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Ambiguous animals, ambivalent carers and arbitrary care collectives: Re-theorizing resistance to social robots in healthcare

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ABSTRACT

Many countries are under pressure because of lack of healthcare staff to provide care to an increasingly aged population. Potential solutions are often sought through technological innovation, including social robots to cater to the patients' emotional needs. Despite significant financial investments in social robots, they have not been implemented at a larger scale. One reason commonly cited for this is the resistance of healthcare staff. Drawing on an ethnographic case study of a social robot Paro in an Austrian hospital, we nuance resistance to robots through the heuristic of ambivalence. We argue that the ontological ambiguity of an animal-looking robot provokes highly ambivalent reactions among healthcare staff. Additionally, these reactions are shaped by how the social robot interferes with different professions and the forms of care that they provide. Finally, we show that non-significant others, such as fellow patients, can importantly impact the (dis)use of social robots, an influence which occurs through what we call 'arbitrary care collectives.'

1. Introduction

Globally, the number of older adults is increasing and the European Union (EU) is no exception. In EU countries, on average, 20 percent of the population is older than 65 years, and Austria is a case in point (Mukasa and Schoenmaeckers, 2021). As older adults are subject to increased health risks and impairments, this demographic shift puts considerable pressure on healthcare systems which are already facing staff shortages (World Health Organization, 2022). To deal with this societal challenge, governments have been focusing on supporting technological innovation, including social robots for older adults. Many of these robots are animal-shaped, such as the seal Paro and dog Aibo (Pols and Moser, 2009; Prendergast, 2021). Such gerontechnologies (i.e. technologies used to support independent living of older adults) have been presented as a "triple win," which envisions technological innovation as good for seniors, society and business (Peine and Neven, 2021).

Despite this increased attention and funding oriented towards social robots for elder care, these technologies have been difficult to integrate in care practices (Van Aerschot and Parviainen, 2020; Lipp, 2022). For example, in 2005 the Dutch company Philips released a social robot iCat, yet the robot only became available for research (Robotics Today,

2018). Even in Japan, which is commonly perceived as a highly technologically advanced and robot friendly country, social robots have not become widely implemented (Wright, 2023). A famous Japanese-made Pepper, described as "the first robot with 'a heart,'" has even been discontinued in 2021 (Nussey, 2021).

How come that care robots are not used as commonly by their intended users – older adults with various cognitive and physical impairments – as it has often been hoped for and even predicted? We address this question by drawing on an ethnographic case study of a seal-shaped social robot Paro. The "therapeutic robot" Paro was developed in 1993 by a Japanese engineer Dr. Takanori Shibata with the intention to "bring psychological enrichment and joy to senior citizens with dementia" (Sense Medical Limited, 2023). Paro can be bought online for 6000 British pounds, excluding value added tax. In the size of a real baby seal, it weighs 2.5 kg and is covered with spotless white fur that cannot be taken off the mechanical parts. Wearing charming, oversized black eyes, Paro can make tiny squeaking noises, simulating seal cries, and it can slightly move its head and tail but does not display any changes in temperature. The robot is powered by electricity through a charger that is inserted in its mouth, not unlike a pacifier that is placed into a baby's mouth.

Our case study is a particular Paro, named Stella, which we

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encountered at a hospital dialysis unit in Austria where the second author conducted fieldwork. We focus on a 75-year old female patient whom we call Frau Hermann. This focus is grounded in our ethnographic material: among all the patients interviewed about their life with a chronic condition, Frau Hermann was the only one who related to Stella and spontaneously started talking about the robot; it was therefore even more surprising that she eventually stopped interacting with Stella completely.

The analysis of our case study has three objectives: to understand resistance to social robots in care through 1) the ‘ontological ambiguity’ of these technologies; 2) the position of the robot vis-à-vis different types of care (nursing, medical and psychological one); and 3) the role of ‘insignificant others’ in what we call ‘arbitrary care collectives.’ By doing so, we aim to move beyond the dichotomy of use and non-use of technology among older people and show that technology adoption is a complex and dynamic process (Gallistl et al., 2021; Fernández-Ardevol, 2016).

People’s reactions to Stella were highly diverse and we suggest that this was due to the ambiguity of Stella as an entity crossing the categories of ‘animal’ and ‘robot.’ Social robots are characterized by high “ontological fluidity,” as their identity is continuously re-enacted through the interactions with people (Felding et al., 2024; Chevallier, 2022). In contrast to technological devices with a clear role, like the hemodialysis machine with a clear role, we illuminate how the ontologically ambiguous social robot differently intervened in the work of healthcare staff (psychologist, nephrologists, nurses). We aim to understand the role of this ontological ambiguity in technology resistance and in negotiating what good care with such robots could look like. For this purpose, we draw on science and technology studies (STS) theoretical frameworks which approach care as an ongoing “tinkering” that includes people, but also objects such as various technologies (Mol et al., 2010). Tinkering refers to people making small adjustments, with technologies and each other, within their daily practices while striving to enact “the good” in care here and now.

