

## REFLECTION DIVERGENT PATHS; 'what can happen, will happen (?)

*March 2024, Arie Voorburg*

The development of Humanity is defined by gradual, linear progression. This linearity is not just a geometric metaphor but a reflection of our cognitive, emotional and societal evolution. Human cognition, deeply rooted in the structures of our neocortex and limbic system -the part of the brain involved in our behavioral and emotional responses- has maintained a consistent pace over millennia. Our emotional responses, learning processes, and memory formations follow a path that is more evolutionary than revolutionary. While individual learning can display moments of rapid growth and adaptation, the overall cognitive development of our species unfolds across generations. Similarly, societal change, guided by cultural norms and collective learning, moves at a deliberate pace. It's a journey marked by the slow accumulation of knowledge, gradual shifts in values, and methodical policy transformations. This pace is inherently linear—a continuous, steady march forward, occasionally punctuated by significant events but largely defined by constancy and gradualism.

Controversial, Exponential Technology is the type of technology that grows at an exponential rate. It does this through conversion which is one technology interacting with another technology. The reason they become exponential is that costs come down creating more opportunities for more growth and or malfeasance. Converging with each other they produce a power never seen before or imagined possible.

Society 1.0 and Society 2.0 are defined largely by their incorporation of wild animals and domesticated animals into humanity's societal structures, Society 3.0 using external energy as driving force for the use of technology and machinery to enable mass production, followed by the information age of Society 4.0. Society 5.0 will differ by welcoming into itself a bewildering array of highly sophisticated social and emotional robots, embodied AI, nanorobotic swarms, artificial life, self-organizing and self-directing computer networks, artificial agents manifesting themselves within virtual worlds, and other artificial types of intelligent cyber-physical social actors.

Society 5.0 will feature enhanced forms of robotics, AI, nanotechnology, and biotechnology, an enhanced Internet of Things, and further exploitation of Big Data. Both Industry 4.0 and Society 5.0 are premised on the creation of increasingly sophisticated cyber-physical systems, which are characterized by their reliance on embedded, decentralized, real-time computation occurring within a network of heterogeneous physical objects.

Is this a treat? Does this mean that computers are as powerful as humans? Well, not really, or not already.

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If we check in the most powerful computer in the world of 2022, we find the supercomputer the Frontier. This computer is capable of reaching an amazing 1.102 petaflops (quadrillion 1.000.000.000.000.1000 flops, the number of operations possible per second an idea on how large this capacity is we can make the companion with a human brain. Our own processing capacity to be of 1.000 petaflops. This brings the capacity of the Frontier to be equivalent of that of our own human brain.

Our human brain is not only a processing machine, it has the capability of a various range of activities, and is not solely restricted to calculations. Humans multitask far better than computers do. The structure of our brain is organized in a way that all our neurons (the cells of our brain) can be activated at the same time, something that machines or computers cannot achieve yet, even for the latest quantum computers. Our brain also has the extraordinary capability to transform its organization, a capacity called neuroplasticity. It is able to build new neurons and new connections between them, making our brain a system incredibly adaptable to changes or even to any organic damage within our brain. Computers on the other side have a total breakdown if parts of their electronic system get damaged, or even if a program has a failure in its operation.

On its physiological side, our brain has a remarkable low power consumption. It uses just about 20 watts of power, a huge difference compared to the consumption of the Frontier with its 21 megawatts, an amount one million time larger.

Our brain does not only have the great capability to recognize patterns, but can also easily build relationships between concepts and uses emotions as a processing mechanism. Our emotions enable us to have a rich communication, to analyze our own performances, and play a crucial role in our relationships with one another. Our emotions also allow us to select the information we pick up with our senses, saving the important experiences into our long memory. At the same time, our brain allows us to have a very strong creativity and richness of expression reaching out into many fields, from language to technology, arts and many more. Our human imagination seems without limits, as it can reach out in any direction beyond time and space. When we a look at the variety of accomplishments human beings are capable of, we are holder of the pole position on the chain of intelligence, at least for now.

At the same time, technology does not stay still. The capabilities of compute growing stronger and developing quicker every day. This growth creates an exponential development of the processing capacity. This speed of developments leads to changes in technology far more intriguing than we could ever imagine. If we consider that computers are not only having their processing power growing exponentially, but that their only communicate is also growing, this leads to an explosive

transformation of all their technical aptitudes. Besides communicating with humans through screens and keyboards, computers and machines are also communicating with each other. More and more machines, or computers, are using the same communication protocol we also use. They have connected to the internet and have therefore access to the same vast digitalized communication systems. Next to the information available they have access to millions of sensors and trillions of information all over the globe. The question is how humans manage to cope.

