Socio-gerontechnology

Interdisciplinary Critical Studies of Ageing and Technology

Edited by
Alexander Peine, Barbara L. Marshall, Wendy Martin and Louis Neven

First published 2021

ISBN: 978-0-367-23082-1 (hbk)
ISBN: 978-0-429-27826-6 (ebk)

Chapter 5

Elderliness

The agential inseparability of ageing and assistive technologies

Michela Cozza

DOI: 10.4324/9780429278266-5

The OA chapter is funded by Mälardalen University, Sweden

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

Chapter 5

Elderliness

The agential inseparability of ageing and assistive technologies

Michela Cozza

Introduction

There is no consensus in the scientific literature about how ageing can be defined. Much depends on the framework in which it is discussed. Two opposite models emerge by positioning ageing along a continuum of studies ranging from social sciences (such as sociology, some branches of psychology, political science and the multidisciplinary field of gerontology to mention a few) to applied sciences (including engineering, design research and medicine that include geriatrics). At the one end there is the social model according to which ageing is the cultural product of human agency, mostly of discursive practices (e.g. Gullette 2018; Weicht 2015). Despite the merit of highlighting the relationships between macro (e.g. care policies) and micro (the individual choices), the social model is imbued with a form of determinism according to which the "'the engine of change' [change in the course of life] is taken to be the social system . . . culture . . . or personality" (Marshall 1995, p. 29). At the other end there is the bio-medical model that frames ageing as an individual state characterised by a loss of physical and cognitive abilities (e.g. Gobbens et al. 2010; Kunkel and Morgan 1999). Although no one can deny that ageing implies a transformation of the body and its functions (see Gilleard and Higgs 2021, Chapter 7 in this volume), this framework "is reductionist in its attempt to perceive and problematize ageing as a pathological 'problem' tied to discourses of 'decline' and 'dependency'" (Powell and Owen 2005, p. 29).

It is possible to have a view of ageing that is neither deterministic nor reductionist by shifting the argument into a posthuman framework that allows ageing to be positioned in relation to social-material practices rather than associating it exclusively with humans (the social model) or nature (the bio-medical model). Such a perspective moves us to a new understanding of ageing that clarifies the relationships between the material world – here represented by, but not limited to, the various assistive technologies for older people – *and* human practices – in particular, those related to designing the above-mentioned technologies and the services they are part of.

Framing ageing by highlighting the entanglement of humans (older people, caregivers and other professionals, in this chapter) *and* non-humans (here, meant as

DOI: 10.4324/9780429278266-5

caring agencies like assistive technologies) is all the more relevant in a digitised world, in which technologies and objects influence both the cultural meanings associated with ageing and the material living conditions in which people age. A focus on design, meant as "the set of interconnected and heterogeneous practices aimed at bringing a new artefact into being" (Storni 2012, p. 89), sheds light on such an entanglement. For example, the bad design of a technological device or an inappropriate set-up of a domestic environment could hinder a person who, in such a case, is disabled 'by design', rather than 'by nature' (Winance 2019). It is the interrelation of social, material and natural factors within space and time, which enacts what I propose calling the phenomenon of *elderliness*. Posthumanism is the perspective that informs such a definition, and it is intended to overcome both the social and the bio-medical models. The posthuman turn dates back to 1970s[1] and was further fuelled during the 1990s by the advancement of digital technologies (Heise 2011).

Consistent with this perspective, I propose approaching ageing *and* assistive technologies by drawing on Karen Barad's (2007) agential realism. Although her work is not focused on ageing, it helps to re-frame ageing as made and remade through material-discursive practices. Design is the arena I focus on to show how posthumanism can have a bearing on the view of ageing *and* assistive technologies as co-constituting (Peine and Neven 2019) or, more precisely, intra-acting and inseparable (Barad 2007). Also, I apply a posthuman theoretical framework to understand age-related stereotypes as produced and re-produced through social-material practices, in particular, the practices of design. In Barad's words, we can say that the negative images of ageing, which are often also gendered (Cozza et al. 2018), racialised or ethnicised (Percil Standford and Tores-Gil 1992), and marketised (Meagher and Szebehely 2013),[2] *exist within relations* between humans and non-humans. Therefore, ageing *and* assistive technologies cannot be understood beyond the practices that generate them. *Together* these social and material components configure the phenomenon of elderliness as relational.

