CHAPTER 26

The Ethics and Literature of Cybernetic Posthumanism, Transhumanism and the Technological Other in the Fourth Industrial Revolution

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Introduction

Cybernetic posthumanism, transhumanism and critical posthumanism are connected philosophies and schools of thought that are often confused within the umbrella term of posthumanism. They all respond to the rapid technological progress that has taken place from the second half of the twentieth century to today's fourth industrial revolution. The idea that people may go beyond their biological boundaries has gained appeal as transhumanism, a movement that supports using technology to improve human capabilities and transcend constraints, has become more central in society. These technological advancements have also prompted discussions on the ethics surrounding the posthuman and the technological other, debates that have found in literature a perfect site for exploration and critique.

Broadly speaking, posthumanism is a philosophical and cultural movement that actively interrogates long-held conventions surrounding human identity and agency. This complex movement often challenges the definition of the human, relentlessly probing the potential offered by technology and the blurring of the boundary between human beings and nonhuman entities. The term "posthumanism" is often used in contradictory ways as it may refer to an ontological condition, the result of the process of enhancing the body through chemistry, technology or surgery, but also to a new conceptualisation of the human. Out of the two, the former, generally known as "transhumanism" and which Pramod Nayar also calls "pop posthumanism" (6) and other authors "techno-scientific posthumanism" (Mahon 24), "neohumanism" (Herbrechter *et al.* 9) or even "bad" posthumanism (Wolfe XVII), has been popularised through TV series, films and cyberpunk fiction and is best represented through the transhumanist movement. The second strand of posthumanism which is concerned with the new conceptualisation of the human is also known as

"philosophical posthumanism" (Mahon 195; Ferrando 54) or "critical posthumanism," a term favoured by the leading academics of the field (Braidotti 2013, 45; Herbrechter 2013; Nayar 8).

In this chapter I will explore the technological other in its connection to the posthuman and the ethical implications of the blurred boundaries between humans and technological nonhuman others that technoscience has propitiated. Starting from the second half of the twentieth century with the emergence of cybernetics, the science of communications and automatic control systems in both machines and living things, I will trace the different perspectives that transhumanism and critical posthumanism have taken on the role of technology and ethics in the context of the present fourth industrial revolution. In the final part of the chapter, I will consider the way in which literature has represented the ethical dilemmas that result from human technological enhancement and the human–machine interface, paying special attention to Don DeLillo's and Jennifer Egan's most recent fiction.

1 Cybernetic Posthumanism

According to Katherine Hayles in her seminal book *How We Became Posthuman* (1999), the history of cybernetics may explain how information lost its body and came to be understood as an entity independent of a material form, how the cyborg turned into a cultural icon and how the posthuman emerged. By underlining the interconnectedness of all systems, whether biological or technological, traditional notions of identity and subjectivity were challenged, begging for a reconsideration of the boundary between human and machine. Cybernetics studies "the entire field of control and communication, whether in the machine or in the animal" (Wiener 1967, 11), that is, both in organic and mechanical contexts indistinctly. Its main concern is the message, regardless of whether the transmission is produced by electrical, mechanical or nervous means. Cybernetics is a term that derives from the Ancient Greek word "*kybernetes*" ("steersman" or "helmsman"), which already contains this double consideration of man and machine.

The foundations of cybernetics can be traced back to the Macy Conferences on Cybernetics that took place in New York annually between 1943 and 1954, organised by the Josiah Macy, Jr. Foundation, and where Norbert Wiener—who is often considered the father of cybernetics—John von Neumann, Claude Shannon, Warren McCulloch and other leading researchers met. Their work led to the understanding that humans were mainly information-processing entities that resembled intelligent machines. A key concept that emerged from these

conferences was "homeostasis," the process of self-correction that responds to the external conditions of the environment. Systems change through negative feedback, that is, the input they receive from their environment, in order to maintain their internal balance. Homeostasis is a concept that can be applied to human bodies and how they regulate their internal temperature by sweating or shivering depending on the weather, but also to thermostats, automatic steering systems and cruise control, among other examples. Homeostasis can also be interpreted as a process that sustains personal identity. As Wiener poetically puts it in his book *The Human Use of Human Beings* (1950):

> Our tissues change as we live: the food we eat and the air we breathe become flesh of our flesh and bone of our bone, and the momentary elements of our flesh and bone pass out of our body every day with our excreta. We are but whirlpools in a river of ever-flowing water. We are not stuff that abides, but patterns that perpetuate themselves. (96)

This definition of humanity is based on the idea that we are transient and dynamic, defined by patterns rather than embodiment, and in constant interaction with the world. Wiener goes a step further to suggest that a pattern is a message and can be transmitted accordingly, in the same way as a radio transmits patterns of sound and a television patterns of light. If we are patterns of information, we could also be transmitted to a different "receiving instrument" (96) that would keep our integrity through a new process of homeostasis. This idea will be embraced by the transhumanist movement but is rejected by critical posthumanism. Despite seeing the subject as nomadic and dynamic, critical posthumanists defend an embodied and embedded understanding of it. In one of the most famous passages of Hayles's *How We Became Posthuman* we can read:

> my dream is a version of the posthuman that embraces the possibilities of information technologies without being seduced by fantasies of unlimited power and disembodied immortality, that recognizes and celebrates finitude as a condition of human being, and that understands human life is embedded in a material world of great complexity, one on which we depend for our continued survival. (1999, 5)

Hayles acknowledges the influence of the first stage of cybernetics in the posthuman discourse but rejects a conception of the self that reduces the human to a bodiless pattern of information.

