

Remembering in everyday life: opportunities for design

Human remembering is a central and crucial aspect of our everyday lives, even though most of us are not aware of this. One might think that for remembering we only need to use our brains, but more and more evidence shows the outside world's influence on our memory and memories, which provides us with lots of opportunities for the future. In this paper the focus will lie on our physical and technological environment, and how these relate to remembering in the complexities of everyday life. Human remembering will be explained and designed interventions will be presented that have been created to support everyday remembering.

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Introduction

Recently, someone mentioned a long-playing record (LP), the black shiny vinyl disc had not been on my mind for many years. I never owned any, because they were replaced by audio cassettes before I was born. Still the mention of the LP record instantly triggered vivid memories for me, of my dad playing them at home, on a device that my little brother and I were not allowed to touch. I remember the homemade storage container that matched the furniture in the living room and hid the LP's from sight and, quite unexpectedly, I suddenly remembered the smell of the vinyl.

This personal story is an example of an involuntary memory (Berntsen, 2009), a memory that I did not want to remember at that moment, but that was initiated through a spoken word nevertheless. This word served as a memory cue, which kick-started the remembering process. Next to involuntary memories, people can also have voluntary memories, which occur when someone ponders or wonders about a past experience. For example, someone might ask you where you have recently seen the car keys. This functional car keys example probably comes to mind first when people think about remembering, and even though both involuntary and voluntary everyday remembering activities are the focus of my research, remembering plays a role in our everyday life in many more intricate ways.

Human memory and remembering have been studied for a long time. For example by psychologists, in particular cognitive psychologists, who have unravelled

many pieces of the puzzle through lab-based controlled experiments. Recent technological developments allow neuroscientists to use brain-imaging techniques, which not only show the structures of the brain, but also its functions. The majority of these studies into memory and/or remembering focus on the individual's cognitive capabilities in relation to personal remembering, which I call internal remembering (Van den Hoven, 2014). However, more and more researchers start to study remembering in its everyday situation, because, in many more ways than just the examples mentioned above, our memories are influenced by our outside world, an activity I call external remembering (Van den Hoven, 2014). This inspiring perspective brings about lots of opportunities for creating or adapting our external world to better support remembering.

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Everyday remembering

Human memory is a wonderful, important and yet mysterious power. Despite the large numbers of researchers in a range of fields studying the subject it is still not well understood. One piece of evidence for this is the fact that 256 types of memory were identified in literature (Tulving, 2007), a number which will drop over time probably. Several of these identified types of memory are relevant for the work described in this paper (for a more extensive overview, see Van den Hoven, 2014), but most prominently are autobiographical and episodic memory (Conway, 2009). Both types represent memories of personally experienced events, such as the examples above.

Our memory and memories are important to us for many reasons, we cannot function without and use them everyday. That is why most people go to great lengths to improve and support their memory, e.g. by playing brain training games, by taking notes or photographs, or by sharing experiences in the hope of others helping them remember.

Understanding how everyday remembering works can give us insights and provides opportunities for supporting it. This is important, because human memory works differently from what is often assumed. In a nutshell, remembering is based on reconstruction (as opposed to reproduction) and concerns an activity that takes place every time we try to recall something (for a more extensive explanation, see Van den Hoven & Eggen, 2008). For example, when trying to remember what you had for breakfast three months ago, you will be unaware that a selection mechanism based on statistics will decide what you remember, not the actual facts of what happened. Many things influence reconstruction, including our mood, attention and the reasons for remembering. The act of reconstruction influences our memories at the same time, which results in ever-changing recollections (Conway, 1996).

One way of starting this reconstruction process is through memory cues, which can be voluntary or involuntary. Memory cues can be extremely diverse, from the above-mentioned LP-example to the sound of a slamming door to someone's perfume to the visual perception of a specific colour. Memory cuing is not yet well understood and it raises many interesting questions, for example in the area of interaction design (Van den Hoven & Eggen, 2014), since many cues nowadays are digital, such as digital photos, videos and audio recordings and require interactive devices to be made accessible.

The functions of autobiographical memory are manifold and not yet fully defined, but include the following categories (Pillemer, 2009): (1) self (e.g. a person's identity); (2) social (e.g. sharing memories with others);

and (3) directive (e.g. memories that shape our future). An interesting conclusion from looking at these functions is that for everyday life truthful or accurate recall is not preferred over memories that are reshaped by our beliefs and motivations (Pillemer, 2009).

Everyday remembering aids

Looking at the whole gamut of currently existing everyday remembering aids, we can identify a number of directions that have potential for external remembering and design: our physical environment, social environment, technological environment or a combination.

Our physical environment includes straightforward functional memory aids, such as journals, photo albums, and diaries. However, other things in our environment can serve as less obvious memory aids, such as a damaged object might remind the owner of how it got damaged, a certain piece of clothing might bring back memories of an event you wore that garment to. This all relates to the field of distributed and extended cognition (Michaelian & Sutton, 2013).

Our social environment revolves around other people, since they can also make you remember things, such as activities, emotions, and places. Someone can do this in a passive manner, just by being there, and actively, by asking questions, sharing experiences and telling stories. Both can be purposely or not. Nowadays our social environment also includes tools, such as social media.