Additionally, we highlight the impact of ‘insignificant others’ on social robot (dis)use. In doing so, we draw on the concept of “care collectives” which is fruitful to explore how people in need of care, their carers and the technologies they use collectively enact care (Winance, 2010; Ahlin, 2023). We extend this concept to ‘arbitrary care collectives’ to make explicit the influence of people who are not actively involved in care for a certain person, yet have a significant impact on whether a particular technology – in this case a social robot – becomes included in a care collective. As our fieldwork shows, people with whom the robot user is only arbitrarily related, such as fellow dialysis patients, may become significant for the ‘survival’ of this technology ‘in the wild.’ We therefore argue that the implementation of social robots depends on the complex relationalities of an extended ‘arbitrary care collective’ that is broader than the user-robot dyad and even user-robot-carer triade.

1.1. Implementing social robots in care

The challenges of social robot implementation are multi-faceted, often arising before such technologies even leave their laboratories, as certain values, assumptions and representations are embedded in robot design. Louis Neven (2010), for example, has shown that media representations of social robots as devices that serve to support old, frail, lonely people in need of care may repel their intended users, as older adults do not wish to be associated with old age in such ways. Similarly, Pols and Moser, 2009 have argued that affect and values are key in technology adoption: people prefer to relate to social robots that invoke feelings of fun and playfulness rather than those which remind them of their poor health and frailty.

Importantly, successful adoption of social robots in care (also referred to as care robots) depends on more than a dyadic relationship between a social robot and its main user. Healthcare staff and others often become involved in facilitating the interaction between a robot

and an older person. For example, Jeon et al. (2020) have argued that robots can work well provided that a human mediator intervenes and compensates for their technical and social limitations. Similarly, a study of Paro in nursing homes in France showed that patient-robot interactions were always mediated by care staff who had to perform considerable work, such as instructing people with dementia to stroke robots and talk to them, which enacted the robot as an “emotionally interactive robot” (Chevallier, 2022).

Highlighting the active role of carers in supporting social robots in dementia care, Nete Schwennesen (2021) suggested “repair” and “bricolage” to describe two modes of work that carers engage in to integrate technologies into local arrangements of care. Whereas repair concerns taking care of specific technologies to ensure their functioning, bricolage refers to “the use and combination of various technologies in the crafting of situated and emergent forms of care” (Schwennesen, 2021, 176). The loci of care in these two types of work differs: in repair, the attention is on the technological device, which needs to be maintained, while in bricolage several technologies are combined and tinkered with to provide care for a specific person at a particular moment in time.

Despite a crucial role of carers in technology adoption in elder care, they are often overlooked in the top-down approaches to technology implementation. Scholars have argued that for care robots to improve, research must go beyond imaginary scenarios or small-scale tests designed for research purposes; instead, broader “care ecosystems” must be considered (Van Aerschot and Parviainen, 2020). Such an ecosystem may include formal and informal carers, and even researchers, who facilitate the robot-main user interactions (Felding et al., 2024).

Significantly, the introduction of care robots may become complicated if carers display “technological resistance” and see technology as alienating and dehumanizing (Persson, 2023). In addition, carers may be particularly concerned about being replaced by social robots (Casey et al., 2020; Wright, 2023). Recently, scholars have called for activating ambivalence as an analytical lens, because it “offer[s] a more nuanced framework for the widely studied phenomena of ‘resistance to’ or ‘acceptance of’ digital technologies” in healthcare (Marent et al., 2018, 139). The notion of ambivalence, understood as simultaneously positive and negative orientation towards something, “facilitates both/and thinking” (Ashforth et al., 2014, 1456) that can be at once disturbing and productive. With this in mind, we analyze how the ontological ambiguity of social robots – and consequently how they intervene in different healthcare practices – can both lead to uneasiness among staff and has the potential for the creation of new openings in the provision of ‘good care’ at the beginning of the 21st century.

2. Methodology

2.1. Context

Many older adults develop chronic kidney disease either as a comorbidity of hypertension, diabetes type 2 and/or being overweight. In Europe, when such patients enter the end stage of renal disease with a kidney function of 15% or less, they receive renal replacement therapy, mostly in the form of hemodialysis treatment (ERA-EDTA Registry, 2018). In Austria, according to the national Dialysis and Transplantation Registry annual report (ARGE ÖDTR, 2017), around 4,000 people out of a total population of 8.7 million were receiving a hemodialysis treatment to replace lost renal function in 2016. The mean age of the patients at initiation of hemodialysis was 64 years.

