User Participation as a Matter of Care
The Configuration of Older Users in the Design of Assistive Technologies

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Abstract: The participation of older people in technology development is an ambivalent field: while promising a better fit between users and technology, it still is challenging for both the project and for older users. This is particularly the case when older people with cognitive or physical impairments are to be involved. The article examines the configuration of older people as users in the design of a digital memory training for older people with mild cognitive impairment (MCI). Referring to (feminist) STS, this configuration is conceptualised as a matter of care. Based on an ethnographic field study the article unfolds the spatial, affective, discursive and material practices of user configuration and describes ambivalences and asymmetries in the configuration process that determine the configuration of older people as users in user-centred design.

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1. Introduction

Against the background of demographic change and active ageing policies, older people are assigned many tasks: for example, they are supposed to play an active role in society, engage in community service and volunteer work, all while staying healthy and fit. In doing so, they should make their own valuable contribution to master the social and economic challenges of demographic change. Participating in technology development is a relatively new topic in this arena of activities. Parallel to the rise

TECNOSCIENZA
Italian Journal of Science and Technology Studies
11 (2) pp. 93-116 - ISSN 2038-3460
www.tecnoscienza.net

TECNOSCIENZA
Italian Journal of Science & Technology Studies

of assistive technologies, which should enable older people to age in place autonomously and independently, they are perceived as a promising target group, but also as important participants in the development process. Their participation should increase the fit between the requirements and needs of older users and the design of the technical artefact. In the course of this redefinition of older people as key agents in the development process, various approaches have been developed to involve them. They range from user-centred design, to design for all, to co-design and co-creation. Irrespective of these different approaches, from the perspective of age(ing) studies, the question arises as *what* older people participate and *how* they participate. Mackay et al. (2000), for example, point out that the practice of user participation has little in common with the humanistic, democratic and utopian ideal of participatory design. Rather, users are considered as a "good thing" (2000, 738) because their participation would lead to an improvement of the technical artefact. Hagen et al. (2018) speak of an "acceptance bias" of user-centred approaches that pursue acceptance by means of participation – a bias that also affects the role of researchers accompanying the design process such as cultural anthropologists or social scientists (Beimborn et al. 2016; Lassen et al. 2015). Peine and Neven (2019) identify a tendency in which participatory methods become the *sine qua nons* of gerontechnology, in which user needs are seen primarily as input for design and development (see also Peine et al. 2014). Compagna and Kohlbacher (2015) emphasize that the integration of users primarily functions as a guarantee for being considered in the competition for funding, which does, however, not necessarily mean that users are successfully integrated.

This is where the article begins. It is based on my ethnographic research I undertook for my dissertation about the development and use of assistive technologies for older people[1]. The article describes the participation of older people in technology development from the perspective of feminist Science and Technology Studies (STS) using the example of user-centred design in state-funded technology development projects in Germany that design assistive technologies for older people. The article points out how older people become older users in the process of participating in the design process. Therefore, the article describes this process as a socio-material configuration and illustrates the different spatial, affective, discursive and material practices in which this configuration of older people as users takes place. From a feminist perspective, this implies asking about the power relations and the potential for intervention.

In the following I will briefly outline the context of user-centred design in information and computer sciences and theorise it from within (feminist) STS. Then I describe the spatial, affective, discursive and material enrolment of older people in the usability test of *MemoPlay*, a technology development project funded by the German Federal Ministry of Education and Research (BMBF), from an ethnographic perspective. The aim of this project was to develop an interactive online platform contain-

ing a memory training for older people with mild cognitive impairment (MCI)[2]. I will then discuss how these practices of configuration can be understood as a matter of care in the sense of Puig de la Bellacasa (2011) and reflect my research in the context of feminist STS. The article points out that the participation of older people in technology development projects is a practice that must be carried out with care so that participation can be arranged in an attentive, responsible, professional and reciprocal manner.

2. Theorising User-Centred Design from a (feminist) STS Perspective

2.1 User-centred design in gerontechnology

In the design process of a technical artefact various methods are used to test the prototype and to ensure that the requirements placed on it are met. Therein, user-centred design (UCD) has become the main design approach. It aims at achieving a high degree of fit between the needs and requirements of the later users and the technical artefact by involving persons who represent the target group as well as possible.

UCD goes back to the psychologist Donald A. Norman, who in his work at the University of California San Diego dealt with design principles for user interfaces in the late 1980s. He first presented his concept together with Stephen W. Draper in the book *User-Centred System Design: New Perspectives on Human-Computer Interaction* (1986). It is followed by *The Psychology of Everyday Things* (1988), in which Norman further elaborates his approach with regard to basic design principles.[3]

In the last years UCD has become an umbrella term for a broad set of methods and agendas linked to the participation of users in different fields of innovation (Karlsson et al. 2012; Marcus 2015; Oudshoorn and Pinch 2003a). Especially in European and national funding programmes on assistive technologies for older people – like for example active and ambient assisted living (AAL) – UCD has become one of the main approaches to enable older people to participate in the design process (Fischer et al. 2020; Merkel and Kucharski 2019; Ogonowski et al. 2018). In these contexts, UCD goes beyond Norman's classical conception by shifting the focus towards user-driven technology development. Here, the participation of older people in the design process pursues different objectives. First of all UCD – as it is for example mandatory in the German funding programme on AAL (BMBF 2010) – is a reaction to the lack of market success of the developed technologies (Fachinger 2018; Greenhalgh et al. 2016). To overcome the missing market penetration UCD should guarantee that needs and requirements of older users are met and the products' acceptance increases (Compagna 2012). Furthermore the participation of older people should avoid negative age-related stereo-

types and ageism and foster the empowerment of older people as users of digital technologies (Beimborn et al. 2016; Endter 2016; Peine et al. 2014; Wanka and Gallistl 2018).

In contrast to this political agenda, the practical implementation of UCD reveals that these objectives cannot be achieved that easily. Rather, it becomes clear how tricky the application of UCD is. In most cases the project members like developers, designers or technicians are unfamiliar with older people as target group, but in the context of state-funded development of AAL they have to get familiar with them. Furthermore, they have to involve them and ensure their stable and long-term participation in the design process in general and the usability testing in particular, whereby the testing may be physically and/or cognitively demanding and emotionally stressful for the test persons. At the same time, the project members should ensure that the participation of the test persons does not jeopardise the success of the project, since this would also call into question the proof of success vis-à-vis the funding agency. At the same time, these challenges limit the scope for user participation as a democratic-humanistic form of participation and practice of knowledge production – as I will show in the following with the configuration of users.

Against this background critical gerontologists argue that UCD fails to involve older people adequately (Lassen et al. 2015; Merkel and Kucharski 2019). It is criticised for instance that their participation primarily functions to legitimize technological development or should foster the market success by improving the fit of prototypes with user requirements (Endter 2016; Neven 2010; Peine et al. 2014). Moreover, it is stressed that certain age groups are often underrepresented in UCD, such as socially deprived or educationally disadvantaged older people (Biniok et al. 2016; Künemund and Tanschus 2013; Compagna 2012).

