Postdigital Humans: Taking Evolution in Own Hands

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1 Introduction

Since the inception of the *Postdigital Science and Education* journal and book series in 2018, our community of postdigital researchers has spent considerable time and effort in defining the concept of the postdigital. While it is natural for a community to leave definitional matters in the background and focus on other topics of interest, foundational concepts are permanently in flux and definitions require periodical revisiting. As I began to examine the current work in the field with the theme of this book, I realized that much postdigital research makes only sporadic reference to (postdigital) human beings. Critical posthumanism is a foundational concept underpinning the postdigital idea (Jandrić et al. 2018), yet its influence has become increasingly covert. To bring this influence to the fore and develop theoretical background for further inquiry, the first part of this chapter examines references to postdigital humans in postdigital literature.

Building on postdigital literature, the second part of the chapter considers: Who is the postdigital human? This question immediately moves the discussion towards philosophical analyses, which, based on my recent works, can be classified into three 'performance standards' for inclusion into humanity: life, consciousness, and behaviour (Fuller and Jandrić 2019; Peters and Jandrić 2019). Not unlike critical posthumanism, much of this philosophy is implied but rarely openly explored in postdigital thinking; by examining this openly, it is possible to point up some theoretical dark spots and research opportunities. The third part of the chapter synthesizes

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philosophical approaches and postdigital theories and builds a postdisciplinary understanding of the postdigital human.

2 The *Postdigital* Human

Early Works (1998–2018)

Early theorists of the postdigital condition almost unanimously agree that one of the key inspirations for their work has arrived from Nicholas Negroponte's Wired article 'Beyond Digital' (1998). In his article, Negroponte refers to the famous scene from the 1967 film *The Graduate* (Nichols 1967) in which young Benjamin Braddock (played by Dustin Hoffman) observes career advice given by his teacher Mr. McGuire (played by Walter Brooke) who is convinced that the future of business is in plastics. Thirty-odd years later, Negroponte observes:

> Now that we're in that future, of course, plastics are no big deal. Is *digital* destined for the same banality? Certainly. Its literal form, the technology, is already beginning to be taken for granted, and its connotation will become tomorrow's commercial and cultural compost for new ideas. Like air and drinking water, being digital will be noticed only by its absence, not its presence. (Negroponte 1998) (emphasis from the original)

In character with Wired's 1990s spirit, Negroponte's focus in this passage is firmly on technology (plastics, digital).

It is unsurprising that those inspired by Negroponte's work have taken similar approaches. Thus, the first scholarly paper that refers explicitly to the concept of the postdigital—Kim Cascone's 'The Aesthetics of Failure: "Post-Digital" Tendencies in Contemporary Computer Music'—makes only implicit reference to humans. Describing the aesthetic of the glitch, Cascone (2000: 13) writes: 'Indeed, "failure" has become a prominent aesthetic in many of the arts in the late 20th century, reminding us that our control of technology is an illusion, and revealing digital tools to be only as perfect, precise, and efficient as the humans who build them.' Notions such as 'controlling' and 'building' technologies may be interpreted as signs of technological instrumentalism and dualism between humans and technologies, yet Cascone attributes them with the first seeds of postdigital thinking. The glitch is a point of intersection between the digital machine and its human user; a fringe at which technologies become more human and humans become more technological. Cascone's aesthetic of the glitch is neither fully human nor fully technological, and it is thus postdigital.

The next definition, by Melvin L. Alexenberg in late 2000s, gives more prominence to posthumanist aspects of the postdigital condition.

