
A Context-Aware Mobile Phone for Remembering Names and Faces

Michael Massimi

Dynamic Graphics Project
Department of Computer Science
University of Toronto
10 King's College Road
Toronto, ON M5S 3G4 Canada
mikem@dgp.toronto.edu

Abstract

This paper describes an early approach for designing a memory aid for the elderly. The goal of the memory aid is to help the user remember names and faces of people in his or her social network. This paper also introduces two concepts related to cognitive aids that could benefit from discussion at the workshop: the need for evaluation techniques for cognitive aids, and the design of "invisible" aids.

Keywords

Cognitive aids, memory aids, mobile phones, participatory design, assistive technologies, elderly, names, faces, context-aware.

ACM Classification Keywords

K.4.2 [Computers and Society]: Social Issues – Assistive technologies for persons with disabilities.
General Terms: Theory, Design, Human Factors.

Introduction

At the University of Toronto, our program in assistive technologies for the cognitively impaired is steadily growing. Our focus is on memory aids, as a subset of cognitive aids [1].

Wu, Richards, and Baecker [15] began this program of research by including anterograde amnesics in a participatory design. They continue to work with that population in order to support intra-familial collaboration [16]. My work also uses a mobile device and participatory design, but differs in terms of the population, deficit, and specifics of the technology.

A Memory Aid for Names and Faces

My current work involves elderly people in a participatory design process. The goal is to create a memory aid that will help them remember names of friends and family members. Our targeted device for this project will be a mobile phone.

We imagine that a senior will be able to glance at his or her phone in order to call up a list of names that might help given his or her current situation. For example, at her weekly bridge game, May forgets the name of one of the new players. She casually retrieves her phone from her purse and, with just one or two button presses, can call up a list of the people that are scheduled to be at the bridge game with her. By process of elimination, she determines that the unknown person is Joanne. Having the phone as a support tool encourages May to stay socially engaged.

Another foreseen function of the phone is that of a training aid. Since the phone carries a list of the user's contacts, the user can play games or run drills using the contact information. One idea is to display a photo of a contact, and ask who it is. Another drill would allow the user to review the names of people he or she will see at a given time and place.

Why Names and Faces?

Elders most frequently report forgetting names, more than any other item [2, 4, 8]. Recent studies also show that social isolation is one of the top factors in a degradation of quality of life for elders [11]. Having a memory support tool in social situations may help improve quality of life for the autonomous elderly.

Working with the Elderly

We have chosen to work with the elderly for this project. Memory problems, especially with names, are more pronounced in older people [4], and many actively strive to overcome them. Their interest in keeping mentally fit may help increase their engagement with the design process.

Participatory Design

We have chosen a participatory design (PD) for this memory aid for two main reasons. First, relatively few studies [6, 7, 9, 12] have specifically engaged elderly people in PD. Because designing for elders will become important in the coming years, validated methodologies are necessary. What design activities should be used? Who will be in control? How do we overcome differences in comfort with technology? Second, PD is beneficial for not only the programmers, but also for the co-designers. Wu, Richards, and Baecker's work [15] illustrated this and we hope for similar results.

Current Status

The project is still in its early stages. Presently, we are recruiting seniors to be part of the design team. A certified geriatric psychologist has agreed to become part of the design team as well, who will ensure that our design is grounded in current rehabilitation and training technique. We have identified a participatory

design path, but it requires further elaboration before meetings begin. At the workshop we will solicit advice regarding participatory design with the cognitively impaired/elderly, design considerations, challenges with mobile devices, and evaluating the effectiveness of memory aids.

In the long-term we hope to move from a purely prosthetic device to also include *restorative* and *preventative* aspects. That is, we are curious if an electronic memory aid can intervene in the cognitive decline of an individual and hinder deficit progression in some way. Our basis for this is strongly linked to the notion of cognitive reserve – that individuals vary in the amount of resistance to pathology they possess [13].

Goals of the Workshop

Two areas of concern are the evaluation of memory aids, and the need for invisible technologies.

Evaluating Memory Aids

Once a cognitive aid has been built, it must be evaluated. How can we be sure that the aid is working? In our discussions with psychologists, they have recommended that we use an experimental design, with one group given the memory aid and the other group given no aid. Is an experimental design the best way to evaluate the effectiveness? How can we compare our memory aids against current standards of rehabilitation (e.g., training in memory strategies or drug therapy)?