2.2 Turning to the user: the perspective of (feminist) science and technology studies

At the beginning of the 1980s there was a growing interest in users beyond technical sciences (Joyce and Mamo 2006; Oudshoorn and Pinch 2003b). According to Mackay et al. (2000), this increased interest is based on an emerging scientific debate on technology in social sciences, which negotiates the question of the social construction of technology. The works of Trevor Pinch and Wiebe Bijker (1984) on the social construction of technology (SCOT) are linked to this turn to the user in early STS research. They assign a significant role to users in the stabilisation of a technology. According to Pinch and Bijker, users are significantly involved in the "closure" (1984) of the interpretative flexibility of a technology. They illustrate these closure processes with various examples, such as the invention of the bicycle or Bakelite (Bijker 1995; Bijker et al. 1987; MacKenzie and Wajcman 1985; Pinch and Bijker 1984).

Steve Woolgar (1991) also uses the idea of interpretative flexibility, whereby, unlike Pinch and Bijker, he does not regard the closure as a negotiation of users, but rather as a practice of designers and developers, whereby he makes use of the semiotic analogy of machines as text and users as readers. He defines this practice as a configuration of users, in which "the user's character and capacity, her possible future actions are structured and defined in relation to the machine" (Woolgar 1991, 89). He interprets this work of defining, enabling and limiting as "boundary work" (Woolgar 1991, 90). The result of this boundary work is a user-technology relation that is configured by the designers, not by the users. The latter are only given access to the use of the technology. Therein, the interpretative flexibility of the machine as text is limited. With his semiotic approach Woolgar is able to reveal user representations and imaginations of designers and developers. At the same time, the strongly semiotic orientation limits the conception of users and thus the analysis of the user-technology relation to its representative function and excludes other actors involved in the configuration. In contrast, Mackay et al. (2000) argue for the opening up of Woolgar's concept and taking more account of the configuration of designers by users or institutions to which they are connected. They suggest an understanding of configuration as a fluid, situated and constructive practice.

In contrast to Woolgar, who emphasizes the encoding of users by designers, Madeleine Akrich (1992) develops an approach that places the inscription of user representations at the center of her analysis. She reveals how the developers, in the process of designing technology, inscribe their ideas about its use, but also their preferences, competencies, moralities and attitudes into technology. She refers to the material-semiotic order that develops in the process as a "script". Although the users can modify the script, they are not involved in the scripting procedure.[4]

Within these strongly semiotic approaches of Akrich or Woolgar, the power dimension within the configuration of the technical artefact remains largely undiscussed. Although Woolgar does refer to the powerful practices that are needed to involve users in a way that is beneficial to the success of the project, his semiotic orientation limits the conception of users. Here feminist approaches provide a different perspective on technology development, in order to show the boundaries on which the constitution of a technical artefact on the one hand and its users on the other hand are based (Forsythe 2001; Moser and Law 2003; Rommes et al. 2012; Suchman 2007). For example, Lucy Suchman (1993; 2006; Suchman et al. 2002) has explicitly gone beyond the academic debate and has made feminist STS approaches productive for the work in the field of Computer Supported Cooperative Work. In this context, thinking about older users from a feminist STS perspective was also given a renewed impulse in the field of Aging Studies (Endter 2020; Höppner and Urban 2018; Joyce and Mamo 2006; Latimer 2018; Mort et al. 2013). Here a key aspect of this research is the consideration of users and technology as mu-

tually co-constituting phenomena (Aceros et al. 2015; Endter 2018; 2020; Östlund et al. 2015; Peine and Neven 2019; Wanka and Gallistl 2018).

2.3 User participation as a matter of care

Theorising user participation from a feminist STS perspective shifts the focus towards the politics of user participation. Therefore, I draw my attention to the "intra-active open-ended performative processes of becoming that reconfigures connectivity, constraints and exclusions" (Suchman et al. 2002, 163) in the alignment of age and technology. Following Suchman (2007), when theorising the configuration of older persons as users, the matters of fact about age and technology in the routinised work of user integration has to be scrutinised. This means that it has to be examined what this work of assembling and reassembling older people as users means for the configuration of age in technology development.

This focus on users-in-the-making opens up the opportunity to "investigate the imaginative and practical activities through which sociomaterial relations are reproduced and transformed" (Thygesen and Moser 2010, 131). Thereby the goal is not to unmask the developers as ignorant towards the diversity and complexity of age and older users' needs, but "to move beyond critique" (Pols 2018, 2) by contesting the images taken for granted about age and assistive technologies in such an emergent context like elderly care technologies (Asdal and Moser 2012). On the one hand we find a manifest imagination of age as decline and loss, especially when thinking about old age cultural images are determined by notions of frailty or vulnerability (Gilleard and Higgs 2011; Katz 2015). On the other hand we have a contradictory imagination of assistive technology, telecare or robotics as innovative and helpful (Hergesell 2019; López Gómez 2015; Neven 2015). This juxtaposition of age as imagined as in need for technical care and technology as being able to provide this kind of care determines the age-technology-relation in the context of assistive technologies.

For feminist STS research this can be understood as a call to "stay with the trouble" (Haraway 2016) when doing research on age and technology. This means, for example, asking who sets "the conditions for practices and for what kind of realities that are made possible" (Thygesen and Moser 2010, 131) or pointing out how participation could have been undertaken in a different manner or how alternative configurations of users were excluded in the design process. Therefore, to think of user-centred design as a "matter of care" (Puig de la Bellacasa 2011) is a promising approach to make these entanglements and power relations visible. In her consideration of technology, Puig de la Bellacasa expands Latour's conception of technology as a "matter of concern" (Latour 2004) by referring to the affective dimension that accompanies things of concern. She states: "We must take care of things in order to remain responsible

for their becoming" (Puig de la Bellacasa 2011, 90). For Puig de la Bellacasa this responsibility is also an "ethico-political obligation". For her, as a feminist scholar in the study of technology, this means that "we need to count all the concerns attached to [technology], all those who care for it" (2011, 90). In contrast to Latour, for Puig de la Bellacasa this also means taking a stronger stand for a position that takes into account the persistent forms of power, exclusion and inequality when dealing with matters of concern.

Following Puig de la Bellacasa, I consider the development of technology in general and the involvement of users in user-centred design in particular as a "matter of care". This conceptualisation throws light on the question of power and hierarchy that undermine the participation process. Caring in this sense is not understood as a work dedicated to the development and functionality of the artefact, as Treusch (2015), for example, clearly shows in her research on robotics, but as a reflexive practice that asks how the project members involved in the constitution of the technical artefact evaluate their actions of user involvement and to what extent they see themselves as responsible for the involvement of older people as users in the design of the technology.

From a feminist perspective, it matters whose interests are represented in technological development, whose work is rendered invisible, who is considered important enough to be included in the socio-material assemblage and who is excluded (Puig de la Bellacasa 2011; Suchman 2007; Moser and Law 2003). This goes along with Mol, Pols and Moser's notion of care in practice as "a persistent tinkering in a world full of complex ambivalences and shifting tensions" (Mol et al. 2010, 14). They understand these practices of tinkering as a form of doing good care, whereby "[t]he good is not something to pass a judgement on, in general terms and from the outside, but something to do, in practice, as care goes on" (2010, 13). With regard to user-centred design this means asking to what extent the agents involved in the process consider their own actions as good. It also means questioning the postulated ideology of user participation as a "good thing" (Mackay et al. 2000) for older people.

