

Living temporality: Speculative engagements with elderly people on bioscience and the body

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journals.sagepub.com/home/tas**Lotta Hautamäki** 

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Abstract

This article reports on speculative engagements in group conversations with elderly citizens on the biomedical possibilities of modifying aging in the future. The participants oriented themselves towards the future of aging through memories and present embodied perceptions. To constrict the analysis, we draw on Isabelle Stengers' speculative thinking and, to conceptualize the multiplicity of temporalities in our data, we build on Henri Bergson's theorization on time. The analysis of the conversations on technoscientific change illustrate how experiences of aging and the life-span are constituted in and through relations with human and more-than-human others. We theorized these connections of the personal and the collective as *living temporality* with two temporal logics: Intergenerational time involving other humans in the past, present and future, and evolutionary time that connects the aging body to other living beings and the planet. Within these articulations of the experience of time various alternative perspectives into what is considered as 'normal' aging emerged as counternarratives to biomedical models of temporal change. Methodologically, we show that as speculative thinking foregrounds experiential knowledge, it provides a vessel for unruliness and freedom that allows other types of aging futures to emerge alongside bioscientific ones.

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Introduction

This article reports on speculative engagements with elderly citizens whose visions, voices, and experiences of times to come have so far received scant attention in social science studies on technoscientific change and temporality (Borup et al., 2006; Michael, 2003; Brown and Michael, 2003). As experiential experts in living with and through temporal changes, elderly people living in Southern Finland were invited to take part in dialogical focus-group conversations with the theme *Aging and the Future*. Rather than constructing scenarios of what the megatrends of aging futures would look like with science or policy experts (e.g., Cozza et al., 2019; Keeler and Bernstein, 2021; Veenman, 2013), we aimed to imagine the futures of aging from the lay persons' perspective in an open-ended, speculative manner (Guggenheim et al., 2017; Meskus and Tikka, 2022; Wilkie and Michael, 2018; Wilkie et al., 2017). Our research engagements with elderly citizens explored the following questions: What kinds of futures are envisioned vis á vis biotechnological modification of the human life course and aging as a biological process? How do elderly people articulate their experience of time in this context?

As a phenomenon, aging itself is a biological process and simultaneously related to the experienced temporality of the life course. The embodied nature of experiencing time in the context of aging has been studied within different periods of the life course from youth (e.g., Coleman, 2008; Paju, 2019) to late adulthood (e.g., Facchini and Rampazi, 2009) and old age (e.g., Twigg and Buse, 2013; Wanka, 2019). As in the studies of May (2016) and Chazan and Whetung (2021), the temporalities we explored with the aged participants were profoundly intergenerational, not solely related to individual life courses and singular selves. A key aspect of how our participants approached the issue of future bioscientific modifications of aging was through personal and collective experiences in the past. Their reminiscing was lodged in concrete places, people, and embodied sense experiences with a view from the present towards the past and the future (Bendien, 2012; Dengen, 2005; 2016; May, 2016; 2018; May and Muir, 2015). Harris and Coleman (2020) note that temporality is always lived within particular situations. The experiences of time emerge from and structure social and political dynamics. For them, this means that time is doubled because it is 'produced by, and productive of, the relations and processes it operates through'.

To conceptualize this multiplicity and doubleness of experienced time, we build on Henri Bergson's (2015[1896]; 1998[1907]) conceptualizations of time as multiple intertwined continuities in our experience, rather than an independent entity measured by clocks, calendars, and age as numbers. Contemporary developments in feminist scholarship on Bergson's thinking (e.g., Coleman, 2008; Grosz, 2001; 2004; 2011; Keightley, 2013; May, 2016; Paju, 2019) help us characterize the embodied nature of the experience of time. Isabelle Stengers' (2011; 2019) speculative thinking on science and nature provides us with tools to methodologically and theoretically address the ways our participants engage with the bioscientific views on the future of aging in our discussions. We draw from her observation that a speculative approach engages with the explored empirical reality as a process, which can take various directions and involves reflection on how knowledge of the world and experiences of it are fundamentally co-constituted (Stengers, 2010; Stengers, 2011, see Meskus and Tikka, 2022; Mäkelin and Hautamäki, 2021).

Our discussion builds on this scholarship with the interest of investigating the nuances of experienced time in the context of bioscientific modification of aging. We aim to understand how scientific knowledge of processes of life connect to and co-constitute lived experiences of time (Hautamäki, 2018). Our analysis builds on the idea of living temporality as simultaneously in movement with nature and thus *living* and rooted in past and present embodied experiences and thereby *lived*. The elderly participants' articulations of experienced time – the specific *living temporalities* – offer alternative perspectives and counternarratives to bioscientific models viewing aging as a condition to be shaped with the help of biotechnologies to counter or even undo the effects of time in the body. We show how the elderly peoples' experiences of time are not only non-linear and intersubjective (e.g., Chazan and Whetung, 2021; May 2016), but also connected to the evolutionary processes of life. Based on the analysis, we theorize the experience of time as situated on two temporal logics. The first logics, *intergenerational time*, is articulated in relation to other humans in the past, present and future. The second logics, *evolutionary time*, is articulated as the longer span of time in relation to other living beings and the planet.