> Postdigital (adjective), of or pertaining to art forms that address the humanization of digital technologies through interplay between digital, biological, cultural, and spiritual systems, between cyberspace and real space, between embodied media and mixed reality in social and physical communication, between high tech and high touch experiences, between visual, haptic, auditory, and kinesthetic media experiences, between virtual and augmented

> reality, between roots and globalization, between autoethnography and community narrative, and between web-enabled peer-produced wikiart and artworks created with alternative media through participation, interaction, and collaboration in which the role of the artist is redefined. (Alexemberg 2011: 10)

Alexemberg's understanding of 'the humanization of digital technologies' avoids exploration of the dichotomy between human beings and technologies which has affected much early postdigital thinking and instead replaces it with a more dialectic notion of 'interplay between digital, biological, cultural, and spiritual systems'. Alexemberg does not reach too deeply into posthumanist thinking and literature, yet his definition opens up opportunities for further work in the field.

The next influential definition, published at Wikipedia and mirrored all over the web, suggests:

> Postdigital, in artistic practice, is an attitude that is more concerned with being human, than with being digital. Postdigital is concerned with our rapidly changed and changing relationships with digital technologies and art forms. If one examines the textual paradigm of consensus, one is faced with a choice: either the 'postdigital' society has intrinsic meaning, or it is contextualised into a paradigm of consensus that includes art as a totality. (Wikipedia 2020)

Drawing on Alexemberg's definition from *The Future of Art in a Postdigital Age* (2011),[1] the Wikipedia definition is now clearly, albeit covertly, situated in posthumanism. However, the understanding of the postdigital project as being more interested in human beings than technologies is problematic in the light of sociomaterial reconfigurations of relationships between human beings and technologies which 'conceptualise knowledge and capacities as being *emergent* from the webs of interconnections between heterogeneous entities, both human and nonhuman' (Jones 2018: 47).

The next definition illustrates one example of postdigital thinking in the humanities and social sciences. In seeking to explore origins, *Postdigital Science and Education* recently published an article about a group of scholars under the pseudonym 52group and the development of their ideas about the postdigital between 2009 and 2019. In their 2009 manifesto, the 52group write:

> We hold out hope for the postdigital era. We hope that it provides the framework for an environment that is good enough, firstly, to hold an individual as they identify and develop authentic personal experiences, and secondly, to stimulate that individual to extend her/his questioning and actions in the world. In this way, as their social experiences stray into what are now called digital spaces, the digital is secondary to the relationships that form and develop, and the activity that takes place, in an environment. A central actor in the postdigital era is, therefore, a significant, more experienced other against whom the individual can securely test their authentic experiences. Within the postdigital era, the personal and emotional comes to the fore and anchors cognitive development. (Cormier et al. 2019: 478)

The manifesto reveals complex and nuanced postdigital understandings of relationships between human beings and technologies. Responses to the manifesto, written by the same authors in 2015 and then again in 2019, refined these insights further.

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[1] Alexemberg (2011: 9) freely admits his active contribution to Wiktionary and similar websites.

A good example is Mark Childs' 2015 response: 'Evolutionarily, technology created the species *Homo sapiens* as much as the other way around' (Cormier et al. 2019: 479). Referring to William Gibson's *Neuromancer* (1984) and cyberpunk literature, Childs' response is deeply situated in posthumanism. Childs' 2015 response also seems to mark the first public usage of the phrase 'postdigital humans'.

This brief overview presents a selection of some key moments in the development of postdigital thinking about human beings from Negroponte's (1998) Wired article 'Beyond Digital', through to early work done in artistic contexts, and towards the humanities and social sciences. It shows development of postdigital understanding of human relationships to technologies from early dualisms to increasingly refined posthumanist and sociomaterialist perspectives. The next section provides a selection of most recent developments in postdigital thinking.

Recent Works (2018–)

Post-2018 work builds upon early postdigital thinking using insights from a diverse body of work including critical philosophy of technology, science and technology studies, critical posthumanism, critical pedagogy, and others. 'The postdigital is hard to define; messy; unpredictable; digital and analog; technological and non-technological; biological and informational. The postdigital is both a rupture in our existing theories and their continuation.' (Jandrić et al. 2018: 895) The concept implies neither a complete break-up with the past nor business and usual—it is a complex entanglement between biological and digital modes of existence (Sinclair and Hayes 2019: 126). Postdigital humans, by extension, are not only those who come after the 'digital humans' or 'predigital humans'. Rather, postdigital humans are all those entangled in different configurations of human–machine assemblages.

