SP: ETHICS & DEI (DIVERSITY, EQUITY, & INCLUSION)

Ethical dimensions in human-robot interactions in the field of gerontechnology
M. Pino & A. S. Rigaud (Conveners)

Participants: S. Dacunha (France), R. Vallée (France), T. Ogawa (Japan), M. Choi (South Korea), L. Blavette (France). **ISSUE** The rapid development and deployment of robotic applications in gerontechnology, such as socially assistive robots for companionship and daily assistance, virtual coaches, and virtual agents for health monitoring or cognitive support, have the potential to significantly enhance the quality of life for older adults (Góngora Alonso et al., 2019). However, this advancement brings forth a multitude of ethical challenges that need to be addressed from various stakeholder perspectives. Primary users, such as older adults, along with informal and formal caregivers, regulators, and healthcare providers, are directly impacted by these technologies. Ethical concerns also extend to companies developing socially assistive robots and the programmers designing the systems for robot behavior control and data handling (Sharkey & Sharkey, 2012; Van Wynsberghe, 2016). This symposium aims to explore and address these critical ethical issues, ensuring that the integration of robotic applications in gerontechnology is conducted in a manner that respects the dignity, privacy, and rights of all involved parties. **CONTENT** Our symposium is designed to bring together speakers from France, Japan, and South Korea. **STRUCTURE** Dacunha et al. address the ethical challenges of integrating social robots in geriatric care, focusing on developing and assessing an educational module for health professionals. Key issues include obtaining consent, managing risks related to judgment impairment, and preventing excessive attachment to robots among cognitively impaired older adults. Conducted in France, the project involved a literature review, interviews with 20 geriatric care professionals, and the creation of 10 training videos. These videos, evaluated by 44 healthcare professionals, provided ethical and practical recommendations for conducting robot-assisted activities. The positive feedback underscores the importance of addressing ethical concerns and training needs for responsible robot use in geriatric settings. Vallée and Aubergé discuss the impact of humanoid design, perceived usefulness, and expressiveness on the acceptability and trust in human-robot interactions. Using a living lab approach, their studies involving the Miroki robot in hospitals and nursing homes revealed that robots introduced as subjects with high expressiveness were perceived as more flexible and trustworthy. Ogawa discusses the effects of cognitive functions on understanding robot speech, revealing that older adults with cognitive decline struggle to comprehend robot speech compared to human speech. The study highlights the need for specific technical features and alternative communication methods in social robots to aid older adults with dementia, bridging the digital divide and addressing ethical implications in human-robot interaction by ensuring accessibility for vulnerable populations. Choi presents public perceptions of care robots in the context of South Korea's rapidly aging population and shrinking caregiver workforce. Her study, involving an online survey of 1,668 participants, revealed significant variability in knowledge and definitions of care robots, with higher education levels correlating with better understanding. Ethical implications are critical, highlighting the need for public communication and discussions to ensure human-centered and ethically responsible development of care robots. Finally, Blavette et al.'s presentation focuses on participatory design in developing social robots for geriatric care. Engaging 45 residents from four French geriatric institutions, their study assessed their needs and preferences through focus groups and interviews. Key features valued by older adults included video-conferencing, object delivery, and cognitive games, which could enhance their quality of life and social connectedness. The findings underscore the importance of involving end-users in the design process to ensure ethical and practical success in technological innovations for geriatric care. **CONCLUSION** This symposium will explore the participatory design of social robots for geriatric care, addressing ethical challenges such as consent, attachment, and the development of training modules for health professionals. Factors influencing trust in human-robot interactions, the comprehension of robot speech by older adults with cognitive decline, and public perceptions of care robots in rapidly aging societies will also be examined. The critical importance of incorporating ethical reflection in the design, assessment, and deployment of robot-mediated services for older adults will be emphasized, ensuring these technologies are developed and implemented responsibly and respectfully.

