

A Skirt for Well Aged Ladies with Cognitive Loss

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Abstract. In this paper, we consider design of skirts for well-aged ladies with cognitive loss. In line with recent trends, a graduate student project, which we supervised, focused on monitoring solutions for those suffering from dementia. The result of the project was a skirt. We found ourselves intrigued by the proposed solution and started unpacking, using a phenomenological approach, the meaning of the skirt, when losing cognition. Our conclusion is that skirts for dement ladies should never be viewed as unimportant, or as the new interfaces for assistive technology. Rather, they may be viewed as an opportunity for design to support body, mind and emotions of the person whose cognition is weakening. Aesthetically appealing garments, which improve self-image, designed for ease of dressing, engaging hands, may provide comfort. From the ethical standpoint, embedding skirts or other garments with technology, should be consented to prior to loosing the ability to reason well.

Keywords: interfaces, elderly, dementia, ethics, body.

1 Introduction

A persistent increase in the ageing population may be seen as both a challenge and an opportunity for human-computer interaction researchers and designers wishing to find technological solutions enabling elderly to retain independent living for as long as possible. Elderly suffering from dementia have received special attention. Dementia is a chronic, progressive illness, affecting persons memory, judgment and ability for abstract thinking [19]. It inevitably leads to a loss of autonomy. Currently, there is little that can be done to prevent it. Research, such as [1], shows that the ability to perform activities of daily living is the main factor affecting quality of life for people suffering from dementia. On the other hand, [13] shows that persons with dementia are likely to have decreased ability to manage everyday technology, including technology that should assist everyday living. The ability to manage technology is thus important to consider when assessing ability to perform everyday activities [5,6]. Further, [2] have examined a host of technologies aiming at improving the quality of life and the quality of care for patients with dementia. These authors were able to identify very few (3) clinical studies involving people with dementia, concerned with evaluation and use of assistive technologies. Although this number might have increased since this paper was published, evaluation of technologies offered to dement people is still an opportunity for researchers in HCI. The use of participatory

approaches in designing for and with elderly is considered to be the correct approach by many researchers [18]. In [16], the authors have, with full participation from people with dementia, provided a “wish list” of technologies that elderly would like use; some of these items were a simple music player, window on the world, and conversation prompter. In [20], the authors have identified activities in daily life that could be supported by technology: dressing, taking medication, personal hygiene, preparing food, and socializing.

In this paper, we discuss design of clothing, in particular skirts, for ladies with cognitive loss. A departure point for the work is a graduate student project entitled “Skirts with Meaning” [12], which we supervised in the context of an interaction design class [7]. The project involved design of skirts with sensors for elderly ladies. In the aftermath of the project, we had one skirt that intrigued us, and we wanted to further explore its design and considerations around embedded GPS sensor. Can skirts be used as the next interface for ladies with cognitive loss? We had good help from four people who are either medical professionals, or have a mother who is suffering from dementia. In our discussions with the participants, we have used the skirt from the project, and some other simple prototypes, in order to really get into the subject of skirts and dementia. Through this process we have started to gain better understanding of what it means to design clothes (with or without technology) for ease of dressing, support sense of aesthetics, well-being and increase self-esteem. This paper, thus, is about sharing lessons learned on this journey, which we believe is just the beginning of thinking about clothing as a support for those suffering from dementia.

In our paper [6], on the use of a smart gym by elderly, we have observed that there was a need to support both cognitive and bodily mastery through design for the smart gym. One would think that talking about a skirt would be easier, but that did not turn out to be the case. We will argue now, there are three equally important dimensions that need to be accounted for in design efforts when designing for elderly ladies: body, mind and emotions.

In research like this, ethical challenges permeate many aspects of the work. Design for and with users who may be considered vulnerable [8,18] is distinguished by increased need for sensibility, empathy and care for ethical concerns.

The paper is structured as follows: in the next section, we discuss the making of the skirt. In Section 3, we present our own experiences with the use of the skirt, and excerpts from interviews with the four above-mentioned participants in this research. In Section 4, we discuss our findings. We conclude in Section 5.