In the past information society, the common practice was to collect information via the network, access a cloud service (databases) in cyberspace via the Internet and search for, retrieve, and analyze information and data by humans. In Society 5.0, however, information from sensors in physical space is accumulated in cyberspace. In cyberspace, this big data is analyzed by artificial intelligence (AI), and the analysis results are fed back to humans in physical space in various forms. People, things, and systems are all connected in cyberspace and optimal results obtained by AI exceeding the capabilities of humans are fed back to physical space. When human beings (or social robots or AIs) are functionally integrated into a cyber-physical system (CPS) at the social, cognitive, and physical levels, it becomes a cyber-physical-social system (CPSS) whose members may engage in cyber-physical-social behaviors within cyber-physical spaces. Through their interactions with one another, the members of a CPSS may give rise to cyber-physical social networks whose topologies follow the members' social connections. Cyber-physical systems are harnessed to enhance human quality of life on a large scale, they may result in the creation of a cyber-physical society, which already includes human, social, cultural spheres as well, above the physical- and cyber spaces.

The new realm of Society 5.0 will encompass a cyber-physical world that functions almost symbiotically alongside the human world, a society that has truly become a Cyber-Physical System that is the mixture of the real world and the cyber world connected by ICT; such cyber-physicalization of its world helps distinguish Society 5.0 from the four preceding stages of human society. Indeed, Society 5.0 is premised on a deepening of technological integration that supports collaboration, co-creation and human-machine interaction.

The development of Artificial Intelligence and Augmented Intelligence will make life take a variety of forms, and the development vision of Human-centered Artificial Intelligence and Augmented Intelligence needs to be refined as soon as possible and better prepared as possible to cope with future changes and evolution. In the future society, the development of Artificial Intelligence, Augmented Intelligence, Digital Technology, Brain and Neuroscience, Nanotechnology will very likely enable the creation of intelligent lives that reach or even exceed the intelligence level of humans that are created by natural evolution, and the traditional human beings will probably no longer be at the

top of the intelligence pyramid. How human beings can form a sustainable symbiotic society with natural life including themselves, non-human animals, plants and other types of living artificial intelligence is an important issue related to human existence, which will bring fundamental challenges to human survival and transformative opportunities for human development.

Nevertheless, such artificial beings would appear not simply to be passive tools or anonymous parts of the environment; it seems possible that they might be capable of acting as true (if limited) non-human participants in society.

Virtual and physical worlds are becoming increasingly interconnected, and indistinguishable from one another. The idea of the Metaverse has emerged describing this convergence. The Metaverse is a stage of existence that allows us to live and exist simultaneously in two worlds, one physical and another virtual. The Metaverse is not parallel with the physical world, continuing the process of annihilation of time and space. Individuals can be in one place physically and in a different place virtually. Yet their personalities will not be split, but instead, they will act and interact with both environments. The concept of the Metaverse is a massively -scaled computer -simulated environment or virtual world which replicates spatial and physical characteristics of humans

The intersection of AI and the Metaverse combines multiple technologies such as VR, 3D animation, and blockchain in the evolution of Web3 or an evolving technology producing a power never seen before or imagined possible. A massively scalable platform is required to support Metaverse AI. The term 'AIOps' stands for 'artificial intelligence for IT operations', which utilizes big data, modern machine learning, and advanced analytics technologies directly or indirectly to enhance its operations. Generally defined Artificial Intelligence represents the third era of computing, the ability of a machine to perform cognitive functions such as perception, learning, reasoning, problem-solving, contextual understanding, predictions, and exercising creativity, as well as or better than humans.

Beyond its human members, Society 5.0 can be expected to include many types of non-human intelligent social actors as participants or even members. For the foreseeable future, such artificial entities are not expected to merit or receive recognition as moral subjects (e.g., moral agents) or political persons (e.g., citizens) in the way that human beings are.

One particular locus of ambiguity in the Society 5.0 vision relates to the exact role that human beings will play within it: it seems possible that the diverse types of robots, advanced AI, sentient computer networks, responsive smart environments, and other non-human intelligent social actors who become incorporated into Society 5.0 will not only do work that had been previously performed by human beings but in some cases may possess physical, intellectual, emotional, and social capacities that exceed those of the human beings whom they are tasked with serving. Such a society will include

at least two distinct sources of sensing, deciding, and acting: the natural bioagency possessed by human beings and the artificial cyberagency possessed by robots and AI (and, potentially, by neuroprosthetically augmented human persons).

