Introducing Personas and Scenarios to Highlight Older Adults' Perspectives on Robot-Mediated Communication

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ABSTRACT

Little is known about the expectations of older adults (60+ years old) in robot-mediated communication when leaving aside care-related activities. To bridge this gap, we carried out 30 semi-structured interviews with older adults to explore their experiences and expectations related to technology-mediated communication. We present the results of the collected data through personas that portray three archetype users, Conny Connected, Stephan Skeptical, and Thomas TechFan. These personas are presented in a specific communication scenario with individual goals that go beyond mere communication, such as the desire for closeness (Conny Connected), a problem-free experience (Stephan Skeptical), and exploring affordances of telepresence robots (Thomas Tech-Fan). Also, we provide two considerations when aiming at positive experiences for older adults with robots: balance generalizable aspects and individual needs and identify and challenge preconceptions of telepresence robots.

CCS CONCEPTS

• **Human-centered computing → User models**.

KEYWORDS

telepresence robots; personas; scenarios; older adults; robot-mediated communication

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1 INTRODUCTION

According to the World Health Organization, the world's population aged 60 or older could reach 2.1 billion by 2050 [24]. This ongoing increase is expected to further influence the dynamics of communication between older adults and their distantly located family and friends. Here, telepresence robots create a sense of spatial presence and embodiment for communication despite having interlocutors remotely located [13]. However, the needs and views of older adults toward telepresence robots for non care-related activities are yet to be explored.

Older adults may have large differences in terms of their expertise and affinity to technology. This emphasizes the importance of identifying and understanding older adult's relationships with technology. An approach to better understand users is by using semi-structured interviews. However, capturing and communicating interview data to the design and development team may not be a trivial task. User Experience (UX) tools such as data-based personas (archetypal characters that represent groupings of mindsets, goals, and perspectives identified during a research phase [4]) and scenarios ("narrative descriptions of the personas using a product or service to achieve specific goals" [5]) provide relatable practical information to understand the target population and communicate user insights to a larger design and development team who may not have a direct connection with end users.

In our study, we carried out 30 semi-structured interviews with older adults living in Germany. Interview data were used to create personas that represent different expectations and attitudes of older adults toward Robot-Mediated Communication (RMC). The created personas are showcased in a communication scenario to pinpoint specific user goals. Our main contributions are: (1) data-based older adults personas and a scenario that emphasize different mindsets and goals toward robot-mediated communication, (2) design considerations in RMC for older adults.

2 RELATED WORK

2.1 Robot-Mediated Communication for the Aging Population

Computer-mediated communication can have a positive social function for older adults [10]. This has been mostly investigated for

assistive and care purposes, e.g., for older adults with dementia. Moyle et al. [17, 18] used telepresence robots with older adults with dementia and found that telepresence robots enable connection with family and friends. This leaves space to investigate the intention of use of telepresence and social robots for older adults without cognitive or physical impairments.

The relationship between older adults and robots for communication purposes places the social aspect at the core of research. The perception of the robot as a "social other" has shown to have positive effects during RMC by encouraging self-disclosure towards the communication partner, reducing social isolation, and providing a sense of security among older people [6, 12, 20]. However, when older adults are not sufficiently informed about the robot's capabilities, robots' adoption may be affected. For instance, Isabet et al. [12] mentioned that high expectations were inversely correlated to robot acceptance and intention of use when older adults were not familiarized with the robots. This shows the caveats of human-robot relations especially when aiming at enhancing communication.

2.2 Using Personas and Scenarios in HRI

In HRI, Stadler et al. [23] used personas to depict an industrial robot programmer to share basic information about the characteristics of people involved with industrial robotics. Also, dos Santos et al. [7] presented behavioral personas to be used when designing new robot features and Duque et al. [8] proposed using personas to develop a computational behavior model for robot companions. We did not find any study that looked into older adults' personas for HRI. However, we found personas that represent older adults for health-information technologies, Sakaguchi et al. [22] presented "connected personas" to depict the social circle of a persona (family, friends, and healthcare providers) and their involvement in health information management of older adults. Their findings and the absence of other studies suggest that the needs and expectations of older adults without physical or cognitive disabilities and their relation to robots is an underexplored area.

