

Designing personalized prompts for a virtual assistant to support elderly care home residents

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ABSTRACT

In this paper, we present the first results of the ACT@HOME research project which aims to develop an artificially intelligent virtual assistant (VA) to engage and help older adults with Alzheimer's disease (AD) to complete activities of daily living (ADL) more independently. In order to define the most appropriate prompting style for each user profile, we performed 12 semi structured qualitative interviews with dyads of elderly care home residents and their family caregiver. During these interviews, we presented the virtual assistant and the different 'static' prompts to support people in the activity of hand washing. We gathered as much feedback and suggestions as possible coming directly from the end users about how to improve the provided prompts and thus, increase acceptability. The results are presented around three extracted themes: a) comments on current design of the virtual assistant, b) perceived usefulness, user adoption and c) suggestions for improvements. These should guide in the future developers of assistive technology to support elderly care home residents.

CCS Concepts

Human-centered computing → Interaction design → Interaction design process and methods → User studies

Keywords

Assistive technology; gerontechnology; clinical research; qualitative interviews; user feedback; affective computing, Intelligent interactive systems; affective interaction; virtual assistant; prompting; support in ADL; elderly care; dementia

1. INTRODUCTION

Previously, an artificially intelligent virtual assistant (VA) has been developed that can assist older adults with Alzheimer's disease (AD) during activities of daily living (ADL) by monitoring the person and providing audio-visual cues when the person stops making progress [1,2,3]. It has been found that the VA works very well in practice, reducing the need for caregiver

assistance by up to 100% in some cases [4]. However, for some persons, it fails to provide appropriate assistance, and we believe this may be due to an affective (emotional) misalignment of the VA with the specific needs and states of the individuals and whether the VA is perceived as a tool undermining their sense of personal identity [5-6].

Considering the big variety of personal affective identities, a primary reason for lack of effectiveness may be the static, non-adaptive nature of the "canned" (pre-programmed) prompts. While we have made significant effort to design prompts founded on the methods and styles of human caregivers [4], a simple "one size fits all" style of prompting may be limiting. For example, one person might find our prompts to be too imperious, and would respond better to a more servile approach. However, this will not be the case with every person, and some may prefer the more imperative prompting style. Each person comes from a different background, has a different personality and has different emotional responses to prompts, whether given by human or machine.

In order to define the most appropriate prompting style for each user profile, we performed 12 semi structured qualitative interviews with dyads of elderly care home residents and their family caregiver. During these interviews, we presented the virtual assistant and the different 'static' prompts to support people in the activity of hand washing. We gathered as much feedback and suggestions as possible coming directly from the end users about how to improve the provided prompts and thus, increase acceptability.



Figure 1. Screenshot of VA

2. STUDY DESIGN

A semi-structured interview tool was designed questioning elderly residents of a nursing home as well as their family caregivers. The nursing home residents are diagnosed with mild to moderate dementia while their caregivers are healthy but command over long-term experiences with the residents.

2.1 Data gathering

We conducted interviews with 12 dyads of resident and family caregiver during which we played on a laptop screen 3-4 different prompts given by the virtual assistant such as “Please turn on the water”, “Please, dry your hands using the towel”. All questions of the semi-structured questionnaire were open-ended and phrased conversationally, to allow maximum flexibility in accommodating the needs of respondents and in order to consider concepts not known beforehand. The part of the questionnaire presented in this study sought to evaluate the digital virtual assistant (see Figure 1.).

This section of the interview also sought to determine the likelihood that the avatar face or voice would increase rather than decrease confusion, and if there was a risk that an adult with dementia might attribute negative characteristics to it stemming from their own identity confusion.

In a next step, the recorded interviews were transcribed and then analyzed in order to identify recommendations for different prompting styles according to a specific user profile.

2.2. Participants

12 elderly nursing home residents and 12 family caregivers were interviewed. Each interview session, of approx. 45 min was recorded and carried out by a trained psychologist. Inclusion criteria for the residents were to be over the age of 50 years; fluent in English; to hear normal levels of speech (including through corrective means); diagnosis of AD; have mild-to-moderate cognitive impairment (as determined by a Mini-Mental State Examination score greater than 10, and impairment in initiating and performing sequences of ADL steps (as reported by their caregivers). Inclusion criteria for the caregivers are that no technology proficiency is required; the caregiver can be family or staff caregivers, but must be familiar with the resident they are paired with.

3. RESULTS

We coded all interview transcripts using an emergent open coding scheme to identify recurring themes related to how the participants perceived the prompts provided by the virtual assistant and their suggestions on how to improve the design and thus, the likelihood of adoption of such technology.

