



DESIGN RESOURCES

DR-04 Familiarity and Usability of Products
by People with Dementia

Familiarity and Usability of Products by People with Dementia

Jennifer Boger, M.A. Sc.Eng., Alex Mihailidis, PhD
Toronto Rehabilitation Institute, University of Toronto

Issue and Its Importance to Universal Design

Older adults with dementia frequently encounter (often insurmountable) difficulties when trying to use everyday products and tools that are required to complete activities of daily living (ADL). For example, many institutions' regulations stipulate the use of liquid soap in a pump to minimize contamination, however, the majority of older adults with dementia do not recognize the pump nor are they able to learn how to operate it. If products were designed to be intuitively usable by older adults with dementia, it follows that their ability to complete ADL would improve, which in turn could lead to increases in independence and increasing feelings of self-esteem.

Globally, the number of older adults with dementia is projected to significantly increase, both in terms of overall numbers and as a proportion of the population. When coupled with the substantial amount of care this population requires, it is important to support both people with dementia and caregivers through universal design practices to enable greater access to products by the dementia population.

Existing Research/Evidence

Designing for dementia can be seen as a way to further increase the portion of the population that is well served by current universal design practice. When designing for the dementia population, it is important to keep in mind the morbidities that arise as a result of aging, (e.g., arthritis, limited motion because of a stroke, compromised eyesight, etc.). Additionally, behavioural implications that are associated with dementia as well as how and why design affects these behaviours should be considered.

Research has indicated that incorporating familiarity into environmental design can help to augment deficits caused by dementia. This is mainly because long-term and implicit memory functions are considerably more intact than short-term and explicit memory in most dementias, such as Alzheimer's disease. While environmental design [e.g., (Van Hoof & Kort, 2009); (M. P. Calkins, 2009); (Mitchell et al., 2003)] and assistive technology [e.g., (Cahill, Macijauskiene, Nygård, Faulkner, & Hagen, 2007); (Topo, 2009); (Bharucha et al., 2009)] for people with dementia have been investigated, there is a lack of research regarding how everyday product design impacts usability for this population.

(Current) Design Guidelines

Presently, no formal design guidelines exist for the design of products for older adults with dementia, however, environmental design for dementia has received and continues to receive formal study. The outcomes of these studies are still modest and rather subjective, but there is a general consensus through other work (Calkins, Sanford, & Proffitt, 2001) (Cohen & Weisman, 1991) to create spaces that:

- Support peoples' perceived independence and control through a choice of environments (e.g., different activities, access to a quiet space, etc.)
- Encourage the use of residual skills and capabilities
- Capitalise on relatively-intact distant past memories through retro, home-like furnishings
- Give people the ability to add personal touches to their personal spaces
- Are simple, intuitive to navigate with cues to help a person recognise different areas
- Minimise unnecessary stimuli (e.g., bright light, excessive noise, etc.)
- Ensure the environment is safe and non-threatening

While reports (Hodges, Bridge, & Chaudhary, 2007) have attempted to quantify these generalisations to some extent, overall findings advocate environments that are familiar, non-threatening, safe, and empowering. What is not well studied or understood is if or how these themes translate into the field of product design.

Score Quality of Existing (non-RERC-UD) Evidence/Research: Weak

Summary of Related New Research Accomplished by RERC-UD

The objective of this research was to examine the role of familiarity in the usability of product operation by older adults with different levels of cognitive impairment. Water faucets were chosen as a representative everyday product since successful operation of a faucet is necessary for several daily tasks and self-care activities.

Five different faucet types were examined (Figure 1). Familiarity and usability for the faucets was determined from a literature review. Twenty-seven (27) older adults (mean age=82, SD = 9.2) were recruited from a long term care facility in Toronto, Canada and had either no (n=9), a mild (n=3), a moderate (n=9), or a severe (n=6) cognitive impairment, as determined through the MMSE scores taken at the beginning, middle and end of the study. Participants were randomly presented with the faucets and asked to complete 10 consecutive, caregiver-supervised trials on each faucet (a total of 50 trials per participant, one trial per day). To gain an estimate of *satisfaction*, the participant was asked to rate how difficult they felt the faucet was to use after each trial. A within-subject design was used to collect data on *effectiveness* and *efficiency* (Nielsen, 1993), which were measured by the number and type of errors committed, and the amount of assistance required to use the faucet. Assistance was considered to be any verbal prompt, demonstration, touch, or the caregiver doing the action herself. Data for three of the usability measures for turning the water on are presented by dementia level in Figure 2.

Although the sample sizes are too small to detect significant statistical differences, results suggest some interesting trends that are supported by comments made by the participants during the trials:

- People with no, mild, or moderate impairments seemed to be able to use any of the faucets with little or no assistance, while the severe population generally required assistance regardless of the faucet type.