Cybernetics went through different stages, and a second wave developed from 1960 to 1980, first through the work of Heinz von Foerster and later that of Humberto Maturana and Francisco Varela. Homeostasis gave way to what Hayles calls *reflexivity*, which she defines as "*the movement whereby that which has been used to generate a system* is *made, through a changed perspective, to become part of the system it generates*" (1999, 8; original italics). Unlike in the first wave of cybernetics, in the second the observer is taken into account as the emphasis moves from self-correction (homeostasis) to self-awareness and self-organisation (autopoiesis). Systems are not governed by fixed rules and external inputs but they can modify their behaviour and model themselves by means of reflection, thus underlining the importance of context and contingency. This gave way to more complex models of communication and control that acknowledged the blurred boundary between observer and system. As Hayles puts it: "the center of interest for autopoiesis shifts from the cybernetics of the observed system to the cybernetics of the observer" (11). This idea has also been very influential in posthuman discourse since it not only blurs the boundary between observers and observed but also underlines the entanglement between humans and the environment, rejecting the idea that humans are separate from and superior to nature. It challenges the Cartesian conception of mind and body as separate entities and the disembodied conception of the self. Besides, agency is extended to the nonhuman (animals, technology or the environment) and stops being exclusively human, challenging anthropocentrism. All these ideas are key to understand critical posthumanism.

Cybernetics has also been influential in the field of the posthuman through the concept of the cyborg. This term was first used by Manfred E. Clynes and Nathan S. Kline in 1960 to refer to "self-regulating man–machine systems" or cyb(ernetic) org(anisms), in particular an "exogenously extended organizational complex functioning as an integrated homeostatic system unconsciously" (27). It was used as a possible solution to the challenges of space travel and human adaptation to space conditions. The cyborg would allow for the integration of external technologies to adapt human biology and keep the body's homeostatic mechanisms when living in space. In this original conception, the cyborg was a man–machine system designed to overcome the limitations of the biological body. Since then the cyborg has been reconceptualised beyond this cybernetic first conception, which was based on some of the fundamental principles of cybernetics: feedback mechanism, self-regulation and the human–machine interface as an information-processing entity.

Within posthuman studies the concept of the cyborg was popularised by Donna J. Haraway in "A Cyborg Manifesto: Science, Technology, and

Socialist-Feminism in the Late Twentieth Century," originally published in 1985. She uses the cyborg as a metaphor for transgressing the traditional ontological boundaries between organisms (animal–human) and machines—such as natural and artificial, mind and body, self-development and external design—until a point is reached in the late twentieth century in which "[o]ur machines are disturbingly lively, and we ourselves frighteningly inert" (152). The cyborg invites political action and belongs to a post-gender world of transgressed boundaries, fusions and new possibilities away from hierarchical oppositions. As a metaphor, the cyborg can be interpreted in two ways. On the one hand, it may be the ultimate imposition of a grid of control and the final takeover of women's bodies in its hypermasculine renderings. On the other hand, it may also represent a joint kinship with animals and machines and a symbolic liberation from limited conceptions of the human, which is one of the key ideas to understand critical posthumanism and the importance of the nonhuman. Technology would have the power to do away with rigid categories. As Nayar explains, Haraway presents a cyborg feminism that rejects the humanist conception of man that excluded certain individuals, groups and races to create a more inclusive ideal that makes gender, race and ethnicity "immaterial" (23). Her Manifesto launched a brand-new area of study within cybercultural studies, a form of cyberfeminism and technofeminism.

The third wave of cybernetics stretches from the 1980s to the present and revolves around virtuality, as self-organising systems turn into self-evolving programmes in directions that the programmer may not have anticipated. Hayles defines virtuality as "*the cultural perception that material objects are interpenetrated by information patterns*" (1999, 13–14; original emphasis). The world is an interplay between both information patterns and material objects. The physical and the information systems that constitute the world are separate but also intertwined in this perceptual way. Cybernetics is the study of information (control and communication) but the emergence of virtuality has questioned the study of information in isolation from materiality. The boundaries between the human body and technology and between the physical and the virtual become porous. This challenge of traditional binaries and hierarchies is an important concept of posthuman discourse. The third wave of cybernetics describes how technology and technological mediation play an important role in the shaping of autonomy and agency. These defining features of the human in humanist discourse are challenged and expanded into the nonhuman by the posthuman understanding of the self. In the literary field, cyberpunk, a subgenre of science fiction, also rose to prominence in the 1980s, with authors such as William Gibson, Neal Stephenson, Bruce Sterling and

Philip K. Dick, among others, exploring disembodied consciousness, virtual reality, techno-human beings and dystopian futures.

The influence of cybernetics has fluctuated over time but many of its premises are still relevant and active in the design and optimisation of other areas such as control systems, communication theory, cognitive science and artificial intelligence, as well as other fields of technology linked to cybernetic principles. Cybernetic theorisation on feedback loops is key in the design of self-regulating technologies and intelligent systems that can learn and, consequently, improve their performance. From a cybernetic perspective, the human engagement with these systems can also be understood as a form of control and communication in human–machine interaction. In this sense, ChatGPT is an example of this type of interaction. As a language model, it works in a feedback loop with the user processing and controlling information. In fact, it learns from new data and user interaction, refining its responses and adapting to the prompts it receives. Braidotti underlines that the predominant characteristic of the modern global economy resides in its techno-scientific framework, more specifically in the convergence of what she calls "the four horsemen of the posthuman apocalypse," which are nanotechnology, biotechnology, information technology and cognitive science (2013, 59). These technologies constitute the backbone of the fourth industrial revolution, which contextualises the present debates on the posthuman from both the transhumanist and the critical posthumanist perspectives.

