

Honor thy User: Reconsidering You and Future Self in an Aging Society

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Abstract. Human-Centered design is all about designing for whom and in which context, and in this paper we develop and explore cognitive ergonomic approaches to unpack such empathetic, contextual and imagistic design thinking. By applying a future time perspective and a contextual reality perspective, we conducted a series of design workshops for thirty-eight young entrepreneurs to speculate traditional and future technologies for their future selves and the current elderly. We report their idea generation processes and design proposals, followed by a discussion on practical guidelines and conceptual resources for researchers and practitioners. Our goal is to expose and engage the younger generation in building an empathetic aging society with various traditional and future technologies.

Keywords: speculative design · participatory design · cognitive ergonomics · idea generation · aging society · perspective-taking · design strategy

1 Introduction

Cognitive ergonomics as a holistic component of human-centered design practices did not appear magically from our ancestors of Stone Age, but the story was romanticized through an industrial designer how a thirsty caveman found his inspiration when he “instinctively dipped his cupped hands into a pool and drank. Some of the water leaked through his fingers. In time he fashioned a bowl from soft clay, let it harden, and drank from it; attached a handle and made a cup; pinched the rim at one point to make a spout, creating a pitcher.” [6] The anecdote envisioned how the concept of ergonomics evolved naturally in terms of human beings’ needs, capabilities, and constraints. We may know that the very first idea of a bowl for drinking generated through human minds and shaped through human bodies harmoniously interacted with people by now. It

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is the psychological reality that explains how we store experiences in memory, particularly how we can abstract from specific experiences to general conceptual understanding. Innovation is a process of abstraction that allows us to create conceptual knowledge involving categories of structures and functions with purposes, such as bowls, cups, pitchers and so on. These general cognitive mechanisms grant us the ability to predict, to communicate, and to collaborate across timelines and contexts [1].

As lifelong learners and guerrilla researchers in design innovation, we see cognitive ergonomics as a discipline that prioritizes addressing and learning about human needs and well-beings over generating and populating industrial solutions and digital designs. Designing for people has everything to do with how we are born, how we live and even how we die. With science and technology extending and altering human life, a new generation of cognitive ergonomists are also required to possess knowledge of more than physical objects and structures and to understand the interaction between the physical, non-tangible products and the ever-changing human minds. We should not only care for a heritage of people's efficiency and comfort but also attend to an adaptive living system of people's struggles in the evolution of society.

Therefore, designing for whom and in which context indicates an inclusive consideration and speculation of individuals in every stages of life and the relationships and interactions among them in an ecosystem of community(Fig. 1). Our goal, in this paper, is to expose and engage the younger generation in building an empathetic aging society with various technologies. By applying a future time perspective and a contextual reality perspective as the major cognitive ergonomic approaches, we conducted a series of design workshops for young entrepreneurs to speculate traditional and future technologies for their future selves and the current elderly. We report their idea generation processes and design proposals and discuss practical guidelines and conceptual resources for researchers and practitioners.

1.1 Design for an Aging Society

It is estimated that from 2013 to 2050, the aging population (persons aged 60 years and over) in the world is expected to more than double its number, reaching 2 billion and at some point exceed the number of children [15]. Loneliness and isolation among the elderly have posed high risks for life quality due to their association with cardiovascular and infectious diseases, cognitive deterioration and depression [2, 17, 21, 5].

Loneliness is an umbrella term that refers to both objective and subjective isolation due to a lack of social relationships and supports [11]. In existing literature, loneliness of the elderly encompasses three dimensions, including 1) existential loneliness referring to uncontrollable helplessness facing aging, sickness and death, 2) social loneliness referring to boredom, deprivation, sadness resulted from lacking social network, support and belonging and loss of friends and loved ones, 3) emotional loneliness referring to psychological feelings such as emptiness, anxiety, fear, lack of happiness [20, 23, 12, 5].

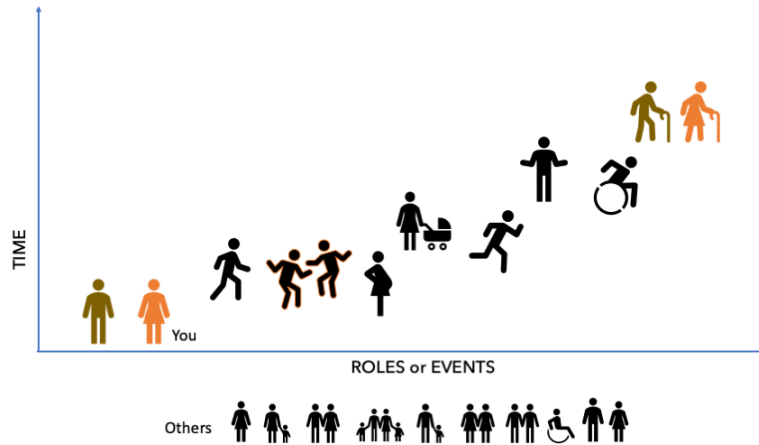


Fig. 1. Who Is the Real User? Changing Roles Across the Timeline.