To question this goodness of user participation I refer to Joan Tronto's (1993) criteria of good care. Although Tronto does not take an STS perspective her conceptualisation of good care is fruitful for thinking about the relation of age and technology and linking STS and Aging Studies. According to Tronto, good care is characterised by attentiveness, responsibility, competence and reciprocity. Tronto argues that these requirements must be fulfilled for carers to be able to recognise the needs of others (caring about), to carry them out (care taking) and to serve them (care giving), thus building a mutual relationship between carers and those who are cared for (care receiving) and thus providing *good care*. Tronto's criteria can function as a heuristic for examining the extent to which user-centred design actually empowers users to participate in the design process and fosters a fit between technology and user needs.

Therefore, I apply Tronto's criteria of good care to user-centred design and analyse how the different spatial, affective, discursive and material practices of configuring older users are attentive, competent, responsible and reciprocal and thus representing a "specific *modality* of handling questions to do with the good" (Mol et al. 2010, 13).

3. Configuring Dementia

With the focus on dementia, ageing is no longer stigmatised as an age-specific loss of physical capabilities and competences, it is also configured as cognitive decline and the loss of personhood (Alzheimer's Disease International 2018). These scientific depictions of dementia in neuroscientific and cognitive psychological studies are echoed in public discourses about dementia as a threat or burden either to society or to the welfare state, but these cultural assumptions and normative expectations are entangled with material figurations of dementia for example in scientific laboratories (Åsberg and Lum 2010), clinical memory consultations (Moser 2008), care practices and environments (Spindler 2018) or in technology.

Sociologists working critically on this double stigmatisation deconstruct the fear of dementia as expression of our "cognitive culture" and modern individualism (Katz 2012). For example Latimer shows in her study on biomedical research how dementia is constructed as "the worst of what ageing does to people" (Latimer 2018, 839; see also Latimer and Puig de la Bellacasa 2011) and coincidently this construction legitimates medical research and intervention. Also Moser outlines Alzheimer's Disease (AD) as a powerful material-semiotic assemblage that mobilises different actors like for example scientists responsible for putting AD squarely on the public discourse and policy agenda as a significant topic (Moser 2008). Åsberg and Lum (2010, 329) critique the decontextualization and objectification of AD in biomedical imagination and scientific practice and highlight "the subject positions thus rendered available" in the object-subject-positionings of biomedical practices. Against the powerful instrumentalisation of dementia in the public health and scientific discourses, researchers such as Twigg and Buse (Twigg 2010; Buse and Twigg 2014, 2016) emphasise the role of materiality to reconfigure the ageing-dementia-relation. In their research they point out how the mundane practices of everyday clothing enable people with dementia to reclaim their status as autonomous subjects. Similarly, Kontos (2004; 2005; 2015) is broadening the empowering scope of embodiment in describing the bodily practices of remembering for example in dancing or singing. And Swinnen (2016; Swinnen and de Medeiros 2017; Swinnen and Schweda 2015) shows how people diagnosed with AD express themselves in poetry slams in a New Yorker day-care hospital. These research findings contradict the normative image of dementia as a loss of cognitive abilities and personhood, instead they reveal the mundane acts of per-

formatively reconfiguring identity as an ongoing discursive articulation *and* material formation (Endter 2020).

4. Methodological Approach

The following ethnographic description of the configuration of older people as users in user-centred technology development is based on my fieldwork in the state-funded research project *MemoPlay*.[5] From March 2014 to November 2014 I conducted fieldwork in the project, which included accompanying the project members in their work, conducting interviews and actively participating in the tests as study personnel of the project. Furthermore, I conducted interviews with the older usability test participants and took part in their trainings at home as a participating observer. The fieldwork in *MemoPlay* was part of a larger field study in the context of my dissertation, in which I ethnographically examined different state-funded research projects on the development of assistive technologies for older people from 2014 to 2016. Most of them were part of the BMBF research agenda of Active and Ambient Assisted Living (AAL).

The empirical analyses presented here is based on my field notes, protocols, interview transcripts and minutes of conversations, as well as the field documents I have collected during my participation in the project. All interviews were transcribed and coded with MAXQDA. The coding procedure of my ethnographic material and its analysis is based on Grounded Theory in its reflexive (Breuer et al. 2010) and situational (Clarke 2012) modification. Furthermore, I have triangulated the ethnographic material with a document analysis of the BMBF research program on active and ambient assisted living from 2008 until 2016.

As ethnography always focuses on the single case – here the state-funded technology development project *MemoPlay* – the interpretation of the practices, meanings and structures is always situational and contingent (Rabinow 2008; Marcus 1995). Concentrating on a single project allows me to go into greater depth to describe the different groups of actors in their heterogeneity and relativity. At the same time, the analysis reveals problem areas and solution strategies that go beyond the individual project, allowing conclusions to be drawn about the field beyond the single case. The empirical analysis given here highlights the final usability test by describing the first meeting of the older participants with the project members Stefanie Müller and Thomas Beyer. Müller and Beyer are staff members of the gerontological research institute and responsible for the user involvement in the user-centred design of the project. In the empirical analysis given here I will ethnographically describe the first visit of the older usability test participants in the final usability test of the project.

5. Case Study

MemoPlay is the name of a German state-funded technology development project. From 2012 until 2014 it developed an interactive online platform. This platform contains three different components: a memory training – its central component – a communication tool to chat or for videotelephony and an information section for users with short films and texts about age-specific topics such as healthy living, nutrition, mobility and security. It should enable older people suffering mild cognitive impairment (MCI) to train their cognitive abilities by conducting the memory training. As a stand-alone application that can be installed both on a standard tablet or on a personal computer, it is intended for individual use at home without the need for assistance from care givers or medical staff.

The memory training consists of six different exercises in which, for example, the older user has to sort words to colours, mentally rotate geometric objects or compare numerical values. Five of these six tasks must be completed per training unit. The selection of the tasks as well as their degree of difficulty is determined by the programme's algorithm. After each unit a chart appears on the screen that reports the test results back to the user and compares them with the points already reached. With the help of the training, the cognitive performance of the users should improve over the course of the training.

The interdisciplinary research project team consists of three academic project partners – a gerontological research institute, a geriatric hospital, and a research institute for artificial intelligence (AI) – and two non-academic partners – an IT service provider and a provider of medical devices. The non-academic partners and the research institute for AI were mainly responsible for hard- and software development. The gerontological research institute and the geriatric hospital carried out the user involvement following a user-centred design approach.

In the user-centred design of the project people aged sixty years and older were involved as interview partners or test users in three different stages of the technology development: the requirements analysis, the formative evaluation and the summative evaluation of the prototype.

In the requirements analysis twelve participants – half of them diagnosed with MCI – had to fill in two standardised questionnaires to evaluate their technical competence and technology acceptance. Afterwards, a standardized interview was conducted with them. The interviews were analysed in-depth to derive requirements that should lead the iterative design process.