2 Skirts with Meaning

Wellbeing and self-esteem are linked to personal appearance. Clothes and what one wears matters a whole lot, we found out, also when one can no longer remember one’s own clothes, even the favorite ones. Aging alone brings problems in terms of dressing oneself, regardless of whether one has dementia or not. Putting stockings on becomes harder, if not impossible. However, when cognition is affected, people may start to suffer from dressing apraxia, and forget how and in which order to put the pieces of clothes on. Dressing processes can thus become stressful and frustrating. At

the same time, the act of dressing is a very private experience. Conducting research in homes about such a topic is difficult. Schulte, a fashion knitwear and knitted textiles design student, describes her interest in designing garments for dementia in [15]. Her study is motivated by direct experience with her grandmother, who suffered from apraxia. This made her think how to design clothes that are simple to put on, require minimum assistance, yet extend the sense of beauty and dignity.

A group of three graduate students taking our interaction design course were inspired by this work, as well as [4], Fig. 1. However, being in the computer science department, they wanted to experiment with embedding sensor technology into skirts. Design thinking, with rapid prototyping, focus on empathy and abductive reasoning, was used to explore. No users were involved, in part due to the format of the course, and in part, strict regulations from the Norwegian ethics board. The outcome of their project work are ‘skirts with meaning’, one of which was designed for ladies with dementia, see the students’ blog for further information [12].



Fig. 1. The students discussing skirts as a technology interface, on the left, a skirt with a proximity sensor (a working prototype made), and an idea for a skirt with QR code, light and sound. Photos: Finken and Culén.

The students made a skirt, Fig. 2, paying attention to the visual load (choosing a solid color) and cognitive processing (simple wrap around style with Velcro closure, for the ease of putting it on and taking off). A solid, blue color was chosen. The skirt has lining for comfort in wear and so that the technology based components could be placed between the two layers of fabric. The panel made of stringed Styrofoam balls, which was placed between the lining and the outer fabric, was a surprising design element for us. The students got inspiration from existing products – the ‘ball duvet’ and the ‘ball vest’ – both having small balls inside. When the students presented their project in class, before showcasing their work at the Student Faire, they explained that the small balls were meant as sensory stimuli, which “*may reduce anxiety and provide a sense of security*”. Also, they pointed out that the panel, in the skirt, might have other benefits, such as providing a light massage or simply an interesting surface to engage hands of elderly. Indeed, the Styrofoam balls were pleasant to touch.



Fig. 2. The final concept for the skirt: simple wrap-around style with Velcro closure, balls for comfort and GPS sensor for motion tracking. Photos: Culén.

The panel with a GPS sensor and two Lilypads was sewn on the side, at the upper part of the skirt close to the belt, and closed with Velcro fasteners. The technology was, in terms of wearing it, unnoticeable. The students developed a tracking solution to be used by caretakers on the iPad. However, it was not possible to use the GPS in the building in which the department is located, and thus, a simulation was used for demonstration purposes.

The skirt and the tracking demo on the iPad were exhibited at the annual faire. The purpose of the Faire is to present various research groups within the institute of informatics, and to present to students a range of local ICT companies.

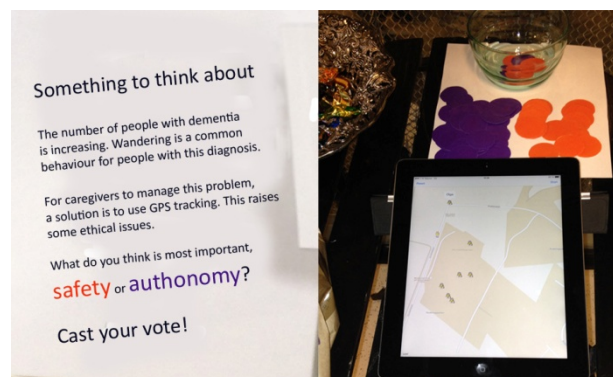


Fig. 3. The voting stand: visitors could try the skirt and the GPS simulation and then cast orange token for safety and the purple one for autonomy. Photo: Culén

The students have used the opportunity to collect some votes on ethical dilemma: should one worry more about person's safety, or their autonomy, see Fig. 3. The people who voted were predominantly students, some researchers and guests for the day. Nobody was in the target group. So the results indicate only how young, technology-oriented people view this question today: 65 % thought security was the most

important, while 35% opted for autonomy. The exhibit was the final point for this student project, and we were left with an intriguing piece of clothing to work with further. Was it really a skirt with meaning?

