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ORIGINAL ARTICLE

Aging in light of digitalization of healthcare

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Abstract

With the advancements in digital technologies, notions such as aging in place have gained currency. But, next to technical issues concerning the extent to which full-blown aging in place is possible, philosophical and ethical questions have been also raised. An important dimension of the digitalization of healthcare is how would aging look to both older adults and the public in the wake of such systems. In this article, I will suggest integrating postphenomenology into Age Studies to explore how aging comes to be conceptualized. An advantage of postphenomenology is that it is anchored in a first-person perspective, and in this sense, it may be a perfect fit to enhance our awareness about the impacts of the digitalization of health on older adults from their own point of view. I will also argue that postphenomenlogy can throw light on digital technologies in their actual use. This may help researchers go beyond merely exploring conditions of use and adoption implemented through notions such as usability, trust, privacy, dignity, and the like, and gain knowledge of how users' relationship with their surroundings reconfigures after exposure to digital assistive technologies.

Keywords Aging · Digitalization of health · Postphenomenology · Assistive technology

Drawing the context

The number of individuals above the age of 60 will triple worldwide between 2010 and 2050 (Garatachea and Lucia 2013). As the number of older adults surges so do concerns about their health and well-being. This, in conjunction with economic challenges associated with budget cuts, might be the underpinning of the popularity of notions such as *active and healthy aging*, *independent living*, and *aging in place* (See, for example, Van Hees et al. 2018). Recent advancements in technology,

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on the other hand, have both accelerated and facilitated the transition to preventive and telemedicine. Chief among others are the advancements in digital technologies which have rendered digitalization *of* health possible, as the frequent reference to keywords like electronic health (*eHealth*), mobile health (*mHealth*), *telemedicine*, *telehealth,* and so many others, indicate. Digitalization of health, simply put, is implemented through obtaining digital data associated with the health of individuals over the internet, measuring vital signs by using smart devices, and then sending the aggregated data directly to the care service providers to provide the required care remotely (Merkel and Hess 2020).

But this agenda is often grounded on a particular envisioned relationship between older adults and technology; a view that has been coined an 'interventionist logic' by some (see, for example, Peine and Neven 2019). In an interventionist approach, on the one hand, aging implies a set of problems to be solved, and on the other hand, technology is thought of as an innocent instrument that can target aging (Peine and Neven 2021). But both sides, i.e., the 'crisis account' of aging and the instrumentalist account of technology, are open to critique, as will be elaborated in the following lines.

To begin, Age Studies have witnessed a turn today where aging is no longer characterized merely based on chronological, biological, evolutionary, and biomedical models (Marshal and Katz 2012). Rather, as cultural gerontologists have demonstrated the blurring of life-course identities, the longevity stretch in population aging, and the popularity of anti-aging industries have rendered the measuring of human aging increasingly indeterminate (Katz 2014; Marshall 2015). Thus, aging is simultaneously a cultural and natural phenomenon, or as Marshal and Katz argue, 'physical changes in age … are culturally mediated' (2012). In this sense, the commonly held view of the aging population, as 'a monstrous entity set upon destroying welfare states and generational futures, is grounded on both a bio-demographic reality and a social construction reacting back into each other' (Katz 2014). This might lead one to think that the public imaginary running through media, fashion, and art, shape age and aging as much as biological dimensions do (Marshall 2018; Twigg 2018).

The interventionist approach also fails to adequately address the other aspect of this relationship, i.e., technology. Here, technology is conceived as having 'a well-defined and measurable impact on the lives of older people' (Peine and Neven 2021). Yet, technology is fluid, situational, and highly contingent, as I will elaborate on shortly.

The relationship between technology and aging is interactive and reciprocal, or, as Peine and Neven argue, 'aging and technology mutually shape each other' (2021). And by this, they mean, first, 'technologies for older people are partially shaped by ideas about aging' (Ibid). For example, whether older adults are considered active and competent or sickly and technologically illiterate matters for the design of technology (Neven 2010). Conversely, and perhaps more importantly, aging, to a degree, is shaped by technology; 'large-scale use of Facebook, Skype, and WhatsApp by older people' for instance has changed the characteristics of aging (Ibid). In this sense, technology may promote, or reinforce, a certain conception of aging.