Hence, this chapter is about the agential inseparability of ageing *and* assistive technologies in defining what elderliness means and how specific meanings of it come to matter at the expense of possible others through design practices. In other words, elderliness emerges as a phenomenon when the process of ageing is understood in relation to the design of assistive technologies, and vice versa. Design practices define the material conditions of living and are interrelated with the representations and discourses about later life. The phenomenon of elderliness does not pre-exist these agential components, which in turn materialise and become meaningful when considered as a dynamic whole. A technology is 'assistive' or 'empowering' in relation to a certain view of ageing, and ageing 'appears' through the design of the devices. The resulting configurations of the phenomenon of elderliness are multiple because the relationships between the components are constraining but not determining, and they also change according to time, space and matter.[3]

Drawing on Barad's agential realism and focusing on the design of assistive technologies, in this chapter I show how different social and material elements together actively configure what elderliness is. Hence, I elaborate on the *inseparability* of ageing *and* assistive technologies. In other words, I propose to frame *elderliness as a relational social-material phenomenon enacted by the intra-actions between humans and non-humans, which dynamically configure and reconfigure it*. For this purpose, I firstly introduce Barad's thinking; secondly, I apply the agential realism to examples from the research work I have been involved in over the last few years. In the discussion, I elaborate on the ontological, epistemological and ethical implications of a posthuman approach to ageing *and* assistive technologies. I conclude with some remarks about the theoretical and empirical relevance of the posthumanism within design research as well as in professional design practice.

Theoretical framework

Agential realism

In her introduction to *Meeting the Universe Halfway. Quantum Physics and the Entanglement of Matter and Meaning* (2007), Karen Barad claims that every aspect of how we understand the world, including ourselves, is changing by displaying the multiple relationships between domains traditionally separated within Western culture (e.g. social sciences and humanities (SSH) and the natural sciences; subject and object; matter of fact, matter of concern, and matter of care). Accordingly, argues Barad, we need to come up with an *ethico-onto-epistemology*, that is, a new conceptualisation of ontology, epistemology and ethics as inseparable that allows to study the co-constitution of matter and meaning (Dolphijn and van der Tuin 2012).

Barad takes her inspiration from the philosophy-physics of Niels Bohr (for whom philosophy and physics were inseparable) along with many other scientists and scholars, especially those traditionally not read within the sciences (e.g. Merleau-Ponty and Deleuze). Bohr's work is relevant to Barad because he calls into question the Western tradition in metaphysics and its definition of reality. According to Bohr, the basic nature of the universe is not something that is given and fixed in advance or defined by the desires or will of the scientist (or, we can say, by the intention of any other professional – like designers – affecting other lives). Grounding on Bohr's thought about reality, Barad argues that we first need to say *what* material conditions exist that generate intentional consequences at the social level, and *how* the material and the social stand in relationship to one another:

> [P]erhaps intentionality might better be understood as attributable to a complex network of human and nonhuman agents, including historically specific sets of material conditions that exceed the traditional notion of the individual. Or perhaps it is less that there is an assemblage of agents than there is an

> entangled state of agencies. These issues, however, cannot be resolved by reasoning analogically; they require a different kind of analysis.
>
> (Barad 2007, p. 23)

Barad aims to develop an analysis that enables to theorise the roles of human and non-human, material and discursive, and natural and cultural factors together: they are and cannot be dissociated. This understanding of reality contributes to the founding of a new ontology, epistemology and ethics. *Agential realism* is her central theoretical framework to reconceptualise the processes by which matter (objects, technologies, artefacts, organisms) is examined and knowledge is created in scientific and other social-material practices, say, design practices. This framework provides a "posthumanist account of technoscientific and naturecultural practices" (p. 32) – as Barad puts it – which implies that technology and science, nature and culture, space, time and matter are entangled rather than ontologically and epistemologically separable.

To study such an entanglement, Barad uses quantum physics (as an example) and develops a *diffractive methodology*. In quantum physics, diffraction is the spreading of waves around obstacles: a view that troubles classical physics. In the mid-seventeenth century, the mathematician and physicist Francesco Grimaldi coined the word 'diffraction' to refer to the light behaving as a fluid "which upon encountering an obstacle breaks up and moves outwards in different directions" (Barad 2014, p. 171). He "dubbed this phenomenon diffraction, citing the Latin verb *diffringere – dis (apart)* and *frangere (break)*" (Barad 2014, p. 171, emphasis in original). In Barad, the practice of 'reading diffractively' implies that the primary ontological units are not 'things' but 'phenomena', defined as relational entanglements of space, time and matter. 'Spacetimemattering' is the neologism she introduces to describe this dynamic entanglement. Also, in applying the diffractive methodology, the primary semantic units are not 'words' but 'material-discursive practices' through which boundaries are constituted. Accordingly, agency is not an attribute of subjects or objects, even less an exclusive property of humans. A posthuman perspective frames agency as the ongoing reconfiguring of worlds in which both humans and non-humans have a role and affect each other (Forlano 2017).