Focusing to these assemblages, Peter McLaren (2019: 11) asks: 'What kind of socio-historical human agent do we wish to nurture in a postdigital society? One whose computational capacity and recursive self-improvement is enhanced genetically? A being that is emulatable by postdigital materials and powered by evolutionary algorithms?' Mixing sociomaterialism's shared agency between human and non-human actors with critical pedagogy, McLaren opens up a hugely important question: Where do we, as a society, want to direct this shared agency?

Postdigital studies of artificial intelligence (AI) and neurology offer further relevant insights. In 'Brain Data: Scanning, Scraping and Sculpting the Plastic Learning Brain Through Neurotechnology', Ben Williamson (2019: 82) opens up the practical question of what takes to conduct research on digital humans. 'Understanding and analyzing neurotechnology from a postdigital perspective requires engagement with biosocial studies of neuroscience, sociotechnical studies of technology production and posthumanist theory on the assemblages produced by human-machine integration.' Alongside Levinson (2019) and others, Williamson (2019) opens up an important question of postdigital research methodology. Current research in the field sees epistemology as mutually constitutive with political economy (Fuller 2019; Jandrić 2020a). 'Our postdigital age is one of cohabitation, blurring borders between social actors and scientific disciplines, mutual dependence, shifting relationships between traditional centres and margins, and inevitable compromise.' (Jandrić and Hayes 2019: 390) Epistemically, this leads to radical postdisciplinarity; politically, it calls for forms of involvement usually associated with critical pedagogy.

Recent interesting work about postdigital humans can be found in the field of teaching and learning. Within a plethora of available examples, in particular, in their recent book, *The Manifesto for Teaching Online*, scholars from Edinburgh University's Centre for Research in Digital Education apply the postdigital perspective to human contact.

> As many of our digital technologies have become smoother, more immersive, less obtrusive, we find ourselves in a postdigital era in which we need to understand contact as something which takes place multiply: a video call is contact, and so is teacher presence on a Twitter feed; a phone call is contact, and so is a shared gaming session; an asynchronous text chat is contact, and so is a co-authoring session on a shared document. These are forms that we can value on their own terms, without needing always to align them with ideals of contact dependent on proximity in space, and visibility of face. (Bayne et al. 2020: 78)

Written before the Covid-19 pandemic, these insights have hugely risen in importance during recent lockdowns and 'self'-isolations (Jandrić 2020b; Peters and Besley 2020). Arguably, the described shift towards blurring borders between physical and digital social contact, or postdigital human contact, is one of many important steps in development of postdigital humans.

This selection of recent developments in postdigital thinking bursts with unfinished thoughts, open questions, and research opportunities. Therefore, these early insights can be understood as mere announcements of what postdigital thinking could be (about) and possible directions it could explore. After situating this inquiry into postdigital humans within relevant works, it is the time to launch a head-on attack.

3 The Postdigital *Human*

This section examines who is a postdigital human? The first definition might suggest that the postdigital human is a human being living in the postdigital condition defined by vanishing borders between the digital and the analog in all spheres of life, including their own body. However, I first want to remove the most common critique that many people in this world have no access to technology and therefore are not even digital. This critique, which regularly occurs across a range of publications (for example in Feenberg 2019), can be responded to in two different ways. The first response is to argue that the critique is misleading because of its focus to computers, networks, and other digital devices. However, computers are one of many possible embodiments of digital principles and are foundational in fields from physics to biology. In fact, '[h]uman beings have always been digital—we have always classified sounds, colors, textures and smells in certain categories which roughly correspond to "resolution" of our senses' (Jandrić 2019: 172). In the humanities and social sciences, however, computer-related digitalization has indeed deeply transformed our being and society, any inquiry into postdigital humans cannot ignore other forms of digital existence inherent to our bodies and nature.