During the formative evaluation brief surveys were conducted in the day clinic of the geriatric hospital. For example, paper prototypes were tested in small samples up to five older people. They were shown different designs of pictures, icons or logos and asked which one they thought would better meet their needs or be more intuitive. More complex ques-

tions, such as the design of the menu navigation or the user interface, were tested with a larger group of patients of the day clinic using mockups to illustrate the design more adequately. All participants in the formative evaluation were diagnosed with MCI.

In addition to the formative tests in the day clinic a laboratory testing was carried out by the gerontological research institute after 18 months of the project's running time. Sixty people had to test one of the later six exercises of the memory training as well as various other functions, such as receiving and carrying out a video call. During their tests eye movements and facial expressions were tracked, logging data was collected and the behaviour of the persons was recorded. In this sample, too, half of the participants were diagnosed with MCI.

The final usability test of the summative evaluation started after completion of the development of the prototype in spring 2014. A total of eighty people – half of them diagnosed with MCI – was selected and divided into four groups of twenty people each. One test group carried out the memory training on a tablet, another on their home PC. The other forty people were divided equally between an active control group testing a video game and a passive control group not receiving any intervention. Participants were found through a senior university, advertisements on the Internet and the gerontological research institute's network.

While the previous tests were mainly concerned with aspects of usability and technology acceptance, the final usability test pursued a further scientific question. The gerontological institute and the geriatric hospital also wanted to find out whether regular memory training has a measurable effect on cognitive performance and neural structure. To assess cognitive performance of all participants, the test persons had to complete various psychological tests measuring their cognitive abilities at the beginning, in the middle and at the end of the usability test. From the persons assigned to the active test groups doing the memory training on tablet or PC, twenty were randomly selected to undergo magnetic resonance imaging (MRI) at the beginning and end of the eight-week test. The aim of the MRI examination was the visual detection of structural changes in the cortex due to training. If abnormalities were found during this examination, the person was informed and advised to consult a specialist to clarify the findings. This scientific evaluation of the training was a strong motivation for test users to participate in the study, as they repeatedly emphasised during interviews. Many hoped to obtain more precise and, above all, scientifically proven information about their cognitive performance. For most of the participants, cognitive fitness was proof that they were not yet old and did not show any signs of dementia.

6. Empirical Analysis

On a sunny Monday morning in May 2014, twenty older people arrive at the gerontological research institute for the first time. In the study room the tables have been already arranged in a closed rectangle. Each place has been prepared with a nameplate and a folder with information about the project, the agenda of the day and further information about the study. The people in the room have been invited to take part in the usability test of the project. As a test person, it is their task to test the prototype at home for eight weeks, to undergo psychological tests to determine their cognitive performance, and – if randomly chosen – to take part in the MRI examination at the beginning and the end of the usability test period. In addition to the participants, the two project members Stefanie Müller and Thomas Beyer, who both work at the gerontological research institute, and myself are present.

6.1 Spatial and affective user configuration

After all participants have arrived Müller and Beyer start their presentation. Müller informs the participants what will happen over the course of the next weeks and explains the study. She repeatedly emphasises how important it is that older people are involved in the development of technology that they will later use, hence why it is so important that the participants are here today and have agreed to participate in the study. She also appeals to their individual ambition and sense of responsibility when she describes the user test. No questions are asked during her presentation, everyone is listening carefully. Some take notes, but most of them follow Müller's explanations and wait and see how things will unfold.

In the further course of the test, they also only react when asked, they keep quiet, they complete the questionnaires without asking questions and they agree to the tests Müller and Beyer are doing with them, even if some mention later in a subordinate clause that they felt uncomfortable in the test situation they had to undergo during their visit. They want to appear competent and informed and, as if their participation would be put to the test, they want to prove themselves as suitable candidates.

In this test situation Müller and Beyer create a social situation, which addresses participants as users and encourages them to take on this role. For this purpose, the participants are placed in a spatial setting that is largely foreign to them, such as the things (questionnaires, psychological tests) and persons (study personnel) with whom they interact within this setting.

In addition, the older participants have to prove their cognitive abilities in front of two strangers who not only lead the study and thus seem to have a specific social status qua professional position, but also distinguish themselves from them as "scientists". Thus, they not only assign a specific role to the participants, but also assume one themselves. Within

this setting, emotions such as shame and social norms, such as respect for authority, play a crucial role in understanding why the participants behave passively. Furthermore, the presence of the other participants reinforces the assumption of the role as test users. This also explains why no exchange between the participants develops in the further course of the event. When social communication takes place, it occurs on a hierarchical level in exchange with the coordinators of the study.

Müller and Beyer thus not only create a social, but also a normative space that promotes the assumption of the role of test users. In contrast to Müller and Beyer, who – as study coordinators and staff members of the gerontological research institute – can be assigned to the scientific field, the older participants are configured as a homogeneous group – the test users. The participants only know each other's names, but they do not have any information about age, profession or personal attitudes. This liminality enables Müller and Beyer to assign a new role to the participants and to spatially, affectively, discursively and materially code them according to this role. The spatial setting (a conference room in a scientific research institution), the materialities at hand (information material, presentation techniques, test sheets) and their own role as scientists help them to do this.

6.2 Discursive and material user configuration

In addition to the spatial setting, the dichotomous construction of study coordinators and test users along with the resulting asymmetrical positioning of the older participants, it is Stefanie Müller's lecture that convinces participants to take on the role of test users.

She is the welcoming project member, the professional scientist, the sovereign study coordinator. But she is also the test supervisor who provides the participants with questionnaires and test procedures to measure and classify their cognitive performance. What is striking here is the repeated reference to how important it is that those present take part in the study and thus make a central contribution not only to the *MemoPlay* project but also to the development of gerontechnologies as a whole.

Stefanie Müller does, however, not mention that the participation of older people is also highly relevant for the project team in order to meet the requirements of the funding authorities. Instead, she appeals to the sense of responsibility of the participants and stresses how important their feedback and test results are for the development of the prototype. Neither does she mention that its development has already been completed at the time the usability tests are carried out. At the end of the usability test, none of the eighty participants will have terminated prematurely, all will have undertaken their exercises twice a day and completed the test tasks as well as the medical examinations.

In repeatedly referring to the value of the training for the scientific investigation of cognitive performance, Müller does not only appeal to the

participants' sense of responsibility, but also to their ambition to achieve good results and to prove that they are cognitively capable, on the one hand, and on the other hand, to their fear of getting Alzheimer's Disease, thus indirectly referring to the discourse on dementia. In her speech, Müller refers to the dementia discourse uncritically and places the users in the asymmetrical dementia-technology relation in which older people are regarded as potentially affected by cognitive impairments due to their age.

However, it is not only the study coordinators Stefanie Müller and Thomas Beyer, the spatial setting, the study situation and the circulating scientific knowledge that configure the older participants as users, but also the psychological test procedures and questionnaires used in the test to assess cognitive performance. In their materiality they witness the scientific authority of the study coordinators and contribute to their scientific performance. The test procedures not only generate different numerical values, but also rank the participants according to their performance and classify them into those without MCI and those affected by MCI. Therein, psychological tests tame older persons to fit into their assigned roles as users (Pols 2012, 144).

