligences. For example, Davies (2010) has argued for a shift toward what he terms “post-biological SETI,” which

searches not for conventional technological signatures but for evidence of information-processing systems embedded in the fabric of physics itself. Similarly, Ćirković and Bradbury (2006) introduced the notion of “Dysonian SETI,” which expands the search to include indirect signatures of advanced activity, though still largely within the technological paradigm. The most radical extension of this line of thought is the recognition that advanced entities may evolve in ways that completely transcend technology. If cognitive, perceptual, and communicative capacities become effectively infinite, then no external technological scaffolding would be necessary. In such cases, no detectable signature would remain.

The implications for SETI are profound. If advanced minds can exist without technological civilization, then our search strategies are systematically biased toward a narrow slice of possible intelligences. This bias risks reinforcing the so-called “Great Silence” (Brin, 1983), not because the universe is empty, but because our detection methods are tuned to artifacts that only transitional, technologically limited civilizations produce. In other words, the silence may reflect our deafness rather than the absence of voices. Recognizing this possibility forces a reconsideration of the Fermi Paradox (Fermi, 1995). Rather than asking, “Where is everybody?” we might instead ask, “Why do we assume that everybody would look and act like us at a particular stage of technological dependence?”

Finally, acknowledging the possibility of non-technological advanced intellects situates SETI within broader philosophical debates about the nature of intelligence and civilization. Scholars of the philosophy of technology, such as Ellul (1964) and Heidegger (1977), have argued that technology reflects specific modes of being rather than universal necessities. Applying this insight to astrobiology suggests that technology is a contingent response to limitation, not a necessary marker of intelligence. If so, then SETI must broaden its conceptual framework, moving beyond the presumption that technology is the inevitable expression of intellect. Such a shift would not only alter our search strategies but also reshape our understanding of what it means to be advanced in a cosmic context.

Evolving out of technological state

A further implication is that technological civilizations may be transitional.

Through artificial intelligence, bioengineering, or other transformative sciences, all successful technological civilizations may eventually produce entities whose innate capacities render technology redundant. Once such entities emerge, the civilization that birthed them may be abandoned. This possibility echoes the “transcension hypothesis” proposed by Smart (2012), which suggests that civilizations evolve toward states beyond technological detectability.

Possible Direct Pathways of Evolution

It is also conceivable that evolutionary pathways of matter may lead directly to advanced entities approximating the unlimited intellect. In such cases, technology would be bypassed entirely. Here, astrobiology must grapple with the possibility that human civilization may represent one parochial pathway rather than a universal trajectory. If beings exist whose cognitive and sensory capacities already embody what a civilization could possibly provide, they may never build technological civilizations. They would thus be invisible to current detection strategies. From our perspective, the universe may appear silent not because it is empty, but because the most advanced entities leave no technological trace. This possibility resonates with the so-called “Great Silence” (Brin, 1983; Fermi, 1995).

PHILOSOPHY OF TECHNOLOGY: THE FUNCTION AND REDUNDANCY OF TECHNOLOGICAL CIVILIZATION

Philosophers of technology have long debated whether technology is essential to human existence or merely contingent (Ellul, 1964; Heidegger, 1977). For Heidegger, technology reveals a mode of being-in-the-world, shaping not only how humans act but how they perceive. Yet if technology is an expression of limitation, then it is not essential to advanced intellect per se. It may be, rather, a contingent crutch. Once limitations are overcome—biologically, cognitively, or evolutionarily—the crutch may be discarded.

To explore this further, it is useful to consider the broader philosophical tradition. Jacques Ellul (1964) emphasized that technology tends toward autonomy, becoming a self-perpetuating force within society. For Ellul, humans do not simply control technology; technology restructures human possibilities. Martin Heidegger (1977), in contrast, analyzed technology as a mode of “revealing,” shaping how reality itself discloses. For Heidegger, the technological worldview frames beings as “standing reserve,” resources to be optimized and

extracted. These two perspectives highlight the ambivalence of technology: it is both empowering and constraining.