References
Góngora Alonso, S., Hamrioui, S., de la Torre Díez, I., Motta Cruz, E., López-Coronado, M., & Franco, M. (2019). Social robots for people with aging and dementia: a systematic review of literature. *Telemedicine and e-Health*, *25*(7), 533-540.
Sharkey, A., & Sharkey, N. (2012). Granny and the robots: ethical issues in robot care for the elderly. *Ethics and Information Technology*, *14*, 27-40.
Van Wynsberghe, A. (2016). *Healthcare robots: Ethics, design and implementation*. Routledge

Affiliation: Broca Hospital, Assistance Publique – Hôpitaux de Paris, Université Paris Cité, France
Email: maribel.pino@aphp.fr; **ORCID iD:** 0000-0002-1598-9144

Ethical challenges in integrating social robots in geriatric care: Development and assessment of an educational module for health and social care professionals

S. Dacunha, C. Ware, A. S. Rigaud, M. Pino

Purpose: The rise of new technologies in geriatric care, particularly the use of social robots, is transforming the support provided by medical and paramedical professionals. For some years now, these robots have been used within the framework of psychosocial interventions for older adults with neurodegenerative diseases like Alzheimer's disease. Social robots, which resemble humans or animals and are equipped with AI, offer promising solutions but raise ethical and deontological concerns, especially when used with vulnerable elderly populations (Sharkey & Sharkey, 2012; Borenstein & Pearson, 2020; Vandemeulebroucke et al., 2018). A significant challenge is training professionals interested in using social robots with geriatric patients on how to address relevant ethical issues related to consent obtention, impaired judgment, or the risk of attachment. Obtaining fully informed consent may be particularly challenging with persons with cognitive impairment, as it requires ensuring that they fully understand and agree to the use of robots in their care. Judgment-related issues involve assessing whether these individuals, due to potential judgment disorders, truly comprehend the nature of the robot and the purpose of the therapy. Attachment risks concern the potential for older adults with neurocognitive disorders to develop strong emotional bonds and excessive attachment to the robots, which could lead to problematic outcomes. Moreover, professionals may be discouraged or reticent to use this form of intervention because of these ethical issues or other concerns, such as the complexity of integrating new technology into existing care routines. The ROBETHICS project aimed to understand healthcare professionals' perspectives on IPRS and develop ethical guidelines for their use. **Methods and Materials:** The project was conducted in France and involved two steps. First, we aimed to understand the ethical challenges faced by professionals working with older adults with neurocognitive impairments when using social robots. To achieve this, we conducted a comprehensive literature review of academic works that studied these issues. Then, we identified the ethical challenges and training needs of professionals in the geriatrics sector by conducting in-depth interviews with 20 professionals working in nursing care institutions. In the second step, the aim was to co-create with healthcare professionals a series of 10 short videos on the introduction of social robots in geriatric settings as part of psychosocial interventions and how to address some of the ethical issues identified in the first phase of the project. Based on recommendations from healthcare professionals, the video scripts were developed by three psychology researchers and shot by a team of professional videographers. The videos covered topics such as defining social robots, preparing psychosocial intervention sessions using social robots, obtaining user consent, and handling various interaction scenarios with the robots. The 10 videos produced were evaluated by 44 healthcare professionals working in six different geriatric facilities. Evaluations included recorded group interviews and a 12-item questionnaire assessing video content, format, and style. **Results and Discussion:** The professionals addressed two major themes linked to psychosocial interventions using social robots: training needs and ethical issues. They stressed the importance of clarifying the indications and benefits of social robots and addressed ethical issues such as consent and the balance between technology and the human. Indeed, the belief that humans should not be replaced by robots was raised several times. Regarding the videos created, the feedback gathered underlined the effectiveness of the training materials, with positive comments on the clarity, relevance, and modernity of the videos. Feedback indicated good reception and appreciation of the quality of the videos in the geriatric environment. Suggestions for improvement included highlighting key concepts, written fact sheets to accompany the videos, demonstrating the varied functionalities of social robots, as well as dramatizations involving real older adults. Overall, most participants expressed agreement with both the content and the format and style of the videos, suggesting that they are suitable as training aids for healthcare professionals working with older adylts with cognitive impairments. The results of this evaluation will be used to improve the material created (clarifications, details, formatting elements), before being widely and publicly distributed to the community of professionals and researchers working in the field of geriatrics.