Our technological environment is rapidly becoming more complicated and diverse. In terms of everyday remembering aids, most physical aids have also appeared in digital form, such as digital photo cameras embedded in phones for easy access, online journals and blogs, remembering apps on mobile phones. Some everyday remembering aids are inspired by the life logging trend. Life logging is often based on the implicit and incorrect assumption that recording equals remembering, using technology to record everything, automatically and seemingly effortlessly.

After listing all these remembering aids, one might wonder what the impact is on everyday life. For example, do these remembering aids really help us in our remembering? The physical and social environment do, but it is unclear whether some of the current technological aids help. Remembering, and the activities related to remembering, are embedded in our complicated everyday lives and most technologies do not take these into account, let alone add benefit to them. It is time to step away from this technology push and move on to using technology as the useful tool it indisputably can be. I am convinced that if we understand the complexities of our physical and social

environments better, we can develop more suitable technological aids to support everyday remembering.

Design opportunities for everyday remembering

Studying everyday life can get quite complicated, because when it comes to remembering there are many factors that influence it, including the rememberer's goal and mood, and the remembering context and process. Design research (for a recent overview; see Golsteijn e.a., 2014) is an approach that can be used to explore people's everyday lives (with and without designed interventions), which can result in an imagined future. Design can also integrate multidisciplinary teams and topics, which is a necessity when combining psychology, design and engineering, and these multidisciplinary perspectives can facilitate a combination, and ultimately integration, of theory and practice.

Another opportunity, which is not limited to design however, is to create awareness on how human memory works and thus that taking photographs is not the same as 'storing memories'. Actually the choice for the term 'computer memory' might make people (incorrectly) think that human memory works in a similar manner to the seemingly permanent, structured and searchable computer memory. Therefore, I would like to suggest renaming computer memory, for example, to 'computer storage'.

Many design opportunities for everyday remembering can be found when looking at the complexities and intricacies of people in their everyday lives. This is where the design research program comes in, which I lead, called *Materialising Memories* (<http://www.materialisingmemories.com>). *Materialising Memories* aims to design for improved reliving of personal memories, which includes the following subgoals: (1) to understand the relation between media, remembering and forgetting; (2) to investigate remembering experiences; and (3) to design media products to support everyday remembering activities. (For more information, see Van den Hoven, 2014.) The research covers a broad, diverse and largely uncharted territory of how people currently do and potentially would want to participate in activities related to remembering, and how we can support them. Our multidisciplinary approach includes a people-centred interaction design process and knowledge about human memory, but also the imagination and implementation of possible future products. We create physical and interactive prototypes (hence 'materialising') with embedded electronics that can respond to people's actions (a combination of the fields of interaction design and tangible interaction). In turn, we place these interactive designs back into the real world to find out what the effects are of our interventions.



Figure 1. Pearl: the interactive photo collage projector (Jansen e.a., 2014; image courtesy: Martijn Jansen)

Many of our projects centre on everyday activities that people do, such as storytelling, but also the creation, and (lack of) curation (or organisation) of memory media, such as photographs. Our interests do not lie in improving people's memory and memories, but in supporting the situation, activities and experiences related to remembering.

One design example is Pearl (Jansen e.a., 2014; see figure 1). Pearl is an interactive device, which can project personal digital photo collages on the wall of the living room. People can choose which photos are displayed by making hand gestures in front of the device. The main benefit of using Pearl is that these gesture interactions also organise the digital photo collections stored on the home's server. For example, photos that have not been interacted with in a long time will start to fade, and if they are not reactivated, they will be demoted. This means they will be moved to a different part of the photo collection, which can easily be deleted if the owner wants to clean up.

A new strand of opportunities for the field has opened up in the domain of people who are having memory issues, such as dementia patients and their carers. With the rapidly increasing number of people suffering from memory problems and most research focusing on the clinical aspects instead of the everyday, the interest is growing for ways to improve the quality of life for these patients and everyone else affected.

A design example is ReCog (see figure 2), a system including an interactive application on a commercially available touch-screen tablet with camera and a cover for the tablet with a dedicated notepad. When interviewing people with dementia and their carers we found that remembering names and faces of people was a recurring problem. ReCog was implemented as a partially working prototype, implementing the errorless learning technique (Clare e.a., 1999). This proven technique focuses on the repeated learning while gradually reducing the amount of memory cues provided, including a photo of the to-be-remembered



Figure 2. ReCog: application for remembering names and faces using the errorless-learning technique (image courtesy: Matthew Simpson)

person (taken with the tablet), the spelling of the name and information on when, where and how they met. This application can be useful for anyone who would like some support with remembering names and faces in everyday life.

Conclusions

Interaction design for supporting everyday remembering calls for a multidisciplinary design research approach, with a special need for significant and sound contributions in the areas of cognitive and social psychology to inform designers to embrace and understand the complexity of human memory and remembering in everyday life. The Materialising Memories design research program has started to scratch this surface.

Acknowledgements

A sincere thank you goes to my collaborators, in particular Berry Eggen, for supporting me through this wonderful research journey, and those who have worked with me on the example projects mentioned. For Pearl: Martijn Jansen and David Frohlich; for ReCog: Matthew Simpson, Laurie Miller and Cara Wong. This research was supported by STW VIDI grant number 016.128.303 of The Netherlands Organization for Scientific Research (NWO), awarded to Elise van den Hoven.

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