Both Cognitive Ergonomics and Human-Computer Interaction have long been actively designing technological solutions for ageing in different contexts, mostly with a focus on specific problems and needs of the current elderly. And regarding the topic of loneliness and isolation, previous research has explored into building a social network and companionship [10], supporting care-giving and therapy [16], promoting psychological well-being from ambient lighting [5].

Recently, speculative design has received rising attention in designing with future technologies [7]. It applies critical inquiries and fictional storytelling to imagine alternative uses and implications of technologies, and involves the current elderly and other stakeholders such as policy-makers, designers, engineers, caregivers together in the participatory design [22, 24]. However, little is known about how the aging issue is related to the current younger generation. This paper argues that it is important to engage young people in designing the aging society for the following reasons. Firstly, the rapidly-increasing elderly care calls for participation of the entire society, especially the younger generation as the major force; secondly, the current younger generation themselves can be equipped with better awareness and preparation to adapt to ageing in the future; thirdly, time can play an important role in conceptualizing needs and planning design actions (i.e., time-construe theory and perspective taking [13, 8, 4]), and young people as key players in an aging society, can be “lead users” [19] for thinking about alternative scenarios or a myriad of new needs for their future selves in future. Therefore, young people’s perspective into both the future possibilities and the current realities are essentially complementary to existing participatory studies.

In this paper, we recognize young people’s double roles, empathetic caregivers to the current elderly and inevitable future elderly themselves, and seek to speculate alternative technology designs in combining a future time perspective and a contextual reality perspective, as well as to promote the inter-generational engagement in building the aging society. In the following sections, we describe our case study of a 6-week long design workshop conducted with young entrepreneurs from diverse backgrounds. Participants started by imagining their future selves as elderly and empathizing diverse aspects of loneliness, and then relating to loneliness of the current elderly in various life contexts, and finally speculating design ideas with traditional and future technologies.

To align with the evolution of Cognitive Ergonomics in its broader scope of analysis, we attempt to answer the following research questions. Firstly, how do the current younger generation perceive aging in both the current and future perspectives? Secondly, what are critical design considerations related to traditional and future technologies? Thirdly, what are complexities of designing for loneliness of diverse dimensions? In discussing these concerns with the younger end of the young-old continuum, our intention is not to present the final technology design outcomes, but to highlight our design thinking approaches that elicit and scaffold participants’ experience, thoughts and solutions around the loneliness issue, and how these can serve as a cognitive foundation for future technology design.

2 Study Method

A total of 38 young entrepreneurs aged between 22 and 35, took part in the design workshop for elective university course credits, including 23 women, 15 men. Participants represented a diverse set of educational backgrounds (at Bachelor, Masters level) and professional experiences including business administration, marketing, finance and banking. All of them participated in the co-design activities across six workshops over six weeks, each lasted approximately 3 hours. From the third week, participants were divided into 14 groups according to their proposed design ideas.

2.1 Workshop Structure

Six workshops were divided into three stages of activity. At stage 1 (workshop 1), participants were involved in scoping, imagining and empathizing loneliness of their future selves. At stage 2 (workshop 2-3), participants were involved in observing, relating and telling stories about loneliness of other elderly in various real life contexts. At stage 3 (workshop 4-6), participants were involved in exploring, criticizing and designing traditional or future technologies to tackle the loneliness and aging issue.

2.2 Analysis

Workshop recordings and participants' written reports of 6 weeks were transcribed and analyzed using open coding. Transcripts were coded in an iterative manner to capture recurring themes and contrasts among participants.

3 Workshop Design and Findings

3.1 Stage One (Workshop 1): Scoping and Imagining The Future Self

Participants were asked to imagine themselves as a 75-year old in the future time and to empathizing various aspects and consequences of loneliness and isolation. To scaffold this activity, we initiated a warm-up conversation adapted from a "who are you?" dialogue between the Caterpillar and Alice [3] to engage participants in reflecting on who they are, what they aspire to do and what they would spend time for enjoyment. Following this, participants were asked to assess themselves against a list of survey items regarding diverse aspects of elderly loneliness. Our intention was to help participants to recognize and immerse their personal identity and experience with specific life details of a future 75-year old. This list covered health conditions, psychological well-beings, leisure activities, social interactions and supports, which were compiled and adapted from previous measurements in the psychology and elderly care literature [12].