Of course, the participants are by no means passive puppets, they also participate in the configuration as users. Nonetheless, there are gradual differences between their own commitment and agency as users and the discursive and material practices of the study coordinators that configure them as users and situate them in the asymmetrical user-technology relation of the user-centred design (Endter 2018; López Gómez 2015; Neven 2010).

7. Discussion

7.1 User configuration as a matter of care

In the analysis of the different practices of configuration it has become clear that the usability test represents a critical situation in the development process. It is Müller and Beyer's task to handle this critical situation by integrating the older participants into the role of test users so that they "most likely act like users" (Woolgar 1991, 82). But the participants are "complex, fragmented in nature, and are attributed with varying significance" (Mackay et al. 2000, 738). To handle this complexity, Müller and Beyer employ different powerful practices that configure the participants as users spatially and affectively as well as discursively and materially. In this, user configuration becomes a powerful practice that distinguishes between those who assign positions (project workers) and those who are placed in those positions (older people). The asymmetrical relationship between project members responsible for conducting the usability tests and older test users who performed the tests guarantees that the test users

behave in accordance to their role, develop a high level of compliance with the test procedure and ensure that the prototype evaluation is carried out. At the same time, this hierarchy ensures that the uncertainty introduced by the participation of older people is brought under control.

With regard to the question, if these practices of configuration can be regarded as *practices of care*, I return to Tronto (1993). She stresses that care is characterized by attentiveness, responsibility, competence and reciprocity. Considering the practices of Müller and Beyer, the empirical analysis shows that they meet the criteria mentioned by Tronto to a certain extent: they are attentive to the participants, ensure that they feel comfortable in the test situation, emphasize the importance of their participation and show how useful they are as users for the development of technology. In doing so, they signify the decision of the participants to take part in the usability test as a practice of *good care* – in the sense that they contribute to research and innovation as well as a better life for other older people when using assistive technologies. Furthermore, they themselves take on responsibility for the participants and prove their scientific competence in conducting lectures and test procedures. At the same time, it becomes clear that these practices are always aimed at involving the participants in such a way that they neither delay nor hinder the development of the technology, that their results do not endanger the success of the project and that they correspond to the user representations of the project and thus of the artefact. Müller and Beyer's actions are, however, not reciprocal – the last of Tronto's criteria. The test users only get involved when it is useful and helpful for the project. More participatory formats or participations that go beyond testing prototypes or being interviewed to evaluate technical features are not applied.

It becomes clear that the project members do indeed make an effort to involve older people in a good way. They do act to a certain extent attentively, responsibly and competently. However, they are basically not oriented towards the good of the users, but towards the success of the project and thus the development of a new technology – in this case the interactive online platform for memory training. However, this orientation contradicts the actual orientation of user participation as democratic and emancipative, and cannot be reconciled with Tronto's criterion of being a reciprocal interaction. This clearly shows that the project members' concern for the users cannot be described as *good care* in the sense of Tronto. Rather, it becomes apparent that good care is not addressed to the users, but to the technology. What follows from this if user participation is considered a matter of care from a feminist perspective? First of all, it shows that user involvement is ambiguous, situational and contingent. Beyond this, it also calls into question what can be regarded as user participation in technology development in general and user-centred design in particular. In this it can be seen an opportunity to show how the participation of older people in technology development is a practice that needs to be taken care of. On the one hand, UCD represents the oppor-

tunity for older people to be involved in the development of technologies that are important for them. User participation offers the possibility to counteract stereotyping and deficient images of age and raise developers', software engineers' or designers' awareness to the heterogeneity and multiplicity of age. On the other hand, it has been emphasised at various times that older people often do not participate as participants in the humanistic, democratic sense of participatory design but as preconfigured test users. Here it becomes clear that both the question of when participation takes place and the question of how it takes place is an expression of a specific power relation in which older people are involved but do not participate. Herein, UCD is a relational, situated practice with shifting powers and moving targets. It cannot be judged as enabling or paternalistic, instead it is ontologically multiple (Mol 2002). Latimer calls such heterogeneity "a multiple inhabited by a multitude" (Latimer 2019, 277). In this multiplicity the older participants are configured in the spatial, affective, material and discursive practices of the project members in order to witness a user-centred design of the prototype without participating in the development of the prototype.

Against this background Neven (2010; 2015) asks why more and more older people should be involved in technology development and suggests that the outcomes of participation should be scientifically evaluated rather than continuing current practice. Künemund (2018) argues similarly with regard to the German AAL funding programme and calls for a problem-oriented scientific evaluation as starting point of technology development that should be carried out independently of the involvement of older people. Wanka and Gallistl (2020) also demand a revision of the funding programmes which envision other participation formats of older people. This article adds a feminist perspective to these calls with the aim of intervening against established practices and views of older users and power relations in UCD as explained in the following.

7.2 Being reflexive: the politics of doing research on technology

Participating as a feminist STS scholar in the user-centred design implies "reclaim[ing] and reinvent[ing] the politics of relation" (Latimer and López Gómez 2019, 251). This means critically asking how one's own research stabilises the normative potential of user participation as good. While Puig de la Bellacasa emphasises "the ethico-political obligations" (2011, 90) that shape our research, reassembling the often-neglected "real" users and what they imagine technocare to be like, this implies "staying accountable to the politics, power and privilege involved in such work" (Martin et al. 2015, 630). This can be a form of care. This suggests understanding research as an open-ended and "response-able" (Barad 2007) process of "being alongside" (Latimer 2019) or as Martin et al. have claimed it: "As the contexts in which we work become seemingly more urgent, that is, more critical, we must become even more cautious

about how we enact our care. Likewise, the greater success we STS schol-ars have in world-making, the more we have to be accountable to and take responsibility for those whose lives we touch" (Martin et al. 2015, 635-636). In the context of assistive technologies this means taking on ac-countability for the world-making effects of one's own research and the intimate entanglements in the research process including participation in the configurational practices of user participation. Thinking about the technology-age-relation in UCD from a feminist STS perspective broad-ens this reflexivity to the question of intervention. By re-contextualizing the powerful practices of Müller and Beyer as care that is contradictory, multiple and relational instead of objective, quantifiable and per se good, is an attempt to intervene into the politics of age and technology as it is powerfully enacted in the policy agendas of active and assisted living. Ex-plicating the boundaries, differences and contradictions that constitute technocare, scatters the normative power of user participation as a "good thing" and opens up the multiple ontologies of the age-technology-relation.

8. Conclusion

The ethnographic description showed how older people are config-ured as users in user-centred design in state-funded research projects on the development of AAL technologies in Germany. It pointed out that the involvement of older people in the design process is a critical situation for technology projects and their outcomes. By ethnographically describ-ing the practices of configuring users in the state-funded AAL project *MemoPlay*, it could be illustrated how participation is limited to passivity and control. In this, UCD can be understood as a powerful practice "that includes particular objects of attention and concern and inseparable knowing subjects" (Suchman 2011, 134) and at the same time excludes and makes invisible other practices and subjects. The result of this boundary work is the constitution of older people as users of assistive technologies in the design process that do not question the design pro-cess. Against this background it becomes clear that user participation is less a manifestation of the participation process of older people than of the powerful practices of establishing controllable users. If UCD should lead to an involvement of older users it must become a matter of care for those responsible for the user involvement. Tronto's criteria can lead here as a taxonomy that can guide the participation process and lead to a more participative involvement of older people as users in the development of technologies that should fit their needs and not in reverse.