In what follows, we first explain our analytical framework, the methodological premises of the study and the details of the materials. The subsequent analytical sections report the main outcomes of the focus group conversations. We first analyse our study participants' discussions on experiences of time in relation to other humans in the past, present and future while imagining how biotechnologies could shape futures. In the second analytical section, we show how the elderly people extended the discussions on the lived temporalities of an aging body to other living beings on the planet. In the conclusions, we discuss these results in the context of studying the experience of time and the methodological choices that allow a more nuanced analysis of the challenges of uncertain futures.

Analytical framework and data

In our group conversations with the elderly people, we opted for an open, or speculative, approach to the collaborative study of futures, following the methodology developed in a larger project on biotechnological modification of life (Meskus and Tikka, 2022). In previous studies on technoscientific expectations and future promises, theoretical attention has been given to how expectations and uncertainty vary according to actors' closeness to scientific knowledge production (Brown and Michael, 2003). Expectations have been proposed as 'the missing link' between the inner and outer worlds of technoscientific knowledge communities (Borup et al., 2006). While this approach provides insight into how actors orientate towards future and technological innovations, it does not theorize the deeply experiential and thus embodied aspect of futures-imagining. Recent speculative approaches inspired by Stengers' thought have tapped into this theoretical-methodological gap (e.g., Guggenheim et al., 2017; Wilkie and Michael, 2018; Wilkie et al., 2017). Contributing to this scholarship, our previous studies (Meskus, 2023; Mäkelin and Hautamäki, 2021) have highlighted the fruitfulness of speculative research in resisting a 'future that presents itself as obvious, plausible, and normal', as Stengers (2010: 10) puts it. In this article, the critique of instrumentalized rationality in science, developed in and through speculative thinking, is crucial in addressing the questions of experienced time in the context of aging and biotechnology.

Stengers (2019) maintains that the problematization of the modes of living (human and more-than-human) in the present requires thinking from a place of not-knowing to embrace the uncertainties of the future. A speculative approach should remain open to the experiences of life's continuous improvisation – an intuitive stance of not-knowing our elderly participants drew upon while discussing aging and its modification through bioscience and technology. Stengers' (e.g., 2008; 2011) work develops Alfred North Whitehead's process philosophy and his claim that 'nature' should not be differentiated (*bifurcated*) in terms of the external world that can be objectively known and the human perceptions and subjective experiences of it (Whitehead, 2015[1920]: 30–31). Time, meanwhile, is for Whitehead the continuous passage of nature, where individual beings, human and more-than-human, become and perish in a constant process of interrelation (Stengers, 2011: 31–113; Whitehead, 1978[1929]: 22–23).

Stengers (2011: 54–57) points out how this view builds on Henri Bergson's thinking on time as *duration* (*la durée*), which is the temporal mode in nature on the scale of both evolutionary time and individually lived and experienced time. It is the 'continuous progress of the past which gnaws into the future and which swells as it advances', Bergson (1998[1907]: 4) writes. The history of life is evolutionary both in the sense of the immense time spans of the evolution

of species and in the creative production of novelty and difference that occurs through human heredity (Bergson, 1998[1907]: 224–240). Time as the passage of nature is, importantly, something perceived and experienced by all living beings (Stengers, 2011, 55). This understanding of time is hard to grasp via bioscientific rationality that tends to reduce time to a measurable sequence of instantaneous states (Prigogine and Stengers, 1984: 90–96). Bergson’s duration, on the contrary, sees human embodied experience through its individual enduring rhythm, specific to each body and experience, and yet connected to others’ bodies and experiences (Coleman, 2008).

The perceiving body is integral in the temporal generation of memories and the experience of duration within a human life span (Bergson, 2015[1896]: 191–212). Elizabeth Grosz (2004:196) re-articulates Bergson’s duration from the perspective of embodied experience as follows: ‘As living beings, we are the accumulation and concretion of our history, of what has happened to us and what we have done, perhaps even before any personal or subjective existence. The past, including one’s cultural history and even biology, are carried with every living being.’ In envisioning possible futures of aging, the elderly participants discussed how a certain view on the biological processes of life and nature was inscribed, embodied, in their experience. These embodied experiences interconnect the subjectively lived, the personal, and the collective, or the ‘assemblage of practices, discourses, images, institutional arrangements, and specific places and projects’ (Lock and Farquhar, 2007). The analytical sections of the article suggest that elderly peoples’ personal experiences of time are inextricably interconnected with collective, that is cultural, social and political, contexts (Harris and Coleman, 2020).