She wisely pinpoints that her use of *posthumanism* does not advocate positions against the human, despite the suffix *post-*. What she aims at is thinking about the limits of humanism according to which "man is the measure of all things" (Barad 2007, p. 136). Such an anthropocentrism (which is also a form of androcentrism) grants too much power to language as a tool for measuring and representing objects (subjects, events or state of affairs) and overlooks the role of non-humans. Agential realism relies on the entanglement of humans and non-humans, and, to express this idea, Barad uses the neologism *intra-action*, instead of inter-action:

> KB – The usual notion of interaction assumes that there are individual, independently existing entities or agents that preexist their acting upon one

> another. By contrast, the notion of 'intra-action' queers the familiar sense of causality (where one or more causal agents precede and produce an effect), and more generally unsettles the metaphysics of individualism (the belief that there are individually constituted agents or entities, as well as times and places). According to my agential realist ontology . . . 'individuals' do not preexist as such but rather materialize in intra-action.
>
> (Kleinman 2012, p. 77; interview)

A relevant example is that of a wheelchair that Barad borrows from Lisa Diedrich (2001). Barad highlights that a wheelchair is not merely a bodily auxiliary but an integral part of the user's body, they intra-act and define each other:

> It then becomes clear that 'able-bodiedness' is not a natural state of being but a specific form of embodiment that is co-constituted through the boundary-making practices that distinguish 'able-bodied' from 'disabled'.
>
> (Barad 2007, p. 158)

As in this example, a specific phenomenon occurs and exists only within relations. The phenomenon is produced by intra-actions enacted by humans and non-humans. Agency is distributed over them because all of them are relevant in defining particular material articulations of the world (Harbers 2005). Barad calls these articulating practices *agential cuts* because they enact a specific resolution to the exclusion of other possibilities. Therefore, agency is about responsibility and ethics: the accounting for what matters and what is excluded from mattering. The concept of agential cut brings us back to the need for an ethico-onto-epistemology as counterpoint to humanist ethics. Such ethics is limited to human-human encounters and, then, is unable to account for a world in which boundaries and differentiation, as well as the constitution of the human, are continually being reconfigured through the intra-actions between humans and non-humans (e.g. the cyborgian feature of a body with prostheses for medical purposes).[4]

From a posthuman perspective, together humans and non-humans not merely embody a discourse about ageing and technologies at large but perform an agential cut that enacts the phenomenon of elderliness.

A posthuman approach to ageing *and* assistive technologies

From theory to practice

Barad's theory resonates with what I have been observing in my research experience, which I refer to in order to illustrate the contribution of posthumanism to understanding the entanglement of ageing *and* assistive technologies. I worked on several research projects[5] on assistive technologies in different countries (Cozza et al. 2017, 2018). Older people over 65 and living at home were the

envisioned end-users in all these projects conducted according to a participatory methodology (for critical discussions of participatory methods, also López Gómez and Criado 2021, Chapter 6 in this volume, Bischof and Jarke 2021, Chapter 15 in this volume, and Manchester 2021, Chapter 16 in this volume). In this regard, it is worth noting that such a methodology and its application to the projects at issue rely on a distinction between 'user participation' and 'user involvement'. User involvement is a weak form of user participation where users are just observed, interviewed, represented or merely surrogated (users as source of information). User participation refers to an active contribution of users in the process instead and their presence is placed at the head of the agenda (users as legitimated domain experts that influence the design and development of a product) (Iivari and Iivari 2011).

In these projects, the designing of devices and services targeted towards older people was the main practice that I studied as a member of the team appointed to conduct the research on this matter. It would be outside the scope of this chapter to elaborate on each project. I will use the examples of a belt for fall detection (project 1) and a night camera for monitoring older people at home (projects 2–3) to show that a posthuman interpretation of elderliness allows us to account for all components and their interrelations.

Wearable technology for fall detection

The first example (fully presented in Cozza et al. 2016) is a special belt (see Figure 5.1) which allows the participant to wear a smartphone: these two technologies were designed to work together for monitoring and alerting a defined group of caregivers (professionals, family members or trustworthy acquaintances) if a fall occurs.

Small groups of older people (between five and six) were invited to participate in workshops for testing and discussing this solution. It is noteworthy that the 'fall' event drove the design and development of all devices and related services. Such an emphasis on older people as exposed to the risk of fall injuries corresponded to the sponsor's view on ageing, which was mainly seen as a process of physical and cognitive deterioration to be turned into an opportunity to maximise commercial profit, while meeting local policy concerns about social care provision. The notion of ageing as decay overlaps with the one persisting in many age-related technology studies: an older person is frail and in need of being 'assisted' (e.g. Bailey et al. 2011; Boyd and Stevens 2009). Accordingly, many scholars attribute a key role to technologies as the 'norm' to improve social care delivery (e.g. De Witte et al. 2013; Gobbens et al. 2010; Hardey and Loader 2009). This overarching narrative around ageing and technology intra-acts with the dominant policy conceptualisation according to which the "21st century technologies . . . will reduce strain on services and 'solve the social care crisis'" (Toms et al. 2019, no page). Such a scenario influenced the project as well and enacted specific causal intra-actions that locally determined the phenomenon of elderliness.