3.1 Interview outcome themes

After the coding, we extracted three themes in the feedback given by the participants about the virtual assistant which we describe below integrating representative excerpts of the transcribed interviews. First we present the different comments gathered on the current design and look of the VA, then the following section focuses on the perceived usefulness and user adoption of the VA and the final theme describes the interviewer’s suggestions on how to improve the design of the VA.

3.2.1 Comments on current design of VA

The VA looks too ‘hard’, stiff, unrealistic, the participants had difficulties relating to the VA, too aggressive and robotic (the image and the voice).

How do you like the way she looks?
“..yea that one seems a little bit rough.”

Her voice?
“It’s such a high pitched, it has a high pitch in it.”
How you find like her voice?
“Her voice is annoying. It’s too aggressive.”

What do you think would make the voice, the voice better? If it could be softer?
“ Could be.”
Caregiver: “I would just say that the face would be very futuristic and very robotic

Participants often preferred if the VA would have the opposite gender.

You like it as a woman?
“ I’d prefer a woman probably.”
“yes, okay. I would certainly give credit to a woman then I would to man.”

It was often reported, that it would be preferable if the VA would look older, closer to the age of the end-users. This would make the prompting appear less condescending and more given on an equal base.

If you had an assistant like this installed in your bathroom at your place, umm.. would you find that helpful?
“No. No, I would not. If it was the seniors, yeas”

Furthermore, it was suggested to couple the prompting with text/words on the screen as well as with an actual image or video of the current step of the activity (ex. Putting soap on the hands, turning water off, etc.).

“umm.. I think pictures would be nice (mumbles) so many yeas, would be better than words

Caregiver: “I don’t think everyone is there yet with knowing how far we’ve come with technology.... I think utilizing words is probably better than seeing a face.”

Finally, small suggestions about hair or eye colour and change of cloths were reported.

Maybe it would be not really necessary to change her look. What do you think?
“well I prefer blonde myself! (laughs)”

3.2.2 Perceived usefulness, user adoption

Remarkably, almost every resident reported that they would not need such a technology. This seemed to relate to their need to preserve the image of themselves being ‘still able to do’ basic activities of daily living such as hand washing. In most cases, it was only possible for the residents to imagine the technology for someone else much more dependent and demented as them. If

applied to something else than hand washing (confusion in the middle of the night; showering, tooth brushing, etc.)

Then you think it will be a helpful tool ?

*"yea sure, I am not kinda surprised zzzzzzz...there's a lot of people out there who are just on the edge, and uhh... **this will be good for them** because **they need the prompting, they need the function.**"*

You think that would be helpful? Having something like that in your bathroom?

"No. (firmly). No, I know what I want to do when I go to my bathroom."

Would it bother you? Like having this?

*"Yes, it would, **because I would like to be independent as much as I can.**"*

So, would you prefer, like to have somebody like a nurse, somebody who works here coming in to help you in the bathroom or how would you feel to have this, like.. in the bathroom to help you guiding through the activities.

" oh I don't... when I get to the point I'll ask for it. I don't want to do it until I get to that point."

Maybe imagine your husband would have something like that, would you.. how do you like it?

" it's alright."

But if this is, this is.. this is.. maybe you don't want it for yourself..

"No, I don't want it for myself."

If somebody else had this, for hand-washing, do you think with that face appeared in the bathroom when they got stuck and forgot what they were doing do you think that that might be helpful?

"it might help them."

" well I am happy the way I am...so I don't need anything else...well, it's good that they have that but I don't need any of that. I am still quite capable."

I mean how do you, would you, how would you feel about having something like that in your bathroom, helping you?

"I would not need that...And I would have a very strong feeling not wanting to have that."

Okay and why's that?

"Because I can take care of myself very well.

...They don't have to tell me that I have to wash my face or my hands."

"I know when I need to do that...I am pretty independent and do my own thing. I know when to use the wash cloth and when to not. And when to use soap, and water, and...."

Okay so you would not like at all to have something like that.

"No. (firmly)"

"No I don't appreciate having a help from people when I can do it on my own. And I am pretty independent".

A few residents reported feelings of indifference towards the VA, saying they don't really care if it would be a real person or a piece of technology taking care of them.

So if it's this or a real person, you don't really..

"It doesn't matter much for, to me."

So, how would you feel like if you had that in your washroom.

" Well, I have had my kidney operation done by a robot and I had to agree to that. Was done entirely by robot."

Okay, now how would you feel about now, when you would have this you know..

"well, that would be fine."

Would you be annoyed by it, would you be fine?

"no, it wouldn't bother me."

Would it make you feel a bit more secure to have something like this installed?

"Certainly safe, there's no doubt in that."

Sensory impairments which are very often concomitant to dementia have to be taken into account when designing the VA. Certain residents had a very negative, rejecting attitude towards the VA indicating that they don't want to get told what to do by a machine and perceived it as highly insulting.

Would you.. be bothered?