Another way to elaborate on how a particular image of aging might be inscribed into technologies, and how, subsequently, a technologically mediated aging may materialize, is to draw upon the notions within the Science and Technology Studies trend (STS). According to Akrich (1992), technology carries certain scenarios for forming future uses, or 'scripts' in their technical language. Once applied to technologies associated with later life, we might imagine these scripts to be built into technology to stimulate, or otherwise constrain, specific actions in elderlies. Scripts might be unintentionally loaded into technology, but also they could be deliberately designed into it, based on either developers' personal views, or compliant with the dominant discourse, on what is good, appropriate, and safe behavior. Scripts cannot determine users' behavior, however, as users 'may adapt, circumvent, use selectively, or decide not to use a technology at all' (Peine and Neven 2020), and by resilience, individuals in fact 'de-script', i.e., alter, inscriptions having been built into technology (Akrich 1992). Yet, while not determining future actions, scripts can make it difficult for users to act outside of the designers' imagined scenario (Oudshoorn and Pinch 2003), and in this sense, technology might strengthen the existing norms of codes of behavior.

But the relationship between technology and aging might become even more complicated once advanced technologies such as digital systems are at stake. What conceptions associated with older adults are designed into digital technologies, and in particular, how aging is conceptualized through the digitalization of health care? What do older adults (and also the public) take aging to mean in the wake of digital medical technologies? And perhaps more importantly, which conception of aging would emerge ultimately from the digital health systems? In the following lines, I will try to outline a sketch to explore these queries. But before that, I have to pave the way and briefly introduce a trend whose concern overlaps with what I just said; *socio-gerontechnology*. This is an important step since shortly after I will try to justify why we need to strengthen socio-gerontechnology with other approaches.

Socio-gerontechnology situates itself at the intersection of Age Studies and STS (Katz 2018; Peine et al. 2021). It depicts aging as a constructed phenomenon enacted within a socio-material environment while the latter, itself, is shaped through power relations (Wanka and Gallistl 2021). In other words, socio-gerontechnology is in pursuit of explaining how aging and technology are co-constituted in time and space (Peine et al. 2015; Peine and Neven 2019; Wanka and Gallistl 2018).

Despite its promise and contributions to aging-related technology studies, I believe socio-gerontechnology suffers from some notable shortcomings. Most importantly, building on STS, socio-gerontechnology is anchored, predominantly, in a *third-person* perspective, so it might not be able to perfectly address the 'inside of aging', the aspect which is essential, as Katz argues, in critical gerontology or Age Studies (Katz 2014). In other words, to explore the aforementioned questions we need to lay bare, above all, 'what it means to grow older', from an *inside-out* perspective.

A further shortcoming is that there is little research on how digital technologies, in particular, reinforce the current, or bring about an ill-formed, conception of aging. To remedy the gap I will suggest taking also a *phenomenological* approach.

The structure of the article is as follows. In the next section, I will introduce the postphenomenology movement and how it treats technology. In "A Postphenomenological Analysis of Digitalization of the Health" section I will try to show how a postphenomenological lens can account for the digitalization of health. And finally, "Closing Remarks" section will present the closing remarks.

Introducing a (post)phenomenological approach to technology

Even though concerns about ATs within social sciences have been raised only recently the role of technology in reconfiguring one's world has long been a focus within the phenomenology tradition. Merleau-Ponty's blind person who uses a cane for navigation (1962) was a paradigm example to showcase the significance of artifacts in reconfiguring human experience. Her cane, he noticed, is not simply a thing among other things. Rather, it is incorporated into her sensorial system, as it were. She feels (i.e., perceives) the world *through* the cane, as we perceive our surroundings through our vision. Here, the intentionality of the blind person flows through the cane, and the cane plays a major role in structuring consciousness.[1]