References

BMBF (2010) *Loccumer Memorandum*, Berlin, BMBF Press.

Aceros, J.C., Pols, J. and Domènech, M. (2015) *Where is Grandma? Home Telecare, Good Aging and the Domestication of Later Life*, in "Technological Forecasting and Social Change", 93, pp. 102-111.

Akrich, M. (1992) *The De-scription of Technical Objects*, in W.E. Bijker and J. Law (eds.), *Shaping Technology/Building Society: Studies in Sociotechnical Change*, Cambridge, MIT Press, pp. 205-225.

Akrich, M. (1995) *User Representations: Practices, Methods and Sociology*, in A. Rip, T.J. Misa and J. Schot (eds.), *Managing Technology in Society: The Approach of Constructive Technology Assessment*, London, Pinter, pp. 167-184.

Alzheimer's Disease International (ed.) (2018) *World Alzheimer Report 2018*, London, Alzheimer's Disease International.

Åsberg, C. and Lum, J. (2010) *Picturizing the Scattered Ontologies of Alzheimer's Disease: Towards a Materialist Feminist Approach to Visual Technoscience Studies*, in "European Journal of Women's Studies", 17(4), pp. 323-345.

Asdal, K. and Moser, I (2012) *Experiments in Context and Contexting*, in: "Science, Technology, & Human Values", 37(4), pp. 291-306.

Barad, K. (2007) *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*, Durham, Duke University Press.

Beimborn, M., Kadi, S., Köberer, N., Mühleck, M. and Spindler, M. (2016) *Focusing on the Human: Interdisciplinary Reflections on Aging and Technology*, in E. Domínguez-Rué and L. Nierling (eds.), *Ageing and Technology: Perspectives from the Social Sciences*, Bielefeld, transcript Verlag, pp. 311-333.

Bijker, W.E. (1995) *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*, Cambridge, MIT Press.

Bijker, W.E., Hughes, T.P. and Pinch, T.J. (eds.) (1987) *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, Cambridge, MIT Press.

Biniok, P., Menke, I. and Selke, S. (2016) *Social Inclusion of Elderly People in Rural Areas by Social and Technological Mechanisms*, in E. Domínguez-Rué and L. Nierling (eds.), *Ageing and Technology: Perspectives from the Social Sciences*, Bielefeld, transcript Verlag, pp. 93-117.

Bødker, S. and Pekkola, S. (2010) *Introduction the Debate Section: A Short Review to the Past and Present of Participatory Design*, in "Scandinavian Journal of Information System", 22(1), pp. 45-48.

Breuer, F., Dieris, B. and Lettau, A. (2010) *Reflexive Grounded Theory: Eine Einführung für die Forschungspraxis*, Wiesbaden, VS Verlag für Sozialwissenschaften.

Buse, C. and Twigg, J. (2014) *Women with Dementia and Their Handbags: Ne-*

gotiating Identity, Privacy and 'Home' through Material Culture, in "Journal of Aging Studies", 30, pp. 14-22.

Buse, C. and Twigg, J. (2016) *Materialising Memories: Exploring the Stories of People with Dementia through Dress*, in "Ageing and Society", 36(6), pp. 1115-1135.

Clarke, A.E. (2012) *Situationsanalyse: Grounded Theory nach dem Postmodern Turn*, Wiesbaden, VS Verlag für Sozialwissenschaften.

Compagna, D. (2012) *Lost in Translation? The Dilemma of Alignment within Participatory Technology Developments*, in "Poiesis & Praxis: International Journal of Ethics of Science and Technology Assessment", 9(1-2), pp. 125-143.

Compagna, D. and Kohlbacher, F. (2015) *The Limits of Participatory Technology Development: The Case of Service Robots in Care Facilities for Older People*, in "Technological Forecasting and Social Change", 93, pp. 19-31.

de Laet, M. and Mol, A. (2000*) The Zimbabwe Bush Pump: Mechanics of a Fluid Technology*, in "Social Studies of Science", 30(2), pp. 225-263.

Ehn, P. (1989) *Work-oriented Design of Computer Artifacts*, Stockholm, Arbetslivcentrum.

Endter, C. (2016) *Skripting Age – The Negotiation of Age and Aging in Ambient Assisted Living*, in E. Domínguez-Rué and L. Nierling (eds.), *Ageing and Technology: Perspectives from the Social Sciences*, Bielefeld, transcript Verlag, pp. 121-140.

Endter, C. (2018) *Arbeit an der Grauzone – Sorgebeziehungen zwischen einem Gedächtnistraining und dessen Nutzer/innen*, in H.-P. Zimmermann (ed.), *Kulturen der Sorge: Wie unsere Gesellschaft ein Leben mit Demenz ermöglichen kann*, Frankfurt am Main, Campus Verlag.

Endter, C. (2020) *Becoming with Technology – The Reconfiguration of Age in the Development of a Digital Memory Training*, in J. Loh and M. Coeckelbergh (eds.), *Feminist Philosophy of Technology*, Stuttgart, J.B. Metzler, pp. 123-142.

Etgen, T., Sander, D., Bickel, H. and Förstl, H. (2011) *Mild Cognitive Impairment and Dementia: The Importance of Modifiable Risk Factors*, in "Deutsches Aerzteblatt International Online", 108(44), pp. 743-750.

Fachinger, U. (2018) *Altern und Technik: Anmerkungen zu den ökonomischen Potentialen*, in H. Künemund and U. Fachinger (eds.), *Alter und Technik. Sozialwissenschaftliche Befunde und Perspektiven*, Wiesbaden, VS Verlag für Sozialwissenschaften, pp. 51-68.

Fischer, B., Peine, A. and Östlund, B. (2020) *The Importance of User Involvement: A Systematic Review of Involving Older Users in Technology Design*, in "The Gerontologist", 60(7), pp. 513-523.

Forsythe, D.E. (2001) *Studying Those Who Study Us: An Anthropologist in the World of Artificial Intelligence*, Stanford, Stanford University Press.

Gilleard, C. and Higgs, P. (2011) *Ageing Abjection and Embodiment in the Fourth Age*, in "Journal of Aging Studies", 25(2), pp. 135-142.

Greenhalgh, T., Shaw, S., Wherton, J., Hughes, G., Lynch, J., Court, C., Hinder, S., Fahy, N., Byrne, E., Finlayson, A., Sorell, T., Procter, R. and Stones, R. (2016) *SCALS: A Fourth-generation Study of Assisted Living Technologies in Their Organisational, Social, Political and Policy Context*, in "BMJ Open", 6(2), pp. e010208.

Hagen, H., Nitschke, M., Schlindwein, D. and Goll, S. (2018) *Akzeptanz als Problem, Partizipation als Lösung? Zu Prämissen und Bias in der partizipativen Forschung*, in R. Weidner and A. Karafillidis (eds.), *Technische Unterstützungssysteme, die die Menschen wirklich wollen*, Hamburg, Laboratorium Press, pp. 127-137.