Figure 5.1 A participant tests the belt

The interaction between researchers and participants made it possible to identify different dimensions affecting the phenomenon via the design of assistive technologies: among them, aesthetic appropriateness and social sensitivity. Participants commented on the characteristics of the artefact and their implications by letting the prevailing social-material configuration of elderliness surface.

The aesthetic characteristics of the belt such as the colour (electric blue), the size (covering the abdomen) and the material (a synthetic fabric) were severely criticised by the older people as signs of a poor and stigmatising design. One participant's behaviour was remarkable: he crossed his legs and arms and rejected the use of that belt as socially penalising. All participants agreed that such a support was unsightly and in contrast to their style. Furthermore, they said that the fabric of the garment could cause unpleasant consequences (in particular, an embarrassing perspiration, mainly during the summer). Only its elasticity was appreciated for making the belt easy-fitting.

What this group of older people pointed out is that technology, broadly speaking, cannot be understood and least of all designed as something apart from the human being, because its design inevitably produces consequences that the designer has to take responsibility for. This consideration leads back to Barad's

concept of an agential cut. Its empirical relevance becomes clear when we apply it to rethink design as a set of no neutral practices enacted at every scale (space-timematterings) with ethical implications to be aware of. The way technology is devised, developed and implemented articulates specific possibilities of use and perception of the self, of others and of the surrounding environment. As Barad uses the example of the wheelchair to show that a specific phenomenon exists only within humans-non-humans relationships, the example of the belt allows us to see the phenomenon of elderliness as being produced by the intra-actions between designers, users' body, technologies and objects. It is an emerging phenomenon, which is here coproduced by the designers' overriding emphasis on falls prevention and their aesthetic blindness, by the users' reactions to such a design and also by the effects of these technological objects in their life. Elderliness is thus a relational phenomenon and its configuration depends on agential cuts enacted through spacetimematterings.

Surveillance technology

The second example (for an extensive presentation, see Cozza 2018) is a remote monitoring service owned by a municipality and mediated by a night camera installed in the private homes of older people (around 20). This solution implied the interrelation between a piece of equipment (a camera linked to a router) and home-care personnel (a night patrol team) (see Figure 5.2). Both were key to the functioning of a security alarm system that enabled an alert to be sent in case of need.

However, more devices and professional caregivers were available to be active to carry out an immediate intervention independently of the night camera. In fact,

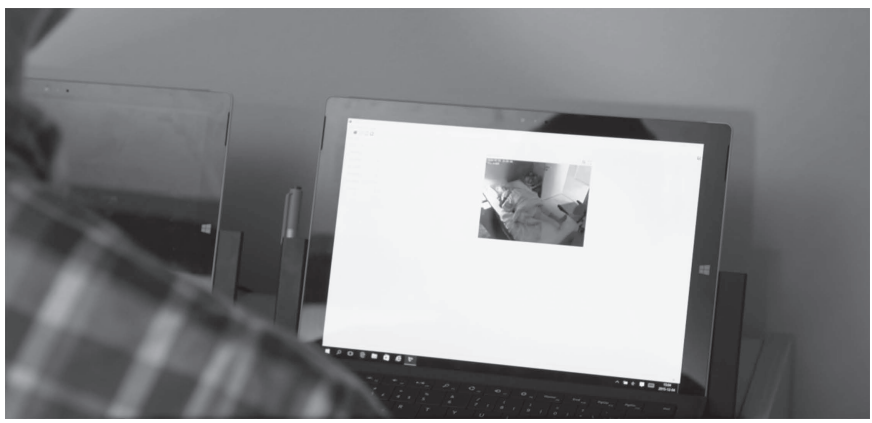

Figure 5.2 An operator remotely monitors an older person who is sleeping at home

the service was designed to trigger the alarm by also pushing a button applied to a pendant or bracelet when a need for assistance suddenly arises in a place far from the night camera. In such a circumstance, a signal is transmitted to another alarm group working 24/7. The alarm group is expected to inform and ask the home-care personnel to go to the person's home as soon as possible and within 40 min. If required, an ambulance is also alerted simultaneously.