References

Sharkey, A., & Sharkey, N. (2012). Granny and the robots: ethical issues in robot care for the elderly. *Ethics and Information Technology,* 14(1), 27-40.

Borenstein, J., & Pearson, Y. (2020). Robot caregivers: harbingers of expanded freedom for all? In Machine Ethics and Robot Ethics (pp. 125-136). Routledge.

Vandemeulebroucke, T., Dierckx de Casterlé, B., & Gastmans, C. (2018). How do older adults experience and perceive socially assistive robots in aged care: a systematic review of qualitative evidence. *Aging & Mental Health,* 22(2), 149-167.

Affiliation: Broca Hospital, Assistance Publique – Hôpitaux de Paris, Université Paris Cité, France
Email: sebastien.dacunha@aphp.fr; **ORCID iD:** 0000-0002-3380-4019

Designing trustful and empowering human-robot interactions using a living lab approach
R. Vallee & V. Auberge

Purpose: The notion of trust, not yet enough scientifically defined, that a machine can inspire explicitly or implicitly has been much studied (Schaefer et al., 2016; Chang & Joseph, 2020). For fragile users in isolated situations, it has been shown that by manipulating very simple robot parameters, it is possible to trigger strong attachment and desirability of the machine (Aubergé et al., 2014). Two research questions arise: 1) What are the robot parameters that develop this trust? 2) Does this trust have beneficial or adverse consequences for these users and the entire ecosystem that cares for them? In this presentation, we address the first question using a living lab approach (Pino et al., 2013). **Methods and Materials**: For our research, we used the first drawings and prototypes of the new Miroki robot currently under development. This robot is both a social and a logistical robot, serving care professionals as well as patients and their caregivers. Over the past 2 years, we have carried out the following studies in hospitals and nursing homes: 1) Three workshops with 15 older adults and 6 semi-directive interviews with experts in hospital innovation to gather their initial reactions to this robot and discuss their perception of the benefits and risks associated with its use. 2) Two workshops with a total of 67 hospital caregivers to better understand the notion of trust they might have in such a robot. 3) An experiment with 30 caregivers in a scenario for helping older adults to hydrate themselves (a scenario in which we introduced the robot as an object or a subject, varying its degree of expressivity). 4) A study with 48 people (10 older adults, 10 informal caregivers, 14 hospital caregivers and 14 other hospital staff) to ensure that the robot's development was guided by users' needs, while aligning the objectives of the innovation project with the requirements of the geriatric hospital environment. **Results and discussion**: Some of our results confirm the main findings of the scientific literature, in particular concerning 1) the importance of a humanoid / animaloid design as an important factor in this acceptability (Barnes et al., 2017) compared with purely industrial robots, 2) the strong link between the robot's perceived usefulness in its use cases and its level of acceptability (Lee et al., 2018), 3) the link between the quality of the robot's interaction and its acceptability to its end-users (Whelan et al., 2018). Other results show the influence of parameters little studied so far on the perception of the robot, such as the influence of introducing the robot as an object (machine) versus a subject as well as its level of expressiveness. Thus, the robot Miroki 1) introduced as a subject (rather than an object) with a high degree of expressiveness seems to be perceived as more flexible and inspiring more trust 2) with a high degree of expressiveness (rather than a low one) and presented as an object seems to be perceived as more tender. How these parameters influence user perception over time will require further research. The impact of these parameters on user perception and interaction with the robot over time will be addressed in further studies.

References

Schaefer, K. E., Chen, J. Y., Szalma, J. L., & Hancock, P. A. (2016). A meta-analysis of factors influencing the development of trust in automation: Implications for understanding autonomy in future systems. Human factors, 58(3), 377-400.