Hemodialysis is a medical procedure of mechanically purifying the blood of a patient with failing kidneys. This process is either a step towards a kidney transplant or, if the type of kidney disease forecloses a transplant or the patient does not want one, a clinical prolongation of life. For patients, hemodialysis implies that they come to the dialysis unit every other day and undergo ‘a run’ of blood purifying which lasts around 4 h. Including the drive to and from the hospital, waiting and

recovery time, this process takes up most of the day and is often described as a part-time job by the patients (Gunnarson, 2016). Making time pass during a dialysis run is one of patients' central concerns (Russ et al., 2005).

2.2. Ethnographic case study

The data for this paper was gathered by the second author during her ethnographic research on improvements of quality of life for people with chronic kidney disease in Austria (Mann, 2021; Mann, 2024). The bulk of data was collected between 2016 and 2018 in dialysis units of two public hospitals, with follow-up interviews in 2022. The data we draw upon stems from one of the two hospitals which we call City Hospital. Its dialysis unit consisted of offices for nephrologists and nursing staff, a social room for all staff, a spacious, sunny waiting area for patients, and three dialysis rooms with four beds in each of them. In the unit, patients were always assigned the same room and bed.

Fieldwork focused on the daily routines of providing healthcare to patients in the end stage of renal disease. Everyday rhythms were recorded through participant observation for 29 days, for around 7 h per day. Observational data was complemented with formal semi-structured interviews with staff ($n = 5$) and numerous informal conversations. In contrast to elder care institutions, where social robots are often introduced as a potential solution to inadequate funding and the resulting lack of staff (Felding et al., 2024), the dialysis hospital in this research was financially stable and staff was not overworked.

The second author also observed and conducted semi-structured interviews with eight patients at the City Hospital dialysis unit (Mann, 2024). In this paper, we focus specifically on one of them, Frau Hermann. Having had an active working life and lifestyle, Frau Hermann entered the end stage of renal disease in 2010 and was on dialysis from then onwards until her death in 2018. Besides having a renal condition, Frau Hermann had been diagnosed with cancer and polyneuropathy, a condition in which peripheral nerves cease functioning. Despite barely being able to walk, she managed to live on her own in a residential apartment and was brought by an ambulance every other day to the City Hospital for hemodialysis. Frau Hermann did not have children, her best friends had either passed away or were old, multi-morbid and immobile, and her husband with Alzheimer's disease was in a nursing home. Her 'dialysis free' days often went by without her seeing anyone.

2.3. Analytical approach

The findings presented here are based on an interpretative analysis of specific sections of field notes and interviews related to Stella, the Paro robot that appeared in the City Hospital. Despite Stella not being the main object of the research within which our data was collected (Mann 2024, Mann and Chiapperino 2023), the question of the social robot emerged as an intriguing issue, worthy of exploration in its own right. Interpretative analysis, an inductive method common in anthropology and other social sciences, involves the search for meanings and their interconnection which requires a deep involvement into a particular environment, including an intimate familiarity with the language (Russel Bernard, 2011, 415). In this case, the second author is a native speaker of Austrian German, sensitive to the intricacies of translation (Mann and Mol 2019). She collected the data in Austrian German, transcribed interviews and wrote fieldnotes in Viennese Austrian German. She then translated the fieldnotes and the relevant parts of interviews into English.

The project was exempt from ethics review in Austria. Ethics clearance was obtained from the University of Copenhagen in 2016. All personal names, except for the robot, have been assigned pseudonyms.

3. Findings

3.1. Ambiguous social robots

Healthcare staff and patients are commonly accustomed to technologies, since hemodialysis treatment is highly dependent on them (Lehoux et al., 2004; Russ et al., 2005). Ethnographers of kidney patients' experiences have discussed technology primarily in relation to the machine-body that receiving this treatment creates. In particular, the hemodialysis machine, which exposes intimate bodily processes such as urinating, shapes patients' embodied sense of "self" (Kierans and Maynooth, 2001). In contrast, the Paro robot was a much more puzzling entity. The ways in which people in the dialysis unit, healthcare staff and patients, interacted with the robot enacted it as ontologically ambiguous. The ethnographer described her first encounter with Stella in her fieldnotes in the following way:

I follow Barbara Mayer, the dialysis unit psychologist, down the corridor to her office. As she opens the door, I notice a white plush seal on top of a box, placed in the corner of the room. "This is Stella?" I ask. Barbara nods: "Exactly!" She takes the seal and switches it on. The seal starts emitting sounds that resemble a cat miaowing. She turns to me, "This is Stella!" She turns back to the seal. "Aren't you, Stella?!" [Fieldnotes, 1 March 2017]

The psychologist introduced the robot to the ethnographer by using a personal name, Stella, and talked to it as if it were a living being, perhaps an actual animal or even a child. This was surprising to the ethnographer, who had been sensitized to nameless, obviously lifeless medical technologies. In an interview a couple of days later, Barbara Mayer explained how the robot entered their dialysis unit and acquired a name:

"A nursing home nearby had a project with the robot seal and gave a presentation during which they handed their seal around. Really cute. So I thought, that would be cool for us! I approached the head of our unit with the proposal to buy one, but her response was 'Nice idea, but we don't have 4.000 euros.' So, I approached Astella, the pharmaceutical company with whom we were doing stuff [small scale research projects] on adherence and told them that the seal might increase adherence to medication." [Interview with BM, 3 March 2017]

Because the costs of the robot were prohibitive for the dialysis unit, the psychologist acquired it with the help of sponsorship. As a token of appreciation, she named the robot Stella after the pharmaceutical company which acted as the sponsor.

This kind of introduction into 'the wild,' non-controlled environment is different from how Paro's entrance into care institutions has been described elsewhere. New technologies are often introduced into care practices with a top-down approach, with the management of care facilities asking the practitioners to adopt it (Schwennesen, 2021; Gibson et al., 2019). Chevallier (2022), for example, writes about how Paro was introduced to a French elder care home as a part of a research trial. This process included two demonstrations by the company selling the robot to the care home managing team. These demonstrations covered detailed instructions on how to introduce Paro to the care home residents. However, in the City Hospital dialysis unit, the initiative came from the psychologist who found the idea of a social robot appealing to improve the healthcare that was provided at the dialysis unit. No staff members ever reported having joined any demonstration classes to learn how to use it.

When people encounter new technologies, they "tinker" (Mol et al., 2010) with them to see how they could fit into their daily practices. Through tinkering, people "meticulously explore, 'quibble,' test, touch, adapt, adjust, pay attention to details and change them, until a suitable arrangement (material, emotional, relational) has been reached" (Winance, 2010, 111). In the case of care home in France, staff tinkered to make instructions they had received during the training sessions fit

particular situations (Chevallier, 2022). The dialysis nurses, nephrologists, and the psychologist at the City Hospital tinkered differently with the robot. Because this was a bottom-up initiative without any associated training, the staff tinkered to establish what the robot was, how to relate to it, and how good care with it might look like (see next section). Without clear directives about the robot, they also had little grounds towards which they could build their resistance in an explicit way.

For healthcare staff, tinkering involved switching the robot on and off to discover at what moment is it appropriate to activate the robot, for example when introducing the robot to the ethnographer. Further, tinkering involved quibbling with their emotional reactions to the robot:

Eva Doblinger, the senior nephrologist, gets up from her desk. She turns around and picks Stella up, along with Stella's charger and a brush that Barbara had already prepared for Frau Hermann. With Stella in her arms, Eva leaves her office and walks towards room 2 in which Frau Hermann and three other patients are lying attached to hemodialysis machines. In the hallway, Eva turns around to face me and says, tongue-in-cheek, "Don't you want to take a picture?" The sight of the nephrologist, wearing her white coat and holding the robot seal in her arms, is too pretty not to be documented. A smiling Frau Doktor Doblinger bringing quality of life in the form of a seal to her patients. [Fieldnotes, 1 March 2017]

The ethnographer interpreted the physician carrying the seal robot to a patient as a practice of improving patients' quality of life, because her main research question at that time was how 'improving quality of life' was enacted within mundane care practices (Anonymous, 2021; 2023). This fieldnote reflects the striking irony with which the nephrologist 'staged' the seal in a very particular way to the ethnographer. In other settings and contexts, ethnographers have interpreted irony as an affective frame through which conflicting emotions are expressed, as "a rhetorical device aimed at emphasizing the absurdities of social life, and the presence of competing versions of the world" (Gallo, 2015, 2). According to Gallo (2015), irony is the emotional work involved in meaning-making of events over which people feel they have little control. The physician's invitation to take a picture – and the ethnographer's response in her fieldnotes – could be interpreted as an attempt to make sense of the absurdity that Stella represented as an animal-looking robot, a technological device with artificial fur towards which people acted as if it were some sort of a baby.

The robot's ontological ambiguity became evident again in the ethnographer's third encounter with it:

Barbara, the psychologist, has asked me to carry Stella from her office to the dialysis unit where Stella will be used by Frau Hermann this afternoon. I walk down the corridor, take the elevator, and enter the dialysis unit. Nurse Denise is walking towards me on her way to the nursing station. "Is this our Stella?" "Yes," I reply. "How sweet!" Another nurse has joined us. "Is this her pacifier?" she asks. "No, it's her charger," I explain. "How cute!" I feel utterly bewildered. Everybody is interacting with this thing as if it were a real animal. But it's only a robot, isn't it?!

Identifying the charger as a pacifier, using the words 'sweet' and 'cute' accompanied with smiles made the ethnographer feel as if the nurses were interacting with a baby, or more specifically a baby animal. That left her confused and even slightly irritated. Her switching the pronouns between 'it/its' and 'she/her' to refer to Stella reflects this confusion.