Even within the special case of computer-related digitalization, the inability to access computers, networks, and other digital devices does not set one free from digitalization. We live in the age of the Anthropocene, where the human race affects the Earth's geology and ecosystems significantly through burning fossil fuels, using chemical fertilizers, and multiple other practices. These days, traditional analog practices such as fertilizing land cannot be thought of without digital technologies which enable development of new fertilizers—situated in a space between the digital and the analog, all our environment-shaping practices are postdigital. Consequently, even the most isolated Inuits in the Arctic, and Tagaeri in the Amazon, cannot escape digitally enabled changes in their environments. These people may indeed not have any access to digital tools, yet the postdigital condition shapes their environments and lives. Therefore, they are also postdigital humans.

These arguments about ubiquity and inescapability of the postdigital condition cover postdigital *Homo sapiens* and their evolutionary successors. However, a growing body of posthumanist research developed during the past few decades suggests that entities very different from *Homo sapiens* may in some cases also be considered human. According to Steve Fuller, the answer to the question 'What does it mean to be human?' reaches far beyond *Homo sapiens*.

> We shouldn't be sentimental about these questions. 'Human' began – and I believe should remain – as a normative not a descriptive category. It's really about which beings that the self-described, self-organised 'humans' decide to include. So we need to reach agreement about the performance standards that a putative 'human' should meet that a 'non-human' does not meet. (Fuller and Jandrić 2019: 207)

Fuller also states: 'you cannot be "human" on your own, simply because you have, say, the right genetic makeup. Humanity is a collective achievement or nothing at all' (Fuller and Jandrić 2019: 207).

Following Fuller's understanding of 'human' as a normative category, an inquiry into postdigital humans beyond *Homo sapiens* implies identification of performance standards. Recent research in the field (Fuller and Jandrić 2019; Peters and Jandrić 2019) has suggested three important performance standards for postdigital humans: life, consciousness, and behaviour.

Before moving on, let us identify possible candidates for postdigital humans. They can be classified into three main categories: biological entities other than *Homo sapiens*, non-biological entities, and entities combined of biological and non-biological parts.

Speaking of biology, all known life on planet Earth is based on carbon. While the common expectation in astrobiology that possible extraterrestrial life forms will also be based on carbon is sometimes critiqued as carbon chauvinism (Sagan 1973: 47), forms of life based on material bases other than carbon have not (yet) been detected and/or developed in laboratories. Looking at biological entities, therefore, the following analysis assumes that they are made of carbon.

Looking at non-biological entities, all today's 'thinking machines', or computers, are based on digital (zero-one) computation—in words of Alan Turing (1950: 439), they are a subgroup of a more general mathematical concept of 'discrete state machines'. Historical computers, such as ENIAC, performed zero-one computation using technologies of the day such as vacuum tubes, crystal diodes, resistors, capacitors, and others. After decades of development, today's zero-one computation takes place in silicon field-effect transistors placed on monolithic integrated circuits. Latest recent research developments point towards opportunities to develop digital computing on other material bases such as graphene and carbon nanotubes, and quantum computing. While all today's machines that could possibly be considered as postdigital humans are based on silicon, all non-carbon-based discrete state machines have the potentials to develop artificial intelligence.

Entities based on this or that combination of human biology and non-carbon-based discrete state machines are well-known under the name of cyborgs. While cyborgs have inspired decades of important posthumanist research, a lot of this research does not question humanity of its protagonists. In *Singularity is Near*, Ray Kurzweil (2005) takes the argument further using an interesting thought experiment. Let us imagine a future in which all bodily organs can be replaced. So, when I break a hip, I replace my bone with an artificial hip; when my liver stops working, I replace it with an artificial liver; and so on. According to Kurzweil, 'gradual replacement also means the end of me. We might therefore wonder: at what point did my body and brain become someone else?' According to Kurzweil, '[i]t's the ultimate ontological question, and we often refer to it as the issue of consciousness' (Kurzweil 2005: 257). However interesting, Kurzweil's thought experiment reaches a philosophical point of no return, and his 'fully replaced' entities need to be examined against performance standards for postdigital humans: life, consciousness, and behaviour.