When extrapolated into the far posthuman future, these insights suggest radical transformations. If posthuman entities arise with vastly expanded capacities—immortality, perfect memory, instantaneous communication, infinite perception—then the functional role of technology as a compensatory scaffold would vanish. The Ellulian concern about technological autonomy might dissolve entirely: a being whose cognition and perception are complete would have no need to pursue endless technical improvement. Similarly, Heidegger's critique of enframing would lose traction in a context where entities no longer relate to the world through scarcity, optimization, or extraction. In such a scenario, technology as a mode of revealing would no longer dominate; other ontological orientations might emerge.

The notion of redundancy is crucial here. Lewis Mumford (1934) distinguished between "polytechnic" technologies, which are diverse and life-enhancing, and "monotechnic" technologies, which are narrowly specialized and controlling. For human beings, civilization has always balanced between these poles. But for posthuman beings who no longer require tools to extend memory, senses, or communication, even polytechnic functions become redundant. Civilization collapses back into the entity itself; the scaffolding disappears.

This transformation resonates with contemporary discussions in transhumanism and posthumanism. Bostrom (2005) envisions future beings whose enhanced cognition and perception transcend current human categories. Fukuyama (2002), in contrast, warns of the dangers to human dignity if such transformations occur. Yet both agree that technological civilization, as currently conceived, may not persist indefinitely. Instead, the posthuman condition would inaugurate a new relation to technology—one in which external prostheses are absorbed into the being itself.

The implications for the far future are profound. If advanced civilizations inevitably move toward such states, then technological civilizations are only transitional. They represent a chrysalis stage, soon to be shed. The abandonment of external technology could occur not because of collapse or catastrophe, but precisely because of success: technology fulfills its purpose by eliminating the need for itself. Once cognitive, sensory, and communicative capacities are

perfected, civilization ceases to be necessary. The trajectory of history thus points not toward endless technological growth but toward the eventual obsolescence of technology.

From this perspective, the posthuman future cannot be understood through traditional categories of progress. If technology is contingent rather than essential, then the highest form of advancement is not the perfection of civilization but its transcendence. This possibility unsettles many assumptions in both philosophy and astrobiology. It suggests that the absence of technological signatures in the cosmos is not evidence of absence, but evidence of maturity. The most advanced intelligences may be those who have no need to build civilizations at all.

Finally, the posthuman scenario compels us to reconsider our own trajectory. Are we moving toward a future in which technology enslaves us, as Ellul feared, or one in which it becomes redundant, as the unlimited intellect thought experiment suggests? If the latter, then the ultimate destiny of humanity—or its descendants—may be to outgrow civilization entirely. In this vision, the far future is not a technological singularity of machines but a condition beyond machines, where mind itself is sufficient.

CONCLUSIONS

The assumption that technological civilization is the universal indicator of advanced intellect is anthropocentric. Human civilization emerged as a prosthetic scaffold, compensating for our mortality, limited memory, bounded senses, and finite cognition. For a counterfactual intellect without these limitations, civilization would have no function. From an astrobiological perspective, this implies that advanced entities may exist undetected, either because they bypass technological civilization entirely or because they abandon it once it becomes redundant.

The most advanced minds in the universe, therefore, may not dwell in civilizations at all. They may inhabit forms of existence beyond the technological, invisible to our current methods of detection. To equate technological civilization with advanced intellect is to mistake a parochial human stage of development for a cosmic norm. SETI and philosophy alike must remain open to the possibility that the silence of the universe conceals not emptiness but abundance.

From a futurological perspective, this conclusion also casts new light on humanity's trajectory. If technology is a scaffold destined to become obsolete, then the future of humanity—or its posthuman descendants—may lie not in endlessly expanding technological infrastructure, but in transcending it. This trajectory could unfold through radical cognitive enhancement, biological transformation, or integration of mind and matter at scales currently unimaginable (Bostrom, 2005; Smart, 2012). In such scenarios, humanity would not collapse into silence but graduate into a higher mode of existence that requires no external technological scaffold.

This has ethical and existential consequences. First, it suggests that the search for extraterrestrial intelligence may be simultaneously the search for our own future: the absence of detectable civilizations could prefigure the destiny that awaits us. Second, it invites humility: our current civilization may be a chrysalis, not an end state. Third, it reorients futurological thinking away from unbounded technological accumulation toward the possibility of post-technological maturity. In this sense, the true measure of advancement may not be the grandeur of our machines, but the capacity to render them unnecessary.