In Chevallier's research (2022, 8), a demonstrator explained to the carers in two special sessions that the robot is emotional in the sense that "when you see it, it will create an emotion." This, precisely, is the moment of ontological confusion which occurs commonly within human-robot interaction: social robots do not have emotions in and of themselves; rather, it is people who anthropomorphise technology and project characteristics such as emotions and intelligence onto these devices (Scheutz, Mattheus, 2011; Voss, 2021). Moreover, Paro's

ontology is complicated by the fact that it resembles and makes movements and sounds reminding of an animal.

In their article on affective social relations through care technologies, (Pols and Moser, 2009, 159) challenge the idea of a sharp distinction between "cold technologies" and "warm care," arguing that there are "different relations between people and technologies within different use practices." Stella confirms and complicates this further: the animal-shaped robot's ontological ambiguity as neither a cold technology nor a truly (figuratively and literally) warm, caring living being generated a confusion that people could not easily resolve and therefore approached it with irony and, at times, irritation. In the coming section, we explore how this ontological ambiguity influenced the negotiations regarding what good care for dialysis patients could, should and, in this dialysis unit ultimately would be.

3.2. Ambivalent healthcare staff

As mentioned, the introduction of the social robot to the healthcare staff in the City Hospital dialysis unit occurred haphazardly, without an explicit imperative and instructions from the management. Stella's ontology remained ambiguous and, as we show in this section, the same was true regarding the alignment of the robot with the values and tasks of different healthcare staff. This had consequences for how the healthcare staff involved Stella into patient care, which was full of ambivalence:

Regina Watschinger, the head nurse, walks towards patient room 3. Herr Pospischil, a gaunt male patient in his early 40s, is approaching that room too. "Are you in need of a cuddle?" Regina asks him. "Why, are you available?" he retorts. "No. But I have a cuddly toy," she replies. "That's too cool for me," Herr Pospischil responds, and they both laugh. Later, Regina tells me that "Magister Mayer" charged her with asking other patients whether they would want the seal. "So, for the fun of it, I ask around randomly." [Fieldnotes 6 March 2017]

Rather than referring to the psychologist by her first name, Regina used the psychologist's title, "Magister", indicating that there was a difference in education levels between them. In Austria, nurses receive a degree without an academic title while psychology is studied at the university. This difference placed the psychologist, educationally, slightly above the head nurse. At the same time, in the hospital hierarchy the psychologist and head nurse were at the same level. Furthermore, the psychologist had only joined the hospital shortly before fieldwork took place, she worked part-time, and her office was located in the outpatient clinic. Thus, she was physically and administratively outside of the realm over which the head nurse had the main responsibility: the dialysis unit. Within this web of hierarchies. The psychologist had used her position within this web of hierarchies to delegate the work of introducing Stella to the dialysis patients to the nurse.

Resembling Eva Doblinger's irony-laden reaction to Stella, this brief encounter between the head nurse and the patient was full of jest. At the dialysis unit, patients and healthcare staff saw each other every other day for months and often for years, so it was common for them to become friendly. The patients were familiar with the staff and also with the daily happenings in the unit, including Stella's arrival. Herr Pospischil therefore immediately recognized what (or whom) nurse Regina was referring to as a "cuddly toy." The head nurse, in turn, was not in the least convinced that patients would like to engage with the robot. As Regina confirmed to the ethnographer, she only asked them "for the fun of it," and she did it in a joking manner. In this way, she followed the request of the psychologist while simultaneously boycotting it. The patient replied with the same joking mode, noting that the robot mimicking an animal from an arctic environment is "too cool" for him to engage with. The whole joke was on Stella.

On another occasion, Regina explicitly expressed anything but neutral feelings towards the robot, as the ethnographer observed:

I have just passed nurse Denise and another nurse on the corridor, and am wondering where to put Stella until, later this afternoon, Frau Hermann will use her. I am walking to the nurse's station inquiring with the vice head nurse. She tells me to put it in Regina's office. A few minutes later, Regina, sitting in her office, notices Eva Doblinger passing by on the hallway. She shouts towards Eva: "Take her PLEASE! I can NOT stand her! I don't get it! Neither ethically, nor morally, nor socially, nor whatever!" Eva picks up the seal and replies, "As long as you are not against her ...". Later, Regina tells me, "I have an ethical-moral issue with this artificial animal that imitates human feelings." [Fieldnotes 1 March 2017]

Regina's resistance to the social robot, hidden under jesting in the previous fieldnote, came fully into the open. The two fieldnotes reveal the tension that is created by trying to follow the request from someone slightly higher in the professional hierarchy while this request is not aligned with one's values as a nurse, which Regina herself described as 'moral,' 'social,' and 'ethical.' A straightforward request to include the robot into care practices, without ensuring that all staff agreed on what the robot was and how it aligned with their values and tasks resulted into half-hearted, non-serious engagement with the robot and – when patients were not nearby – open resistance on behalf of the head nurse.