Haraway, D.J. (2016) *Staying with the Trouble. Making Kin in the Chthulucene*, Durham, Duke University Press.

Hergesell, J. (2019) *Technische Assistenzen in der Altenpflege. Eine historisch-soziologische Analyse zu den Ursachen und Folgen von Pflegeinnovationen*, Weinheim, Beltz.

Höppner, G. and Urban, M. (2018) *Where and How Do Aging Processes Take Place in Everyday Life? Answers from a New Materialist Perspective*, in "Frontiers in Sociology", 3 (7), doi: 10.3389/fsoc.2018.00007.

Joyce, K.A. and Mamo, L. (2006) *Graying the Cyborg. New Directions in Feminist Analyses of Aging, Science and Technology*, in T.M. Calasanti and K.F. Slevin (eds.), *Age Matters: Realigning Feminist Thinking*, Oxford, Taylor & Francis, pp. 99-121.

Karlsson, F., Holgersson, J., Söderström, E. and Hedström, K. (2012) *Exploring User Participation Approaches in Public E-Service Development*, in "Government Information Quarterly", 29(2), pp. 158-168.

Katz, S. (2012) *Embodied Memory: Ageing, Neuroculture and the Genealogy of Mind*, in "Occasion: Interdisciplinary Studies in the Humanities", 4, pp. 1-11.

Katz, S. (2015) *Ageing, Risk and the Falling Body*, in J. Twigg and W. Martin (eds.), *Routledge Handbook of Cultural Gerontology*, London and New York, Routledge, pp. 165-172.

Kontos, P.C. (2004) *Ethnographic Reflections on Selfhood, Embodiment and Alzheimer's Disease*, in "Ageing and Society", 24 (6), pp. 829-849.

Kontos, P.C. (2005) *Embodied Selfhood in Alzheimer's Disease: Rethinking Person-centred Care*, in "Dementia: The International Journal of Social Research and Practice", 4(4), pp. 553-570.

Kontos, P.C. (2015) *Dementia and Embodiment*, in J. Twigg and W. Martin (eds.), *Routledge Handbook of Cultural Gerontology*, London and New York, Routledge, pp. 173-180.

Künemund, H. (2018) *Problem-centered Design: Shifting Debates from the User to Problems*, in "Gerontechnology", 17, p. 37.

Künemund, H. and Tanschus, N. (2013) *Gero-Technology: Old Age in the Electronic Jungle*, in K. Komp and M. Aartsen (eds.), *Old Age in Europe*, Dordrecht, Springer Netherlands, pp. 97–112.

Lassen, A.J., Bønnelycke, J. and Otto, L. (2015*) Innovating for 'Active Ageing' in a Public-Private Innovation Partnership: Creating Doable Problems and Alignment*, in "Technological Forecasting and Social Change", 93, pp. 10-18.

Latimer, J. (2018) *Repelling Neoliberal World-making? How the Ageing-Dementia Relation is Reassembling the Social*, in "The Sociological Review", 66(4), pp. 832-856.

Latimer, J. (2019) *Science under Siege? Being alongside the Life Sciences, Giving Science Life*, in "The Sociological Review", 67(2), 264-286.

Latimer, J. and López Gómez, D. (2019) *Intimate Entanglements: Affects, More-than-human Intimacies and the Politics of Relations in Science and Technology*, in "The Sociological Review", 67(2), pp. 247-263.

Latimer, J. and Puig de la Bellacasa, M. (2011) *Re-Thinking the Ethical: Everyday Shifts of Care in Biogerontology*, in N. Priaulx and A. Wrigley (eds.), *Ethics, Law and Society*, London, Ashgate, pp. 153-174.

Latour, B. (2004) *Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern*, in "Critical Inquiry", 30(2), pp. 225-248.

López Gómez, D. (2015) *Little Arrangements That Matter. Rethinking Autonomy-enabling Innovations for Later Life*, in "Technological Forecasting and Social Change", 93, pp. 91-101.

Mackay, H., Carne, C., Beynon-Davies, P. and Tudhope, D. (2000) *Reconfiguring the User: Using Rapid Application Development*, in "Social Studies of Science", 30(5), pp. 737-757.

MacKenzie, D.A. and Wajcman, J. (eds.) (1985) *The Social Shaping of Technology: How the Refrigerator Got Its Hum*, Milton Keynes, Open University Press.

Marcus, A. (ed.) (2015) *Design, User Experience, and Usability: Design Discourse. 4th International Conference, DUXU 2015, Held as Part of HCI International 2015, Los Angeles, CA, USA, August 2-7, 2015, Proceedings, Part I*, Cham, Springer International Publishing.

Marcus, G.E. (1995) *Ethnography in/of the World System: The Emergence of Multi-Sited Ethnography*, in "Annual Review of Anthropology", 24(1), pp. 95-117.

Martin, A., Myers, N. and Viseu, A. (2015) *The Politics of Care in Technoscience*, in "Social Studies of Science", 45(5), pp. 625-641.

Merkel, S. and Kucharski, A. (2019) *Participatory Design in Gerontechnology: A Systematic Literature Review*, in "The Gerontologist", 59(1), pp. 16-25.

Mol, A. (2002) *The Body Multiple: Ontology in Medical Practice*, Durham, Duke University Press.

Mol, A., Moser, I. and Pols, J. (eds.) (2010) *Care in practice: On Tinkering in Clinics, Homes and Farms*, Bielefeld, transcript Verlag.

Mort, M., Roberts, C. and Callén, B. (2013) *Ageing with Telecare: Care or Coercion in Austerity?*, in "Sociology of Health & Illness", 35(6), pp. 799-812.

Moser, I. (2008) *Making Alzheimer's Disease Matter. Enacting, Interfering and Doing Politics of Nature*, in "Geoforum", 39(1), pp. 98-110.

Moser, I. and Law, J. (2003) *'Making Voices': New Media Technologies, Disabilities, and Articulation*, in G. Liestøl, A. Morrison and T. Rasmussen (eds.), *Digital Media Revisited: Theoretical and Conceptual Innovation in Digital Domains*, Cambridge, MIT Press, pp. 491-520.

Neven, L. (2010) *'But obviously not for me': Robots, Laboratories and The Defiant Identity of Elder Test Users*, in "Sociology of Health & Illness", 32(2), pp. 335-347.

Neven, L. (2015) *By Any Means? Questioning the Link between Gerontechnological Innovation and Older People's Wish to Live at Home*, in "Technological Forecasting and Social Change", 93, pp. 32-43.

Norman, D.A. (1988) *The Psychology of Everyday Things*, New York, Basic Books.

Norman, D.A. and Draper, S.W. (eds.) (1986) *User Centered System Design: New Perspectives on Human-Computer Interaction*, Hillsdale, Erlbaum.

Ogonowski, C., Jacobi, T., Müller, C. and Hess, J. (2018) *PRAXLABS: A Sustainable Framework for User-centred ICT Development. Cultivating Research Experiences from Living Labs in the Home*, in V. Wulf, V. Pipek, D. Randall, M. Rohde, K. Schmidt and G. Stevens (eds.), *Socio-informatics: A Practice-based Perspective on the Design and Use of IT Artifacts*, Oxford, Oxford University Press, pp. 319-360.