3.2 Findings From Stage One

How do you imagine yourself getting old in loneliness and isolation? Participants stereotyped. Most participants reported problems with moving and carrying without support, chronic diseases like high blood pressure, heart disease, arthritis without care. And they were able to relate their experience to future conditions as the elderly. For example, one participant who loved playing basketball described: *"I would be very sad if cannot play basketball with my friends when I'm getting very old... I want to stay safe and active on the court."* Another participant portrayed herself as a passive victim of the aging process: *"It's inevitable to get all kinds of chronic diseases, particularly, I fear for suffering dementia when I become an old lady... I wish to live in a well-equipped place surrounded myself with family and friends."* Loneliness can be seen as two sided. More than half of the participants expected to rely on support from friends and neighbors, which conformed with the actual experiences highly reported by the current elderly people [18]. A few others, on the other hand, expressed desires to *"be independent and active at the same time"* and *"wished to enjoy a normal life without causing inconvenience to his family... I would be very happy to live with my camping and hiking gears,"* which intended to defy the conventional image of being old by voicing and coordinating their independence and liking.

3.3 Stage Two (Workshop 2-3): Observing and Telling Stories about Other Elderly

In a “where is Wally the elderly” activity adapted from [9], participants were asked to identify and observe elderly people in various real life contexts from far away and then interact with one elderly to probe further into the topic of loneliness and aging. Following this, they were asked to tell a comprehensive story of the current elderly. Our intention was to help participants to gather situated details of aging and loneliness and to see how the current elderly differ from their own images at stage one.

3.4 Findings From Stage Two

Many popular perceptions associating old age with illness and isolation were found in participants’ observations and interviews. Additionally, those who paid special attention to the surroundings reported novel impressions of elderly in unlikely places and at unusual times. For example, “*a well-dressed elegant old lady who was reading a novel on the bus,*” “*an old gentleman who drank coffee at McDonald’s after midnight,*” “*a retired policeman who volunteered to do gardening on campus,*” “*a grandma played a mobile game on the smart phone with her grandchild on the subway.*” They reported feeling different types and levels of loneliness if they themselves were in the similar situations, and such loneliness was also two sided, as observed from stage one.

Interviews and stories further revealed emotions and experiences behind the scenes of loneliness, which implied various design opportunities. For examples, curiosities and yet skeptics towards VR/AR in health and entertainment (84- and 80-year old couple, at the train station, hike weekly) and self-driving cars (78-year-old retired engineer, love traveling); worries and disappointment from conflicts between likings and inadequacies (a 78-year-old retired engineer, live alone: “*love traveling but suffer from leg injuries*”), content with copings and compromises (“*watch popular TV shows or Netflix series about traveling as life routine*”); openness and excitement from being connected by new technologies such as “*using social media and social networking service like Facebook in sharing interests*”, “*using smartphone to share life pictures*”; comfortableness with keeping life routines (“*writing diaries*”, “*watching TV series*”), remaining in their own neighborhood and community, constant contact with friends and family, especially the younger generations.

3.5 Stage Three (Workshop 4-6): Designing Better With Different Perspectives

Participants were introduced with the tools and digital technologies into the past and future 60 years along the reality-virtuality spectrum [14] and were asked to critically discuss different technologies in tackling loneliness and aging. Following this, they worked in small teams to iterate on design conceptualizations. An online platform based on google forms and shared documents was set up to scaffold