As the following fieldnotes unravel, there were significant differences among the healthcare staff, even among those of the same profession. In the below situation, the nurses spoke one over another in a heated debate, making it difficult to record who exactly said what. The nurses' views of Stella diverged and the robots ontological ambiguity amplified these divergences:

The nursing staff on duty today is sitting around a long table, having lunch. From time to time, an alarm of a hemodialysis machine rings and a nurse gets up to check on her patient's blood pressure. "How do you find Stella?" I throw into the conversation, addressing nobody in particular. "It's sad that nowadays you have to give patients an animal on batteries to keep them satisfied," one nurse responds. "But what would be the alternative? That Frau Hermann goes to a day care centre?" "It's physical contact that she needs. Which she would not get in the day care centre." "But if the patient is really happy with it?!" "I said to Frau Hermann, 'You don't need it.' She replied: 'But Frau Doktor talked about it so much.' So, I said, 'If Frau Doktor tells you to jump out of the window, do you jump?'" "It isn't hygienic either." "But it was approved of by the hygiene department." "It isn't hygienic." "But it was approved." Stella makes run feelings high, indeed. [20 March 2017]

For nurses integrating the robot into patient care came along with the repair work of following the hygiene rules regarding the robot (see also Schwennesen, 2021). Before use, the patient had to be tested with a swab for antibiotic-resistant bacteria. Then they had to wait for the test results. Once the results returned as negative, the seal had to be sprayed with a disinfectant. Further, an extra bed sheet had to be added between the patient's bedsheet and the seal for protection. As other research has shown, social robots in healthcare settings add new tasks to the work of healthcare staff, both in terms of making sure that the relationship between the patients and the robot is smooth and pleasant (Chevallier, 2022) and in terms of caring for the robot itself (Schwennesen, 2021). Here, new tasks become apparent, which is the work of asking whether the patient wants to interact with the robot and then ensuring patients' physical safety by preventing the spread of infection when one robot is shared among several patients.

However, the problem of hygiene was not the only, or the most important, issue for the nurses in the dialysis unit. From the conversation above it transpires that their feelings towards Stella were complex and conflicting. The nurses recognized that the robot seal was useful for some patients, yet at the same time felt that it could not replace the physical presence of another living being, such as a nurse. Despite seeing that Frau Hermann enjoyed interacting with Stella, some nurses actively

discouraged her from doing so. They clearly could not reconcile the "cold technology" with the notion of "warm care" (Pols and Moser, 2009). This opposition could become blurred within care practices; our fieldnotes also show that it became re-actualised and worked to prevent the inclusion of the robot into care. What is at stake here is, 'good care,' as the nurses struggled to reconcile their ideals of good care with their patients' specific needs and preferences within certain contexts that included limits of movement and socialization.

The head nurse raised ethical questions of what she perceived as an attempt to replace a human presence with a robotic one. The human presence in question is that of the nurse standing next to a dialysis patient and providing a presence that is compassionate, for instance through the caring touch of a hand (American Nurses Association, 2021). The social robot most obviously *competed* with this nursing task of being a presence. This is reflected also in the discourse of care robots which commonly argues that these technologies are needed to fill the gap of insufficient numbers of nurses and/or increase economic efficiency by reducing nurses' wages, especially of those with lower qualifications (Wright, 2023, 132). By contrast, the nephrologists and the psychologist did not share these concerns. The psychologist attended to patients' emotional wellbeing during clearly defined one-hour long sessions in her office in the outpatient clinic; the social robot *complemented* this tasks. It also did *not compete* with the nephrologist's tasks, which were focused on the replacement of a physiological processes through hemodialysis and medication prescription. Thus, a social robot may either complement or compete with forms of care – nursing, psychological, medical and other ones.

Further, the nurses in the conversation asked questions about for whom the robot is doing any good: Is including the robot into care good because the patient asked for it? Or is it bad care because the patient was talked into interacting with the robot by someone else, in this case the doctor? Finally, does the robot help to enact good care at the hospital unit because it brings a socio-emotional component to the patient's life which the patient may be missing in her daily life outside of the unit? Or is it rather the government that is to blame for not taking better care of its older citizens?

In the absence of a structured conversation around these issues, the healthcare staff did not represent a homogenous group of people, but rather adjusted their specific care practices according to their own values and tasks. While the psychologist saw Stella as something that could be "fun" for the patients while they were in the dialysis unit and the nephrologist literally made fun of Stella as the robot was outside of her professional domain, the nurses held ambivalent attitudes towards Stella and engaged in deliberations about how this ambiguous entity could support good care, or not. Despite their feelings of uneasiness with the robot because it did not align with their values, complicated their tasks and competed with their role, the nurses collectively pushed their own attitudes in the background and insisted on doing what was *best for each of their patients individually*. For some patients, like Frau Hermann, this included interacting with the robot.