2 The Fourth Industrial Revolution

Every industrial revolution brings new technologies that cause social transformation. In the second half of the eighteenth century, the use of steam power for industrial purposes and mechanised production marked the development of the first industrial revolution, which led to a great increase in productivity and later in new transportation systems. Socially speaking, it favoured urbanisation, a rising middle class and the expansion of market economies but also social inequality and labour exploitation. Science and engineering boosted the second industrial revolution (1870–1914), especially due to the discovery of electricity and the introduction of assembly line production, which increased the speed of manufacturing while decreasing its cost. Socially speaking, urban working-class communities developed and consumer culture expanded. The third industrial revolution, which began in the latter half of the twentieth century and is linked with the digital revolution, is often defined as the age of

information. It has brought the widespread adoption of digital technologies, extensive connectivity through the internet and automation of tasks through computerised systems and robotics. Therefore, there has been an evolution from the mechanical technology of the first industrial revolution and the electronic technology of the second to digital electronics, which is key to understand the third industrial revolution.

Klaus Schwab, the founder and executive chairperson of the World Economic Forum from 1971 until 2025, has popularised the idea that we are living in a fourth industrial revolution (4IR) that will unfold over the twenty-first century and that builds on the previous ones, especially on the general digitalisation made possible by the third industrial revolution. According to Schwab, the 4IR entails a transformation of humankind and affects all aspects of our lives, even our very sense of identity and agency. The concept was developed in his books *The Fourth Industrial Revolution* (2016), and *Shaping the Fourth Industrial Revolution* (2018) co-authored with Nicholas Davis. Its defining feature is the convergence between physical, biological and digital technologies that is affecting all industries, governments, institutions, systems of education, healthcare and transportation at an unprecedented scale, speed and scope (Schwab 7). Examples of this convergence can be seen in the Internet of Things (where physical devices combine with digital technologies); artificial intelligence and robotics (industrial robots that use AI algorithms in automated processes); bioinformatics (biological data which are analysed through computational techniques); and bioprinting (a combination of 3D printing or additive manufacturing and gene editing to produce living tissue). Other technologies that are central to the 4IR are new computing technologies, blockchain and distributed ledger technologies, "neurotechnologies, biotechnologies, virtual and augmented reality, new materials, energy technologies, as well as ideas and capabilities we don't yet know exist" (Schwab and Davis 7). Many of these technologies, especially those related to intelligent machines, autonomous systems and data-driven decision-making, are based on cybernetic principles and on the machine–human interface leading to the enhancement of human capacities that cybernetics introduced.

According to Eric Brynjolfsson and Andrew McAfee, what we are living is a second machine age in which computers and other digital technologies have enhanced human mental power, that is, our brains rather than our physical and mechanical power (7–8). On the societal front this brings a paradigm shift that is changing the way in which we communicate, consume information and entertain ourselves to the extent that technology is modifying what being human means as technologies become seamlessly embedded into our physical

environment. This is a topic that is explored by critical posthumanism, but whereas critical posthumanists see the present from a post-anthropocentric critical perspective, economists and engineers such as Schwab, or Marc Benioff, chairperson and CEO of Salesforce, see it as the moment to create "an empowering, prosperous, human-centered future for all" (Benioff VIII). Even though the reality that critical posthumanists, transhumanists and theorists of the fourth industrial revolution interpret is the same, their perspectives are very different.

Theorists of the fourth industrial revolution acknowledge that all these technologies bring new ethical issues and dilemmas that need to be explored and acknowledged. Some of these concerns have to do with the practical consequences in the workforce that automation and digitalisation may produce, as workers will need to develop new sets of skills. Many key technological companies have better detailed and simplified jobs to turn them into well-defined, easily monitored digital tasks that can be carried out by algorithms. Schwab acknowledges that according to some studies about 47 per cent of total employment in the US is at risk (38), and Brynjolfsson and McAfee admit that there will be an increase in spread—the differences among people in economic success (11). Schwab acknowledges that there will be a greater polarisation in the labour market, with both high-income cognitive and creative jobs and low-income manual jobs increasing, and middle-income routine and repetitive jobs diminishing (38). Jon-Arild Johannessen also believes that knowledge workers, who use their intellectual abilities to perform their work, bring creativity and innovation to the market, and companies have become aware that "creativity, expertise and innovation are the new competitive parameters" (21).

However, technology changes so fast that after the introduction of ChatGPT and DALL-E, creative jobs that seemed secure are now at risk, such as those of content generators, that is, writers, journalists, musicians and artists, among others. Creativity has stopped being an exclusively human area since generative AI algorithms can produce human-like texts by working on large amounts of data. Creativity may stop being an exclusively human ability and become the result of human–machine interaction. Brynjolfsson and McAfee believe that as automation reaches more and more realms of life it will be necessary to become more adaptable and flexible progressively so as to seize new opportunities in which machines will complement and even enhance human capabilities, since both human and machine inputs will be necessary for effective production (203). This feedback loop is the basis of cybernetics, as we have seen.

3 Transhumanism

The theorists of the 4IR are optimist about the future. Brynjolfsson and McAfee believe that digitalisation will in the end bring "bounty instead of scarcity, freedom instead of constraint" (11), and Schwab and Davis believe that some of the consequences of the 4IR will be that "our relation with data is transformed, the physical world is reformed, human beings are enhanced" (3). This optimism is shared by the transhumanist movement, which believes in human enhancement through science and technology. Similarly to Brynjolfsson, McAfee, Schwab and Davis, Hava Tirosh-Samuelson argues that "humans will live longer, will possess new physical and cognitive abilities, and will be liberated from suffering and pain due to aging and diseases" (20).

The fourth industrial revolution has boosted interest in the transhumanist movement, as seen in the publication of recent anthologies and edited collections such as *H+: Transhumanism and Its Critics* (Hansell and Grassie 2011), *The Transhumanist Reader* (More and Vita-More 2013), *Post—and Transhumanism: An Introduction* (Ranisch and Sorgner 2014) and *Transhumanism Handbook* (Lee 2019), among others. Transhumanist ideas were systematised with the founding of the journal *Extropy* in 1988 by Max More and Tom Morrow. The concept of "extropy" (as opposed to "entropy") that they coined underlines the idea of expansion in all realms. In its 1993 version, the "Extropian Principles" they formulated included boundless expansion, self-transformation, dynamic optimism, intelligent technology and spontaneous order (9). In origin, these principles were tainted by libertarian and anarcho-capitalist ideology; however, the 2003 version of the principles was less political and more focused on an "open society" approach.