3 Constructing the Meaning

There were two elements of the skirt that we wanted to examine closer. The first one was the panel of Styrofoam balls. We could not find any related scholarly papers. The second element was the GPS, and much has been written and said about that. We give two examples where researchers try to evaluate the usefulness of GPS. In [3], the authors have studied monitoring of people inside homes and concluded that some of the positive aspects of using the GPS include peace of mind, feeling of safety and increased medical compliance. The negative aspects had to do with complying with demands of the technology in terms of wearing it or filling diaries, the glitches it may have, and, most importantly, privacy issues. In [14], the authors assess GPS based technology in terms of out of home wandering. Their study is inconclusive in terms of overall usefulness of GPS, indicating that while some people view use of GPS as loss of autonomy, other people with dementia view it as a means to increase the autonomy, due to the feeling of safety. Searching literature for more conclusive studies did not give results.

We opted for a phenomenological, embodied cognition approach to this issue. Speaking about embodied cognition, Varela states in [17]: “Perception and action, sensorium and motorium, are linked together as successively emergent and mutually selecting patterns”. These successively emergent and mutually selecting patterns are formed also in the relation to the environment, in particular, environmental features that are directly relevant to the action that the body is currently performing. One’s knowledge of the world is gained through ones experiences within the world and these experiences in turn, are constrained by person’s sensorimotor functionality. When there is impairment, the person’s experience of the world is affected on multiple levels, since sensorium and motorium are mutually dependent.

An outside observer can never know with certainty how it feels in the mind and the body of another. The best we could do then is to try ourselves. How does it feel to wear this skirt? What does it do my body? What kind of sensory perception it gives?

One of the authors took the skirt home to wear over a couple of days. The very first observation that could be made was that the students did not take into account aging bodies: the skirt was made for a really thin person, and while students who wore it could easily wrap it around, the same thing was not possible in this case. In fact, a long pin had to be used to keep the skirt secure. The Styrofoam balls felt OK while sitting, but awkward and heavy while walking. As the skirt was not sitting right on the body, this effect was just increased. Furthermore, the fabric was synthetic, both the lining and the outer layer, and it was utterly uncomfortable from this perspective, too. As soon as the GPS component was truly forgotten, and the wearer threw herself on the sofa, she jumped up fast to check if all the components were undamaged. The skirt

did not need to be worn the second day. It felt more like an evidence of how well minded designers compromise aesthetics, functionality and privacy, all in one piece of clothing (this even without considering washing the garment, glitches of technology, etc.).

It was easy to reject the concept of the skirt as it was. Yet, the questions around dementia and skirts persisted and we wanted to further explore the issue. The questions were no longer about concrete design solutions (for example, placing the GPS on a belt, which does not get washed). Rather, we concerned with exploring how fabric, materials, photos, etc. can support body, mind and emotions in designing new textile-based interfaces for ladies with dementia.

Both authors have experience with dementia. One of us had summer jobs when younger, working as a home care person, where she encountered people with dementia [10]. The other has a person in early stage of dementia in the immediate family.

We have decided to broaden our experiences by inviting four people to in-depth interviews about dementia and skirts. The first person interviewed is a woman, 72 years old, with an education in sensory perception from 1960's Berlin. Her mother died recently, 106 years old, suffering from dementia for the last 20 years of her life. The second person is a male psychiatrist, 74, chosen also because of his keen sense for ethical issues. The third interviewee is a clinical psychologist aged 54, whose mother is in early stages of dementia. The last interviewee is a 50-year-old woman whose parents very recently chose to live in smart nursing home, because her mother is suffering from both dementia and Parkinson's disease. The last two women were interviewed together. The interviews were conducted in English, Norwegian, and Danish, sometimes mixing the three languages in one interview. Thus, for the purpose of this paper, we have written up the interviews in English, summarizing their content.

In order to offer a richer starting point than just the one skirt, we also included other prototypes shown in Fig. 4. The purpose with these was to have tangible objects that can create engaging discussions, Fig. 4.



Fig. 4. The jeans skirt with transparent pockets into which different objects from a person's life can be placed. Beads attached to the pocket. Next, a wool skirt with contrasting texture pockets, a wool skirt with elastic waist and trim, or pocket with different texture and fur. Photos: Culén.