3.3. Arbitrary care collective

On the same day as the ethnographer was introduced to Stella, she was able to observe how the robot seal interacted with Frau Hermann, the only patient at the dialysis unit who could be described as a user of this technology:

Frau Hermann, covered with a blanket, is lying in her bed. Tubes that have been attached to the catheter at her chest and are leading to the dialysis machine, which is, for four hours, washing her blood. The screen of the machine is counting down the time until today's run will end: 2:13:52. Around Frau Hermann, three other patients are lying in their beds, watching TV, reading a newspaper or dozing.

On Frau Hermann's chest, on top of her blanket and a bed sheet, is Stella. Frau Hermann is brushing her fur. I am asking her questions,

“Does she recognize you?” “She does,” Frau Hermann responds and to Stella, “Stella!” The seal hears her name, lowers her head and looks at Frau Hermann. Frau Hermann continue to brush her fur. The seal opens her eyes. “Ahhh ... so cute! I have utterly fallen in love with these eyes.” She beams. [Fieldnotes 1 March 2017]

Frau Hermann’s reaction to Stella was similar to what has been observed in other care settings. Especially people with dementia have reported that interacting with Paro made them “happy”, transforming the uncertain and uninviting hospital environment into a more relaxed and even cheerful one (Hung et al., 2021). However, in the scholarly literature on social robots for older adults, one of the major debates is the ethical issue of deceiving and infantilizing older users of robots. As (Sharkey and Sharkey, 2012, 35), following Sparrow (2002) maintain, “any beneficial effects of robot pets or companions are a consequence of deceiving the elderly person into thinking that the robot pet is something with which they could have a relationship.” This is a years-old ethical concern in social robotics, especially when the older adults in question are people with dementia. However, Frau Hermann did not have dementia and she understood perfectly well that she was interacting with a technological device. In practice, Stella’s ontological ambiguity left an opening for a “positive affective value” (Ahmed, 2010, 29). In other words, “to be affected by an object in a good way is to have an orientation towards an object as being good” (Ahmed, 2008, 10). By affording Frau Hermann to take care of her, touch her and brush her fur, Stella made Frau Hermann feel good to the point that Frau Hermann “fell in love” with the robot. This expressed love for the robot seal drew also on in Frau Hermann’s general love of animals, by her spending much time watching animal documentaries at home, as she reported to the ethnographer.

And so it came as a great surprise to the ethnographer when she heard that Frau Hermann suddenly refused to keep on using the robot:

In the social room, the daily round is taking place. A senior nephrologist, the nursing staff on duty today, and the head nurse are sitting at the table. One patient after the other is discussed. Nurse Angelika starts: “Frau Hermann is coming the last time before she will go to a health resort for three weeks. A note says that she does not want the seal anymore. She is embarrassed.” “Oh no.” “The nice seal.” Nurse Ulrike adds, “Given that the other patients were shaking their heads, I understand her.” [Fieldnotes 6 March 2017]

There was no additional discussion regarding Frau Hermann’s abrupt decision to stop interacting with the robot. The situation was further illuminated several years later, during follow-up fieldwork:

I have returned to inquire about how the Covid 19 pandemic has changed the daily routines. After my questions have been answered, I ask Eva Dobliger about the patients that I had encountered five years earlier: “How is Frau Hermann doing?” “She passed away,” Eva explains. “Oh no.” “She was the only one who asked for the seal. I remember that she found a boyfriend in autumn the year you were here. But he spoke badly about the seal. Told her that she wasn’t a baby anymore, that she should get her act together. So, she was embarrassed. What a pity! So stupid!” [Fieldnotes 26 May 2022]

From this data, it transpires that care practices involving robots do not occur as a dyadic relationship between an object and its user. As mentioned earlier, literature on social robots in care has emphasized that facilitators, who could include healthcare staff or researchers, are crucial in mediating the relationship between robots and the people who are their intended main users (Lipp, 2022; Felding et al., 2024). The significance of relationships between carers, people who need care, and technologies has been described in terms of “care collectives” (Winance, 2010). Care collectives refer to assemblages of people and technologies which work together to enact care within specific practices. They may be formed within formal or informal settings and may involve people who are consistently involved in caring as well as those who are called upon

in case of a particular need, such as sudden aggravated illness or an accident (Ahlin, 2023).