More and Morrow founded the Extropy Institute in 1990 to promote transhumanist ideas and technologies. The foundation of the World Transhumanist Association (WTA) by the Swedish philosopher Nick Bostrom and the British philosopher David Pearce in 1998 contributed to the construction of a less libertarian and more academic form of transhumanism. In fact, Bostrom was the director of the Future of Humanity Institute at the University of Oxford from 2005 to 2024. In 2008, the WTA changed its name to Humanity+, which seems to underline transhumanism's links to humanism. In fact, although transhumanism is often confused with critical posthumanism, the movement is more connected to humanism than to the latter. Cary Wolfe describes transhumanism as "an intensification of humanism" (XV). Renaissance humanism favoured values such as autonomy, rationality and independence by means of reason rather than authority, and of critical thinking and education instead of superstition. Rationality also plays a key role in the transhumanist movement.

As James Hughes argues in his book *Citizen Cyborg*, transhumanism is the idea that "humans can use reason to transcend the limitations of the human condition" (156). This suggests that humanism and transhumanism share an interest in rationality to achieve human improvement. However, transhumanism goes further, believing that human limitations caused by our bodies should be overcome "through reason, science and technology" (Young 15), with the ultimate purpose of liberating us from "biological slavery" so that we can evolve from *homo sapiens* to *homo cyberneticus* (44). Technologies developed through the fourth industrial revolution such as biotechnology, nanotechnology, genetic manipulation and cognitive science seem to go in this direction.

In this sense, transhumanism continues the Cartesian separation of mind and body in which the mind is the seat of consciousness and, being immaterial, exists independently of the physical body. In some extreme versions of transhumanism, the essence of the self is reduced to the mind. Ray Kurzweil, who is a key figure within the transhumanist movement, has discussed the idea of mind uploading or whole brain emulation. As he explains, it would entail scanning the brain and transferring the mind into a computational container that would preserve the essence of being, capturing "a person's entire personality, memory, skills, and history" (198) without the limitations of a biological body. This would achieve cybernetic immortality and would constitute the next step in evolution: disembodied but immortal, intelligent selves living in cyberspace, and leading to a communal sense of intelligence once all minds merge. Hayles has offered a more nuanced view of the mind–body divide by discussing the idea of "distributed cognition." According to it, thinking is not limited to the human brain and takes place instead in partnership with intelligent machines and other nonhuman actors (1999, 289–90). This understanding of the self that, as we have seen, can be traced back to the origins of cybernetics works as an antidote to the stark inert body and disembodied subjectivity that the virtual implies for most transhumanists. Hayles sees this posthuman subjectivity as expanded, "extending embodied awareness in highly specific, local, and material ways that would be impossible without electronic prosthesis" (291). Electronic prostheses extend embodied awareness, rather than produce disembodied forms of the self. We have recently seen the development of smart glasses such as Google Glass, the Metaverse platform that uses XR technology and the Apple Vision Pro headset. The philosopher of information Luciano Floridi has discussed how information and communication technologies are creating new realities, what he calls "the *onlife experience*" (43; original emphasis), as the digital online world merges with the analogue offline world due to emerging technologies of the fourth industrial revolution such as "Ubiquitous Computing," "Ambient Intelligence," "The Internet of Things" and

"Web-augmented things" (43). He predicts that, as a result of the digital revolution, in the near future the distinction between online and offline will become increasingly blurred to finally disappear. In this new context, the separation between mind and body will not make sense any more.

Ethical concerns have emerged from the implications of transhumanist ideas and in connection to the scientific breakthroughs and new technologies developed in the context of the fourth industrial revolution. Those thinkers that oppose the use of technology to modify the human body are usually known as bio-conservatives or bio-luddites and include writers and intellectuals such as Leon Kass, Francis Fukuyama, George Annas, Michael Sandel, Wesley Smith, Jeremy Rifkin and Bill McKibben, among others. Depending on their political ideas, they may be right-wing bio-conservatives who believe in the sacralisation of the body and fear the undermining of human dignity. They contend that biotechnology should be limited or banned. There are also left-wing bio-luddites, who are concerned with the indiscriminate use of biotechnology for enhancement and who believe that transhumanist practices should be monitored (Adorno 26).

Concerns have also been voiced regarding the social inequality that costly body enhancements could bring since only those with the economic means to afford it would have access to them. In a 2004 special issue of *Foreign Policy*, Fukuyama referred to transhumanism as one of "the world's most dangerous ideas" as it aimed at liberating "the human race from its biological constraints" (42) and warned that biotechnology would create a separation between those enhanced and those left behind. In effect, privilege would not just be financial but would affect the very essence of being. If those enhanced acquire better memory or more physical power, for example, those unenhanced could not compete with them in terms of jobs or admission tests. A genetically engineered superior social class could emerge as a result. Fukuyama warns readers that humility concerning human nature needs to be developed, otherwise "we may unwittingly invite the transhumanists to deface humanity with their genetic bulldozers and psychotropic shopping malls" (43). This separation would also widen the economic gap and amplify inequality between rich, developed countries and poor, developing ones, for whom biotechnology's marvels would most likely be out of reach.