Based on this preliminary analysis, the following analysis of performance standards for inclusion into humanity discusses entities which are available at present or could be available in foreseeable future: non-carbon-based AIs, including but not limited to today's silicon-based computers.

The First Performance Standard: Life

To be human, one first needs to be alive. Fuller's understanding of being human reflects a long tradition of posthumanist thinking which deconstructs the notion of life from its material base (biological vs. non-biological, carbon-based vs. non-carbon-based). A powerful example of such thinking was presented by Steven Hawking at his lecture 'Life in the Universe' (1996). 'One can define Life to be an ordered system that can sustain itself against the tendency to disorder, and can reproduce itself. That is, it can make similar, but independent, ordered systems.' Hawking proceeds:

> A living being usually has two elements: a set of instructions that tell the system how to sustain and reproduce itself, and a mechanism to carry out the instructions. In biology, these two parts are called genes and metabolism. But it is worth emphasising that there need be nothing biological about them. (Hawking 1996)

In practice, it is possible to imagine a self-repairing robot programmed to produce new self-repairing robots. According to Hawking, a functional self-repairing, self-reproducing robot is a legitimate form of life.

Application of Hawking's definition to robots is relatively straightforward because robots and *Homo sapiens* consist of different material bases (metal and carbon). However, recent advances in biotechnology complicate this analysis because they often transcend the borders between different material bases. For example on the 70th Anniversary of Erwin Schrödinger's famous lecture about the nature of life at Trinity College Dublin, Craig Venter gave a presentation 'What Is Life? A 21st Century Perspective', which explores these developments.

> We can digitize life, and we generate life from the digital world. Just as the ribosome can convert the analogue message in mRNA into a protein robot, it's becoming standard now in the world of science to convert digital code into protein viruses and cells. Scientists send digital code to each other instead of sending genes or proteins. There are several companies around the world that make their living by synthesizing genes for scientific labs. It's faster and cheaper to synthesize a gene than it is to clone it, or even get it by Federal Express. (Venter 2012)

Based on Hawking's definition, it could be argued that the digital code is not alive since it cannot reproduce without the external help of scientists, while the protein cell is alive because it can reproduce on its own. However convincing, this argument is worth an in-depth consideration.

Science in the twenty-first century recognizes that genes, whilst not a form of life, are essential to life. In Venter's example, digital codes for protein synthesis play the role of protein genes—information contained in these entities is necessary, but not enough, for creation of life. According to current biological classifications, both digital codes for protein synthesis and protein genes are small non-living building blocks of larger living forms. However, these classifications are mere conventions—it is difficult, and perhaps even impossible, to determine the exact point where life ends and non-living organic structures begin. A typical case are viruses. Viruses possess their own genes and evolve, yet they do not possess cellular structure, and they require a living host cell to reproduce. Interpretations of such properties hugely vary, and scientists cannot agree whether viruses are a form of life or non-living organic structures—according to the popular adage, viruses are usually defined as being 'at the edge of life' (Rybicki 1990).

These microscopic discussions at the fringes of biology, chemistry, physics, and information science point towards the inseparability of *postdigital* life and postdigital *life*: at some point of interaction with its environment, digital code may become (a building block of) a living biological organism. This conclusion does not imply that an email attachment containing information for protein synthesis is alive. Instead, it merely leaves an opportunity that, at some point of their development, some inorganic entities could be reorganized into biological forms of life.

In the context of posthumanist understanding which removes the notion of life from its material base, various biological and non-biological entities, and some combinations thereof, can be understood as living. This conclusion leaves an opportunity that some postdigital humans may look and feel radically different from *Homo sapiens*.