Document analysis, interviews and workshops conducted with various professionals involved in this service made clear its social-material configuration and the interconnection between people (both professional caregivers and service users) and objects (assistive technologies and other devices). In particular, the intra-actions between home-care personnel, potential users and technologies of various kinds cut the condition of accessibility to the service. As specified in one brochure, the "remote monitoring is based on a decision for assistance" meaning that people interested in getting access to the service have to apply online or call the assistance officer. The municipality contacts the applicants, and then it is the care officer who assesses and decides upon the case. Such a configuration, under which the decision about both the access to welfare services and which assistive technology the user is entitled to is up to the local public authorities, is embedded into the national regulations on welfare care. Thus, elderliness emerges as a phenomenon configured by human and non-human actors enacting "boundary-making practices" (Barad 2007, p. 146) through which they cut the actual possibility of benefiting from welfare care services. With this cut being delegated to subjective public authorities, the resulting distribution of these 'possibilities' is diffracted, that is, the process generates "patterns of differences that make a difference" (Dolphijn and van der Tuin 2012, p. 3) among applicant users. Accordingly, the phenomenon of elderliness is diffracted too and, then, a 'multiplicity of elderliness' co-exists depending on how differently the users are affected by institutional decisions.

Similarly, the multiplicity of elderliness emerges when considering the plurality of formal caregivers involved in different phases, with different roles and responsibilities, in designing and delivering the monitoring service. Indeed, the configuration of the service made it possible to study the organisational nature of the home-care technology-based services and highlighted an articulation of elderliness as a professional phenomenon diffracted into different communities. From this perspective, elderliness emerged as an organisational question, a diffracted phenomenon "distributed across multiple times and spaces" (Dolphijn and van der Tuin 2012, p. 25) in which different agents dynamically influenced the service. With regard to the professional caregivers, the patterns of differences refer to the effect of the designing-cut of the service. The diverse social-cultural-ethical instances of the professional caregivers were not equally represented in the configuration of the service. Precisely, the equipment was interoperable with the information system of the municipality responsible for the service but not with that of external welfare and healthcare organisations: primarily the hospitals. Such a feature was not only a technical question but also an ethico-onto-epistemological matter concerning the

creation of boundaries between actors differently but nevertheless embedded into the phenomenon of elderliness.

Discussion

What does it mean and imply to study ageing *and* assistive technologies from a posthuman perspective? Barad's agential realism makes it possible to underscore the multiple interrelations between matter and meaning, material and social, being and doing, between what is in the world (ontology), the practices of knowing it (epistemology) and the responsibility for the effects of the cuts enacted while intra-acting within the world (ethics). Barad's appreciation of such an entanglement is expressed by the neologism 'ethico-onto-epistemology' that she has introduced. A discussion about each term allows us to work out the implications of posthumanism for the design (whether it is research work or professional practice) of assistive technologies.

From an ontological viewpoint, framing the relationship between ageing *and* assistive technologies within agential realism makes it possible to account for all the practices – designing is no exception – through which people, objects and technologies articulate the phenomenon of elderliness. The examples of the belt and the monitoring service illustrate this point. The belt supporting a smartphone and the camera linked to the router and interoperable with the municipal information system are interconnected with users and caregivers and, together, co-construct the matter and the meanings of elderliness. In Barad's words, the agential intra-actions between these various actors configure the phenomenon of elderliness as relational and iteratively diffracted across "moments-places-matterings" (2014). A posthuman ontology questions a human-centred design approach and opens it up to questions like who or what is the user, and for whom or what should the design be desirable (rather than needed, which is the prevailing narrative about older people as 'people-in-need' instead of people with expectations and wishes). Such a consideration brings us to the epistemological turn introduced by posthumanism.

Epistemologically, a posthuman perspective makes it possible to reflect upon the way in which elderliness is approached, studied and translated into design practices. The aim of such a posthuman turn is not to remove humans but to deemphasise their primacy while recognising that non-humans are always already present, all the more in a digitised world. In other words, a posthuman take on ageing *and* assistive technologies helps to reframe the discourses and representations of ageing in order to understand how some come to matter while others do not, for example, how 'assistance' was prioritised over 'engagement' in project 1 with reference to the sponsor's narrative about an older person as "just a faller" (Bailey et al. 2011, p. 838). Moreover, the diffractive methodology enables the reading of the complexity of several issues as effects of boundary-making practices (cuts) enacted by specific components. For example, it was clear in the case of the remote monitoring that the design of the home-care service produced

patterns of differences concerning what social-cultural-ethical instances to serve, that is, what professional and organisational communities to prioritise. The design of the service (which is in compliance with the national regulations) also made visible the multiplicity of elderliness enacted by the diffraction of users' requests when 'encountering' the public authorities' decisions about who is an entitled user of assistive technologies, among a number of applicants. From an epistemological point of view, posthumanism urges design to rethink its approaches and tools, which may not be well suited to social-material phenomena whose components cross traditional silos, categories and domains (Forlano 2017). Designers should recognise the situated dimension of ageing whose social and material entanglements are not uniformly distributed across societies and cultures.