Trust in Human Robot Interaction 1st Edition by Chang S. Nam (Editor), Joseph B. Lyons (Editor). (2020). Academic Press, ISBN 9780128194720, (Editor). (2020). Academic Press, ISBN 9780128194720, https://doi.org/10.1016/B978-0-12-819472-0.09992-5

Aubergé, V., Sasa, Y., Bonnefond, N., Meillon, B., Robert, T., Rey-Gorrez, J., ... & Nebout, F. (2014, May). The eee corpus: socio-affective" glue" cues in elderly-robot interactions in a smart home with the emoz platform. In 5th International Workshop on Emotion, Social Signals, Sentiment & Linked Open Data (p. LREC).

Pino, M., Benveniste, S., Kerhervé, H., Picard, R., Legouverneur, G., Cristancho-Lacroix, V., ... & Rigaud, A. S. (2013). Contribution of the Living Lab approach to the development, assessment and provision of assistive technologies for supporting older adults with cognitive disorders. *Stud. Inform. Univ.,* 11(2), 34-62.

Barnes, J., FakhrHosseini, M., Jeon, M., Park, C. H., & Howard, A. (2017, June). The influence of robot design on acceptance of social robots. In 2017 14th international conference on ubiquitous robots and ambient intelligence (URAI) (pp. 51-55). IEEE.

Lee, W. H., Lin, C. W., & Shih, K. H. (2018). A technology acceptance model for the perception of restaurant service robots for trust, interactivity, and output quality. *International Journal of Mobile Communications*, 16(4), 361-376.

Whelan, S., Murphy, K., Barrett, E., Krusche, C., Santorelli, A., & Casey, D. (2018). Factors affecting the acceptability of social robots by older adults including people with dementia or cognitive impairment: a literature review. *International Journal of Social Robotics,* 10(5), 643-668.

Effects of different cognitive functions on the understanding of robot speech
T. Ogawa

Purpose: Currently, one in four older adults in Japan, the world's oldest population, has dementia or pre-dementia, and it is estimated that by 2025 there will be seven million older adults with dementia, putting pressure on the care and welfare system due to a shortage of workers. This trend is not limited to Japan; globally, the number of older people with dementia is expected to increase to 131 million by 2050, and dementia prevention is recognized as an urgent global issue. In response, in 2015, the World Health Organization (WHO) recognized dementia prevention as an urgent global challenge and called for a global initiative to prevent dementia. In addition, the challenge of providing care and medical services to dementia patients in remote areas, such as rural and mountainous regions, where the risk of dementia is high, is also being addressed, and the use of digital devices, such as social robots, is expected to compensate for the shortage of human resources in remote areas. However, a sub-study of e-VITA found that people with reduced cognitive function were unable to understand digital speech. Our presentation purpose is to publish the test results of the sub-study in e-VITA on people with cognitive decline and their understanding of human speech, to summaries alternative communication methods for the older adults, and to discuss the technical requirements and essential features for the development of conversational social robots that are easy to use for older adults with dementia, contributing to bridging the digital divide among older adults.
Method: The Wechsler Memory Test was used to assess the comprehension of a story told by a robot, with the aim of ascertaining whether people with advanced dementia can understand the language expressed by the robot to the same extent as the language expressed by a human. Comprehension of human-told stories was used as a comparison. Subjects were told a story by the robot and then asked to retell the entire story as best they could remember, which was then scored. After a short break, they listened to the human story and were rated in the same way. In these two tests, different stories were used and the order was randomized. Assessment scores were stratified according to the degree of cognitive function, and differences in scores according to the degree of cognitive function were examined. The subjects were 12 female and male residents of a welfare facility in Sendai City. **Results and Discussion:** Older adults with cognitive decline (Lower MMSE, cognitive function test) were unable to understand the robot's speech as well as human speech (<0.05). However, people without cognitive decline (Higher MMSE) had similar levels of understanding. The use of social robots as conversation partners in care homes is becoming more widespread. In this study, we found that depending on the progression of dementia, residents could not understand the robot's voice. This raises the question of what kind of artificial voice and what kind of non-verbal communication tools should be incorporated into the robot to improve understanding. In the presentation, some non-verbal communication methods used in the care home obtained by care givers are also introduced. This is a topic for future research and is applicable to the population living in the remote area thereby contributing to bridging the digital divide among older adults.