The Second Performance Standard: Consciousness

The second performance standard for inclusion into humanity, consciousness, is one of the most baffling scientific questions of today. Consciousness is notoriously hard to define, and many historical attempts at explaining consciousness without clearly identifying the question have been deficient. Researchers, such as Ned Block, Daniel Dennett, David J. Chalmers, and others, have developed a distinction between the 'easy problem of consciousness' focused to cognitive abilities and functions and the 'hard problem of consciousness' which accounts for a conscious experience. Both problems are fundamental for this attempt to define the second performance standard for an entity's inclusion into humanity. However, while easy problems of consciousness can be explored and often even measured in practice (which moves them to the third performance standard for inclusion into humanity, which is behaviour), the problem of consciousness lies firmly in theory.

Since the beginning of the twentieth century, physicists including Nils Bohr and Erwin Schrödinger have asked why it seems impossible to explain the functioning of an organism using our understanding of quantum-physical workings of its microscopic building blocks such as atoms and molecules. In a recent article, Fuller outlines Bohr's and Schrödinger's different responses to this question. Embedded in their historical circumstances, these responses present two competing philosophical principles which can be found in consciousness studies to date.

> Bohr argued that knowledge of an organism's overall organization structure and its precise chemical composition may also be mutually exclusive, which could be read as implying that half of the available knowledge about an organism is lost while it is still alive (shades of the famed 'Schrödinger cat' thought experiment). In contrast, Schrödinger assumed that an organism's unique level of physical complexity implies that its design is, so to speak, 'quantum-proof', which allows us—at least in principle—to understand its workings without requiring Bohr-style paradoxes and mysteries. (Fuller 2020)

More recently Chalmers' groundbreaking work, 'Facing Up to the Problem of Consciousness' (1995), argues that 'there are systematic reasons why the usual methods of cognitive science and neuroscience fail to account for conscious experience. These are simply the wrong sort of methods: nothing that they give to us can yield an explanation.' Therefore, Chalmers concludes, '[t]o account for conscious experience, we need an *extra ingredient* in the explanation'. Introducing this dualism between the subjective and the objective, Chalmers distinguishes between mental states and physical systems ontologically; these mental states appear in, making him more aligned to Bohr than Schrödinger. Chalmers does not avoid uncomfortable issues with his dualist approach such as the rejection of materialism. In *The Conscious Mind: In search of a fundamental theory of conscious experience*, Chalmers dedicates the whole chapter to these problems (1996: Chapter 'Venturing Beyond the Imposition of a Postdigital, Anti-human Higher Education') and develops his theory of naturalistic dualism. Further philosophical inquiry into this problem is well beyond the scope of this chapter, yet there is something to be said for Chalmers' argument that his position is a mere supplement to the scientific world view; 'it is a necessary broadening in order to bring consciousness within its scope' (Chalmers 1996: 159).

According to Fuller, possible developments towards understanding and creating human and human-like forms of life are likely to develop in two opposing directions:

> One is simply to forsake the opaque relations between brains and genes in the human organism and focus instead on increasing the self-programming capacities of advanced artificial intelligence—perhaps even as the platform into which humans will migrate in a 'transhuman' future. Think Ray Kurzweil. The other is to dwell, as Schrödinger himself did, on the thermodynamic efficiency of human organism, notwithstanding its opaque inner workings. (Fuller 2020)

The second position is reactive, yet the first position requires one 'to change one's frame of reference from creature to creator—that is, from the naïve human observer to "God's point of view"' (Fuller 2020). It is still unclear whether we will ever reach a full understanding of the nature of consciousness—perhaps, as Bohr claimed, there are natural limits which prevent us from doing so. For better or worse, however, what Fuller calls the 'God's point of view' is the type of thinking behind all humanity's attempts at creating human-made fellow humans.

While Schrödinger's approach is still worthy of consideration, today's practical problem of consciousness is much closer to that of Chalmers' naturalistic dualism. As we build more agile AIs based on the 'God's point of view' (such as silicon-based computers), the hard problem of consciousness can be left aside; Chalmers' extra ingredient will either somehow show up or future progress will deem it irrelevant.