The metaphysical position leading to such an understanding of the human-technology relationship was rooted in a critique of an outlook that had long been conceptualizing the human condition; a modern outlook. In this sense, phenomenologists came to believe that we are not Kantian or Cartesian *subjects* standing in sharp contrast with an *objective* world. Rather, we are intertwined with our socio-material environment, and subsequently, humans and non-humans are interdependent.[2]

However, early phenomenologists' accounts of technology remained relatively naïve and basic. For one thing, their accounts of technology were not systematic and well-developed. While for instance the role of the body in shaping perception is well elaborated in the literature of phenomenology there are only sporadic insights into the role of tools, and more generally the material environment, in constitution of perception. For another, phenomenologists' treatment of technology was monolithic, a priori rather than a posteriori, predominantly dystopian, essentialist, and insensitive to the diversity of concrete technologies.[3] These shortcomings gave way to the next generation of phenomenologists to develop innovative insights into technology; a movement that came to be called postphenomenology. Postphenomenology sets its concern to be the same as that of classical phenomenology, that is, the human-world

[1] Heidegger was another leading figure to realize that tools have a peculiar status in our relationship with the world. Taking the example of a hammer, he noted that artifacts shape, in part, how the world is defined and revealed to us (2010, 95ff). He noticed that for the hammering carpenter, the world is configured in a particular manner, different from a world without such tools.

[2] Merleau-Ponty was explicit on this account when he noted that 'man is a network of relations' (1962). This non-Cartesian conception of the human condition may be characterized by the notion of relational ontology. Simply put, 'the basic contention of the relational ontology is that the relations between entities are ontologically more fundamental than the entities themselves' (Wildman 2010, p. 1).

[3] Delving into the details of such critiques is beyond the purview of the current article. For more, see Verbeek 2005.

relationship, while taking for granted the interdependence of humans and technology. But it also revises some of phenomenology's tenets.

First of all, postphenomenology reframes phenomenology to make it sensitive to *actual* technologies. Rather than a priori sweeping generalizations about technology postphenomenology sets the departure point to be concrete artifacts to explore the actual role they play in one's life, and in doing so, it reconciles phenomenology to empirical approaches. But chief among other revisions, postphenomenology discards the essentialist and deterministic orientation of classical phenomenology as was reflected in the slogan 'to the things themselves'. Things possess multiple stabilities instead of an invariant nature (Ihde 1990; Rosenberger and Verbeek 2015; Verbeek 2005). That is, as varying relationships are established in different contexts, technology exhibits different meanings, variations, functions, and characteristics. Taking the example of a hammer, Ihde notes that it is 'designed to do certain things … but the design cannot prevent a hammer from (a) becoming an objet d'art, (b) a murder weapon, (c) a paperweight, etc.' (1999). He calls this characteristic of technology *m*ultistability accordingly (1990). An implication of this multiplicity of variations is that all the future impacts of a given digital technology on older adults, and also, the latter's reactions, cannot be anticipated in advance.

A further core principle of postphenomenology is the understanding that our relationship with the world is often technologically mediated (Ibid). But, crucially, *mediation* of technology goes far beyond passively standing along the way of our relationship with the world. Rather, technology *reconfigures* the way the world is presented to us, and so, new subjectivities are constituted in the wake of technology. This has huge implications to which I will return.

Mediation of technology, according to Verbeek (2005), usually is materialized along two paths. The first category is the *hermeneutic* dimension of mediation, and it has to do with how a given technology affects our perception. The second dimension, further, the *existential* dimension of mediation, is meant to demonstrate how technology influences our actions. Put simply, whereas the hermeneutic dimension of mediation explores how the world is present in our consciousness, the existential facet inquires about how we are present in the world.

Furthermore, mediation occurs through a specific structure, characterized by a pattern *of amplification* and *reduction* (Ihde 1990; 2008; 2009). Once a doctor looks at an internal organ through imaging technologies, for instance, details of the organ come to the surface, and, in this sense, the organ is enhanced. At the same time, however, we would lose the organ's relation to other parts of the body, and it means, the context is diminished. This pattern is present, according to postphenomenology, in every single instance of mediation. In this sense, technology, not just restructures our relationship with the world, but it does so through a particular form.