Table 1. Examples of various solutions

Group	Design Concepts Generated During the Final Stage
E1	“TO BE CONTINUED”: To pursue unrealized dreams through a personalized VR system.
E2	“PreBOT”: A personalized robot companion.
C1	“INVISIBLE MediTAG”: Real-time physiological monitoring system to display daily health info and signal emergency care.
S1	“GO! GO! SHOPPING!”: An immersive VR shopping environment.
E3	“!ME!”: A virtual platform to personalize continuous learning environments.
S2	“FREE SPACE”: A multi-user shopping platform allowing real-time interaction with product experts and friends.
F1	“A MOVABLE FEAST” Service: An outdoor farm-to-table group dining experience for the elderly people.
H1	“AGE-FRIENDLY” Health Village: To support community living with group entertainment facilities.
T1	“SUPER ElderlyAgent”: A customizable wheelchair for the elderly people in hospital settings and health facilities .
C3	“FITNESS TOGETHER” Service: Group transportation service for connecting the elderly people with sport facilities.
C4	“LLNA(LIVE LONG NOT ALONE)” Service: An Oxygen Incubator enhanced by VR and AR to heal body and mind at home.
H2	“SILVER HAIR GARDEN OF EDEN” Housing Project: Location-based social networks connect the elderly people in physical settings.
E4	“UP!”: An location-based APP for organizing elderly group meetup events.
T2	“FLYING CHAIR”: A customized door-to-door chair to promote independence in everyday mobility.

thinking and stimulate sharing and further discussions. In the final workshop, 14 teams presented their design concepts respectively.

3.6 Findings From Stage Three

14 teams showed wide interests in a variety of traditional and future technologies, and generated solutions to tackle loneliness and aging across a broad spectrum of domain areas (Table. 1). Their solutions can be further analyzed into five theme categories, including materialistic or physical, social, active, independent and spiritual. As they narrowed down and specified their problem scopes, many participants developed critical thinking about loneliness and isolation and started to see it as a risk factor rather than the problem itself.

Interestingly, young participants’ adoption of either a “current elderly” perspective or a “future self” perspective affected their design focus on either traditional technologies or future technologies (Fig. 2). Specifically, participants taking the lens of current elderly people tended to develop alternative uses of traditional and more familiar technologies for physical well-being and fundamental living needs; while those with their own future needs and problems in

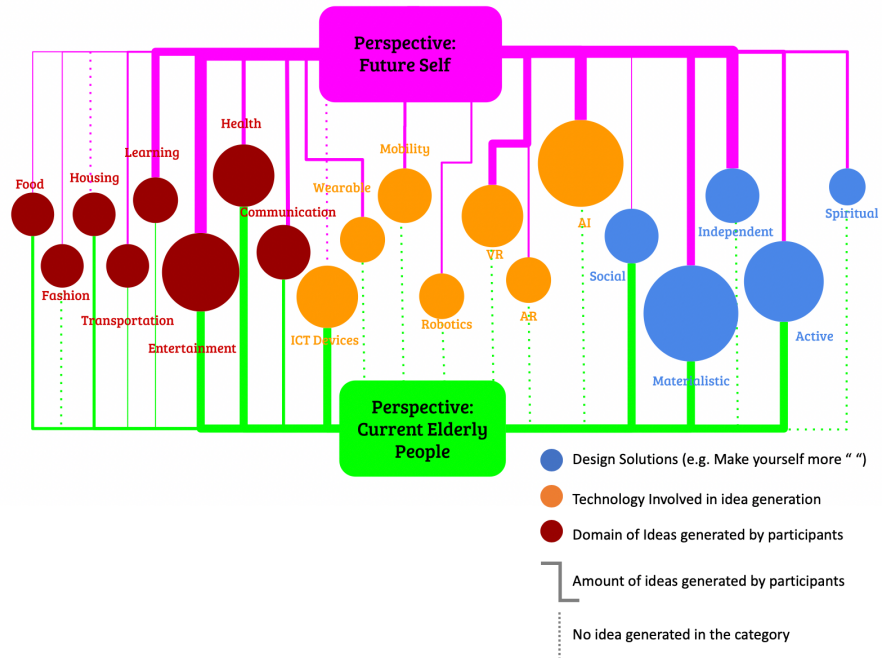


Fig. 2. Gap and Gain in the Cognitive Process: Perspective Taking Affects Design Themes and Technology Choices

mind tended to explore new and future technologies for psychological well-being needs featuring entertainment, learning and communication. Additionally, a few of them also expressed concerns with imposing digital technologies everywhere, posing critical questions such as whether advanced technology is necessary or appropriate in different use scenarios and if such technology would bring drawbacks or harms.

4 Conclusions and Future Work

In this study, we have focused on the dynamic roles of a user during the process of generating design ideas. It helps deepen our understanding of how young people perceive aging and loneliness from the lens of their future selves and the current elderly. These young participants tended to think critically about the loneliness issue as well as generated design ideas within the domains of traditional or future technologies by adopting the current or future perspectives. Apart from fictional storytelling, we have also discovered the importance of combining a future time perspective and a contextual reality perspective in scaffolding speculative design, and proposed innovative uses of self-reported survey items compiled from

previous research literature to engage young people with detailed conditions regarding loneliness and aging, as well as activity narratives such as *Alice in Wonderland* and *Where is Wally?* to engage participants. Future research is required to further understand the time perspective adoption among diverse populations in idea generation and design context, and how to systematically scope complex multi-dimensional society issues like “loneliness and aging” and facilitate speculation with both traditional and future technologies on collaborative and crowd-sourcing platforms.