The ethical implications of a posthuman framework emerge when scrutinising the choices behind specific material configurations of elderliness. In Clarkson et al. (2003) – a book with the merit of including authorial voices of older people – the 81-year-old Marion Bieber reports the scant *participation* of older people in design and production activities and concludes that such a situation "renders a disservice to the markets and to the individual older consumer" (2003, p. 57). She is not talking about a mere involvement of older people as a source of information but is referring to an active engagement through which the participants can shape, plan and drive the research agenda and design process (Iivari and Iivari 2011; Manchester 2021, Chapter 16 in this volume). Bieber's message resonates with the comments of older people invited to test the belt: that solution was materialising a specific cultural pattern on ageing *and* assistive technologies, which was stereotyping in both its configuration and its potential effects. In the case of the remote monitoring, the ethical concern is more about the implications of using surveillance technologies to support independency, safety and security of older people at home. This is a hot topic, in both academic and non-academic environments that are currently working on assistive technologies with and for older people (e.g. Albrechtslund 2007; Hofmann 2013; Lyon 2001). Ethics urges every professional – design researcher or practitioner – to be accountable and responsible when designing a product or a process. Such a behaviour relies on "being attentive to what gets excluded as well as what comes to matter" (Dolphijn and van der Tuin 2012, p. 6) as a consequence of design practices (e.g. including or excluding a specific group of people from the decision-making process; shaping an object or setting-up technologies to meet specific needs and wishes; using a specific language).

Conclusion

The queer terminology introduced by Barad and for which she gives credit to the interdisciplinary fields she is entangled with, should not be naively viewed as an academic practice of making things unnecessarily complicated or as an exercise in imagination. On the contrary, as this chapter has argued, agential realism can contribute to reframing the discursive and material relationship between ageing

and assistive technologies within what I have called the phenomenon of elderliness. *Such a phenomenon is relational and enacted through material-discursive practices by which both scholars and designers cut and diffract elderliness into a multiplicity of configurations*.

A posthuman understanding of ageing *and* assistive technologies should lead both academics and practitioners to question human-centred and technology driven approaches. This is not to deny their importance but rather to recognise that *social and material components are relationally entangled and inseparable*. Accordingly, there are no guidelines or to-do lists for applying posthuman thinking: this would be contrary to the ethico-onto-epistemology introduced by Barad. There are no absolute rules or standardised patterns and, as inclusive designers say, there is no one-size-fits-all (Clarkson et al. 2003). Matter and meaning are iteratively diffracted and (re)configured across spacetime. *A posthuman view urges researchers and designers to expand their 'toolbox', embrace an uncomfortable complexity* and open up to "new problems, questions, opportunities and solutions they are not yet equipped for" (Forlano 2017, p. 19).

The posthuman scenario drives scholars and professionals to a new awareness of the entanglements they are part of as well as to the consequences of cuts enacted by the matter and meanings such entanglements are made of. From this perspective, elderliness is neither a bio-medical nor a social phenomenon. Also, *it is not a uniform phenomenon but multiple, unstable and indefinite*, that is, as multiple and dispersed as the agential intra-actions that generate it. Approaching such a complexity *from within* implies staying with these 'diffraction troubles', trying to *map where the effects of cuts appear* and "tunnelling through boundaries (which is not a bloodless but a necessary revolutionary political action)" (Barad 2014, p. 175). That means understanding that there are not absolute boundaries or configurations that cannot be otherwise. There are no theoretical frameworks nor (assistive) technologies or objects that cannot be re-designed. However, in such a *making and re-making, framing and re-framing, say, the relationship between ageing and assistive technologies asks researchers and designers to further engage in working creatively and responsibly in a process of differently cutting*.

With Socio-gerontechnology aiming at interdisciplinary theorising about ageing and technology, I proposed to reframe ageing and assistive technology within the phenomenon of the co-constitution of elderliness, while arguing why agential realism is relevant to research and design. The agential definition of elderliness is grounded on an invitation to researchers and designers working on assistive technologies to embrace Barad's provocation. This should lead them *to be suggestive, creative and visionary in reconfiguring space-time-matter in which humans and non-humans intra-act*.

Although posthuman turn in scholarly literature dates back to 1970s, its translation in design practice is in its infancy. However, outside academia there are important signals of an increasing interest in what posthumanism can offer to designers, as proved by a recent edition on posthuman design published in Eye on

Design magazine by AIGA (The Professional Association for Design) (Andersen 2019). The challenge is to funnel such enthusiasm into concrete transformative actions, especially in domains mostly resistant to experimentation like the one identified with ageing *and* assistive technologies.