Our data consists of group conversations with elderly people in Helsinki, Finland, about biomedical possibilities of modifying aging. The conversations took place on March 2020 and were organized by Lotta Hautamäki, Mianna Meskus and Emilia Tikka. The call for participation was distributed through local professional organizations, the Age Institute of Finland, the Finnish Pensioners’ Federation and two hobby groups (a sewing circle and a local Lion’s Club). In the call for participation, we highlighted that the working method would be informal and dialogic. According to the time slots available, the groups formed by chance into two mixed groups, two female-only groups, and one male-only group, consisting of 25 participants in total (6 men and 19 women according to self-identified gender). The youngest participant was 65 and the oldest 84, with the majority born in the 1940s. The majority of the participants had either an upper-secondary education or a university degree, and their occupations ranged from teaching and other educational positions, social and health care to industry and business.

We invited the participants to undertake a collective thought experiment together with us researchers, that explicitly appreciated non-hierarchical ways

of knowing and even not-knowing as regards bioscientific knowledge and technologies (Meskus and Tikka, 2022). We emphasized that there were no right or wrong answers to the issues discussed and, in addressing them, the participants' personal views and life experiences were sufficient. The research events were loosely scripted, and each lasted for 3 hours with a break for refreshments in between. Each event was audiotaped and transcribed. Before the conversation, each participant signed an informed consent form.

The issues introduced to stimulate shared deliberation focused on emerging biotechnological modification of bodies and the life course. We showed vignettes of media and other texts as well as news pictures about scientific findings to generate what-if questions and prompt discussion. We encouraged attuning to participants' feelings, ideas, and experiences of personal and societal implications of such developments. The themes were: (1) The gene-editing method of CRISPR-CAS9 and genome-level interventions into life processes; (2) genetic and microbiological research on human gut microbiota and epigenetic changes across generations; (3) research on stem cells in affecting cellular aging in the body, and (4) demographic challenges in the context of climate crises. As discussed in Meskus and Tikka (2022), we chose the themes based on our ongoing research interest on emerging biotechnologies and the reconfiguring of biological facts regarding life course and aging. The transcribed conversations were analysed with the help of Atlas.ti software to discern the themes introduced in this article. In the analytical sections, we explore how the conversations on bioscience instigated discussion on lived temporality.

Intergenerational time: Lived, shared and embodied experiences

Intergenerational relations and their reconfigurations are a key area of study when investigating aging in present societies. Intergenerational relations have been explored as interactions between ages and values (Gáspár and Laurén, 2013), and knowledge exchange that is valued highly both by lay people and experts (Keeler and Bernstein, 2021). Aging has been shown to relate to various processes of transfer between generations. These include economic as well as cultural and social acts of intergenerationality (Neilson, 2012) and the mechanisms of social memory in passing down culture and history between generations (Dengen, 2005; 2016). Intergenerational relations are, particularly in the experiences of aged people, intertwined with the sense of belonging to places, people, times and cultural contexts (May and Muir, 2015; May, 2016).

In the conversations with our participants, intergenerationality emerged as a phenomenon that extends beyond the timeframe of a singular body and life

through the reminisced pasts towards uncertain futures. The relations between generations were discussed in terms of the transgenerational inheritance of intertwined biological and social factors, as well as the modification of inheritance. Furthermore, intergenerationality was a tool to perceive the responsibilities of older generations in the face of technoscientific and ecological futures to come.

Passing on knowledge and biological information

The inherent uncertainty of futures to come was part of our speculative engagement, and the participants had spirited discussions prompted by the vignettes on bioscientific discoveries in genetics and genomic engineering. The introduced conversation issues offered the possibility of discussing the interaction between genetics and the environment and the prospect of extending the health and length of human lives with the help of biotechnologies. Participants also extended the conversation beyond these themes. They engaged in conversations on intergenerational health and lifestyle choices, historical developments in health care and biomedicine, and what constituted natural and healthy aging. These conversations were marked by the participants' memories and stories, as well as ponderings on changing times and adjusting to uncertainties:

I'm just thinking about all the changes. Like if we think of our life span and all that has happened [to us], let alone to our parents, who experienced times without cars and all (...) perhaps people of our age are afraid of changes, because they are not easy, and it takes time to adjust to them (GR2/2020).