Crucially, while this pattern remains ever relevant, every single technology mediates our relationship with the world in its particular manner. One implication of the latter point is that the mediation of every technology should be studied in its specificity. A further implication is an emphasis placed on the empirical approach to

make sense of the mediation of technology in a real-life setting[4] (Rosenberger and Verbeek 2015; Verbeek 2005).

A last notion worthy of mention within the toolbox of postphenomenology is the various possible relationships one might develop with technology. I cannot go into the details of each and the reader is invited to go through the original texts. However, two types of relationships are particularly important. The first is an *embodied* relationship where technology is integrated into one's sensorial system, as though, and in this sense, the given technology is too *transparent* to absorb any attention (e.g., Merleau-Ponty's cane). And the second kind, a *hermeneutic* relation occurs wherever a readout is involved as users have to decipher the existing codes (e.g., reading a glucometer for determining the approximate concentration of glucose in the blood). In the latter type, one's relationship with the world is indirect, as one must first interpret a representation of the world, perhaps displayed on a screen.

I argue while current trends aiming at studying the relationship of older adults and ATs (e.g., socio-gerontechnology) have proven fruitful, postphenomenology may be of great help here as it can equip us with a first-person eye to explore how medical technologies, and in particular digital healthcare systems, mediate the world of users and how, consequently, individuals' image of aging evolves. Technology, and in our case digital healthcare technologies, affects one's habits, actions, behavior, values, and perception, and all these bear upon one's (i.e., both older adults and the public) conception of aging, elderly, body, and the like. In the following section, I will try to illustrate how a postphenomenological lens may raise awareness about the subtleties of the relationship between elderlies and digital health devices.

A postphenomenological analysis of digitalization of the health

As a preliminary step let's clarify the notion of digitalization of healthcare by noticing that it exemplifies *datafication* where the latter figures through, first, the process of collection, databasing, quantification, and analysis of information, and second, using these data for knowledge production, economic value-generation, and service optimization (see, for example, Mayer-Schonberger and Cukier 2013). Even though datafication historically precedes digitalization, today, the former is often implemented through the latter. But this 'conversion of qualitative aspects of life into quantified data' (Ruckenstein and Schull 2017, p. 262) has huge and far-reaching ramifications. I will try to shed light on some aspects of them drawing upon postphenomenology.

To begin, one may think that, digitalization of health, in the end, might promote *dataism*, i.e., the view purporting that large data collections can provide true, objective, and predictive insights that are impossible otherwise (Boyd and Crawford 2012; Van Dijck 2014). Here, clearly, the situational, immediate, and first-person feelings of individuals are left out and abstract quantified knowledge is replaced. But, as cultural Aging Studies have explicated, no neutral and objective knowledge

[4] And here lies how a philosophical trend may integrate empirical approaches.

of the body is possible. Instead, sense-making of the body through digital data is as biased and culturally mediated as any other venue for self-knowledge.

Next, and perhaps more profoundly, the proliferation of digital technologies is creating new modes and styles of later life which can be characterized as 'quantified aging', according to Marshall and Katz (2016). Abstraction of the body into a *data double* would amount to creating new and unprecedented selfhood, self-knowledge, and self-perception, so that, in contrast to normal somatic self-knowledge, it is unbodied and de-corporealized. This change of mood implies that an *embodied* presence of older adults has turned into a *hermeneutic* relationship with the world, postphenomenologically speaking, where, far from subjective knowledge, individuals have to interpret these aggregated data to make sense of their own bodies. This is in fact a new mediated relationship with the body, and, as Lupton argues, access to the body through 'numerical data collection' would change people's 'expectations' (2016).