References

1. Anderson, J.R.: Cognitive psychology and its implications. Macmillan (2005)
2. Becker, T., Leese, M., Clarkson, P., Taylor, R., Turner, D., Kleckham, J., Thornicroft, G.: Links between social networks and quality of life: an epidemiologically representative study of psychotic patients in south london. *Social Psychiatry and Psychiatric Epidemiology* **33**(7), 299–304 (1998)
3. Carroll, L.: The annotated Alice: Alice’s adventures in Wonderland & Through the looking glass. Bramhall House (1960)
4. Chou, Y.Y.J., Tversky, B.: Finding creative new ideas: Human-centric mindset overshadows mind-wandering. In: Proceedings of the 39th Annual Meeting of the Cognitive Science Society. *CogSci* (2017)
5. Davis, K., Feijs, L., Hu, J., Marcenaro, L., Regazzoni, C.: Improving awareness and social connectedness through the social hue: Insights and perspectives. In: Proceedings of the International Symposium on Interactive Technology and Ageing Populations. pp. 12–23. ACM (2016)
6. Dreyfuss, H.: Designing for people. Allworth Press (1955/2003)
7. Dunne, A., Raby, F.: Speculative everything: design, fiction, and social dreaming. MIT Press (2013)
8. Förster, J., Friedman, R.S., Liberman, N.: Temporal construal effects on abstract and concrete thinking: consequences for insight and creative cognition. *Journal of personality and social psychology* **87**(2), 177 (2004)
9. Handford, M.: Where’s Wally? Walker Books (1997)
10. Hollywood, E., O’Brien, G., Lennon, S.: Sigchi project: User centered design of a program alleviating loneliness (pal). In: CHI’05 Extended Abstracts on Human Factors in Computing Systems. pp. 2089–2093. ACM (2005)
11. Hughes, M.E., Waite, L.J., Hawkey, L.C., Cacioppo, J.T.: A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on aging* **26**(6), 655–672 (2004)
12. Kunhong, L.: The study of social support, loneliness, and leisure participation influence meaning in life of the elder. Department of recreation, leisure and tourism, Management Chaoyang University of Technology **1** (2004)
13. Liberman, N., Trope, Y.: The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of personality and social psychology* **75**(1), 5 (1998)
14. Milgram, P., Kishino, A.: Taxonomy of mixed reality visual displays ieice transactions on information and systems, e77-d (12), pp. 1321-1329 (1994)
15. Nations, U.: World population ageing 2013. Department of Economic and Social Affairs PD (2013)

16. Schorch, M., Wan, L., Randall, D.W., Wulf, V.: Designing for those who are overlooked: Insider perspectives on care practices and cooperative work of elderly informal caregivers. In: Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing. pp. 787–799. ACM (2016)
17. Steptoe, A., Shankar, A., Demakakos, P., Wardle, J.: Social isolation, loneliness, and all-cause mortality in older men and women. Proceedings of the National Academy of Sciences **110**(15), 5797–5801 (2013)
18. Taylor, P.: Growing old in America: Expectations vs. reality. Pew Research Center (2009)
19. Von Hippel, E.: Democratizing innovation. MIT Press (2005)
20. Weiss, R.S.: Loneliness: The experience of emotional and social isolation. (1973)
21. Wildevuur, S., van Dijk, D., Hammer-Jakobsen, T., Bjerre, M., Äyväri, A., Lund, J.: Connect: Design for an empathic society. BIS Publishers (2013)
22. Wyche, S.P.: Designing speculative household cleaning products for older adults. In: Proceedings of the 2005 conference on Designing for User eXperience. p. 49. AIGA: American Institute of Graphic Arts (2005)
23. Young, J.E.: Loneliness, depression and cognitive therapy: Theory and application. Loneliness: A sourcebook of current theory, research and therapy pp. 379–406 (1982)
24. Zoels, J.C., Tang, X., Piccolo, G.: Ageing gracefully: participatory design for public services in singapore. In: Proceedings of the 14th Participatory Design Conference: Short Papers, Interactive Exhibitions, Workshops-Volume 2. pp. 88–89. ACM (2016)