Institute of Ecology and Earth Sciences,
University of Tartu, Ravila 14A, 50411 Tartu,
Estonia
Email: olev.vinn@ut.ee

ACKNOWLEDGEMENTS

I was financially supported by Estonian Research Council grant PRG 2591.

BIBLIOGRAPHY

- Basalla, G. 1988. *The Evolution of Technology*. Cambridge University Press.
- Bostrom, N. 2005. In Defense of Posthuman Dignity. *Bioethics* 19: 202–214.
<https://doi.org/10.1111/j.1467-8519.2005.00437.x>
- Briggs, M.H. (eds.). 1965, *Current Aspects of Exobiology*. Oxford: Pergamon, pp. 323–345.
- Brin, G.D. 1983. The Great Silence: the Controversy Concerning Extraterrestrial

- Intelligent Life. *Quarterly Journal of the Royal Astronomical Society* 24: 283–309.
- Ćirković, M.M. 2012. *The Astrobiological Landscape: Philosophical Foundations of the Study of Cosmic Life*. Cambridge University Press.
- Ćirković, M.M. and Bradbury, R.J. 2006. Galactic Gradients, Postbiological Evolution and the Apparent Failure of SETI. *New Astronomy* 11: 628–639. <https://doi.org/10.1016/j.newast.2006.04.003>
- Clark, A. and Chalmers, D. 1998. The Extended Mind. *Analysis* 58: 7–19. <https://doi.org/10.1093/analys/58.1.7>
- Cocconi, G. and Morrison, P. 1959. Searching for Interstellar Communications. *Nature* 184: 844–846. <https://doi.org/10.1038/184844a0>
- Davies, P. 2010. *The Eerie Silence: Renewing Our Search for Alien Intelligence*. Houghton Mifflin Harcourt.
- Dick, S.J. and Lupisella, M.L. (Eds.). 2009. *Cosmos and Culture: Cultural Evolution in a Cosmic Context*. NASA.
- Drake, F. 1965. The radio search for intelligent extraterrestrial life. In Mamikunian, G. and Ellul, J. *The Technological Society*. Vintage Books.
- Fermi, E. 1995. Fermi's Paradox. In Hart, M.H. and Zuckerman, B. (Eds.), *Extraterrestrials: Where Are They?* Cambridge, New York: Cambridge University Press.
- Fukuyama, F. 2003. *Our Posthuman Future: Consequences of the Biotechnology Revolution*. Profile Books.
- Heidegger, M. 1977. The Question Concerning Technology. In: Martin Heidegger: Basic Writings. Edited by David Farrell Krell. New York: Harper and Row, pp. 287–317.
- McLuhan, M. 1964. *Understanding Media: The Extensions of Man*. McGraw-Hill.
- Mumford, L. 1934. *Technics and Civilization*. Harcourt, Brace and Company.
- Sagan, C. 1973. *The Cosmic Connection*. Anchor Press.
- Shostak, G.S. 2010. What ET will look like and why should we care? *Acta Astronautica* 67: 1025–1029. <https://doi.org/10.1016/j.actaastro.2010.06.028>
- Smart, J.M. 2012. The Transcension Hypothesis: Sufficiently Advanced Civilizations Inevitably Leave Our Universe, and implications for METI and SETI. *Acta Astronautica* 78 (2012): 55–68. <https://doi.org/10.1016/j.actaastro.2011.11.006>
- Stapledon, O. 1984. *Interplanetary Man?*. *JBIS* 65: 30–39.
- Tarter, J. 2001. The Search for Extraterrestrial Intelligence (SETI). *Annual Review of Astronomy and Astrophysics* 39: 511–548. <https://doi.org/10.1146/annurev.astro.39.1.511>
- Wright, J.T. 2018. *Exoplanets and SETI. Handbook of Exoplanets*. Springer International

- Publishing, p. 3405–3412. https://doi.org/10.1007/978-3-319-55333-7_186
- Wright, J.T., Mullan, B., Sigurdsson, S., and Povich, M.S. 2014. The G Infrared Search for Extraterrestrial Civilizations with Large Energy Supplies. *The Astrophysical Journal* 792: 26. <https://doi.org/10.1088/0067-0049/217/2/25>