The passing of time and the uncertainties of the future were intergenerational in the sense of affirming historical, social, and cultural change. As elderly citizens, the participants viewed themselves as mediators of experiential knowledge to the next generations. To counter societal ageism and render value in becoming and being aged, the passing of knowledge and life-wisdom was emphasized. Rather than acting as 'guardians of tradition' in the name of constricting future imageries (Bendien, 2012), intergenerational sharing was related to temporal belonging with others (May and Muir, 2015).

The participants described their generational relations with their current offspring, godchildren, and extended family. Intergenerational belonging was also expressed in relation to past and future generations, when the participants pondered upon what inheritance means in terms of passing down family culture, upbringing, ideas, and behaviours. One participant said:

In my experience, my inheritance, the ways I react and do things, come already from my grandmother, whom I've never met. [The inheritance] has been passed down through my parents to me and I have passed it down to my children. This

inheritance and my upbringing have certainly influenced my work [as a teacher] (GR2/2020).

Our conversations showed that the participants valued the idea of a socially mediated wisdom of life that is passed down through generations. Discussing genetics-induced affective accounts on biological information and genetic inheritance with its risks and uncertainties. One of the participants pondered that, ‘well, I’m thinking of how I have lived my life ... should I have lived in some other way so that my grandchildren’s situation would be different?’ (GR2/2020).

The uncertainties of life and inheritance were shared in the conversations on intergenerational experiences of illness and disease. The participants told stories of relatives who smoked their whole lives and still managed to stay healthy, or others who lived as healthy as possible and yet got cancer – all along acknowledging the complex relationship between risks and the actualization of diseases. They also pondered on the intergenerational responsibility of understanding the genetic risks of certain diseases, such as breast cancer or Alzheimer’s disease, in connection to the environmental factors of nutrition and other lifestyle choices.

Pasts, presents and futures were further connected when discussing the nurture of new generations. Particularly the participants who were mothers acknowledged a certain responsibility regarding what they passed down to their children both through their genes and through their upbringing and social milieu. These elderly people affirmed an intergenerational forgiveness for the fact that knowledge is tied to time and context: ‘Maybe it is so that somehow one must be merciful towards the choices in the past. One acts upon the situation and the knowledge then available. So, one would not need to feel guilty about past actions’ (GR1/2020). The participants affirmed how historical, social, and cultural change is intertwined with the transmission of genetic information from one body to another across generations.

Living temporality is, then, realized through genes, lifestyle choices, social and psychological milieu, and culture. Our participants showed us that envisioning bioscientific futures is deeply connected to ideas of intergenerational relations and belonging (May and Muir, 2015). These relations extend the timeframe of the individual life and body to an understanding of a continuum of generational patterns of what is received from ancestors by present generations and passed on to next generations (Chazan and Whetung, 2021). This aligns with Colman’s (2008) proposition that the embodied experiences of time are deeply connected to others in the past, present, and future through intergenerational patterns. Regarding genetics, our participants did not articulate a strong belief in genetic determinacy but rather, the integration of the social and the biological was characteristic to the participants’ sense of genetic inheritance. Interpreted through Whitehead’s (1978[1929]) and Stengers’ (2011) thinking, our participants understood humanity as neither pre-given through biology, nor learned

through culture, but formed through the processes of this co-arising of life in the temporal becoming of generations.

Modification of life and intergenerational changes

One of the thought experiments we invited the participants to, was to imagine possible uses of genomic engineering. We introduced the prospect of applying the Nobel-winning gene-editing technology of CRISPR-CAS9 to modify an individual's genome to prevent genetic diseases, correct poor eyesight or even change the genotype and phenotype of the offspring, and thus future generations, through modifying their germline (e.g., Doudna and Sternberg, 2017; Kozubek, 2016). These themes rendered the conversations highly mobile between pasts and futures again underscoring intergenerational uncertainties and responsibilities in technological development and its effects on the body and nature.

While one participant wondered if she might willingly use gene editing technology to get rid of a debilitating stomach condition, the overall sentiment in the groups was a reluctance to imagine optimistic futures with genome editing. Some participants linked the risks of gene editing to racial discrimination of the Sámi people in Finland and to Nazism: 'I can't imagine that our generation would forget the risks involved in these attempts of creating an *übermensch*' (GR2/2020). The idea of shaping the human genome of future generations brought up the history of eugenic practices and the challenges of limiting the use of these biotechnologies only to some diseases and anomalies. This highlights how temporality materializes through collective traumatic histories such as that of eugenics (Dengen, 2005) and how the prospects of biotechnological futures are persistently addressed through the history of racial hygienic practices (Meskus, 2005, 2023).

The participants felt that the supposed aim of biotechnological modification would be to enhance the human species and consequently, that diversity as an inherently human value would be compromised. The prospect of germline modification resulting in transgenerational changes led the participants to consider the consequences:

Since the aim would be to make us [as humans] better and better, this kind of genetic modification, passing from one generation to the next, could easily result in the reduction of human variability, making everything the same' (GR2/2020).