- Comments by participants tend to agree with the familiarity ordering in Figure 1 and reflected opinions regarding control of the task and difficulties caused by co-morbidities.
- In general, participants who had no, a mild, or a moderate impairment seem to be able to learn how to use faucets that were previously unfamiliar to them (i.e., infrared and plastic wand). Some of the severely impaired participants were also able to learn to use unfamiliar faucets, although this ability was more dependant on the individual.
- Participants' perceived difficulty of faucets tended to increase as the level of impairment increased, with the exception of the plastic wand.
- Participants appear to commit fewer errors when using the dual lever. This may be because of the operational modality, but also may reflect that this is the type of faucet the participants had in their washrooms at the long term care facility (participants had an average of 2.56 years [SD=1.8] in residence).

While these results suggest that older adults can learn to use a new product up to the moderate impairment stage, they also raise the question of what *familiarity* is when older adults with dementia are concerned – is it how long over his/her lifespan a person has used a faucet, is it what they have recently been using, or something else?

Examples of this Application

This research has significant potential best-practice implications for both the home and institutions. Specific to these results, it is apparent that the notion of familiarity with respect to older adults with a cognitive impairment relates more to a shorter time frame of usage, as opposed to what has typically been used over a person's lifetime (as is typically thought). The results have also indicated that some products may have features and functions that are inherently easier for these users to operate, no matter how long (or short) the period of usage has been. Therefore, an overall good design for this population may be a mix of features that are both familiar and easy to use.

Research Needs (What still needs to be done)

Other everyday products should be investigated to see if the trends identified in this research apply to other everyday products. Data from this research is being used to inform the development of a computer-based tool that will assess new products' usability by older adults, both with and without dementia.

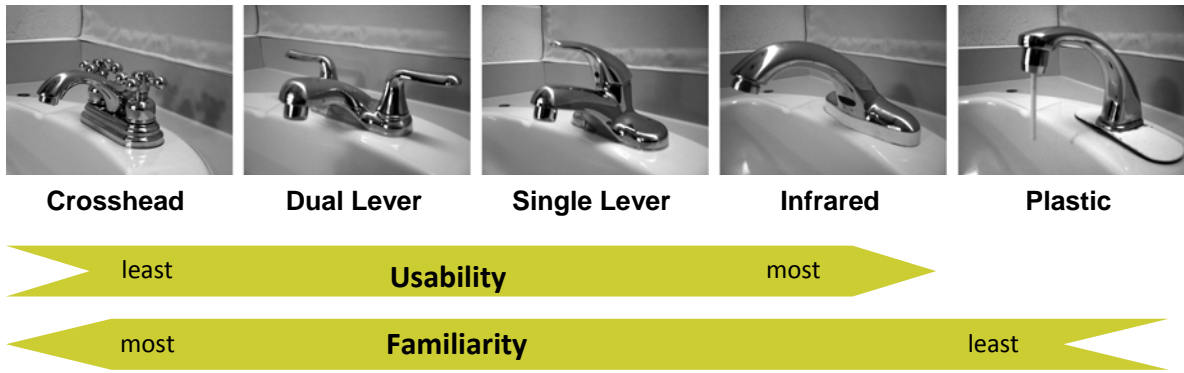


Figure 1. Faucets used in the study. Usability was defined from a review of the literature. Familiarity was defined as the number of years since the product has been in the mainstream market.

* The plastic wand was obtained from a website selling products intended for people with dementia. As there has not yet been a formal human factors analysis on the plastic wand, it was not possible to rate its usability.