The Third Performance Standard: Behaviour

System behaviour may have been philosophically understood as straightforward problem of consciousness, yet in practice, its measurement is difficult. The conclusion that we should focus on the easy problems of consciousness while leaving the hard problems of consciousness alone may sound simple, yet it is closely related to a 70-year research tradition based on the work of Alan Turing. In his groundbreaking paper 'Computing Machinery and Intelligence', Turing (1950: 433) makes a simple yet powerful proposal to replace the question 'can machines think?' by another question, 'which is closely related to it and is expressed in relatively unambiguous words': can a machine fool a human being into thinking that they are communicating with another human being? Turing allowed only digital computers into this imitation game. In defence of that decision, he writes: 'This restriction appears at first sight to be a very drastic one. I shall attempt to show that it is not so in reality.' (Turing 1950: 436) Following a mathematical proof of universality of discrete machines, he arrived at the final formulation of his test.

> It was suggested tentatively that the question, 'Can machines think?' should be replaced by 'Are there imaginable digital computers which would do well in the imitation game?' If we wish we can make this superficially more general and ask 'Are there discrete state machines which would do well?' (Turing 1950: 442)

Since 1950, variants of the Turing test have been instrumental in development of today's computer-based AIs. The test has been endlessly revised, expanded, and extensively critiqued. The Stanford Encyclopedia of Philosophy identifies nine main categories of objections to the Turing test: the theological objection, the 'heads in the sand' objection, the mathematical objection, the argument from consciousness, arguments from various disabilities, Lady Lovelace's objection, argument from continuity of the nervous system, argument from informality of behaviour, and argument from extra-sensory perception (Graham and Dowe 2020). While this chapter is not a place for detailed consideration of these critiques, John Searle's Chinese Room argument deserves deeper elaboration.

Searle's (1981) thought experiment can be found in many different versions. Its simple version supposes a computer which behaves as if it understands Chinese and manages to convince a human Chinese speaker that they are talking to another human Chinese speaker. While this computer has obviously passed the Turing test, Searle asks whether it literally understands Chinese or merely simulates understanding of Chinese. Not unlike Chalmers' distinction between the easy problem of consciousness and the hard problem of consciousness, Searle proposes that the view that the computer literally understands Chinese can be described as strong AI and the view that the computer merely simulates understanding of Chinese can be described as weak AI. According to Searle, only weak AI can be established experimentally. In *The Conscious Mind: In search of a theory of conscious experience*, Chalmers (1996: 301) claims that the heart of Searle's problem clearly lies in consciousness. The Chinese Room experiment shows that the Turing test can resolve only the weak problem of consciousness (conscious behaviour), while the hard problem of consciousness (experience) remains unanswered.

Every few years, there is a newspaper headline claiming a new machine has passed the Turing test. However, these claims are usually immediately disputed (Ekici 2014; Hruska 2018; amongst many others). The problem is not whether the computer has met benchmarks set by experiment's designers, but whether these benchmarks have been set correctly. Reflecting on these critiques, John Denning, one of the creators of 'a computer program named Eugene Goostman which imitates a Ukrainian teenager with a quirky sense of humour and a pet guinea pig', says: 'I think we passed "a" Turing test, but I don't know if it's "the" Turing test.'

(Sample and Hern 2014) In practice, even theoretically solvable weak problems of consciousness, and weak AI, are too hard for today's sciences. The solvable third performance standard for inclusion into humanity, behaviour, is still not available in practice. Being theoretically solvable, however, it does not exclude non-carbon-based entities from humanity.

4 Conclusion: Self-Designated Evolution and Its Responsibilities

What can be learnt from this postdisciplinary journey into the question who, and what, may be considered as a postdigital human? We now need to accept a possibility of biological, semi-biological, and non-biological forms of life, which may be able to meet (currently unavailable) performance tests for inclusion into humanity. Given the normative nature of performance criteria, these tests need to be developed in postdisciplinary collaboration between diverse fields of human inquiry. For various reasons including natural restrictions (such as Bohr's paradoxes) and restrictions pertaining to human nature (normative questions are notoriously contextual, so is human consensus), we do not yet have, and perhaps never will have, a definite demarcation line between humans and non-humans.

