The multifaceted construct of attitudes: Age- and gender-related perspectives on AI, robotics and their users

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Participants T. Kolling (Germany), M. Damholdt (Denmark), M. Wessel (Germany), S. Baisch (Germany). **ISSUE** Embodied and non-embodied AI become increasingly well-known in both younger and older age groups. In the context of gerontechnology, older people are usually assumed the primary users of (new) technology, whereas younger people are considered either secondary users, like, e.g., formal caregivers, or robot developers. Since believes and attitudes are powerful determinants of behavior, they affect the success or failure of a technology by impacting on both technology development, i.e., through developer perceptions, and robot implementation, i.e., through perceptions of primary and secondary users. In all of these relevant groups, believes and attitudes can be affective, cognitive, or behavioral, they can be stereotypical, and they can relate not only to a particular technology, but also to its users. Although most technology acceptance models acknowledge the importance of attitudes for robot acceptance and usage, the multitude of different facets of this complex construct is still not well understood. **CONTENT** The current symposium therefore examines (1) age- and gender-related differences in attitudes towards AI, as opposed (2) age- and gender-stereotypical views on the users, (3) cognitive and affective attitudes towards emotional and non-emotional technology as well as (4) perspectives of three different stakeholder groups. **STRUCTURE** In detail, the first two talks examine attitudes towards *technology*. Kolling firstly presents an age- and gender-related framework of technology diffusion and data on age differences in cognitive and affective attitudes towards AI. Thereafter, Damholdt examines how different individual characteristics affect older and younger users' attitudes towards (emotional) robots. In contrast, the following two talks examine attitudes towards technology *users*. Baisch compares the age-related perceptions of (younger) professional caregivers and elderly people on the older users of two different companion type robots. Finally, Wessel presents results from a qualitative approach investigating the age- and gender-stereotypical views of younger stakeholders (robot developers and professional caregivers) on older robot users and discusses the ethical implications of the findings. **CONCLUSION** The different talks show the multiple facets that need to be considered in research on attitudes towards technology. They suggest that stakeholders in robot development and implementation differ in their attitudes towards both new technologies and their users. They also highlight that these groups are rarely aware of this. As will be shown, sensitivity to these issues is mandatory, since ignorance can hamper robot development and implementation, and, even more important, has ethical implications for the older users.

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Attitudes towards artificial intelligence: An ageing and gender perspective
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Purpose Artificial intelligence is currently one of the hottest topics in technology discussions (e.g., Sundar, 2020) with technology panics (e.g. Orben, 2020) in the media and the general public sometimes obscuring a rational debate about benefits and dangers (e.g., Stone et al., 2016). Against this broader societal context, the present paper presents a theoretical framework of human-technology interaction from an ageing and gender perspective. In this framework, I will argue that cognitive and affective components act differently during different stages of technology diffusion. Against the background of this theoretical framework, I will present a newly developed questionnaire on cognitive and affective attitudes about artificial intelligence and respective results from both younger and older adults. **Method** The questionnaire "Attitudes about artificial intelligence (A-AI) measures both cognitive and affective attitude components. The questionnaire consists of two scales, i.e., hopes and fears about AI. Reliability (internal consistency, split-half) was moderate to high. Both younger (18-30 years) and older adults (>60 years) were asked about their attitudes on artificial intelligence. **Results and discussion** Results demonstrated that artificial intelligence, on the one hand, was conceptualized as being able to save lives, to foster knowledge, to improve science and to foster ecological behavior, among others. On the other hand, subjects feared that artificial intelligence will steal jobs, impact data privacy, and leads to constant surveillance of the individual, among others. These findings vary with age and gender. Results are discussed against the background of the theoretical framework on human-technology interaction.

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Negative attitudes towards robots in the young and old
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Purpose Robots in eldercare are becoming increasingly prevalent. Studies show that, regardless of direct experience with such technology, potential users of robots have pre-existing attitudes and biases towards robots. Presently, we explore if there are significant differences between younger and older healthy participants on prevalence of negative attitudes towards robots (NARS; Nomura et al., 2006), anthropomorphism towards technology or natural object or on personality measures previously deemed important for willingness to interact with robots. **Method** data from 299 respondents were included (for full description see Damholdt et al., 2020). For the present publication the following measures were used: personality items from the IPIP NEO-120 inventory to assess personality (Johnson 2014), NARS (Nomura et al., 2006), and the AMPH (Damholdt et al., 2020). **Results and Discussion** the respondents were sub-divided into a young (n = 250; 18-59 years) and an older (n=49; 60-87 years) subgroup and compared using independent two-sided sample t-tests (see table 1). The results indicated that older participants had more negative attitudes towards robots simulating emotions, were less likely to anthropomorphize technology and scored higher on conscientiousness and lower on neuroticism compared to the younger participants. The personality traits did only show very small correlations ($<.17$) to the degree of negative attitudes towards robots within the two subgroups (not reported here). The remaining results did not yield statistically significant results. Thus, our results tentatively suggest that older participants may have more negative attitudes towards robots that simulate emotions.