Notes

1 The futuristic San Francisco described in Philip K. Dick's novel "Do androids dream of electric sheep?" (1968) foreshadows the posthuman turn that, however, is not limited to the US-American context but can be found also in other cultures.
2 For the value of intersectionality to understand old-age subject positions, see Joyce (2021, Chapter 14 in this volume).
3 The project *No Country for Old Men*, initiated by the Italian-Singaporean designers Lanzavecchia + Wai, offers examples of objects designed as a reaction to the "invasion" of "alien medical products from the hospital context". Through this project, the designers intend to reconcile 'the material' and 'the social', functionality with desirability, physical support with psychological acceptance of an advanced stage of life. About the project, see www.lanzavecchia-wai.com/work/elderly-furniture/
4 In this regard, see Danica Kragic Jensfelt's performance lecture "Om robotar" (transl. "About Robots"; video in Swedish with subtitles in English), available at: www.youtube.com/watch?v=E6L7Yh_ySHo
5 SUITCASE-Sustainable Integrated & Territorial Care Services (2014–2016, funded by TRENTO RISE); SInS: Att utveckla förmågan att driva social innovation genom teknik i samverkan (2016–2018, funded by Vinnova); HV3D-Hjälpmedel och välfärdsteknik I tre dimensioner: Ekonomi, organization och individuella värden (2016–2020, funded by Samhällskontraktet and Regionförbundet Sörmland).

References

Albrechtslund, A. (2007). Ethics and Technology Design. *Ethics and Information Technology* 9: 63–72.

Andersen, M. (2019). What Does "Posthuman Design" Actually Mean? *Eye on Design* 4. https://eyeondesign.aiga.org/what-does-posthuman-design-actually-mean/.

Bailey, C., T. G. Foran, C. N. Scanaill, and B. Dromey (2011). Older Adults, Falls and Technologies for Independent Living. *A Life Space Approach* 31: 829–48.

Barad, K. (2007). *Meeting the Universe Halfway. Quantum Physic and the Entanglement of Matter and Meaning*. Durham and London: Duke University Press.

——— (2014). Diffracting Diffraction: Cutting Together-Apart. *Parallax* 20 (3): 168–87.

Bieber, M. (2003). The Struggle for Independence. In *Inclusive Design. Design for the Whole Population*, edited by J. Clarkson, R. Coleman, S. Keates, and C. Lebbon. London: Springer International Publishing.

Bischof, A., and J. Jarka (2021). Configuring the Older Adult: How Age and Ageing Are Re-Configured in Gerontechnology Design. In *Socio-Gerontechnology – Interdisciplinary Critical Studies of Ageing and Technology*, edited by A. Peine, B. Marshall, W. Martin, and L. Neven, 197–212. London: Routledge.

Boyd, R., and J. A. Stevens (2009). Falls and Fear of Falling: Burden, Belief and Behaviours. *Age and Ageing* 38: 423–8.

Clarkson, J., R. Coleman, S. Keates, and C. Lebbon, (eds.) (2003). *Inclusive Design. Design for the Whole Population*. London: Springer International Publishing.

Cozza, M. (2018). Interoperability and Convergence for Welfare Technology. In *Human Aspects of IT for Aged population. Applications in Health, Assistance, and Entertainment. ITAP 2018, Lecture Notes in Computer Science*, edited by J. Zhou, and G. Salvendy, vol. 10927. Cham: Springer International Publishing.

Cozza, M., L. Crevani, A. Hallin, and J. Schaeffer (2018). Future Ageing: Welfare Technology Practices for Our Future Older Selves. *Futures*. doi:10.1016/j.futures.2018.03.011.

Cozza, M., A. De Angeli, and L. Tonolli (2017). Ubiquitous Technologies for Older People. *Personal & Ubiquitous Computing* 21 (3): 607–19.

Cozza, M., L. Tonolli, and V. D'Andrea (2016). Subversive Participatory Design: Reflections on a Case Study. In *Proceeding of the 14th Participatory Design Conference_ Short Papers*, vol. 2, 53–6, August 15–19. Aarhus, Denmark: Interactive Exhibitions, Workshops. http://dx.doi.org/10.1145/2948076.2948085.

De Witte, N., R. Gobbens, L. De Donder, S. Dury, T. Buffel, J. Schols, and D. Verté (2013). The Comprehensive Frailty Assessment Instrument: Development, Validity and Reliability. *Geriatric Nursing* 34: 274–81.

Diedrich, L. (2001). Breaking Down: A Phenomenology of Disability. *Literature and Medicine* 20 (2): 209–30.

Dolphijn, R., and I. van der Tuin (2012). Matter Feels, Converses, Suffers, Desires, Yearns and Remembers: Interview with Karen Barad. In *New Materialism: Interviews & Cartographies*, edited by R. Dolphijn, and I. van der Tuin. MI: Michigan Publishing, University of Michigan Library. https://quod.lib.umich.edu/o/ohp/11515701.0001.001/1:4.3/ – new-materialism-interviews-cartographies?rgn=div2;view=toc.

Forlano, L. (2017). Posthumanism and Design. *The Journal of Design, Economic, and Innovation* 3 (1): 16–29.