Considering lived temporality in this context, gene editing technology may be viewed as *breaking* the unfolding of intergenerational relations and belonging (May and Muir, 2015; May, 2018). Modification of the body and its biological mechanisms through gene editing is a concrete intervention into what the participants considered natural generational patterns of biological inheritance.

The question of what is considered ‘natural’ in terms of genetics was further discussed in the context of transgenerational inheritance through epigenetics. This branch of genetics studies the impact of the living environment and health behaviour on how DNA sequences are coded in the human body. We discussed how epigenetic changes are linked to changes in human microbiome caused for instance by malnutrition and trauma experienced during war (e.g., Bohacek et al., 2014; Kaati et al., 2002).

As with the theme of genetic modification, the participants’ accounts on epigenetics drew from history, but more in terms of their personal than collective memories. The participants reminisced upon their childhood lifestyles in the 1940s in more rural environments and identified historical shifts after the Second World War, when Finland was rapidly urbanizing. Reacting to the prompt we offered on the epigenetic effects of malnutrition one of the participants gave a lively description of a discussion with a younger family member about an obese relative: ‘I said to the young lad that you don’t know how it was after the war, when we started to get some sugar, cream and butter. We really ate them! And this is the consequence. And now they tell us not to eat fats and sugars at all’ (GR4/2020).

The participants felt earlier generations lived closer to nature and more naturally maintained healthier diets consisting of, for instance, fermented foods and vegetables, without attempting to eat according to various trends and ideals of healthy nutrition. The following quotation highlights how the participants’ articulations on intergenerational patterns included humans in relation to their natural environments. This participant explains her take on what she wishes to pass to future generations:

Personally, I’m maintaining a slightly old-fashioned lifestyle. I’m not trying to teach anything to anybody, but I want the children and grandchildren to see that everything doesn’t have to be that technology orientated. So, I live in the countryside and tend to the forest daily when the weather allows it [...] I believe that we have a kind of a role ... through us, others can see that there is also something different in life from this technology hype that the younger experience. So, I hope [through her interactions with nature and the plants she grows] that it transfers, carries some way towards the future (GR2/2020).

This participant is problematizing modes of living in the present while actively resisting bioscientific orientations towards the future (Stengers, 2019). The quotation illustrates the different aspects of living temporality. On the one hand, temporality emerges in movement with nature, which makes it constantly transforming and living. On the other hand, temporality is rooted in past and present embodied experiences and is thereby actively lived.

Our speculative engagements point to how the elderly participants were drawing from a multiplicity of pasts, collective and personal, to be able to account for uncertain futures. This section has shown that the elderly participants tended to contest the bioscientific rationale distinguishing between the social and the biological, considering these rather as intertwined. Their articulations arose from embodied experiences of belonging to generations in time. The participants also questioned bioscientific motivations of modifying the genetic processes of life. Their resistance towards the modification of life suggests that to understand the passage of time as part of human experience we should not differentiate longer evolutionary temporalities of biological inheritance from the lived experiences of temporality on the personal and collective scale. Indeed, in our study, the logics of intergenerational time, opened the perspective also towards the longer temporalities in the age of biotechnological modification and the logics of evolutionary time.

Evolutionary time: Living temporality with more-than-humans

In a seminal aging research paper in bioscience (López-Otín et al., 2013), aging is broadly defined as the time-dependent functional decline that affects most living organisms, which in humans means progressive losses of physiological integrity leading to impaired function and increased vulnerability to death. In present societies, biomedical definitions of the aging body shape identities and lived experiences, alongside normative societal definitions of health and illness (Joyce and Loe, 2010; Kaufman et al., 2004; Moreira, 2017; Pickard, 2014). The normative stance towards so-called successful aging, the idea of living ever longer lives without frailty and disability, has been criticized as providing a view on aging futures that represents able-bodied, able-minded, affluent, and heterosexual norms of aging (Chazan and Whetung, 2021; Sandberg and Marshall, 2017).

From the perspective of our speculative engagements with elderly people, the biomedical view on aging processes is somewhat narrow. Next, we proceed to explore how our participants linked the aging of the human organism to other species by making references to the passing of time in evolutionary processes of transformation and adaptation. In our conversations with the participants, both the notion of successful aging and aging as a 'disorder' to be cured with biotechnologies, were contested. The participants resisted the idea of an individualized process of aging and showed how their experience of time was related to other living beings.