Affiliation: Smart Aging Research Center, Tohoku University, Sendai, Japan
Email: toshimi.ogawa.e6@tohoku.ac.jp; **ORCID iD:** 0000-0002-7852-2787

SP: ETHICS & DEI (DIVERSITY, EQUITY, & INCLUSION)

Public perceptions of care robots

M. Choi

Purpose The Republic of Korea has experienced the world's fastest rate of population aging. This rapid increase in the number of older adults, particularly the oldest old—those aged 85 and above—coupled with a shrinking caregiver workforce, necessitates innovative solutions. In response, the Korean government launched a major research and development (R&D) initiative in 2019 specifically aimed at developing care robots to assist with transferring, preventing bedsores, toileting, and feeding. Additionally, mass media has widely reported on the promising future of care robots, often depicting them as humanoid. However, little is known about how the general public defines and perceives care robots. This study aims to bridge this gap by exploring public perceptions of care robots. **Method** Data for this study were collected through an online survey of participants stratified by age group, gender, and region to ensure representativeness (N=1,668; approximately 16.7% for each ten-year age group, 50.4% women, and a nationally representative distribution by region). Participants were asked about their knowledge of care robots, with the following response options: (a) I know it well, (b) I have heard the word, and (c) I do not know it at all. Participants were also asked to select the definition of care robots that most closely aligned with their understandings from the following options: (a) a robot that assists with one specific activity (e.g., transferring, eating, toileting) in diverse care environments; (b) a robot capable of assisting with various activities in diverse care environments; (c) a humanoid robot designed to replace care aids; and (d) something else. Participants who chose the last option were invited to provide their own definition of care robots. **Results and Discussion** The survey results regarding perceived knowledge level showed that over half (52.1%) of participants reported having heard of care robots, while nearly four in ten (39.7%) reported not knowing them at all. Only 8.3% of participants reported being very knowledgeable about care robots. In terms of participants' definition of care robots, about one out of three (35.6%) study participants reported they are humanoid robots designed to replace care aids. However, 40.5% viewed them as robots capable of assisting with various activities, and 21.9% perceived them as assisting with only one specific activity. Thirty-two participants selected "something else" when defining care robots, and twelve indicated they had no idea. Notably, five participants described care robots as companions for conversation. The distribution of definitions of care robots across perceived knowledge levels showed that the group reporting no knowledge was more likely to view care robots as humanoid robots, while the group that reported being very knowledgeable were more likely to define care robots as robots assisting with only one specific activity. A chi-square test of independence revealed a statistically significant associated between the two variables: χ^2, $(4, N = 1636) = 49.95$, $p < .001$. Multinomial logistic regression revealed a statistically significant association between education level and perceived knowledge of care robots, even after controlling for age and gender. Participants with higher education were more likely to report being very knowledgeable about care robots or having heard of them, compared to those who reported no knowledge at all. Age also emerged as a significant factor in defining care robots. Younger participants were more likely to view them as robots capable of assisting with various activities, rather than just one specific activity. The findings suggest that the majority of the general population lacks confidence in their knowledge of care robots, and also, they view care robots in a wide spectrum of capabilities. To bridge this gap and ensure human-centered development addressing South Korea's growing caregiving needs, public communication and open discussions are essential. These discussions should focus on defining care robots, outlining the ethical considerations and potential limitations of their development, and fostering responsible implementation.