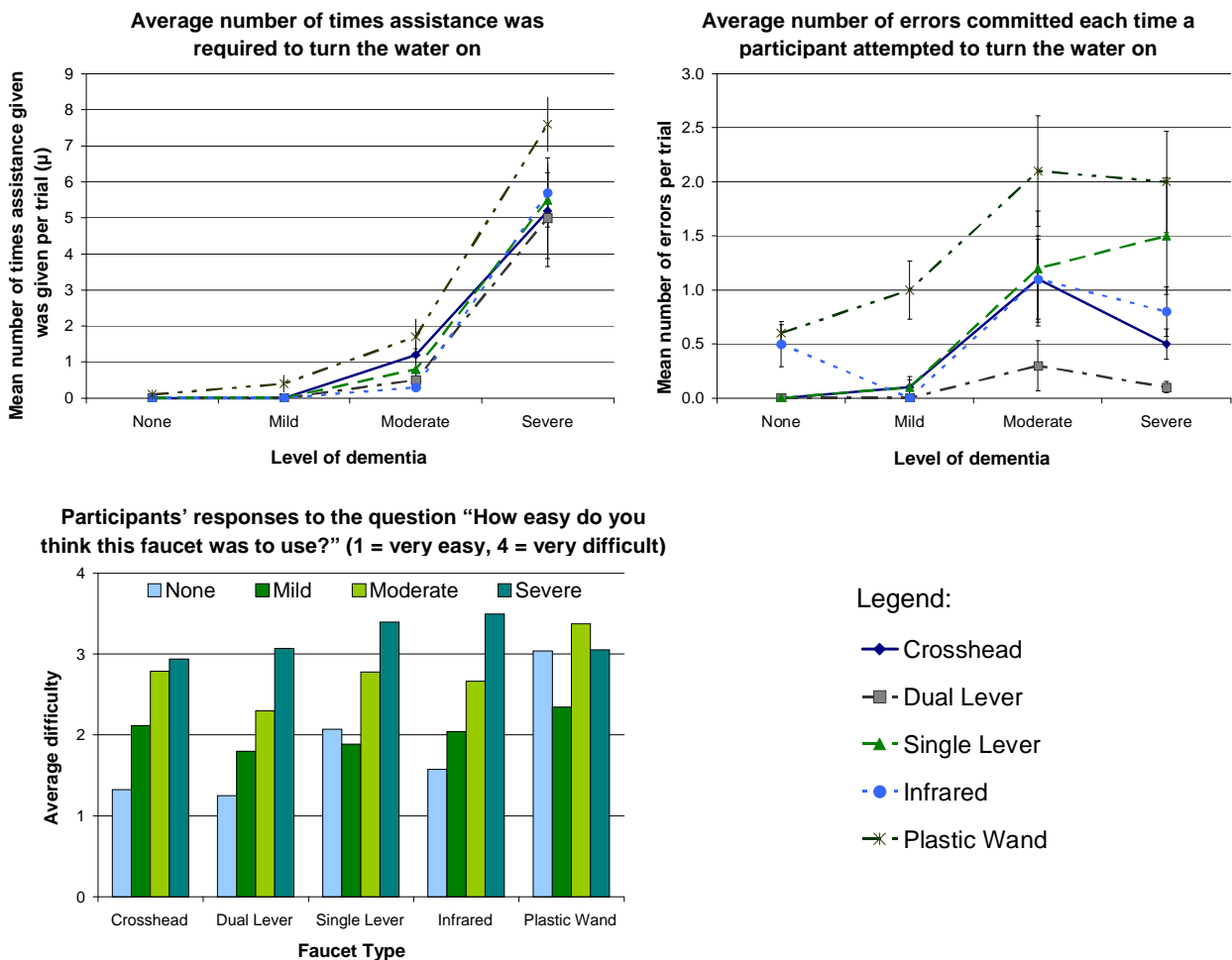


Figure 2. Results for assistance, errors, and self-rated difficulty for turning the water on across all faucets.

Acknowledgements

This paper was developed in part with funding from the National Institute on Disability and Rehabilitation Research (NIDRR), U.S. Department of Education, through the Rehabilitation Engineering Research Center on Universal Design and the Built Environment (RERC-UD), a partnership between the Center for Inclusive Design and Environmental Access (IDeA) and the Ontario Rehabilitation Technology Consortium (ORTC).

References

- Bharucha, A. J., Anand, V., Forlizzi, J., Dew, M. A., Reynolds III, C. F., Stevens, S., et al. (2009). Intelligent Assistive Technology Applications to Dementia Care: Current Capabilities, Limitations, and Future Challenges. *American Journal of Geriatric Psychiatry, 17*(2), 88–104.
- Cahill, S., Macijauskiene, J., Nygård, A.-M., Faulkner, J.-P., & Hagen, I. (2007). Technology in dementia care. *Technology and Disability, 19*, 55-60.
- Calkins, M., Sanford, J., & Proffitt, M. (2001). Design for Dementia: Challenges and Lessons for Universal Design. In W. F. E. Preiser & E. Ostroff (Eds.), *Universal Design Handbook* (pp. 22.21-22.24). New York, NY: McGraw-Hill Inc.
- Calkins, M. P. (2009). Evidence-based long term care design. *NeuroRehabilitation, 25*(3), 145-154.
- Cohen, U., & Weisman, G. D. (1991). *Holding on to home: Designing environments for people with dementia*. Baltimore: Johns Hopkins University Press.
- Hodges, L., Bridge, C., & Chaudhary, K. (2007). *Dementia Design Guidelines: Home and Community Care Capital Works Program (2nd Edition)*. Sydney: Home Modification Information Clearinghouse: University of Sydney.
- Mitchell, L., Burton, E., Raman, S., Blackman, T., Jenks, M., & Williams, K. (2003). Making the outside world dementia-friendly: design issues and considerations. *Environment and Planning B: Planning and Design 30*(4), 605 – 632
- Nielsen, J. (1993). *Usability Engineering*. Boston, MA: Academic Press.
- Topo, P. (2009). Technology Studies to Meet the Needs of People With Dementia and Their Caregivers: A Literature Review. *Journal of Applied Gerontology Series B: Psychological Sciences and Social Sciences, 28*(1), 5-37.
- Van Hoof, J., & Kort, H. (2009). Supportive living environments. *Dementia, 8*(2), 293-316.



DESIGN RESOURCES

DR-04 Familiarity and Usability of Products by People with Dementia

© 2010 Center for Inclusive Design and Environmental Access
University at Buffalo
School of Architecture and Planning

378 Hayes Hall
3435 Main Street
Buffalo, NY 14214-3087

Phone: (716) 829.3485 x329 | TTY: (716) 829.3758

Email: ap-idea@buffalo.edu

Fax: +1 (716) 829.3861