Bostrom has responded to these claims in his work by arguing for a concept of human dignity that is inclusive enough to be used for different posthuman beings (see Ch. 25). This "posthuman dignity" refers to the worthiness of enhanced beings who would be accorded full moral status and legal rights by promoting "a more inclusive and humane ethics, one that will embrace future technologically modified people as well as humans of the contemporary kind"

(2005, 213). Bostrom has also argued against the belief that biotechnology and, more specifically, germ-line engineering may create so-called designer babies, turning babies into products to be evaluated according to standards of quality control and thus undermining the ethical ideal of unconditional acceptance. Bostrom acknowledges that these concerns with human commodification are relevant and should make people aware of the things that could go wrong in order to take preventive countermeasures and develop a "posthuman ethics" against genetic determinism. He also proposes regulation and subsidisation of biotechnology to prevent enhancement from turning into a new, more extreme form of social inequality. However, in the end, he considers that these are "dystopian scenarios" and mere speculation (2003, 497). Literature has explored these scenarios and the moral dilemmas that emerge at length. For example, Kazuo Ishiguro's *Never Let Me Go* (2005) depicts the dehumanisation and commodification of human life that takes place when clones are treated as mere objects and struggle to find their own sense of being in their limited lives. Ishiguro's *Klara and the Sun* (2021) explores AI child companions through Klara, an AI who develops remarkable cognitive abilities, emotions and empathy, and questions the definition of the human. The novel also investigates the consequences of the social disparities that emerge between lifted, enhanced children and those that are not.

The ethical concerns raised by the rapid development of AI systems such as ChatGPT led UNESCO to elaborate in November 2021 a global normative framework, *Recommendation on the Ethics of Artificial Intelligence*. Unanimously adopted by all its members, it was meant to implement the necessary safeguards, ethical guardrails and regulation of the AI sector and develop checks and balances to build an ethical AI at the national level. UNESCO proposes a human rights-centred approach to the ethics of AI based on ten core principles that include proportionality, safety and security, right to privacy and data protection, human oversight and non-discrimination, among other values.

4 Critical Posthumanism

Critical posthumanism is defined by Nayar as an ethical project "that asks us to ponder, and act, upon the acknowledgement that life forms have messy, intertwined histories [… and] have always lived and become with others" (31). In this sense, it is based on two main premises: the rejection of both human exceptionalism and human instrumentalism as humans are not unique creatures entitled to dominate the natural world. In fact, humans and other living forms are entangled with each other and co-evolve relatedly as they share not just

ecosystems but also genetic material. This post-anthropocentric perspective is diametrically opposed to the transhumanist belief that "[i]n the posthuman age, humans will no longer be controlled by nature; instead, they will be the controllers of nature" (Tirosh-Samuelson 20), or to Schwab's proud definition of the Anthropocene as the "Human Age, [which] marks the first time in the history of the world that human activities are the primary force in shaping all life-sustaining systems on earth" (111). From the perspective of critical posthumanism, the human and the nonhuman exist in a state of entanglement and, as a result, technology is integral to the human, not a tool for a means, as transhumanists see it (see Ch. 27). As Nayar explains, the human is a hybrid constituted by difference, which leads to "a whole new conceptualization of the human as a more inclusive, non-unitary entity whose boundaries with the world, with other life forms and species, are porous" (30).

Braidotti does not see the end of classical humanism as a crisis. Instead, she offers an affirmative position that she defines as "rather materialist and vitalist, embodied and embedded, firmly located somewhere" (2013, 51). As she argues, from the definition of humans as autonomous, self-willed, superior to other living forms, and distinguished from them by their exceptionality, rationality and the uniqueness typical of both humanism and transhumanism, critical posthumanism moves to "a relational subject constituted in and by multiplicity [...] but still grounded and accountable" (49). In this sense, rationality, autonomy and agency are questioned and reconfigured to include nonhuman entities such as machines, animals and materials, altering in turn the power structures that exist within society. Richard Grusin writes about a "nonhuman turn" in the twenty-first century in which almost every problem that we face largely involves interactions with nonhumans. Humans have consistently undergone co-evolution, co-existence or collaboration with the nonhuman, which Grusin understands "in terms of animals, affectivity, bodies, organic and geophysical systems, materiality, or technologies" (VII). Regarding technologies, they do not simply extend human beings but contribute to constituting them (Kiran and Verbeek 419). Therefore, technology is understood as part of the nonhuman and it is integral to and co-evolves with humans. As Nayar explains, the human cannot be separated from material, technological and informational networks and is not even the dominating agent in them: "it is not any more human + technological prosthesis or human + data flows but rather an inextricable interface in which the technological constitutes human identity" (79).

Drawing upon Deleuze and Guattari's notion of framework, Braidotti identifies three transformative axes that encapsulate these interconnections with the nonhuman: becoming-animal, becoming-earth and becoming-machine.

More recently, Braidotti has reformulated these axes into the "*zoe*/geo/techno assemblage": "the posthuman subject relates at the same time to the Earth—land, water, plants, animals, bacteria—and to technological agents—plastic, wires, cells, codes, algorithms" (2019, 46). A nomadic subjectivity emerges in which self and others are interconnected. Becoming-animal, or the "*zoe* assemblage," deconstructs subjective perceptions regarding natural borders and underlines shared vulnerabilities. Human responsibility towards ecological sustainability comes into focus through becoming-earth, or geo assemblage, which involves recognising our dependency on nature while transforming our lifestyles to live in harmony with nature. Finally, the becoming-machine axis, or techno assemblage, makes relevant the technological advancements capable of enhancing our cognitive abilities alongside transcending limitations imposed via mortality or physicality. This is where transhumanism and critical posthumanism find a common ground. By applying these processes of becoming, Braidotti argues that we can disregard conventional notions of identity formation and open new avenues for innovation in both ethical and political domains in our rapidly changing world.

Since the human relation to technology has reached unprecedented intimacy, we witness a blurring of the boundaries between "the organic and the inorganic, the born and the manufactured, flesh and metal, electronic circuits and organic nervous systems" (Braidotti 2013, 89). However, a critical posthumanist perspective defends the mutual dependence between bodies and technological others and rejects the transhumanist and the early cybernetic dreams of leaving the flesh behind and the casting of the subject in a dualistic frame. Instead, new modes of subjectivity emerge out of a "vitalist ethics of mutual trans-species interdependence" (92). According to critical posthumanism, becoming machine is just one of the transformative processes undergone by the human.

