Towards a Sociological Understanding of Robots as Companions

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Abstract. While Information Communication Technologies (ICTs) have, in the past, primarily mediated or facilitated emotional bonding between humans, contemporary robot technologies are increasingly making the bond between human and robots the core issue. Thinking of robots as companions is not only a development that opens up huge potential for new applications, it also raises social and ethical issues. In this paper we will argue that current conceptions of human-robot companionship are primarily rooted in cognitive psychological traditions and provide important, yet limited understanding of the companion relationship. Elaborating on a sociological perspective on the appropriation of new technology, we will argue for a richer understanding of companionship that takes the situatedness (in location, network and time) of the use-context into account.

Keywords: Social robots; companionship, sociology.

1 Introduction

Much has been made of the future potential of robots. Increasingly, development has turned to what has been termed 'social robotics', wherein robotic devices play social, assistive or therapeutic roles[1,2]. Cynthea Breazeal [3] who developed Kismet one of the earliest social robot in the mid 1990's, defined a sociable robot as one that "is able to communicate and interact with us, understand and even relate to us, in a personal way" (p.1) She sees the pinnacle of achievement robots that "could befriend us, as we could them".

Such attitudes as those expressed by Breazeal, are instructive because they frame up an idealized relationship based upon communicative action between two essentially isolated individuals. This notion points to the heart of a dilemma in that it would seem to suggest a singular relationship between an isolated robotic artifact and an emotional human being. The robot is seen to evoke in the human a vast array of emotions that result in intimate ties between person and robot. These 'single point' framings are a product of a particular disciplinary background due to a reliance on Human Computer Interaction as a foundation, that itself has roots in cognitive psychology and communications models of human interaction. In this paper we move beyond what might be called a 'single point' notion of interaction between human and

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machine, common to the discipline of Human Robot Interaction (HRI) and Human Computer Interaction (HCI) more generally, to one based upon a sociological understanding of robot companions. We note, with Zhao [15], that until now sociologists have paid surprising little attention to social robots. With this paper we aim to argue the relevance of a sociological understanding of social robots. In doing so we will draw on selected literature in the sociological area of Science and Technology Studies, that moves beyond an ethnographic appreciation of social behaviour and contexts.[1] This approach situates technological artefacts within a broader 'actor-network' and prioritises the relational and transformational nature of the interactions between people and things in particular places [11].

The structure of the paper is as follows. First we will provide a concise impression of how the concept of companion figures in current social robot research by describing some recent and ongoing European projects. Then we will argue the relevance of a broader sociological perspective by highlighting the core social and ethical fears that go with these developments. Lastly we will describe a sociological understanding of robot companions and we will discuss its merits for companions design.

2 Companionship in Current European Research Projects

The notion of "robots as companions" is currently often used to frame current research projects. Just to mention some recent and ongoing core European projects: LIREC (Living with Robots and Interactive Companions) and CompanionAble (both FP 7 projects), COMPANIONS (FP 6 project) and the Austrian project C4U (Companions for Users) that is linked to the FP7 project SERA (Social Engagement with a Rabbitic User Interface).[2] Whereas earlier social robot research tended to emphazise either the functional or the affective dimension of social robots [15], the "companion" approach clearly aims to develop robotic devices that combine these two features. In this section we aim to give an impression on how companionship is conceptualized in these research programmes.

The LIREC project is made up of people from the areas of psychology, ethology, human-computer interaction, human-robot interaction, robotics and graphical characters. As we might expect from such a group, the concerns of the collaboration are wide, but we can discern some key features, such as emotional expression and identification [4,5] along with psychological models of empathy [6]. Enabling devices to remembering previous interaction - and hence learn preferences and the line - and forgetting - so as to protect privacy - are combined to help maintain trust between human and robot [9]. Human-animal relations serve as an important model for robotic companionship in LIREC. This model frames the relationships and points to particulare expectations.

The C4U – Companions for Users – project is one of the few HRI studies that explicitly addresses gender issues. Women constitute a large group of potential users (esp. among the elderly), however, little knowledge is available on the possible gendered character of human robot relationships. This project aims to investigate

[1] For early incorporation of STS ideas see the work of Jutta Weber [7].

[2] See for more information the following project websites respectively: lirec.eu, project-sera.eu; www.companions-project.org; www.companionable.net

possible gender-specific requirements for integrating companion technologies into female lifestyles and, in the end, developing guidelines for gender-conscious companion technology development. C4U is related to the FP7 European project SERA in which long-term social engagement with robotic devices is the core challenge. The project studies social engagement with an embodied (Nabaztag), task-oriented (physical exercises) interface over time in real life situations.

The long term bonding with a companion agent is too central in the EU Companions project. Companions, in their perspective, are able of "developing a relationship and "knowing" its owners preferences and wishes". This project focuses on developing meaningful interaction by speech to a central way to establish lasting bonding between humans and virtual companion agents.