Using personas and scenarios has been investigated mostly in human-robot collaboration, e.g., personas and scenarios were used to develop industrial robots and were considered as a "communication catalyst" to build a common vision across different stakeholders [1]. Materna et al. [15] presented an outline on using personas and scenarios to design a human-robot augmented reality collaborative workspace. Both authors used scenarios to showcase complex interactions beyond facilitating communication.

3 METHODOLOGY

To understand the aging population's current ideas and expectations toward telepresence robots, our research questions are: *what do older adults think about using robots for communication purposes?* and *what are the goals of older adults in robot-mediated communication?*

3.1 Participants

The participants were older adults from Germany between 60 and 74 years old (M=67.1, SD = 4.3) where 11 identified themselves as women and 19 as men. The recruitment was done through personal contacts of the researchers and among attendants of a lecture related to innovative technologies. All participants were active seniors, had no physical or cognitive impairments, and gave informed consent. Participation was voluntary and they did not receive monetary compensation for their participation in the interview. The interviews were conducted face-to-face in German and as part of a larger study about older people's current and future technology use. Only data related to robots were considered for this paper. This study was pre-approved by an ethics committee and executed following the ethical guidelines of the local university.

3.2 Procedure

3.2.1 Stimuli. Considering that older adults may not be familiar with telepresence robots and their functionalities, we created visual tools to present the technology. All participants were shown storyboard illustrations depicting RMC between an older (60 - 65 years old) and younger (20 - 25 years old) adult. Each participant viewed two storyboards, one from the older adult's perspective and one from the younger adult's perspective. Women were shown an older female character while men were shown an older male character. The telepresence robot was controlled by the younger person.

3.2.2 Semi-structured Interviews. The semi-structured interviews lasted an average of 43 minutes. Each interview started with a short explanation of the study and information related to data protection. Participants were asked about their (a) work situation, (b) living situation, (c) social activities, (d) communication habits, and (e) technology use. Participants were given a short explanation about telepresence robots and then shown storyboards. Next, the following themes were explored through open questions (a) communication-related activities, (b) attitudes (general opinion on robots, and RMC), (c) intention of use (how and why they would use it and likes and dislikes related to the shown technology).

3.2.3 Creating Personas and Scenarios. To create personas we followed the methodology proposed by Cooper et al. [5]. A summary of the process is presented in Table 1. First, we identified behavioral variables by carrying out a qualitative content analysis of the interview data and followed the methodology defined by Rädiker and Kuckartz [21]. Second, we mapped the interviewee data to the defined behavioral variables and provided a count for each attribute, see Table 1. Third, we identified significant attributes for each type of variable, we deemed an attribute significant if it had more than 5 similar responses. Fourth, in order to synthesize characteristics, we grouped attributes by identifying interviewees with similar insights. Fifth, we identified the groups with the highest counts and transferred them to the personas, see color codes in Table 1. Sixth, we designated persona types based on each group.

4 RESULTS

4.1 Personas

We identified three personas: Conny Connected (Persona 1),(social connection-oriented mindset), Stephan Skeptical (Persona 2) (pragmatism-oriented mindset), and Thomas Tech-Fan (Persona 3) (technology-oriented mindset). Each persona embodies a specific mindset that indicates what drives technology use for them, see Figure 1.