5 Technology and Ethics

Technology deeply affects society and human existence, since it shapes our human practices, how we organise our lives and how we interpret and get to know the world. Because it causes a profound impact, technology raises important ethical considerations that need to be addressed. As we have seen, former Oxford University philosopher Nick Bostrom (2014) has especially focused on the ways in which artificial intelligence and superintelligence pose new ethical challenges. Feminist theorist Donna J. Haraway (1991) confronts conventional notions of the human and explores the possibilities of hybridity and

cyborg identity in the context of technology. MIT professor Sherry Turkle (2011) focuses on the social and psychological impact of technology on relationships and communication. French philosopher Bernard Stiegler (2009) studies the role of technology in shaping human experience, memory and social interactions. Writer and researcher Evgeny Morozov (2011; 2013) critically examines the social and political consequences of digital technologies, focusing on cyber-utopianism, surveillance capitalism and technology solutionism. These thinkers offer diverse perspectives and contribute to the ongoing debate on the ethical aspects of technology.

The consequences of the technologies of the fourth industrial revolution and the resulting cognitive assemblages have been especially studied by Peter-Paul Verbeek. He offers a theory of technological mediation and posthuman ethics that builds upon and expands the US philosopher Don Ihde's (1990) study of the role of technology in human behaviour and how it mediates in the human relation to the world. Ihde distinguished four main roles depending on the way human beings interpret the world. Firstly, there are embodiment relations in which technological artefacts are incorporated into the experience of the body, such as glasses that become part of us and escape our recognition. Secondly, there are hermeneutic relations in which the artefacts are not transparent; for example, when we use a thermometer, our engagement is with the temperature it reveals, which we need to interpret. Thirdly, depending on how technologies shape the context of our experience, we have background relations that we often do notice, for instance, with refrigerators and central heating systems. Fourthly, there are alterity relations, where we interact with technology as an "other" by projecting human properties on it, as we do, for example, with an ATM or an automatic train ticket machine. Verbeek has expanded Ihde's concept of embodied human–technology relations characteristic of the fourth industrial revolution by adding human–cyborg relations. This extension reflects the way in which technologies are now more intimate as the human and the nonhuman form a new entity. As Verbeek argues in *Moralizing Technology* (2011), current developments in information technology include the use of hermeneutics to produce more sophisticated and composite human–technology relations that involve nonhuman forms of intentionality (144–47). The agency emerging from these relations is distributed across artefacts and other technologies. For instance, persuasive technology is aimed at creating health and fitness apps or behaviour-change apps that develop an intelligent interaction with human behaviour, even persuading us to alter our attitudes, opinions and actions (see Ch. 19). Technologies are now more intimate and have a more powerful contextual influence. We become hybrid beings when

technology merges with our bodies in a smart environment, challenging the definition of who we are and changing our actions and our perception of the world. Technologies mediate our knowledge of the world and have an ethical dimension in that they affect our perceptions, actions and experiences. Therefore, Verbeek considers ethics a hybrid, joint affair in which both subject and objects, humans and technologies, play a crucial role (124).

Technology is not, then, just a neutral mediator between us and the world; rather, it helps us shape who we are. From a (post-)phenomenological approach, human–technology relations go beyond the subject–object schema and have a lot in common with Braidotti's vitalist ethics of mutual trans-species interdependence. As Verbeek argues in *What Things Do* (2005), in human–technology relations, subject and object are interwoven and mutually constitute each other: "Humans and the world they experience are the products of technological mediation, and not just the poles between which the mediation plays itself out" (130). In consonance with this, he treats ethics as a hybrid, joint affair between subject and object, that is, between humans and technologies. This outlook on human–technology relations is in line with the critical posthumanist challenge to traditional conceptions of the relation between subject and object and its understanding of the inseparable relation and co-constitution of humans and technologies. This relation of entanglement calls for a new, expanded understanding of ethics that takes into account the complex interactions that emerge from this new understanding of the self, that is, Braidotti's becoming-machine axis, or techno assemblage. Though Verbeek believes that ethics should expand its humanist focus to include technology, he acknowledges the difficulty of the task given that, according to mainstream ethical theory, moral agents are required to have intentionality and some degree of freedom to realise their intentions, and these capacities usually pertain to human entities. He meets this problem by articulating a form of technological intentionality that he calls "hybrid intentionality" or "composite intentionality" (2011, 58). According to it, intentionality is "distributed" among human and nonhuman entities: it is a shared intentionality that shapes, directs and conditions human actions, interpretations and decisions. Freedom also becomes a hybrid affair of humans and artefacts as, given that a range of possibilities and constraints are set through their design, the technologies actively participate through their mediation in shaping human behaviour and transforming our actions. Hayles has also recently called for the development of ethical frameworks to address the multifaceted ethical issues emerging from complex human–technical systems, or cognitive assemblages, that is, "collectivities comprised of humans, nonhumans, and computational media in which

cognition, agency, and intentionality are distributed among many actors and agents" (2022, 1195). These cognitive assemblages will intensify in the future with the increasing entanglement of human agency and cognitive media.