Measure	M (SD) younger (n=250)	M (SD) older (n=49)	t	p (two-sided)
NARS, total	41.11 (8.57)	44.84 (7.67)	-2.33	**.02**
NARS, situations and interactions with robots subscale	15.43 (4.06)	16.20 (4.8)	-1.22	.28
NARS, social influence of robots subscale	16.34 (3.62)	17.10 (3.07)	-1.39	.17
NARS, emotions in interaction with robots subscale	10.00 (2.7)	11.5 (2.41)	-3.67	**<.00**
Anthropomorphism towards technology	10.32 (3.10)	8.6 (3.14)	3.60	**<.00**
Anthropomorphism towards natural objects	5.6 (2.14)	5.00 (2.01)	1.9	.06

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Stereotyping the user: How elders and formal caregivers perceive elder users of companion-type robots
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Purpose Even nowadays, negative aging stereotypes are still prevalent among both older and younger people. According to the Stereotype Content Model (Fiske et al., 2002), elders are often stereotyped as warm and friendly, but cognitively frail. Neven (2010) showed that such negative aging stereotypes can be designed into assistive robots for the elders, which might negatively affect the image a particular robot conveys about its user (Schwind et al., 2019). This can reduce robot acceptance in the target group (Dudek et al., 2021). Companion-type robots are particularly suspected of stigmatizing the user (e.g., Sharkey & Sharkey, 2012). Their user image, however, has received little attention in current research. Therefore, key questions are targeted in this study. Firstly, we investigate if and how age-related stereotyping of elder companion-type robot users differs from general ageing stereotypes. Secondly, we assess ageing stereotypes of both elders and formal caregivers, as the latter might have differing perceptions of age and ageing. Since caregivers decide who is offered a companion-type robot, their user image should not be guided by ageing stereotypes. Finally, the current study is, to our knowledge, the first to compare the age-related user images of two different companion-type robots distinct in design (mechanomorph and zoomorph). **Method** In an online study, both Paro (zoomorph) and Zoomer (mechanomorph companion-type robot) are presented to participants aged 65 years and older and to formal caregivers in a mixed design. General ageing stereotypes and the age-related user image for each robot are assessed in questionnaires already used in earlier studies (Dudek et al., 2021). Basic user characteristics (demographics, experience with animals and technology) are measured as covariates. **Results and Discussion** The results demonstrate to what extent ageing stereotypes are implemented in currently available companion-type robots. We also show if the use of such robots initiates stigmatization above and beyond prevalent ageing stereotypes. Findings regarding differences in user image between the zoomorph and the mechanomorph robot have implications for the design of future robots, companion-type robots or others. Finally, results on the caregivers' user image and its difference to elders' user image will shed light on training needs for formal caregivers with regard to robot implementation.

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Stakeholder perspectives on care robot users at the intersection of age and gender: Empirical-ethical analysis

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Purpose Demographic ageing and the shortage of professional care workers will constitute a crucial challenge for future eldercare. The introduction of care robots to support the independent life and care of older people is considered a promising solution. Despite the potential of care robots, their use also raises questions of moral acceptability, for example regarding issues of diversity sensitivity and discrimination (Weßel et al. 2021). Thus, the development and implementation of robotic systems are often based on stereotypical assumptions about the users' age and gender and neglect the diversity of their actual needs and preferences. In this paper, we explore the assumptions of professional stakeholders about the age and gender of potential users and discuss their ethical implications for morally acceptable diversity-sensitive robotics in eldercare. **Method** We conducted semi-structured interviews (n=16, April-June 2021) with stakeholders from technology development, marketing, and nursing in Germany. We asked to what extent they considered the age and gender of potential users as relevant and what role these categories played in the development and implementation of robots. The interviews were transcribed, coded deductively as well as inductively, and analysed with qualitative content analysis (Kuckartz 2018). **Results and discussion** Our results show in more detail how stakeholder assumptions regarding the age and gender of users can influence the development and implementation of care robotics. In our analysis, we identified three types of assumptions: 1) assumptions about the age and gender of users that were confirmed in practice, 2) assumptions about the age and gender of users that were not confirmed in practice, and 3) the assumption that age and gender of the users are not relevant. Overall, the stakeholder assumptions show a lack of awareness of user diversity and reveal how the development and implementation of care robots are based on stereotypes and biases regarding the age and gender of users. Based on an expanded principlist approach (Schicktanz & Schweda 2021) as well as feminist care ethics (Raghuram 2019), we argue that the diversity of users is not adequately addressed in the context of technology development and implementation. This might compromise user wellbeing, increase power imbalances in care and lead to discrimination of different users due to stereotypical stakeholder assumptions. We propose a diversity-sensitive framework for participatory technology development that includes a variety of users in the design, development, and implementation of care robots to take into account diverse user perspectives and increase user acceptance. In this context, we suggest that increased diversity on the part of the developers can make a substantial contribution to addressing the needs of more diverse users and gain access to marginalized user groups in eldercare.

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