References

Broadbent, E., Stafford, R., & MacDonald, B. (2009). Acceptance of healthcare robots for the older population: Review and future directions. *International Journal of Social Robotics, 1*, 319-330. https://doi.org/10.1007/s12369-009-0030-6

Myung-Joon Lim, Won-Kyung Song, Hyosun Kweon & Eun-Rae Ro (2023) Care robot research and development plan for disability and aged care in Korea: A mixed-methods user participation study, *Assistive Technology, 35*(4), 292-301, https://doi.org/10.1080/10400435.2022.2038307

SP: ETHICS & DEI (DIVERSITY, EQUITY, & INCLUSION)

Participatory design for gerontechnology solutions: Developing and assessing social robots for their integration in geriatric care institutions

L. Blavette, S. Dacunha, C. Harzo, M. Pino

Purpose The emergence of robotic technologies presents transformative opportunities for the care of older adults in institutional settings. The French ROBOTONOMIE project is an applied research initiative aimed at developing a comprehensive set of specifications for a social and assistance robot tailored for use in nursing homes and other geriatric establishments. This project employs a participatory design approach to guide design choices and use cases, ensuring that the robot's development is closely aligned with the needs and preferences of its end-users. One significant issue in designing technologies is the lack of involvement of final users in the process, particularly when these users have dementia, a common condition in nursing care institutions. Implementing participatory approaches with older adults who have neurocognitive disorders necessitates careful consideration of methods to adapt and engage these users effectively in the design process. Participatory approaches are thus adopted not only to enhance technological relevance and feasibility but also to uphold ethical principles such as dignity, empowerment, autonomy, and democratic engagement by giving users a voice (Giaccardi et al., 2016; Merkel & Kucharski, 2019; Cahill et al., 2018). This presentation focuses on the first phase of the project, which involved organizing focus groups and interviews in four French establishments to directly assess the needs, wishes, and specifications of older adults with neurocognitive disorders regarding socially assistive robots. **Methods** This qualitative study involved 45 residents from four geriatric institutions, including two nursing homes in Dijon and one nursing home and a long-term care service in Paris. Participants were selected based on their voluntary consent to participate in the ROBOTONOMIE project. Data were collected through workshops involving two activities: focus groups and individual interviews, adapted to the availability and preferences of the participants. Short videos (~45 seconds) depicting social assistance robots in action were shown to older adults. These videos were simple and subtitled for accessibility, illustrating specific robot functionalities. Structured and facilitated discussions, adapted to the participants' capacities, followed to gather their impressions and reactions. Structured discussions on predefined themes (e.g., desired functionality, robot appearance, and robot behavior) were conducted to deepen the understanding of residents' expectations and preferences. The workshops were documented by audio recordings, followed by full transcripts to enable qualitative analysis. Given the participants' cognitive and sensory limitations, information was frequently repeated, and sessions were designed to minimize fatigue while maximizing engagement. A deductive qualitative analysis, following Braun and Clarke's (2006) method, was applied to code the transcripts and identify emerging themes. The analysis focused on the robot features that residents found useful, as well as their opinions on the robots' appearance and behavior. **Results and Discussion** This study identified key features valued by residents of geriatric institutions for social and assistive robots, including video-conferencing capabilities, delivery of small objects, entertainment and cognitive games, and provision of daily life information. Older adults thought that these kinds of robot features could help them enhance their quality of life at the institution and strengthen social connectedness. Participants expressed satisfaction in taking part in the design process, demonstrating the feasibility and effectiveness of participatory approaches with older adults with cognitive impairment. Such involvement of end-users is crucial for designing technology for older adults, as it respects the dignity and perspectives of future users of gerontechnology products. Facilitated methodologies proved to be effective, underscoring the importance of engaging older adults in the design process to ensure the ethical and practical success of technological innovations in geriatric care.

References

Giaccardi, E., Kuijer, L., & Neven, L. (2016). Design for resourceful ageing: Intervening in the ethics of gerontechnology. In *2016 Design Research Society Conference (DRS 2016), June 27-30, 2016, Brighton, UK*.

Merkel, S., & Kucharski, A. (2019). Participatory design in gerontechnology: a systematic literature review. *The Gerontologist*, *59*(1), e16-e25.

Cahill, J., McLoughlin, S., & Wetherall, S. (2018). The design of new technology supporting wellbeing, independence and social participation, for older adults domiciled in residential homes and/or assisted living communities. *Technologies*, *6*(1), 18.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101. PubMed