For our project, we intend to use case studies and survey methods. The use of external memory aids is so common and ingrained into the lifestyle of seniors [4] that we believe we may overlook important contexts of

use if we only use a laboratory study. At the workshop we would like to explore this further: how are other researchers evaluating the effectiveness of their technology? What measures are used (objective vs. subjective)? What instruments are sensitive to the desired outcomes?

"Invisible" Technologies

We are particularly excited about the use of a mobile phone as the hardware choice in this study. Previous work [3, 5, 10, 14, 15] in developing portable electronic cognitive aids used personal digital assistants (PDAs), beepers, or specialized hardware. Like mobile phones, PDAs and beepers are common devices for an unimpaired person to carry. By using a commonplace device, the assistive technology is no longer "visible" and doesn't mark the user as impaired in the same way other devices like a wheelchair might. The person with the deficit retains autonomy and dignity by blending into the social fabric.

This brings up an important concern: to what extent should devices blend in? Should designers concern themselves with creating invisible aids? What can we learn about designing cognitive aids from successful physiological aids (e.g., hearing aids, glasses)? Are there circumstances where invisibility is harmful (e.g., when a device indicates someone needs help)?

Biographical Sketch

Michael Massimi is a Master's degree student at the University of Toronto under the supervision of Dr. Ron Baecker in the area of Human-Computer Interaction. Mike is a member of the Dynamic Graphics Project and also works with Dr. David Ryan, a geriatric

psychologist, at the Regional Geriatric Program of Toronto.

References

- [1] Baecker, R. Designing electronic memory aids: A research framework. Submitted to this workshop (2006).
- [2] Bolla, K. I., Lindgren, K. N., Bonaccorsy, C., and Bleecker, M. L. Memory complaints in older adults. *Archives of Neurology* 48, (1991), 61-64.
- [3] Carmien, S., Dawe, M., Fischer, G., Gorman, A., Kintsch, A., and Sullivan, J. F. Socio-technical environments supporting people with cognitive disabilities using public transportation. *ACM Transactions on Computer-Human Interaction* 12, 2 (2005), 233-262.
- [4] Cavanaugh, J. C., Grady, J. G., and Perlmutter, M. Forgetting and use of memory aids in 20 to 70 year old's everyday life. *International Journal of Aging & Human Development* 17, (1983), 113-122.
- [5] Cole, E. Cognitive prosthetics: An overview to a method of treatment. *Neurorehabilitation* 12, (1999), 39-51.
- [6] Ellis, R. D., Kurniawan, S. H. Increasing the usability of online information for older users: a case study in participatory design. *International Journal of Human-Computer Interaction* 12, 2 (2000), 263-277.
- [7] Gowans, G., Campbell, J., Alm, N., Dye, R., Astell, A., and Ellis, M. Designing a multimedia conversation aid for reminiscence therapy in dementia care environments. *Proc. CHI 2004*, (2004), 825-836.
- [8] Leirer, V. O., Morrow, D. G., Sheikh, J. I., and Pariente, G. M. Memory skills elders want to improve. *Experimental Aging Research* 15, (1990), 155-158.
- [9] LoPresti, E. F., Mihailidis, A., and Kirsch, N. Assistive technology for cognitive rehabilitation: State of the art. *Neuropsychological Rehabilitation* 14, 1/2 (2004), 5-39.
- [10] McGrenere, J., Davies, R., Findlater, L., Graf, P., Klawe, M., Moffatt, K., Purves, B., and Yang, S. Insights from the aphasia project: Designing technology for and with people who have aphasia. *Proc. CUU 2003*, (2003), 112-118.
- [11] Morris, M. Social networks as health feedback displays. *IEEE Internet Computing*, Sep./Oct. (2005), 29-37.
- [12] Nilsson, M., Johansson, S., and Håkansson, M. Nostalgia: An evocative tangible interface for elderly users. *Proc. CHI 2003*, (2003), 964-965.
- [13] Stern, Y. The concept of cognitive reserve: A catalyst for research. *Journal of Clinical and Experimental Neuropsychology* 25, 5 (2003), 589-593.
- [14] Wilson, B. A., Evans, J. J., Emslie, H., and Malinek, V. Evaluation of NeuroPage: A new memory aid. *Journal of Neurology, Neurosurgery, and Psychiatry* 63, (1997), 113-115.
- [15] Wu, M., Richards, B., and Baecker, R. Participatory design of an orientation aid for amnesics. *Proc. CHI 2005*, (2005), 511-520.
- [16] Wu, M. Collaborative memory prostheses for supporting the care network. Submitted to this workshop (2006).