Table 1: Summary of steps for creating personas

Step 1: Types of variables	Steps 2 & 3: No. of responses per attribute	Step 4: Grouping of similar attributes
Activities related to communication	Family-related (26), social-related with friends and ex-colleagues (28), hobbies (24)	
Information and Communications Technology Skills	Smartphone (30), tablet/laptop (13), social media (10), videoconference (28), messaging applications (28)	smartphone, social media, messaging applications, videoconference (10); smartphone, messaging applications, videoconference (28); smartphone, laptop/tablet, messaging applications, videoconference (13)
Attitudes toward telepresence robots	Optimistic/excited (11), skeptical (8), worried (6), hopeful (6), curious (5), confident (5), confused (4)	optimistic/excited and hopeful (4); skeptical and worried (3) optimistic/excited and curious (4)
Goals/Expectations of telepresence robots	usefulness (18), support (17), independence (11), ease of use and learn (17), privacy (9)	usefulness, support, ease of use and learn (8); usefulness, data protection, ease of use and learn (6); usefulness, independence, data protection (5); usefulness, ease of use and learn, independence (5)

4.1.1 Conny Connected. This persona represents the social connection oriented mindset placing social connection as the driving force behind technology use. She represents users who would adopt a telepresence robot if it helps them stay close to family and friends. Connection-oriented older adults communicate frequently both face-to-face and through technology. They actively engage in online and offline communication to stay in touch with others. Also, they rely on recommendations made by their social contacts and expect a certain level of technical support from them once they start using a new device.

4.1.2 Stephan Skeptical. This persona represents the pragmatism-oriented mindset focusing on straightforwardly achieving communication goals. Older people with this mindset may not be interested in using a telepresence robot as a communication device, as they are satisfied with the current tools available. They describe a telepresence robot as overly complicated for its capabilities. Face-to-face communication is preferred by these users and voice-only calls serve them well to keep in touch with their social contacts. For these users, using telepresence robots can only be envisioned in situations such as illness, limited mobility, or social isolation.

4.1.3 Thomas Tech-Fan. This persona represents the technology-oriented mindset which is characterized by older adults' interest in innovative technology. Older adults with this mindset are curious to see how a telepresence robot could be integrated into their daily lives. These users often consider themselves proficient in using computers and fast learners, as the use of other technological devices and applications has given them transferable skills. Older adults with this mindset are well informed about technological advances —usually by the media— and therefore have low levels of fear and insecurity when adopting new technologies.

4.2 Scenario

We defined a scenario based on the general goal of this research, namely, understanding RMC for the aging population. Conversely to the storyboard (designed and targeted to older adults to picture a telepresence robot), the scenario targets robot designers and developers to identify specific use cases. This scenario presents an older adult and a relative communicating through a telepresence robot. Within this scenario, each persona has a goal based on their specific characteristics.

"Persona X" wishes to communicate with their sister who lives 500 km away. They have not seen each other in person in a while and would like to give her a tour around the house. They could use a telepresence robot.

- *Conny's goal:* She wishes to make her sister feel as if she were together with her in person.
- *Stephan's goal:* He would like to have a problem-free experience where his sister takes care of controlling the robot.
- *Thomas' goal:* He is interested in exploring the different functionalities of the telepresence robot.

5 DISCUSSION

5.1 What do older adults think about using robots for communication purposes?

We analyzed the interview data and grouped the resulting insights into three personas: Conny Connected (social connection-oriented), Stephan Skeptical (pragmatism-oriented), and Thomas Tech-Fan (technology-oriented). These personas gather traits of older adults to identify aspects to shape the design of robot-mediated communication and facilitate a deeper comprehension of the motivation behind the adoption of specific technologies, e.g., telepresence robots. We propose that the design of robot-mediated communication for older adults could aim to answer the following questions. For Conny-Connected, the use of a telepresence robot is highly dependent on maintaining or improving social connection. This leads us to ask: *"which social networking features could be incorporated into the telepresence robotic system to enhance communication?"* For Stephan Skeptical, the use of a telepresence robot for communication is only conceivable under unfavorable health conditions. Thus, we propose the following question: *"how can a telepresence robot be introduced to skeptical older adults to mitigate pre-existing biases?"* For Thomas Tech-Fan, using a telepresence robot for communication is driven by own interest and curiosity. Thus, we put forth the following question: *"how can we maintain the interest in using telepresence robots over an extended period of time?"*

The positive views of Conny and Thomas align with previous research showing that there's generally a positive attitude towards social robots' adoption [19]. However, our results show that this may not be always the case for older adults.