'Ordinary' aging as a shared process of life

In our speculative engagements prompted by future visions of modifying the bodily process of aging by, for instance, stem-cell-based therapies and gene

editing, we pondered the question of what aging is as a lived experience. The participants considered rather unanimously that aging belongs to the course of life and, as such, it should not be regarded as a problem to be modified into non-existence. The prospect of biomedical knowledge and technologies being increasingly used to modify and even eliminate age-related processes of 'decline' was problematized through the way our elderly participants articulated the effects of time on the body. Through accounts of personal, embodied experiences with osteoarthritis, back pain, diabetes and other conditions, biological processes of aging were accounted for as part of becoming who one is in the present. As one of the participants said:

Well, let's say that the problems we have, they cultivate us and make us humane and human. If all my ailments are removed, the back aches and what have you, I am no longer the same person. These things affect my attitude towards life and the way I live my life and how I face the difficulties in life. They are part of life (GR2/2020).

This brings into view Bergson's idea that the body is a perceiving sense organ and as such it is an integral part of the temporal generation of memories and experience within a human life span (Bergson, 2015[1896]: 191–212). Future aging without small and even bigger medical conditions was regarded as diminishing the experience of living, although many also admitted that they were speaking from the position of active and yet rather healthy elderly citizens. The participants considered themselves as representatives of what one of them called 'ordinary aging', which could mean 'all kinds of aches but no severe diseases' (GR3/2020). aging was perceived as a process that takes its time yet unfolds differently for different individuals. As with other living entities, aging was considered part of what a human is and does: 'aging is not a disease, it is a characteristic', one participant stated (GR3/2020). Hence, rather than abiding to the normative view of successful aging (Chazan and Whetung, 2021; Sandberg and Marshall, 2017), our participants showed us that aging constitutes a process of life *itself*, accompanied with the diverse conditions that time engenders in the aging person.

When discussing ordinary or 'normal' aging, the participants interestingly used examples from other species to explain what they felt was 'natural' or belonged to nature for humans as well as other living beings. The speculative engagements on bioscientific futures opened-up the relationality of the human aging process to other beings and the environment. Stengers (2019) maintains that to embrace the uncertainties of the future, we need to problematize present modes of living. This involves more-than-human beings demanding attention and consideration alongside the human. The elderly participants touched upon these considerations while discussing aging futures. For instance,

one of the participants stated at the very end of our conversation that ‘somehow there must remain some *sense* in all this manipulation. Nature must be allowed to flourish freely also in the human world and not only in the realm of butterflies and flowers’ (GR4/2020). When conversations turned to extremely long age, in one group the following exchange on *dying like a tree* drew our attention to lived temporality as multispecies relations:

P1: It’s like a tree that is all healthy, suddenly breaks and falls.

R: Yes, what kind of a life would that ...?

P2: That would not even have any dry branches or other such signs.

R: For humans, what kind of life would that mean? That is quite a beautiful ... or I don’t know if it is a beautiful prospect ...

P1: Yeah, it is not possible for humans. I paint for fun and lately, I have painted the forest and trees a lot. Then I started thinking, how does a tree age. Different trees age differently of course. But when I think about myself, it feels that it [the body] dilapidates from here and there. So, to age is of course natural. But I would not want that to go on for too long (GR4/2020).

Abstract and hypothetical imaginaries of the future were envisioned and deliberated through the participants’ experiences of relationality. As our previous studies (Meskus, 2018; Meskus and Oikkonen, 2020) on biotechnologically modified life show, experiences in technoscientific worlds unfold through constitutive relations with other beings and the materiality of living. Participants in this study resisted a thoroughgoing biomedicalization of aging and defended the uncertainties they felt belonged to life. In effect, some of them were concerned for such societal and political developments where, for instance, ‘you are *ordered* not to grow old anymore but to stay healthy until the age of 117 and then ... snap’ (GR4/2020).

The participants’ accounts of aging as an embodied experience make us ask: could we begin to understand and indeed accept aging as an open-ended process of becoming with the environment, as well as intergenerational and interspecies others? Alongside a rather constricted biomedical and health-based approach to aging, there exists aging as a relational process by which individual beings live and die in constant inter-relation with human and more-than-human others (Stengers, 2011). Stengers’ speculative thinking acknowledges the creative power of the biosciences while simultaneously problematizing the way sciences, in the attempt to be ‘objective’, are indifferent to what is judged as non-scientific, such as ‘subjective’ lived experiences. In line with the idea that ‘it belongs to

speculative thought to fight against the impoverishment of experience' (Stengers, 2011: 26), we ought to take seriously the various forms of experience in aging.