Fig. 5. The interviewee trying on a skirt, and materials of different textures. Photo: Culén.

4 Analysis and Discussion

How are we to design for supporting sensory perception? What is considered important to support and how should such support come about? In the following we present excerpts from interviews, where we touched upon topics related to body, mind, and emotions. These topics are considered equally important and need to be taken into consideration when designing skirts for people suffering from dementia.

4.1 Body, Mind, and Emotions

At the first interview we brought the original prototype made by the students and told about the idea behind the concept. The interviewee's first action was to try the skirt on. This made her comment on the size of the skirt, both in relation to waistline and length; it was way too tight and too short when not hanging on the hips. This made her remark that young people do not have an idea about what happens to the human body when it matures (in line with the experience by the author who brought the skirt home). In addition, the skirt did not appear aesthetically pleasing. The blue color reminded her of old school uniforms. On a later occasion, another interviewee backed up this observation, suggesting brighter colors, like red. Personal appearance, we learned in the process, is important not just for one's own wellbeing and self-esteem, but also in relation to how others treat you. Another interviewee told that her mother always got more attention when her hair and clothes were well done: *"How one looks like has influence on what kind of care they receive, because people are more attentive to people who look nice and they interact with them more"*.

In relation to other sensory perceptions, beyond color and shape, the first interviewee was keen on touching the fabric, turning the skirt, pulling it open to make the technology visible, sitting on the Styrofoam balls, turning them to the front, and/or

'fiddling' with them. We conversed about hands and how her mother's were always restless: *"My mothers hands were always slightly fiddling. The hands go because they were used to do things and the mind is not there and the energy goes to hands"*. We talked about the GPS, and the way in which it was embedded in the skirt, Fig. 2, and how loose threads most likely would be pulled out, just like her mother had repeatedly pulled out her hearing aid: *"As for the GPS, if there is any threads or anything, my mother would pull them out. She used to do that the whole time with her hearing aid"*.

In the first interview, sensory perceptions for triggering memory were directed towards music, photos, and flowers. In relation to such memory triggering we talked about how *"Pockets with things that would make good associations are great"*.

At the interview we got valuable insights on what worked well and what could be re-designed in terms of positively supporting the sensory apparatus of people suffering from dementia. The size of the skirt was an issue, so were loose threads, or other items that could be pulled at. However, it was considered important to provide for keeping the hands busy (support of the body), and within this, support of bodily memories. By bodily memories we mean things that the body does, and the mind has forgotten. A touching example is reported in [11] where a women, at a local center for elderly, repeatedly made a cradling movement. She did not speak, and nobody understood her behavior. It turned out that she had saved a baby from dying during the war, and the body remembered it as an important event from her life.

Summarizing the findings from the interviews, aesthetics were considered vital (support of emotions), so was the triggering of good associations (support mind). In order to bring further these ideas, we made some new prototypes that incorporated a broader spectra of tangibles to support sensory perceptions, herein transparent pockets that could hold pictures for triggering the memory, beads for keeping the hands busy, and different kinds of fabrics for emotional support, see Fig. 4 and Fig. 5. We were interested to learn how the new prototypes of skirts for supporting sensory perceptions were perceived. Thus, these prototypes we brought to the other interviews, were we got the following feedback and further insights on what it means to live with dementia.

4.2 The Interviews – A Discussion

The fabrics and texture on the skirts prompted different meanings. All interviewees really liked the red, very soft to touch imitation fur, Fig. 5, whereas the fur on Fig. 4 last image, was considered problematic. One interviewee remarked that it could have a negative effect: *"If there is any paranoid ideation which one may have with Alzheimer's, it could be threatening. Hallucinations are also frequent. Things like fur may seem threatening and experienced as an animal, the person may want to take it off. If it is part of the garment, they can not."* The interviewee further suggested designing a blanket or a stole so that the garment could easily be put away, if something suddenly becomes distressing: *"I would suggest a blanket or a stole, they can simply be thrown away if there is anything suddenly disturbing on the blanket"*.