CompanionAble, another FP 7 EU project, develops a robotic device that cooperates with Ambient Assistive Living environment, aiming to support longer independent living of (mentally impaired) elderly. The autonomously moving robotic companion mediates between the care-recipient and the smart home environment and care givers. The companion robot is able to detect and track people in the home environment and communicates by speech and (touch) screen. The project uses a co-designing approach by actively involving care-recipients and professional as well as personal care givers during design. Testing prototypes is located in smart home labs mimicking real daily living.

All in all, we may conclude that the concept "companion" is currently featuring in various research projects, yet with multiple meanings. One central issue, however, is that current design aims of artificial companions go beyond "user acceptance" and aim to establish lasting social bonding with its user. As bonding and companionship need time and context to evolve, these projects tend to study the interaction beyond the restricted laboratory setting but in (simulated) real life settings. In this respect we may conclude that current HRI research projects tend to move beyond the traditional "single point" interaction and broaden insights in interaction dynamics by framing the interaction in time and real life contexts. However, most projects still focus primarily on the bilateral human robot interaction leaving the wider social context with different actors and stakeholders involved out of scope. This is especially the case where robot companions are aimed to function in more complex, organizational care arrangements. In the next section we will discuss some of the social and ethical issues that currently rise about the use of robot companions in care settings.

3 Social and Ethical Dimensions of Robots as Companions

The idea of robot companions, while a staple of fiction, is moving into the mainstream. In the application domain for care, there are two primary prospective cohorts for companion robots, children and older people. Not only are there hopes that social robots might befriend and care for people, but also fears are given voice.

The first fear is on *deception.* The main argument is that robot companions deceive vulnerable people, such as mentally impaired elders and toddlers, by faking human behaviours, emotions and relations. These humans may come to believe that the devices express 'real' emotions and hence rely on them for their emotional contact and support [18]. They are what Turkle calls 'relational artifacts' [12] and they speak to the 'authenticity' of the interactions between humans and non-humans [13].

We see, for example, the description of social robots as 'synthetic' companions in the LiREC project. In the literature we see descriptions of the 'artificial' companions [2,14] and "surrogates" [15] . We also see a concern to make the robot 'believable' [16] suggesting the perceptual is the most important ingredient. Such concerns echo those expressed about a range of information communication technologies [17], but also the western cultural performances of fictional robots as mechanical, emotionless and potentially malevolent [18].

A second, related fear is s*ubstitution.* This fear is built upon the previous concern about deception, but extends it to institutional care arrangements. Here it is believed that robots will replace humans in care situations, and thus deprive care-receivers from human contact, empathy, caring and the like [19]. Again there are echoes within alternative technology forms, such as in the introduction of telecare and assistive home devices.

Both issues have supporters and critics and have the potential to develop in the future into dogged public and political debates. As such they need to be taken seriously. However, here we want to argue that both positions use a limited, de-contextualized perspective on the shaping of companionship. The idea of deception and substitution rely on a fundamental separation of human and technology that in turn relies on a set of attitudes and omissions. It ignores for example the place that technology currently plays in people's daily practices and the ways that technology mediates relationships. This we might call the 'mediation response' to the fears of technology, namely that technology already plays a substantial role in the coordination of human-human interaction.

An other point of reflection we want to make, is the realization that people already become emotionally attached to objects. A case in point is an instance drawn from the second author's fieldwork [26]: A visually impaired man that was interviewed about participation in a local friendship groups was seen to have a small portable television continually playing in the background. When asked about this, the person replied that the voices and the indistinct imagery provided 'company', a word with the same root meaning as companion. Turkle's 'evocative objects'[20] extend from the cello to Foucault's Pendulum: "We find it familiar to consider objects as useful or aesthetic, as necessities or vain indulgences. We are on less familiar ground when we consider objects as companions to our emotional lives or as provocations to thought. The notion of evocative objects brings together these two less familiar ideas, underscoring the inseparability of thought and feeling in our relationship to things" [20 p 5]. Turkle's study too shows clearly that the process of how objects become companions for individuals is deeply rooted in the persons wider social context and network relations. Her findings are in line with Suchman's [10] situated understanding of human-technology relations and, as such support the relevance for developing a broader sociological perspective for understanding human-robot companionship.

4 Reframing Human-Robot Companionship from a Sociological Perspective

While the above mentioned research projects extend beyond the laboratory and focus on simulated real life settings, they still miss much of the complexity of social life. In

order to gain more knowlegde on how robot companions will function in real life settings a sociological framing is essential. In the context of this paper we are only able to give a modest, but hopefully challenging outline of such a sociological perspective. We suggest four characteristics as relevant requirements for a sociological analysis: *dynamic, reciprocal, contextualized* and *distributed.* Starting with discussing two recently developed sociological framings from the HRI domain, we will evaluate these based on the four characteristic and suggest to enrich them with the notions of Actor Network Theory as deveoped in technology studies.