Living and dying in evolutionary time

Probing into uncertain futures of what aging could transform into, we pursued the question of what it would mean to become centenarians and even super-centenarians. What if biotechnologies allowed reaching extremely long lives? Recent estimates propose that if the current increase in life expectancy continues, most children born this millennium will celebrate their 100th birthday (Vaupel et al., 2021). The life expectancy of babies born in the early twenty-first century is around 103 years in the UK, 104 in the United States and 107 in Japan (Harper, 2016: 59). In demographic terms this suggests that late-life mortality rates in many developed countries are declining and currently show no signs of slowing. Addressing this scenario, we wanted to discuss what being a centenarian would entail from the study participants' perspective.

In the conversations it became clear, to put it briefly, that becoming a centenarian was regarded as both an intriguing and a frightening prospect. Living extra-long lives was the source of both affective lure and disquiet. Our participants felt that living up to 100 years had its advantages: 'I have so many things that I would still like to do. I have a billion books waiting to be read, I would like to learn oil painting, to continue icon painting, you name it!' (GR4/2020). Another participant said that being given more time in life was appealing if it would enable seeing 'grandchildren grow and continue enjoying this life I now have' (GR2/2020). Simultaneously, deliberations on biomedical shaping of aging instigated comments on how long life on the planet could continue. One participant lamented 'Why should longevity be increased? This planet is anyhow too full soon. How can all this be sustained if we just live on and on?' (GR3/2020). Such views cut across the groups with further discussions on how society and the planet would sustain the prolongation of life spans.

Several participants were concerned about how to maintain mental and physical functionality in everyday life and to be able to *enjoy* living with longer life spans. One argued that 'I think living up to 130 years cannot be an aim in itself. It is more important that the final years are meaningful with agency and competency' (GR3/2020). To be alive but not being able to enjoy life, as in the present, was a future not worth aiming for.

The theme of changing temporalities of aging grew into conversations on how to let go of life and die well. The end of life was considered a process that involves embodied knowing of when life is coming to its end. Our study participants maintained that there exists 'the will to life that naturally declines towards the end' (GR3/2020). This perspective was elaborated as follows:

There is this sort of maturing [...] when the will to live seizes naturally. Bit by bit one experiences that this has been a good life and nothing more is needed or wanted. Isn't this feeling actually quite sobering and healthy? It's not here for me yet, but I could imagine that when I'm closer to 100 years old, I can feel that this was a full and rich life. One has had experiences and done something good for the whole and so forth (GR3/2020).

The issue of letting go of life prompted views on what we term evolutionary time. Letting go of life should be regarded as 'natural', because it is something evolutionary and thus part of the human species and shared with other animals: 'Old elephants ... become aware that the end of life is near and seek that corner of the jungle where they go to die' (GR3/2020). Contrary to aspirations of immortality, a natural life span was experienced by the participants as having its limits. Futures with extremely long aging were perceived as paradoxical – they might change our understanding of how and when life ends, how it is *allowed* to end, and what enjoyment of life means at very high ages.

Kaufman and others (2004) have suggested that societal expectations of biomedical interventions in curtailing the temporal and processual changes in aging are constantly increasing, which entails the affective coupling of *hope* with the *hype* of life-extending interventions. This kind of 'technohype' to counter bodily aging and prolong life spans did not appeal to our participants. Rather, they problematized future imageries of successful aging and of supercentenarians as 'obvious, plausible, and normal' (Stengers, 2010: 10). Our thought experiments on the future of technoscientific aging were met with certain unruliness and resistance. Instead of abiding to the prospects of better aging through biotechnologies, the participants were experiencing life as an ever-changing process of becoming subjects (Stengers, 2011). Rather than placing major hope on biotechnologically modified and extended life spans, participants ended up deliberating on how to 'allow' aging as an embodied manifestation of living temporality.

To sum up, the processual becoming an aged subjects takes place intergenerationally, together with others in the passage of time (Whitehead, 1978[1929]). Furthermore, the living temporality of aging involves the evolutionary time of generations of humans and other living beings on the planet. The participants' articulations showcase Bergson's view that there is no real distinction between the creative process of heredity over generations and the creative process of evolution in its unfathomable entirety – all part of the modality of time of creative evolution (Bergson, 1998[1907]; see Grosz 2001). Anticipating futures, then, emerges in its full complexity: Through the coming together and mobilization of individual durations and rhythms shared with other humans and more-than-humans in the past and present.

Conclusions

This article has explored how elderly citizens articulated their experience of time while engaging in conversations on a bioscientifically modified future of aging. The participants oriented themselves towards the future through memories and present embodied experiences thus manifesting the Bergsonian idea of the body as the central locus that connects past, present, and future in human experience through the generation of memories (Bergson, 2015[1896]). Like Elina Paju's (2019) and Rebecca Coleman's (2008) analyses of younger people's experience of time, our analysis confirms how the experiences are simultaneously collectively shared and personal in their embodied nature. The speculative, open-ended approach to technoscientific change allowed us to avoid constructing abstract scenarios or detached imaginations of collective futures. Instead, we ended up engaging in complex discussions on futures as rooted in lived experiences that connect histories of generations and their social, cultural, and political conditions (see Harris and Coleman, 2020; Keightley, 2013). We theorized these connections of the personal and the collective with two temporal logics showing various alternative perspectives into what is considered as 'normal' aging and what is passed down through generations.