While triggering a hermeneutic, rather than embodied, relationship with the body, some digital technologies such as wearable and mobile tracking devices, and in general those associated with passive telemonitoring, would foreground the body of users. Here is of great relevance the work of Leder (1990) and his contribution to the differences between the 'dis-appearing' body and 'dys-appearing' body. He posits that body, in the flow of daily life, often disappears from our immediate awareness and recedes accordingly into the 'backgrounded'. In postphenomenological terms, one might claim that the body, most often, is *transparent* in the course of the daily activity flow. But, in contrast, once we find ourselves in a state of illness, or episodes of pain, the body moves to the foreground of our consciousness, and the latter emerging body is what he calls a 'dys-appearing' body. Postphenomenologically speaking, the body, in these abnormal conditions, becomes *opaque* and draws attention accordingly.[5] So, the digitalization of health care, at least when it comes to some specific preventive devices, might turn the elderly's body from a subjective, transparent, and dis-appearing body into an objective, opaque, and dys-appearing body.[6]

This shift, and bringing back a (quantified) body into the foreground, sets the stage for emerging a mediated presence in the world for older adults. But the mediation engendered by digital medicine technologies, like any other instance of mediation, should follow the pattern of amplification/reduction, according to postphenomenology. How can we pinpoint the pattern here? Even though different technologies stimulate varying types of mediation, and in this sense, every technology, as elaborated, should be investigated in its specificity, still one might be able to bring into light commonalities of a pervasive cluster of digital technologies, that is, those associated with wearable self-tracking and passive telemonitoring. So, one

[5] Leder's distinction of two bodies parallels the distinction of Leib (subjective body) and Körper (objective body) in the work of Husserl (e.g., 1989).

[6] It is no surprise if this reminds the reader of Heidegger's case of hammer and hammering; once a hammer becomes broken or starts to malfunction, it turns from a state of *ready-to-hand* into the state of *present-at-hand*.

might wonder, what aspects of individuals' life become enhanced, and which facets, accordingly, diminish?

Where persons, as said, are often immersed within their life and, thus, barely attentive to their corporeal dimensions, the body, in the wake of digital systems, might come to stand out in their consciousness. In this sense, the body of individuals has an inverse relationship with their surrounding world within awareness; the more body foregrounds, the less the surrounding world stands out, and vice versa. This perfectly squares with the structure of amplification/reduction of mediation.

Yet, this *objectification* of the body, and making it stand out, might come at a price. The first price we have to pay, as just mentioned, is the distraction from the smooth flow of daily life. Second, and perhaps more crucially, it might intensify binary normative categorizations revolving around the state of the body in its later life; functional/dysfunctional, young/old, active/inactive, fit/frail. As Aceros and his colleagues find, after being exposed to such technologies, 'docile users [might] begin considering themselves as elderly people who do indeed need care' (2015, p. 105). In this sense, digital technologies may reinforce the stereotypical discourse associated with older bodies, and accordingly, a biased conception of aging might resurface. And this, once again, illustrates how digital health technologies, might carry, as well as promote, a normative conception of later life.[7]

In fact, such technologies may allure older adults to keep up self-evaluation, and by keep tracking their body, they might feel themselves 'as (un) healthy subjects' (Lupton 1995), and if so, such technologies might turn out to be anxiety-provoking. This might make good sense when we recall that some of the prominent scholars in the phenomenology of medicine, tend to think of health as nothing but being in a state so long as the body remains transparent, and in this sense, illness is associated with the objectification of the body in the wake of a breakdown in it[8] (see, for example, Carel 2016). Opacity of the body, therefore, brought about by digital technologies might disrupt the balance of *the subjective* body and *objective* body. And this, again, demonstrates a new mediated relationship with the body; body as the object of continuous surveillance awaiting its likely breakdowns. In a study to identify the impacts of heart rate monitoring on individuals many of the participants felt unfounded anxieties, as one participant recounts how, right after receiving alarms, he would become shocked and start to wonder 'is my heart rate fast? … oh, is my heart rate too fast? Am I concentrating too hard at work … what's going on?' (Toner et al. 2022). In fact, one might said that digital preventive technologies mediate the relation between the objective and subjective body through transformation of the individuals' first-person and *direct* knowledge of themselves into an *indirect* and

[7] I purposefully use modal verbs such as 'might' throughout the writing since, as said, technology is multistable and it cannot determine one's future action. If so, telemonitoring systems might objectify the body of individuals but not necessarily do so.