One route to understanding companionship as a set of relationships is through an 'ecology' notion of technology. This notion allows for a dynamic, contextualized and reciprocal analysis. Jodi Forlizzi developed the concept of "product ecology" [22,23] to "describe the dynamic and social relationships that people develop with robotic products and systems. how people make social relationships with products" [22, p.131]. Forlizzi defines the product ecology as "an interrelated system of a *product*, surrounded by other products, often acting as a system; *people*, along with their attitudes, dispositions, norms, relationships and values; *products, activities*, *place,* including the build environment and the routines and socials norms that unfold there; and the social and cultural context of use" [22 p131].

The product ecology describes the social experience of use, it allows individual users to develop different interaction with and appreciations of the same product. The concept too allows to study *reciprocity dynamics* as not only the environment affects how products are used, but in turn a new product can change the user and the wider context of use. Forlizzi's study on robotic vacuum cleaner roomba reported that the roomba impacted cleaning routines more profoundly than a traditional vacuum cleaner [22]. However, the understanding of these differences in agential capacities has not been theorized within the ecology framework.

Another route is organizational analysis. Mutlu & Forlizzi [24] provided with their research on the appropriation of an autonomously moving delivery robot in a hospital, a convincing underpinning of the relevance of contextual, organizational analysis. They found dramatic differences in the ways nurses in distinct hospital departments appreciated the delivery robot. In medical units, like oncology and surgery, where the nurses are highly dedicated to their often severely ill patients, they developed a strongly negative attitude toward the robots. They had low tolerance for being interrupted by the robots, uttered resistance against the extra work the robotic system required them to perform, and the robot was perceived as taking precedence over people in the often heavily trafficed hallways. Some nurses even came to abuse the robot, by kicking or cursing. By contrast, nursing staff of another departement, the post-partum unit, developed a radical different positive appreciation of the robot. In this unit, having in general a rather cheerful atmosphere, the nurses welcome the robot as a welcome addition to their working practices: they refered to the robot as "my buddy" and "a delight".

Mutlu & Forlizzi explained their remarkable findings by focussing on organizational differences of the departments (workflow, patient profile, work culture & practices). To understand these complex processes of integration of robot in organisational settings, it is important too to acknowledge transformative agency of

the technology itself, in this case the delivery robot, on the various network relations that constitute hospital practices. New technology brings along a redistribution of tasks and responsibilities implying a reconfiguation of human machine relationships [10, 25]. In this case the delivery robot relieved the work of the linen department but gave nursing staff an additional task: they had to load the linen bags onto the robot.

The ecological and organizational approaches move us undoubtly beyond a 'single point' bilateral understanding, it fails to incorporate the agency of different elements of the network. It does not include the ways that technologies 'configure' human actors as 'users' [28]. It fails to recognize the 'distributed agencies' involved in the 'summing up' of local transformative networks. Here the semiotic approach towards technology as elaborated by the Actor Network Theory provide a welcome addition [10,11,29]. This allows for granting agency to technological artefacts themselves. In this approach there is no apriori distintion between the acting of human and non human actors in the netwerks. Meanings, distinctions and relations are seen as outcome of interactions, rather than pre-given. The various elements of a network act upon, enable and change each other. These moments of translation are highly complex, involving people, objects and situations.

5 Conclusions and Outlook

The potential use scenarios of artificial companions, especially those in care setting, are highly complex. They have multiple actors/stakeholders, each with their own interests, expectations and histories. Adequate appropriation of new artificial companion technology, will not so much depend on the quality of the bilateral relationship, lasting over time and with affective emotional bonding between a care-receiver and artificial companion, but on how companion robots fit in and transforms the wider actor-network that constitutes the care setting. Here emotional bonding in not only a matter of bilateral relation between user and companion, but also a matter of *distributed emotional agency* over the whole complex care network, the robotic companion being only one actor.

Multiple actors/stakeholders too may generate conflicts based on power differences of different actor groups. Tensions between autonomy and control in institutionalized care settings, for instance, may severly impact the dynamics within the sociotechnical network and the evolving human-robot companionship.

In terms of design process, this sociological perspective will make design more socially inclusive and more complex and time consuming, but it is our belief, the efforts will pay off as it certainly has a potential to smooth the adoption processes in care settings. Prasad Boradkar in *Designing Things* incorporates Actor-Network Theory into design processes by reminding us that '[o]jects are what they are because of the relationships in which they exist. They exist in large dynamic networks of people, other objects, institutions etc., and should be treated as having equal weight and interest as everything else in the network' [21]. Social robots as companions will exist, and gain meaning, in such dynamic networks, and hence it is important that we understand them as such.

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