Building on and synthesizing the perspectives presented above, the future Society 5.0 can be understood as posthumanized insofar as it is a vast, complex cyber-physical-social system that encompasses more than simply natural biological human beings as members and participants. A society that has become posthumanized no longer has natural biological human beings as its sole members and participants.

The phenomenon of posthumanization is something related but distinct: it encompasses those processes or dynamics that are actually at work in a given society that have the effect of blurring the practical barriers between human and non-human and between the natural and the artificial and that cause the society to become de-anthropocentrized. The result of such dynamics is a society that has become at least partially posthumanized. The processes of posthumanization would have existed in the world even if posthumanization as an academic approach had never been created, and the dynamics of posthumanization can be studied using either posthumanist or non-posthumanist research methodologies.

The processes of posthumanization are not restricted to changes occurring in the minds or bodies of human beings; rather, human society as a whole can undergo a process of posthumanization (and become posthumanized even if no changes are made directly to the internal architecture of human beings—through the act of incorporating increasingly numerous, intelligent, and capable artificial beings into that society in the form of social robots, embodied AI, nanorobotic swarms, sentient computer networks, and other bearers of non-human agency).

The next step in our -own- evolution is the connection of our neocortex to synthetic neocortex in the cloud, (the Metaverse?) which will add an indefinite (and perhaps infinite) amount of modules in our new exocortex and enable qualitatively new profound things that we literally don't have the ability to comprehend with our current neocortex.

Molecular nanotechnology and a brain computer interface are the technologies required for this to be possible. Nanotech and BCI -brain computer interfaces- that exist today are nowhere near being advanced enough to do this. So why am I so confident that the exocortex is on the horizon? It is about a transcendence of our human capabilities. It's not just that there'll be new versions of things that already exist; there'll be new things beyond what already exists - new senses, capabilities, and things in general. Everything will change, and not only quantitatively like how it did with the industrial revolutions, but literally qualitatively.

Posthumanism plays a major contributor to the posthumous contemporary debate. Digital 'second life', genetically modified food, advanced prosthetics, robotics and reproductive technology are familiar aspects of our globally connected and technologically mediated society. It exposes the unnatural structure of humans, blurring the traditional distinction between humans and others.

In the case of the technologically posthumanized Society 5.0, nonhuman beings that might contribute meaningfully to such a society—and come to be considered members of it—despite their lack of human-like mentality might include synthetic biological computers whose behavior is not modelled on that of the human brain, nanorobotic swarms, and AGI (Artificial General Intelligence) s that possess radically nonhuman cognitive structures and dynamics.

Synthetic posthumanisms, on the other hand, define 'posthumanity' as a set of hypothetical future entities (such as full-body cyborgs or artificial general intelligences) whose capacities differ from – and typically surpass – those of natural biological human beings and whose creation can either be intentionally brought about or intentionally blocked, depending on whether humanity decides to develop and implement certain transformative technologies such as those relating to genetic engineering, neuroprosthetics, bioenhancement, artificial intelligence or virtual reality. Genetic engineering, synthetic biology, bionanotechnology, and biomolecular computing are expected to make possible the creation of neuroprosthetic devices that are partially or wholly composed of biological material (perhaps based on the DNA of the device's host) or other non-electronic components. From subcutaneous implantable computers and communication devices, cybernetically linked to create 'hive minds', sophisticated implantable RFID transponders sensory, cognitive, motor and neuro-prosthetics body, sensor networks (BSNs), to full cyborg bodies, etc. These cognitive neuroprosthetic devices may offer their user the ability to create, delete, or otherwise edit memories stored within his or her brain's biological neural network and manipulate neurons to create engrams containing particular memories. Such abilities could be used, for example, to acquire new knowledge or skills or to erase existing fears. Furthermore these implantable technologies utilize sophisticated biocybernetic control loops that allow the physiological and cognitive activity of their host to be detected, processed, and interpreted for use in exercising real-time computer control.

Posthumanism marks a careful, ongoing, overdue rethinking of the dominant humanist (or anthropocentric) account of who 'we' or becoming are as human beings. It is up to us to decide.

The process of gaining qualitatively new intelligence will continue infinitely, and even if it is not always just by adding more neocortical modules, we will create new paradigms that will enable more new higher cognitive functions.