Our fieldwork data suggests that this conceptualization of care collectives must be extended, as it highlights the importance of people who could be described as ‘insignificant others’ in the adoption or discontinuation of social robots in healthcare settings. This ‘arbitrary care collective,’ which adds the people who serendipitously happen to be present in the place of care but are neither patients’ carers nor family members, may influence the patient-robot interaction and robot acceptance or rejection. For Frau Hermann, the decision to stop engaging with the robot was influenced by the views of her new partner, a member of her extended care collective. Additionally, it was significantly influenced by her fellow patients who happened to share with her the space of the dialysis unit. In such a unit, patients are placed in the same room randomly, regardless of their gender, age or personal interests, for several hours at a time, several days a week over months and years. As the patients are experiencing the same physical condition of failing kidneys, the dialysis unit room becomes a “biosocial space” (Hamdy, 2008) in which not only nursing, medical and psychology staff negotiate how to provide good care. Patients, too, assess and reassess, tinker and try out what good care is for them or their fellow patients. As our fieldnote shows, fellow patients within this arbitrary care collective responded in very different ways to the social robot, and some were more assertive in voicing their opinion than others. In the end, Frau Hermann bowed to the peer pressure, expressed through judgements made in passing, and to scolding from her partner who felt that the social robot was nothing more than a toy, demeaning for an adult. She renounced the robot she had fallen in love with.

4. Discussion

In this paper, we investigated ontological ambiguity as a key element that helps to understand the limited use of social robots in healthcare. Despite the high hopes and considerable investments in social robotics to alleviate the resource-poor healthcare of at least some pressure, these robots have not become widely implemented in any country in the world (e.g. Wright, 2023). The reasons for this are complex, and our case study highlights three of them: the ontological ambiguity of animal-shaped social robots; the ambivalence of healthcare staff, particularly nurses, towards social robots; and arbitrary care collectives.

As a robot in the shape of a baby seal, Paro transcends the clear-cut categories of “cold technologies” and “warm care” (Pols and Moser, 2009). Despite being a technological device, Paro in our study became enacted by patients and different healthcare staff – the psychologist, the nephrologists, and the nurses – as a living being in various ways: they gave the robot a name and interacted with it as if it was it were a baby animal, including providing care to it such as combing its fur. This ontological ambiguity – are we dealing with technology or a baby animal, an object or a subject? – created confusion which, in turn, generated ambivalent responses to the robot that were highly diverse, both among healthcare staff and patients.

Much literature on social robotics, and technology in general, tends to treat healthcare staff as a homogenous group that must be recruited to implementing new technologies within healthcare. However, our data shows that the ontological ambiguity of an animal-looking social robot may leave the door open for a plethora of responses of the healthcare staff differing between and within professions ranging from doctors to nurses to psychologists. Different forms of care and professions are positioned in diverging ways vis-à-vis the robot, as they complement or compete with the robot’s presence. Even when healthcare staff may seemingly accept the request to offer the robot to the patients, the way in which they do so – through joking and ironic comments – may have exactly the opposite effect. Through such ambivalent responses to the robot, what is ‘good care’ with such technologies is continuously negotiated. This is especially relevant for nurses, who are confronted with additional tasks, including repair and relational work to facilitate

the functioning of the robot in practice, while they must also contend with the robot competing with their (professional) presence.

The literature on technologies in general, and within healthcare specifically, has effectively shown that the success of any technology is dependent on sociotechnical relations in which it is embedded. However, the relations that are significant for the ‘survival of technologies in the wild’ are not only between the technology and its users (Oudschoorn et al., 2003), and also not only between carers, people in need of care and the specific technologies they engage with (Winance, 2010; Schwennesen, 2021). The extended and arbitrary care collectives, including fellow patients, matter too. Not having more information about these patients’ views on the social robot could be a limitation of this paper. The strength of our analysis strength lies in our ethnographic material: besides Frau Hermann, no patient interacted with the robot nor did they mention it in interviews. To them, it did not matter. Our observations, however, show that the response of such fellow patients to the ontological ambiguity of animal-shaped robots has important implications on whether a particular patient may continue to engage with a robot. Even when the patient may enjoy this interaction, peer pressure from fellow patients as well as significant people in their care collective may be too intolerable to continue interacting with the robot.

As (Marent et al., 2018, 139), responsible research and innovation “requires us to embrace ambivalence rather than seek to resolve contradictions and avoid conflicts.” In this article, we have not only provided empirical evidence for the usefulness of activating ambivalence as a heuristic tool, but also shown how through ambivalence and the negotiations resulting from it something fundamental becomes configured and reconfigured: the practices of good care at the beginning of the 21st century.

CRediT authorship contribution statement

Tanja Ahlin: Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Anna Mann:** Writing – review & editing, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Statement on ethics

The project was exempt from ethics review in Austria. Ethics clearance was obtained from the University of Copenhagen in 2016. All personal names, except for the robot, have been assigned pseudonyms.

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Data availability

The data that has been used is confidential.

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