5.2 What are the goals of older adults in robot-mediated communication?

Personas alone may not be enough to provide sufficient information about potential uses of a system or product[11]. Scenarios consider

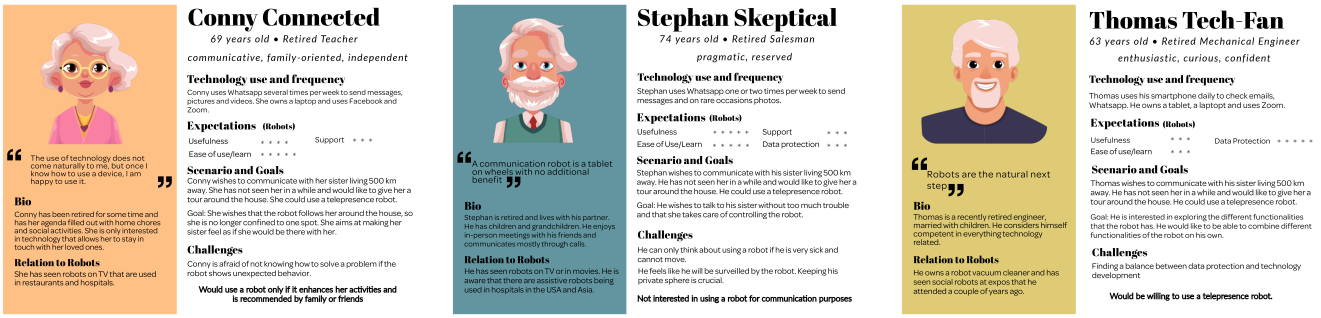

Figure 1: Graphical depiction of the resulting personas, scenario and individual goals: (a) Conny, (b) Stephan, (c) Thomas

the motivations of each persona and can be used to provide insights about enhancing experiences. We aimed to identify a generalizable communication scenario wherein each persona has an individual goal. These individual goals are rooted in the persona's mindset and entail specific requirements for a given scenario.

In the scenario presented in Section 4, the persona's goals extend beyond simple communication with a relative, there is a specific intention that they wish to fulfill. Conny Connected emphasizes the desire for closeness, leading to the question: *"what aspects contribute to an increased sense of social presence when using telepresence robots?"* Stephan Skeptical, highlights the desire for straightforward use of the telepresence robot, thus raising the question: *"to what extent the operation of a telepresence robot can be simplified?"* Thomas Tech-Fan mentions the exploratory aspect of using a telepresence robot, prompting the question: *"what features can be provided to enable customization when using a telepresence robot?"*

5.3 Considerations in robot-mediated communication for older adults

5.3.1 Balance generalizable aspects and specific needs. The interviews revealed diversity in conditions and lifestyles of older adults, certain characteristics such as pragmatism or social connection can vary significantly from person to person. Aging is an individual experience, thus, a "one-size-fits-all" approach should not be taken when developing tools for older people [9]. Thus, we consider that human-centered design, specifically using personas and scenarios, provides insights in a visual manner and allows for balancing the individual and generalizable characteristics of a target user group.

5.3.2 Identify and challenge preconceptions of telepresence robots. We identified that for certain older adults, robots are associated with unfavorable health conditions —in this paper represented by Stephan Skeptical. This association of robots with stigmatized or stereotyped images of aging accounts for the low adoption rates of robots among some older people [14]. Hence, designers should aim to challenge these preconceptions from the initial stages by providing information about the differences between assistive and social robots.

6 LIMITATIONS

Our findings are limited by the demographic characteristics of the interviewees, i.e., they had formal education, do not present physical or mental disabilities, and are located in Germany. Our proposed personas provide a "snapshot" of the current mindsets of older adults. These mindsets evolve over time and will be influenced by the widespread of robotic platforms, their representation in media, and availability in the consumer market.