[8] Admittedly, that is not to deny that one can also find positive dimensions in the objectification of the body. On the contrary, in some cases, objectification might turn out to be a change for better rather than worse, as someone might use a heart rate monitor to avoid fixating on their heart rate, or they might use technology (such as an Apple Watch) to eradicate worry regarding falling.

third-person knowledge that is equally accessible to all, and this might, in turn, unjustifiably sensitize users.

A further dimension to highlight how digital technologies might strengthen the discourse of *ageism*, i.e., a rhetoric of stereotypical conceptualization of aging, is to explore whether digital technologies are considered stigmatizing by older adults. Though there have been a whole bunch of studies on non-digital and mundane ATs, such as ramps, grab bars, stair lifts, assistive toilets, therapeutic tubs, etc. to investigate how stigmatizing they are (see, for example, Barnhart and Peñaloza 2013; Fletcher et al. 2015), much work needs to be done to showcase whether also new digital devices bring stigma attached to them. Stigmatization, in fact, is another way that a mediated frail and abnormal body comes to be enacted and performed.

One can think of a more nuanced elaboration on how age, aging, body, selfhood, and self-knowledge come to be reconfigured after being exposed to various digital health technologies. But to develop more detailed contributions one needs to conduct empirical endeavors, and above all, qualitative research. Besides that, there is also a 'genuine need to improve the theoretical understanding of aging–[digital] technology relations' (Peine and Neven 2020). I hope this section has illustrated how postphenomenology might be helpful in both theoretical and empirical directions.

Closing remarks

Advancements in digital technologies in conjunction with aging-in-place discourse have raised philosophical and ethical concerns about individuals' later life. While there have been innovative attempts to explore the role of the digitalization of the healthcare system in changing older adults' life, in this article, I argued, more things can be done. In particular, I tried to introduce the postphenomenology framework into Age Studies. Taking for granted the interconnectedness of humans and technology, postphenomenology is interested in investigating the relationship between individuals and technology, and how, subsequently, the latter might affect individuals' world. In particular, I tried to elaborate on how a postphenomenological lens may account for the nuances of the different relationships individuals come to develop with their body and world in the wake of preventive medicine devices. While most of the studies so far conducted in a phenomenological fashion tend to explore the intention to use ATs (Fowe and Boot 2022), and in this sense, they usually explore *conditions* of use and adoption of ATs by individuals[9] postphenomenology with a diverse vocabulary at disposal can study the *actual* use of ATs by older adults. The notion of mediation, above all, can bring to light dimensions of one's life in the wake of using ATs that might remain untouched otherwise, as elaborated.

I argued further that postphenomenology may bridge the gap between empirically conducted studies of health technologies within social sciences, and the theoretical

[9] To get a sense of such contributions and see how ATs are (or are not) received and adopted by older adults see (Chandrasekaran et al. 2021; Fowe and Boot 2022; Li et al. 2019; Salifu et al. 2016; Wilkowska et al. 2021).

speculations within philosophy. As I argued, on the one hand, having been derived from classical phenomenology, postphenomenology is a rich theoretical framework to explore the role of digital preventing devices in conceptualization of notions associated with later life. In this sense, postphenomenology can be adopted as an 'overarching theoretical theme' to understand 'the way aging and [digital] technology mutually shape each other' (Peine and Neven 2020). In particular, mediation theory and insights into different relationships between individuals and technologies would enrich our understanding of the impacts of the digitalization of the healthcare systems on elderlies. This step is crucial, provided that the literature on aging and technology is still predominantly atheoretical (Sixsmith 2013; Schulz et al. 2015).

On the other hand, postphenomenology's emphasis on empirical methods may give rise to empirically conducted research and bring into light subtleties of the relationship between older adults and digital technologies that might go unnoticed otherwise.

These two directions are not mutually exclusive, however, as 'it is in the practical worlds of doing and making that profound ideas arise, and not necessarily from the armchairs of the great thinkers and philosophers' (Katz 2014), and postphenomenology may be a rich starting point here in both directions.

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