6 The Ethical Response of Literature to the Techno–human Assemblage

The new conception of ethics and the complex debates that emerge from cybernetics, transhumanism and critical posthumanism in the context of the fourth industrial revolution find in literature a fruitful space for exploration. Literature plays a key role in shaping cultural understandings of scientific theories as it has the power to produce immediate, sometimes also emotional responses to the opportunities and dangers that come or may come from the cognitive, techno assemblages of the present. Reimagined post-anthropocentric realities come to life in literary texts, providing a "local habitation" (Hayles 1999, 22), an embodiment of abstract philosophical ideas and concepts that illustrates them. In this sense, the number of critics and academics of the posthuman that include literary examples in their works as thought-provoking case studies is remarkable. Ivan Callus has underlined the importance of literature for theorists of the posthuman and how, in spite of the popularity and resonance of film, TV serials and digital games, literature is still revitalised and renewed by the posthuman. There is even a posthumanist literary canon emerging from the work of prominent theorists of the posthuman such as Hayles, Wolfe, Nayar, Braidotti and Herbrechter. As Callus puts it, "[i]f literature predefines posthumanism, it also finds itself redefined by it" (675).

However, fictional narratives are arguably deeply bound up with the human, and as Marco Caracciolo notes, they tend to favour "human-scale events that matter to human communities" and are likely to "anthropomorphize these realities, bringing them down to the level of human interaction" (1098). In fact, the type of modern novel emerging at the end of the eighteenth century and the prototype of the well-constructed, realist story are still dominant. Despite these humanistic roots, there are narratives that reflect a posthuman way of thinking about the present and endorse a posthumanist critique of humanity. Caracciolo argues that the novels that best resonate with posthumanist concerns are those that deal with the posthuman not only in terms of plot or subject matter but also in their form, so that these narratives "perform" posthumanist ideas (1099) through strategies such as the use of nonhuman characters and narrators or the disruption of chronological sequentiality (see Ganteau and Onega, 1–20). They upset humanistic conceptions such as the

depiction of human life as linear and science and technology as unquestionably progressing.

Caracciolo finds that the science fiction genre is well equipped to address the posthuman in both content and form as it has always dealt with the boundaries of the human. Sherryl Vint, a leading scholar in the field who believes that science fiction is a constitutive part of posthumanism, divides the genre into three main streams of thought. The first portrays the "uber-human" (from the German *Übermensch*, or "superhuman") and endorses transhumanist ideas that we have reviewed in Part 3 of this chapter, displaying forms of genomic, mental or mechanical enhancement that do not question the ethical challenges and post-anthropocentric visions or humanism itself, but rather extend them. A second stream would portray the "new human." This type of science fiction deals with the perspective of those traditionally excluded from the humanistic conception of the human, as explained in Part 4 of this chapter, devoted to critical posthumanism, and questions and develops new frameworks to understand the human. The third stream is more radical as it gives a voice to the nonhuman and questions traditionally human-only concepts such as agency, intelligence, affect and subjectivity (Vint 2022, 226).

Mainstream literary writers have also taken an interest in the posthuman and human–machine interfaces with fictions that dismantle humanist conceptions through formal experimentation. As Vint suggests, the separation between science fiction and mainstream fiction has blurred considerably in the last 30 years, in consonance with technological development (2021, 195). Creative writers tend to use speculative fiction strategies, as they imagine what could happen as a consequence of the way we live now. This provides the perfect arena to bring to the fore the ethical implications of our current concerns and fears. Works written by prominent mainstream British writers, such as David Mitchell's *Cloud Atlas* (2004), Jeanette Winterson's *The Stone Gods* (2009) and *Frankissstein: A Love Story* (2019), Ian McEwan's *Machines Like Me* (2019), and Kazuo Ishiguro's *Never Let Me Go* (2005) and *Klara and the Sun* (2021), can be interpreted from this perspective. More specifically, in the last ten years many novels have been published that deal with the ethical questions emerging from the human–machine interface, or from social media and digital technologies. In the US, we have Dave Eggers's *The Circle* (2014) and *The Every* (2021), Rob Hart's *The Warehouse* (2019), Don DeLillo's *The Silence* (2020), Richard Powers's *Bewilderment* (2021), Patricia Lockhood's *No One Is Talking About This* (2021), Lauren Oyler's *Fake Accounts* (2021), Jennifer Egan's *The Candy House* (2022) and Colin Winnette's *Users* (2023), among many others. They all share mostly critical perspectives as they deal with the way these technologies may redefine our sense of identity.

These writers combine a thematic interest in the posthuman with strategies that often disrupt linearity and chronology. However, their novels are complex and do not simply respond to the transhumanist or the critical posthumanist label. They acknowledge the positive aspects of technology but reject human enhancement without check. They embrace embodiment but distrust post-anthropocentrism, often presenting dehumanisation and loss of agency as something to be feared. Critics have referred to narratives of this kind as "neohumanist counterratives" (Herbrechter 2020, 7) and "literature's humanist posthumanism" (Thomsen 333–43). What is clear is that they still have a strong humanist component and are more conservative than the science fictions of the second and third stream described by Vint. Carmen Laguarta-Bueno (2022) has studied how novels such as Richard Powers's *Generosity: An Enhancement* (2009), Dave Eggers's *The Circle* (2013), and Don DeLillo's *Zero K* (2016) navigate between the transhumanist and critical posthumanist paradigms in their depiction of the ethical dilemmas that come with human enhancement.

7 The Ethics of Representation in Jennifer Egan and Don DeLillo

I would like to finish this chapter by briefly discussing two very recent novels that delve into and illustrate some the critical theories discussed in it: Don DeLillo's *The Silence* (2020) and Jennifer Egan's *The Candy House* (2022). *The Silence* is set in the near future at the time of its publication, when some friends are meeting to watch Super Bowl Sunday 2022. The what-if scenario starts when, all of a sudden, the grid goes down and screens go black, rendering phones, laptops and TV sets dead. No explanation is given as to what caused the failure of this technical equipment or infrastructure. The focus is not on the causes of the blackout but on its direct consequences for the characters, who depend on technology so much that they seem to have lost their sense of agency. The novel is divided into two parts. The first part further falls into six chapters and is told retrospectively by the type of external narrator with multiple focalisation characteristic of realist fiction. Braidotti's techno assemblage and becoming machine axis of the posthuman self is depicted in this part, but what emerges from the encounter between humans and machines is neither a characteristic critical posthumanist "vitalist ethics of mutual trans-species interdependence" (2013, 92) nor a transhumanist enhancement of the characters by their embrace of new technologies. Instead, the characters are trapped in a process of "posthuman suffering" (Miccoli) as they see themselves totally dependent on technological systems and feel deficient without these systems complementing their biological selves. In the present of the story, humans