The use of personas has received criticism for lacking precision, failing to represent real users, and showing stereotypical depictions [2, 3, 16]. To address these limitations, we utilized interview data and categorized users' characteristics into three distinct groups that better reflect real user traits.

7 CONCLUSION AND FUTURE WORK

We present older adult personas —based on interview data, Conny Connected, Stephan Skeptical, and Thomas Tech-Fan. These personas were placed in a communication scenario where each has individual goals that go beyond mere communication, e.g., Conny aims at social connection, Stephan wishes to have a problem-free experience, and Thomas strives to explore different affordances of a telepresence robot. Also, based on the data collected, we provide two considerations when aiming for positive UX in RMC for older adults: (1) balance generalizable aspects and individual needs, and (2) identify and challenge preconceptions of telepresence robots.

Future work can focus on instrumentalizing the goals of each persona (social connection, ease of use, and allowing for customization of robot affordances) into specific design features of telepresence robots. We encourage the community to delve into the perspectives on the use of telepresence robots for older adults in the Global South and other regions, as it allows for a wider perspective on the expectations of older adults towards robotic systems.

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REFERENCES

[1] Petra Björndal, Mikko J. Rissanen, and Steve Murphy. 2011. Lessons Learned from Using Personas and Scenarios for Requirements Specification of Next-Generation Industrial Robots. In *Design, User Experience, and Usability. Theory, Methods, Tools and Practice*. Lecture Notes in Computer Science, Vol. 6769. Springer Berlin Heidelberg, 378–387. https://doi.org/10.1007/978-3-642-21675-6{_}44

[2] Yen-ning Chang, Youn-kyung Lim, and Erik Stolterman. 2008. Personas: From Theory to Practices. In *Proceedings of the 5th Nordic Conference on Human-Computer Interaction: Building Bridges*. ACM, 439–442. https://doi.org/10.1145/1463160.1463214

[3] Christopher N Chapman and Russell P Milham. 2006. The personas' new clothes: methodological and practical arguments against a popular method. In *Proceedings of the human factors and ergonomics society annual meeting*, Vol. 50. SAGE Publications Sage CA: Los Angeles, CA, 634–636.

[4] Alan Cooper. 2004. *The inmates are running the asylum*. Sams.

[5] Alan Cooper, Robert Reimann, and Dave Cronin. 2014. *About face: The essentials of interaction design* (fourth edition ed.). John Wiley and Sons.

[6] Nicola Döring, Melisa Conde, Karlheinz Brandenburg, Wolfgang Broll, Horst-Michael Gross, Stephan Werner, and Alexander Raake. 2022. Can communication technologies reduce loneliness and social isolation in older people? A scoping review of reviews. *International journal of environmental research and public health* 19, 18 (2022), 11310.

[7] Thiago Freitas dos Santos, Danilo Gouveia de Castro, Andrey Araujo Masiero, and Plinio Thomaz Aquino Junior. 2014. Behavioral Persona for Human-Robot Interaction: A Study Based on Pet Robot. In *Human-Computer Interaction. Advanced Interaction Modalities and Techniques*. Lecture Notes in Computer Science, Vol. 8511. Springer International Publishing, 687–696. https://doi.org/10.1007/978-3-319-07230-2{_}65

[8] Ismael Duque, Kerstin Dautenhahn, Kheng Lee Koay, Lan Willcock, and Bruce Christianson. 2013. A different approach of using Personas in human-robot interaction: Integrating Personas as computational models to modify robot companions' behaviour. In *2013 IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN 2013)*. IEEE, 424–429. https://doi.org/10.1109/ROMAN.2013.6628516

[9] Olujoke A Fakoya, Noleen K McCorry, and Michael Donnelly. 2020. Loneliness and social isolation interventions for older adults: a scoping review of reviews. *BMC public health* 20 (2020), 1–14.