Gilleard, C., and P. Higgs (2021). Agents or Actants: What Technology Might Make of Later Life? In *Socio-Gerontechnology – Interdisciplinary Critical Studies of Ageing and Technology*, edited by A. Peine, B. Marshall, W. Martin, and L. Neven, 99–111. London: Routledge.

Gobbens, R., K. G. Luijkx, M. T. Wijnen-Sponselee, and J. M. Schols (2010). Toward a Conceptual Definition of Frail Community Dwelling Older People. *Nursing Outlook* 58 (2): 76–86.

Gullette, M. M. (2018). Against 'Aging' – How to Talk about Growing Older. *Theory, Culture & Society* 35 (7–8): 251–70.

Harbers, H., (ed.) (2005). *Inside the Politics of Technology. Agency and Normativity in Co-Production of Technology and Society*. Amsterdam: Amsterdam University Press.

Hardey, M., and B. Loader (2009). The Informatization of Welfare: Older People and the Role of Digital Services. *British Journal of Social Work* 39: 657–69.

Heise, U. K. (2011). The Posthuman Turn: Rewriting Species in Recent American Literature. In *A Companion to American Literary Studies*, edited by C. F. Levander, and R. S. Levine. Chichester, UK: Blackwell.

Hofmann, B. (2013). Ethical Challenges with Welfare Technology: A Review of the Literature. *Science and Engineering Ethics* 19 (2): 389–406.

Iivari, J., and N. Iivari (2011). Varieties of User-centredness: An Analysis of Four Systems Development Methods. *Information Systems Journal* 21: 125–53.

Joyce, K. (2021). Commentary: Encountering Ageing, Science, and Technology – Whose Future? Whose Definition of Ageing? In *Socio-gerontechnology – Interdisciplinary Critical Studies of Ageing and Technology*, edited by A. Peine, B. Marshall, W. Martin, and L. Neven, 112–16. London: Routledge.

Kleinman, A. (2012). Intra-actions. *Mousse* 34: 76–81.

Kunkel, S., and L. Morgan (1999). *Ageing: The Social Context*. New York: Pine Forge.

López Gómez, D., and T. S. Criado (2021). Civilising Technologies for an Ageing Society? The Performativity of Participatory Methods in Socio-Gerontechnology. In *Socio-Gerontechnology – Interdisciplinary Critical Studies of Ageing and Technology*, edited by A. Peine, B. Marshall, W. Martin, and L. Neven, 85–98. London: Routledge.

Lyon, D. (2001). Facing the Future: Seeking Ethics for Everyday Surveillance. *Ethics and Information Technology* 3: 171–81.

Manchester, H. (2021). Co-Designing Technologies for Care: Spaces of Co-Habitation. In *Socio-Gerontechnology – Interdisciplinary Critical Studies of Ageing and Technology*, edited by A. Peine, B. Marshall, W. Martin, and L. Neven, 213–27. London: Routledge.

Marshall, V. W. (1995). Social Models of Aging. *Canadian Journal on Aging/La Revue Canadienne du Vieillissement* 14: 12–34.

Meagher, G., and M. Szebehely (2013). *Marketisation in Nordic Eldercare: A Research Report on Legislation, Oversight, Extent and Consequences, Stockholm Studies in Social Work 30*. Stockholm: Stockholm University. www.normacare.net/wp-content/uploads/2013/09/Marketisation-in-nordic-eldercare-webbversion-med-omslag1.pdf.

Peine, A., and L. Neven (2019). From Intervention to Co-constitution: New Directions in Theorizing About Aging and Technology. *The Gerontologist* 59 (1): 15–21.

Percil Standford, E., and F. M. Tores-Gil (1992). *Diversity: New Approaches to Ethnic Minority Aging*. New York: Baywood.

Powell, J., and T. Owen (2005). The Bio-Medical Model and Ageing: Towards an Anti-Reductionist Model? *The International Journal of Sociology and Social Policy* 25 (9): 27–40.

Storni, C. (2012). Unpacking Design Practices: The Notion of Thing in the Making of Artifacts. *Science, Technology, & Human Values* 37 (1): 88–123.

Toms, G., F. Verity, and A. Orrell (2019). Social Care Technologies for Older People: Evidence for Instigating a Broader and More Inclusive Dialogue. *Technology and Society*. doi:10.1016/j.techsoc.2019.01.004.

Weicht, B. (2015). *The Meaning of Care: The Social Construction of Care for Elderly People*. Basingstoke: Palgrave Macmillan.

Winance, M. (2019). "Don't Touch/Push Me!" From Disruption to Intimacy in Relations with One's Wheelchair: An Analysis of Relational Modalities Between Persons and Objects. *The Sociological Review Monographs* 67 (2): 428–43.