The first temporal logic, intergenerational time, was recognized in the elderly peoples' articulations of the momentary passing of time in personal lives that were related to significant others in the past and the present. This observation confirms Vanessa May's (2016) argument that intergenerational experiences of self and others can be seen through Bergsonian duration as defying understanding of not only linear temporality but also a singular self (see also Chazan and Whetung, 2021). The embodied memories of past generations, social and cultural history and genetically and epigenetically transmitted traits are interconnected. For our participants humanity was neither pre-given through biology, nor learned through culture, but formed through the processes of this co-arising of life in the temporal becoming of generations. The participants also felt certain responsibilities for the future generations in terms of passing down social, cultural and biological inheritance and an understanding of living in relation to nature and the environment. This entailed problematizing some modes of living in the present and the relations between humans and other living beings on the planet, struggling with ecosocial crises (Stengers, 2019).

The second temporal logic, evolutionary time, connected the aging body to the longer time span in evolutionary processes. Articulating human life as akin to, or different from, the life of elephants and trees, illustrated our participants' acknowledgement of more-than-human relations and the inevitable perishing of life in death. This underscores a Whiteheadian conception of nature as the interconnected coming to be and passing away of beings, which was also evident in our participants' articulation of themselves as beings within generational and evolutionary

continuums. Our participants' view of life is expressing itself through the connected processes of species evolution and aging at the individual level, linking the personal embodied experiences and the flow of life in nature. Moreover, our participants connected the personal and the collective conditions in their accounts of 'natural' and 'normal' aging. Particularly when discussing the possibilities of becoming a centenarian, the participants understood aging as a natural part of life in the evolution of the planet that should not be tampered with even if the biotechnologies to do so existed. They felt ambivalent about the idea of extremely long life spans and resisted normative stances of successful aging as something to strive towards. As Grosz (2001) points out, the past, present and the future are bound up with the durational movement of biologically understood life, as well as social struggle and politics of aging futures.

The group conversations were inspired by vignettes on the prospects of modifying human inheritance and aging. Experiences of time were thus articulated in a specific context: In trying to imagine the future of aging where people might live to become centenarians and the genetic and epigenetic processes could be modified to get more health and well-being over the years. We argue that these experiences of time offer alternative perspectives to the bioscientific view of attempting to shape, correct, counter, or even undo the effect of time in the human body. The doubled nature of time that Harris and Coleman (2020) refer to, emerges in our case from the ways personal embodied experiences and collective intergenerational, social and historical relations with human and non-human others structure each other. The interconnected temporal logics of intergenerational and evolutionary time underscore, we propose, the experience of time as what we term 'living temporality' emerging in movement with nature and simultaneously rooted in past and present embodied experiences.

In line with this kind of conception of time, the speculative methodology of our study highlighted the interconnectedness of knowledge and experience and the perceiving body as the focal site of experiencing time (Bergson, 2015[1896]). As it comes to aging, bioscientific rationality alone is incapable of grasping the living temporalities of aging and its embodied aspects. The speculative methodology we deployed in this study orients towards the future as deeply connected to lived experiences. The speculative engagements allowed the participants to reflect upon and contrast the 'subjective' knowledge of their experience and the bioscientific 'objective' knowledge as co-constitutive of aging in the present and the future.

Stengers (2008; 2010) has argued that speculative thinking departs from the bifurcation of the 'objective' knowledge of the external world and the 'subjective' experiences and perceptions of it. Speculative thinking entails, in Stengers' (2011) words, a fight against the impoverishment of experience. For us, this means that various forms of experience in aging should be considered when attempting to 'know' uncertain futures regarding life spans and their biomedical control. In such considerations, one should also pay attention to how more than

humans might enter the picture. Barbara Adam (1998) calls to understand ‘time-scapes’ in the ecosocial crises as complex temporalities of contextual being, becoming and dwelling. She emphasizes the study of temporalities of *all* living in local practices that can render the abstract notions of the inevitability of the crises more tangible and thus with more potential to create sustainable futures. The view of the future provided by the elderly participants’ living temporalities offer us counternarratives to grand models of inevitability as it comes to how we live and age on the planet. We can learn from aged people to pause on the implications of living temporality. This requires attention towards individual and shared embodied experiences in a longer and non-anthropocentric timeframe.


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