

Doing Scheduling? The Construction of Agency and Memory while Programming a Reminder Robot with a Person with Severe Brain Injury

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ABSTRACT

The paper argues that the field of human-robot interaction needs a distributed and socially situated understanding of reminding and scheduling practices to meet the needs of people with cognitive disabilities in the design of reminder robots. These results are based on an embodied interaction analysis of video recorded interactions of a co-creation process in which the participants test a reminder-robot prototype that was designed for and with people with acquired brain injury.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**; *Field studies*; • **Social and professional topics** → **People with disabilities**.

KEYWORDS

brain injury, co-creation, ethnomethodology, multimodal interaction analysis, reminding, memory aid, care

1 INTRODUCTION

Acquired brain injury (ABI) often results in deficits in people's ability to remember past experiences and upcoming events. These losses in memory affect people's independent functioning, self-esteem and psychological well-being. Often they become heavily reliant on those who take care of them, which in turn poses great strain on the care givers. Rehabilitation and health care robots are seen as a promising solution to support independence and well-being in people with cognitive impairments, but also to face the challenges of the aging society that implies a growing number of people

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with cognitive impairments [7, 11]. Especially medication and schedule reminders are named as central key-functions in these robots (beside e.g. training or entertainment). Major challenges for these kinds of robots are the different demands of the various user groups (e.g. person with disabilities, therapist, family members), key-requirements are therefore easy programmability, customizability, the possibility for individualization and adaptation over time [4, 11]. However, most research in this area is technology driven and uses predominantly questionnaires/quantitative studies in experimental settings for evaluation and development of the system, which leads to a lack of understanding the interactional implications of the robot in real-world settings [6]. Furthermore, due to the psychological and cognitive traditions in HRI (Human-Robot Interaction), memory is mostly approached as an archive, the individual's capacity to save memories, instead of memory/remembrance as distributed and socially situated construction in conversation [2]. Our project shows that this misses the needs of the participants' practices of reminding in the field of application. An exception is the virtual assistant 'Billie' that was developed on the basis of a micro-sociological study of reminding practices of the target group [1, 5]. The question is therefore how a micro-sociological and interactional analysis of reminding and scheduling practices can inform the design of reminder robots for people with severe cognitive impairments?

2 TECHNICAL SYSTEM AND STUDY SETUP

In an ongoing interdisciplinary research project *Build Your Own Robot* (BYOR, <http://byor.ehci.dk>) we engage in a co-creation process with six residents living in a Danish residential home for people with ABI and their staff. The project aims for developing individual reminding/guiding robots on the basis of social practices and user's needs to strengthen the experience of technological ownership and independence for people with ABI [8, 9]. The project began in spring 2017 and was funded by Helsefonden and SparNord. Within this context we found that classical reminder platforms are too

demanding for citizens with severe short-term memory impairments, as e.g. understanding classical calendar functions and the consequences of an appointment in a calendar (e.g. to go to the appointment). Therefore one of the residents (P1) and her close carer wished for a reminder robot that would prepare P1 not for the appointment as such, but for the upcoming occasion of being fetched by somebody to go to an appointment. The co-creation process resulted in a simple-design robot that both prepared P1 for upcoming events and enabled carer and citizen to jointly "feed" the robot with upcoming appointments once a week. An activity they have not done before.

3 DATA AND ANALYTIC METHODOLOGY

Beside the insights we gained during the co-creation process, we also engaged in a *concurrent* video ethnographic research from a micro-sociological perspective based on ethnomethodological/conversation analytical principles [3, 10]. This approach aims to understand the development of situated and local meaning making by which the participants account for their actions and understanding of the situation to inform the individual robot's design. All workshops were video recorded (in the case of the reminder robot we have 17 workshops by now) and relevant situations were transcribed.

4 OBSERVATIONS AND RESULTS

The multimodal interaction analysis of video recordings of the joint programming of a prototype version of the robot points out the social structures and functions of the situated and distributed practices by which the participants construct memory, identity and agency. Reminding/scheduling practices are embedded in the ongoing activity in which the different participants (developers, sociologist, carer, resident with ABI) engage to program the robot. Thereby they build an interactional framework in which both the robot and the citizen with ABI become competent participants. We identify different logics of reminding either directed to the scheduling of activities (robot's planing logic) or directed to the construction of social relations and identities in which carer and citizen are constructed as a "reminding dyad" [2].

5 CONTRIBUTION

Our observations point out that HRI needs to reconsider how a distributed and socially situated understanding of reminding practices require new system designs. Especially when the system is directed to people with ABI the robot profits of not aiming for the individuals autonomy but his/her participation in a social encounter afforded by the robot.

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