Östlund, B., Olander, E., Jonsson, O. and Frennert, S. (2015) *STS-inspired Design to Meet the Challenges of Modern Aging. Welfare Technology as a Tool to Promote User Driven Innovations or Another Way to Keep Older Users Hostage?*, in "Technological Forecasting and Social Change", 93, pp. 82-90.

Oudshoorn, N. and Pinch, T.J. (eds.) (2003a) *How Users Matter: The Co-Construction of Users and Technology*, Cambridge, MIT Press.

Oudshoorn, N. and Pinch, T.J. (2003b) *Introduction. How Users and Non-users Matter*, in N. Oudshoorn and T. Pinch (eds.), *How Users Matter: The Co-Construction of Users and Technology*, Cambridge, MIT Press, pp. 1-25.

Pantel, J. and Schröder, J. (2007) *Die leichte kognitive Beeinträchtigung: Epidemiologie, Symptomatik und klinisches Management*, in "Nervenheilkunde", 26 (1-2), pp. 49-58.

Peine, A. and Neven, L. (2019) *From Intervention to Co-constitution: New Directions in Theorizing about Aging and Technology*, in "The Gerontologist", 59(1), pp. 15-21.

Peine, A., Rollwagen, I. and Neven, L. (2014) *The Rise of the "Innosumer"- Re-*

thinking Older Technology Users*, in "Technological Forecasting and Social Change", 82, pp. 199-214.

Pinch, T.J. and Bijker, W.E. (1984) *The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other*, in "Social Studies of Science", 14(3), pp. 399-441.

Pols, J. (2012) *Care at a Distance: On the Closeness of Technology*, Amsterdam, Amsterdam University Press.

Pols, J. (2018) *A Reader's Guide to the Anthropology of Ethics and Morality - Part III*, in "Somatosphere". http://somatosphere.net/2018/11/a-readers-guide-to-the-anthropology-of-ethics-and-morality-part-iii.html (retrieved October 15, 2020).

Puig de la Bellacasa, M. (2011) *Matters of Care in Technoscience: Assembling Neglected Things*, in "Social Studies of Science", 41(1), pp. 85-106.

Rabinow, P. (2008) *Designs for an Anthropology of the Contemporary*, Durham, Duke University Press.

Rommes, E., Bath, C. and Maass, S. (2012) *Methods for Intervention: Gender Analysis and Feminist Design of ICT*, in "Science, Technology & Human Values", 37(6), pp. 653-662.

Spindler, M. (2018) *Wie eignen sich Menschen mit demenziellen Erkrankungen neue Pflegetechniken an? Selektive Türschließtechniken zwischen humanistischer Theorie und ökonomisierter Praxis in der Demenzpflege*, in H.-P. Zimmermann (ed.), *Kulturen der Sorge: Wie unsere Gesellschaft ein Leben mit Demenz ermöglichen kann*, Frankfurt am Main, Campus Verlag, pp. 333-358.

Suchman, L. (1993) *Working Relations of Technology Production and Use*, in "Computer Supported Cooperative Work", 2(1-2), pp. 21-39.

Suchman, L. (2006) *Agencies in Technology Design: Feminist Reconfigurations*. http://elib.suub.uni-bremen.de/ip/docs/00010581.pdf (retrieved October 15, 2020)

Suchman, L. (2007) *Human-machine Reconfigurations: Plans and Situated Actions*, Cambridge, Cambridge University Press.

Suchman, L. (2011) *Subject Objects*, in "Feminist Theory", 12(2), pp. 119-145.

Suchman, L., Trigg, R. and Blomberg, J. (2002) *Working Artefacts: Ethnomethods of the Prototype*, in "British Journal of Sociology", 53(2), pp. 163-179.

Swinnen, A. (2016) *Healing Words: A Study of Poetry Interventions in Dementia Care*, in "Dementia", 15(6), pp. 1377-1404.

Swinnen, A. and de Medeiros, K. (2017) *"Play" and People Living with Dementia: A Humanities-based Inquiry of TimeSlips and the Alzheimer's Poetry Project*, in "The Gerontologist", 58(2), pp. 261-269.

Swinnen, A. and Schweda, M. (eds.) (2015) *Popularizing Dementia: Public Expressions and Representations of Forgetfulness*, Bielefeld: transcript Verlag.

Thygesen, H. and Moser, I. (2010) *Technology and Good Dementia Care: An Argument for an Ethics-in-Practice Approach*, in M.W.J. Schillmeier and M. Domenech (eds.), *New Technologies and Emerging Spaces of Care*, Burlington, Ashgate, pp. 129-148.

Treusch, P. (2015) *Robotic Companionship: The Making of Anthropomatic Kitchen Robots in Queer Feminist Technoscience Perspective*, Linköping, Linköping University Electronic Press.

Tronto, J.C. (1993) *Moral Boundaries: A Political Argument for an Ethic of Care*, New York, Routledge.

Twigg, J. (2010) *Clothing and Dementia: A Neglected Dimension?*, in "Journal of Aging Studies", 24(4), pp. 223-230.

Wanka, A. and Gallistl, V. (2018) *Doing Age in a Digitized World - A Material Praxeology of Aging with Technology*, in "Frontiers in Sociology", 3 (6), doi: 10.3389/fsoc.2018.00006.

Wanka, A. and Gallistl, V. (2020) *Ältere Menschen und Digitalisierung aus Sicht der kritischen Gerontologie. Expertise zum Achten Altersbericht*, in C. Hagen, C. Endter and F. Berner (eds.), *Expertisen zum Achten Altersbericht der Bundesregierung "Ältere Menschen und Digitalisierung"*, Berlin, Deutsches Zentrum für Altersfragen.

Woolgar, S. (1991) *Configuring the User: The Case of Usability Trials*, in J. Law (ed.), *A Sociology of Monsters: Essays on Power, Technology and Domination*, London, Routledge, pp. 57-103.

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[1] The dissertation "*Assistiert Altern. Die Entwicklung und Nutzung technischer Assistenzsysteme für ältere Menschen aus kulturanthropologischer Perspektive*" is published in spring 2021.

[2] MCI can occur at an older age and cause impairments of memory, attention and thinking. These may be significantly below the performance usual for the respective age and educational level without significant everyday restrictions (Etgen et al. 2011). However, it is assumed that MCI is associated with a highly increased risk of dementia, especially with regard to the occurrence of Alzheimer's dementia (Pantel and Schröder 2007).

[3] In addition to the more narrowly defined user-centred design, there are a number of approaches that address a broad group of users, such as human-centred design, design for all or universal design. They all have the common objective of designing human-technology interfaces for all users, regardless of previous knowledge and experience, age or gender. These design approaches have their origin in early trade union efforts to improve the computer workstations of employees in Scandinavia (Ehn 1989; Bødker and Pekkola 2010).

[4] Akrich (1992; 1995) uses the terms "subscription" and "de-inscription" to describe precisely those processes of appropriation that run counter to the action programmes. De Laet and Mol (2000) later expand the idea of re-scription with their concept of fluid technology to point out the creative and unpredictable practices of use and modification.

[5] The project name, places and persons mentioned in the following have been anonymised by the author.