[10] Belinda G Fuss, D. Dorstyn, and L. Ward. 2019. Computer-mediated communication and social support among community-dwelling older adults: A systematic review of cross-sectional data. *Australasian journal on ageing* (2019). https://doi.org/10.1111/AJAG.12703

[11] Rosa Gudjonsdottir and Sinna Lindquist. 2008. Personas and scenarios: Design tool or a communication device? *From CSCW to Web 2.0: European Developments in Collaborative Design Selected Papers from COOP08* (2008).

[12] Baptiste Isabet, Maribel Pino, Manon Lewis, Samuel Benveniste, and Anne-Sophie Rigaud. 2021. Social telepresence robots: a narrative review of experiments involving older adults before and during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health* 18, 7 (2021), 3597.

[13] Saso Koceski and Natasa Koceska. 2016. Evaluation of an Assistive Telepresence Robot for Elderly Healthcare. *Journal of medical systems* 40, 5 (2016), 121. https://doi.org/10.1007/s10916-016-0481-x

[14] Hee Rin Lee and Laurel D Riek. 2018. Reframing assistive robots to promote successful aging. *ACM Transactions on Human-Robot Interaction (THRI)* 7, 1 (2018), 1–23.

[15] Zdeněk Materna, Michal Kapinus, Vítězslav Beran, Pavel SmrŽ, Manuel Giuliani, Nicole Mirnig, Susanne Stadler, Gerald Stollnberger, and Manfred Tscheligi. 2017. Using Persona, Scenario, and Use Case to Develop a Human-Robot Augmented Reality Collaborative Workspace. In *Proceedings of the Companion of the 2017 ACM/IEEE International Conference on Human-Robot Interaction*. ACM, 201–202. https://doi.org/10.1145/3029798.3038366

[16] Tara Matthews, Tejinder Judge, and Steve Whittaker. 2012. How Do Designers and User Experience Professionals Actually Perceive and Use Personas?. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 1219–1228. https://doi.org/10.1145/2207676.2208573

[17] Wendy Moyle, Cindy Jones, Marie Cooke, Siobhan O'Dwyer, Billy Sung, and Suzie Drummond. 2014. Connecting the person with dementia and family: a feasibility study of a telepresence robot. *BMC geriatrics* 14, 1 (2014), 1–11.

[18] Wendy Moyle, Cindy Jones, and Billy Sung. 2020. Telepresence robots: Encouraging interactive communication between family carers and people with dementia. *Australasian Journal on Ageing* 39, 1 (2020), e127–e133.

[19] Stanislava Naneva, Marina Sarda Gou, Thomas L Webb, and Tony J Prescott. 2020. A systematic review of attitudes, anxiety, acceptance, and trust towards social robots. *International Journal of Social Robotics* 12, 6 (2020), 1179–1201.

[20] Yohei Noguchi, Hiroko Kamide, and Fumihide Tanaka. 2018. Effects on the self-disclosure of elderly people by using a robot which intermediates remote communication. In *2018 27th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)*. IEEE, 612–617.

[21] Stefan Rädiker. 2020. Focused analysis of qualitative interviews with MAXQDA: Step by step. (2020).

[22] Dawn K Sakaguchi-Tang, Anne M Turner, Jean O Taylor, and Julie A Kientz. 2019. Connected personas: translating the complexity of older adult personal health information management for designers of health information technologies. In *AMIA Annual Symposium Proceedings*, Vol. 2019. American Medical Informatics Association, 1177.

[23] Susanne Stadler, Nicole Mirnig, Manuel Giuliani, Manfred Tscheligi, Zdenek Materna, and Michal Kapinus. 2017. Industrial Human-Robot Interaction: Creating Personas for Augmented Reality Supported Robot Control and Teaching. In *Proceedings of the Companion of the 2017 ACM/IEEE International Conference on Human-Robot Interaction*. ACM, 291–292. https://doi.org/10.1145/3029798.3038365

[24] World Health Organization. 2022. Ageing and Health. https://www.who.int/news-room/fact-sheets/detail/ageing-and-health