Similar observations, concerning color, texture, and emotions, are reported in a study on sensory gardens for people with dementia [9]. Here plants and their ability to

afford sensory is considered with respect to such concerns: *“Plants provide sensory, but non-confrontational, stimulation for all the senses through colours, structures, scents, tastes, forms and sometimes by sounds. Sensory stimulation is important for people suffering from dementia since it can improve orientation, trigger memory, prevent emotional outbursts and facilitate connectedness in individuals with dementia”*, [9:4].

Nature was also a topic mentioned in the interviews. Especially, we talked about it in relation to photos that could be carried in transparent pockets. Such photos were considered beautiful and calming, thus suitable for people who are suffering from dementia: *“Pictures of nature, beautiful and calming are good.”* However, instead of pictures of nature, we had placed photographs of people as a means of triggering good memories, Fig. 4. Rather than being welcomed by the interviewees, this feature created much discussion. Other interviewees mentioned that carrying portraits (and other items) in this way, could be distressing as it could be difficult to figure out who was portrayed on the photo: *“People would pick at things and it could be distressing because there is an object or a photo they may recognize and wonder why are these people on my skirt?”* and *“Peoples photos are distressing as they can not figure out who it is and they know they should know who it is.”* Another interviewee commented that some might perceive it as *“an insult to carry around memory on the outside”*. A suggestion from this interviewee was to try out different methods to see how they were perceived.

While the feature of carrying around portraits was debated, the attached beads were welcomed. One interviewee said that *“repetition with beads is good, picking is diminished”*. Another mentioned sensory qualities of beads, they had a *“suiting sound”* to them. This interviewee was attentive towards the feel of the beads also: *“The brown is too cold. So is the yellow. The white is nice”*.

During all the interviews, ethics was also a topic of discussion, especially regarding the GPS. Privacy issues in relation to use of such technology are important to discuss in situations of cognitive loss. Herein, it is essential to take into account the relationship between automation and autonomy when, on the one hand, independency of an individual is considered important, while, on the other, wandering might be a concern. At the interviews the interviewees had different and interesting viewpoints on this issue. One talked about the GPS in terms of wandering, safety, and autonomy, and considered the technology a supporting device: *“The GPS might be a good thing for a person alone. But in the center situation, there may be many to monitor at the same time, more room for problems. In principle, an ok solution”*. Yet another interviewee was particular about the relationship between patients, family, and medical staff. It was noted that a patient might be more sensitive towards having doctors and nurses knowing where the patient is. Thus, it was considered important to *“talk about it with the family, preferably the ones with whom there is a good relationship”*.

In coming to an end of the article we present our findings from the interviews in a table summarizing different thoughts around supporting the mind, the body and emotions when designing for ladies who suffer from dementia, Table 1.

Thus, what we have learned from this process is that a designed garment for people suffering from dementia should cater to mind, body, and emotions. Also, it is

important to take into consideration the flexibility of use (easy to put on and away), in addition to colors and textures of both fabrics and other materials. Neither aesthetics nor ethics should be forgotten or compromised, in particular if including sensors or memory triggering objects as design elements.

Table 1. Diverse ways to support the mind, the body or the emotions of people with dementia

Activate the mind	Support the body	Support emotions
Photos	Balls	Soft furry materials
Flowers	Beads	Velvet
Jewellery	Trims	Colours
Musical buttons		Shape, e.g., blanket

We conclude with a quote from Alanna Shaikh’s *How I’m preparing to get Alzheimer’s* talk on TED: “*The more things my hands know how to do, the more things that I can be happy and busy doing when my brain’s not running the show anymore*”, [22].

5 Conclusion

In this paper, we have started unpacking possibilities of skirts or other garments embedded with sensors such as GPS to support ladies with genitive loss. While opinions on this topic vary, we have come to the conclusion that the choice between autonomy or safety, offered by GPS monitoring, is a very personal issue, best taken care of while the person still has faculties to make decisions. Other aspects of clothing were then looked at, through series of interviews with tangible props, such as a skirt with a panel of Styrofoam balls or clear fabric pockets containing memorabilia. The main lessons learned are that skirts need to support mind, body and emotions, that is, aim for the simplicity of taking them on and off, use them to engage hands, and make those aging mothers thrive in them, as well as look good! Clothing for dement people should never be seen as a new interface for assistive technology. Rather, it should be seen as an opportunity for design of aesthetically appealing garments improving self- image, feeling good etc. which have a potential to offer more through technology, if the person allows it.

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