However, our inability to detect postdigital non-carbon-based humans does not imply that such postdigital humans do not exist. The sheer amount of today's AI research, its long-term nature (it takes years to properly develop and train AIs), and the commitment to secrecy in highly funded military and pharmaceutical laboratories (see Stewart 2018) indicates that we could soon face much more advanced forms of AI than those which are publicly available today. Moreover, the evolutionary nature of human development suggests that postdigital humans cannot be described in either–or terms—there should be at least some postdigital non-carbon-based humans, perhaps in early stages of evolutionary development, around us at the moment.

While we wait for non-carbon-based postdigital humans to emerge, postdigital *Homo sapiens* play and attend musical concerts and engage in visual arts, architecture, design, humanities, social sciences, natural sciences, and philosophy. Critical posthumanists working in education ask questions such as '[w]here does the human teacher leak into the algorithm, and where does the algorithm leak into the human teacher's practice?' (Bayne in Jandrić 2017: 206). They also propose the development of a Turing Teacher Test (Kupferman 2020). Transgender activists such as Paul B. Préciado (2013) and McKenzie Wark (2020) explore effects of digitally enabled biotechnology on their own bodies. Silicon-based AIs and non-tampered *Homo sapiens* are just extremes in a long continuum of diverse material configurations and bio-machine entanglements that can make up postdigital humans. The in-between configurations are theoretically and practically more complex, and arguably more interesting, than these clear-cut extremes. Situated at the fringes between the digital and the analog, postdigital theory fits with explorations that are at the postdigital edge of humanity.

Homo sapiens have been around for ca 300,000 years, but our civilization and culture, depending on inclusion criteria, are only a few thousand years old. Throughout that long period, our physical bodies have remained similar, and the main developments have happened within society and culture. Since the first proposal of the cyborg, however, humankind has become able 'to take an active part in [its] own biological evolution' (Clynes and Kline 1960: 29). This transforms human evolution 'from natural selection based on the Darwinian model of internal transmission to cultural or self-designed evolution based on an accelerated external transmission of information' (Peters and Jandrić 2019: 195). Today's postdigital humans are active participants in this new form of evolution. Therefore, Peters and I argue that as we are 'slowly but surely taking natural selection into our own hands', we need to be aware that 'these new powers bring about new responsibilities' (Peters and Jandrić 2019: 205).

These responsibilities can be approached in various ways. Computer scientists need to try to develop new versions of the Turing test, educators need to teach new generations, and artists need to explore new aesthetics. None of these tasks and approaches is more (or less) important than the other. With its radical postdisciplinary approaches, postdigital theory is burdened with numerous issues including but not limited to the obvious incommensurability of different understandings of knowledge within the disciplines drawn upon by this chapter. However, this epistemic burden is a price for opening up a new window of opportunity for identifying links and relationships between traditionally disconnected world views. Such is the nature of postdigital research, in which the high epistemic risk associated with linking the unlinkable is justified with a prize of reaching further than others (see Jandrić 2020a).

However, the key contribution of postdigital theory to studies of human beings is neither in its convenient positioning between the analog and the digital nor in benefits of radical postdisciplinarity. Deeply imbued in the tradition of critical pedagogy, postdigital theory does not stop at explaining the world—its key goal, and its key mission, is to actively participate in its development and to enable the widest spheres of society to participate as well. Therefore, the question, who is a postdigital human?, requires some urgent updates: What kind of postdigital humans do we want to become? What kind of future do we want for our postdigital children? Working at the intersections of diverse human interests and disciplinary approaches, postdigital theory has an important role in developing a wide consensus about the future of the postdigital human.

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