have offloaded many of their skills to new technologies and, as a result, they have lost some of the abilities they used to possess, such as memorising facts or focusing on one task. People's brains must adapt to the language of machines and the general datafication of life, thus turning into datafied selves or data bodies, with algorithmic identities more powerful than organic flesh. However, this cybernetic conception of the self in which the human is reduced to information or parsable data is also rejected in the novel, something that becomes clear in the second part when the consequences of the blackout and the sudden break in the human techno assemblage become apparent.

Formally speaking, the second part of the novel also breaks with the more traditional narrative form of the first. There are no chapter numbers, only sections separated by blank spaces, and the narrative voice and characters' perspectives become blurred through free indirect discourse. Instead of the past, the present tense is used, adding to the sense of urgency and loss that the characters feel towards the unknown, a present without technology. The characters remain trapped in a process of melancholia, as they mourn not only the loss of digital connectivity but also the unknowing loss and inaccessibility of a constitutive part of their (post)human selves. Rather than dialogues, we have mostly monologues and soliloquies, as the capacity for self-reflection, for empathy and for conversation with others has been overshadowed by simple connection and machine language. This becomes obvious when our means of expressing our appreciation for something is reduced to a mere click of a "like" button on social media. A vulnerability thus emerges from our posthuman selves, in which agency becomes a joint affair and, as Hayles has explained (see above), cognition becomes distributed among intelligent machines and other nonhuman actors. Tony M. Vinci (2020) has proposed a radical posthuman ethics of expansive vulnerability that suggests that grief and vulnerability can have a transformative power and help in the development of empathy.

Something similar happens in Jennifer Egan's *The Candy House*. The novel is set in a near future resulting from the 2016 release of a revolutionary technology called "Own Your Unconscious™," which allows for the memory externalisation of one's consciousness to a "cube" so that individual memories can be revisited and explored, even those aspects that have been forgotten or repressed. The premise invites the transhumanist reduction of the self to the mind, turning embodiment into something secondary. One of its supplementary features—the "Collective Consciousness"—allows users who have previously uploaded their individual externalised memory to search and access the anonymous thoughts and memories of other users, so that events can be revisited from different points of view, forgotten traumas remembered and missing people traced back through the anonymous memories of others. In

this sense, Kurzweil's ideas about cybernetic immortality and mind uploading into a computational container without the limitations of a biological body (see above) are reimagined in the novel. However, these externalised, digital memories are also used by the company's "counters," data mining experts who secretly gather data on consumer behaviour patterns and create algorithms that reduce human interaction to quantifiable phenomena, thus mirroring the threat of "surveillance capitalism" (Zuboff) or what Clare Birchall (2018) has named "shareveillance," the combination of covert data surveillance and open government data transparency.

Through a convoluted narrative style of interwoven stories, the novel formally performs the "Collective Consciousness" and the fragmented subjectivity of social media users, as it offers a mosaic of voices and an amalgamation of stories that combine different points of view, time shifts and fragmented perspectives. Narrators range from the more classical third-person omniscient ones to a second-person series of tweets or a collective first-person plural. The core chapter, where many of the characters converge, is written entirely through several threads of email chains. Like the "Collective Consciousness" technology, the novel allows readers to roam through the minds of a collection of characters and follow the unanticipated ripples that individuals cause for each other. However, *The Candy House* builds the intimacy of another consciousness through words and narrative in a safe environment. As the extradiegetic narrator of the novel's final chapter claims, "knowing everything is too much like knowing nothing; without a story, it's all just information" (333). The book engages with the posthuman thematically and formally but it still firmly asserts the power of the human imagination and the importance of literature to navigate the ethical consequences of the posthuman.

Conclusion

The exponential development of technology since the second half of the twentieth century and the consequent creation of different types of techno-human assemblages have sparked ethical debates on the evolving concept of humanity. Already in the 1950s, cybernetics studied the interaction between the organic and inorganic in the field of control and communication. From cybernetics emerges the idea that humans are patterns of information, the concept of the cyborg and, more recently, the blurred boundary between physical and virtual reality. The convergence between the physical, biological and digital realms that also defines many of the technologies of the fourth industrial revolution, and the transhumanist belief in human enhancement through

technology, have sparked ethical concerns from bio-conservatives and bio-luddites who believe that these practices should be monitored. Critical posthumanism takes a more balanced approach in its conception of the human as interconnected with the nonhuman. The human as a techno assemblage is defined by a vitalist ethics of embodied and interwoven human–machine relations that mutually constitute each other.

Literature plays a very important role in the exploration of both the fears and the possibilities that the human techno assemblage generates. Science fiction has always dealt with the boundary of the human, but in the last decades more and more mainstream novelists have taken an interest in the ethical debates that emerge from the human–machine interface. Favouring literary strategies that disrupt linearity, unity and chronology, they offer neo-humanist perspectives that acknowledge but also distrust the role of technology in our lives. Novels such as Egan's *The Candy House* and DeLillo's *The Silence* depict the ethical need of embracing a more embodied and embedded sense of self that could enhance resilience and adaptation in the face of the changes that the posthuman brings to the human sense of agency in the context of the fourth industrial revolution. By recognising the value of a grounded and integrated new form of subjectivity, we are invited to approach technological advancements with thoughtful caution, appreciating the significance of preserving our physicality and cherishing the ethical responsibility to safeguard part of our human nature in a world of evolving posthuman possibilities.

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