"I don't like it."

Could be. But how do you.. how do you like her?

"I can't hear"

"I don't want to talk to her."

You don't want to talk to her? "No."

But..

"Go to hell.."

Go to hell?! Okay! So you find it stupid. You don't like this.

"I don't like this."

Ok. Can you maybe try to tell me what you don't like about it so..

"I thought that it's too (unclear) a great deal on her shoulders.. and.."

A great deal can you please repeat?

"She's taking on things on her shoulders. And she shouldn't need to be."

So.. it's not her job to tell..

"Tell somebody what to do-no...not from her"

3.2.3 Suggestions for improvement

The main outcome was the preference of personalizing and customizing the design of the VA and the prompting, as for example the greeting of the VA should use the name of the resident, integrating pictures or even sounds and music the residents like. Everyone has a different preference, either more visual or more audio prompts, therefore the design has to be tailored to the individual needs. When questioned about the VA's look, it was often proposed to make it look more natural and in particular more empathetic (more smiling).

Any suggestions, do you think it would be nice to have a girl or it would be a man, or is there any like.. I don't know, is there anything you think could be improved
"Well, no if people are capable then it would be nice to have a woman there to help a woman and a man to help a man. I think it's more acceptable. For either, for each sex to have their own. I think."

"I think some people will appreciate it and some people will need to be told wash your hands, now that you've gone to the washroom you know.."

"and the thing is to, would be good if when people go to the washroom to have a screen like that saying "now wash your hands" cuz some people go in and they don't even wash their hands ...and we could have a screen saying "wash your hands"

"I think it would be nice to have a face to know where the source is from. And.. yes, and would be more helpful."

"To know it coming from a person who knows what.. what.. needs to be done.."

"I think possibly, rather than a dummy sort of thing, I would prefer photographs."

Words of encouragement, like 'Good job!' should be not exaggerated, it should be rather acknowledged when a step of the activity was completed.

Caregiver: "Well, you could also try instead of having a picture of someone talking with their lips moving, maybe even the words going across the screen saying I want you to wash your hands and it's talking at the same time."

"..I think if it greets him, "Hi XY" please wash your hands." That might be good enough.

What about encouragement? Things like saying "oh, good job (F)!" or would he be annoyed by that?

"He would probably be annoyed by that...that's when you're treating someone like they are a child Maybe if it just said thank you, or you can shut off the water now, or you know...something along those, those words but not "great job you washed your hands!"

Suggestive informative prompting style was often proposed by caregivers.

"If it says you're fighting infection by washing your hands, ...if you're, you know gearing it to something else, you're preventing yourself from getting sick, or preventing spread of germs. Residents can understand, (R01) can understand that process then right, and it could appreciate it more, why he's being told to wash his hands."

"I think that's good with him. I think overall, the system, I think you would have to give it to each resident

as an individual and know is it going to meet their needs or not is trial needed out."

"And really gear it to the individual, otherwise I think it's a great idea, umm.. I think simplifying the words making sure not talking to much"

4. CONCLUSIONS

To summarize the overall feedback provided directly by the interviewed target end-users, we underline the importance of the different obstacles in regards of integrating successfully the technology in their daily life routines. Every user is different, with a different personality and set of affective states which influences the user experience with the technology. The prompting system may work for certain elderly but not for others, therefore an important obstacle to overcome is to respond equally to the needs of everyone. It seemed problematic to accept a technology that reminds the user of being 'disabled', 'different', 'dependent', and about to lose important cognitive functions. It was perceived as condescending and insulting to show the user a device to support them in such a simple and easy activity as 'hand washing', particularly if the user is highly educated and used to work in a high position (used to be the 'provider' for others rather than receiving help from others). So far, we haven't really managed yet to overcome these obstacles. However, it appears from the interviews with the targeted end user, that it is of great importance to avoid making them feel labeled as 'demented', 'old' and basically 'in the need of care for even the simplest tasks'. The challenge is to make them perceive the usefulness of the technology in terms of it can allow actually longer independent living, allow even to relieve their family caregiver not to remind them all the time for everything which in turn often leads to tension and arguments. To make them see and experience that it can actually lead to more peace of mind and allow to spend actually more quality time with the family. What the interview outcomes show is that the the VA has to be experienced as a piece of technology that will support longer independent living and not replace highly valued interpersonal relationships between elderly and their carer. We faced the obstacle that the targeted end user reported, "I rather have a 'real' person helping me than a machine", which demonstrates the fear of increasing even more isolation by introducing assistive technology.

The enablers in regard to improve acceptability among the targeted end-user group seem clearly to be the personalization and customizing the technology to the individuals' personality, state, needs but also physical condition (for example taking into consideration sensory impairments). In the context of providing prompts to support elderly in activities of daily living through a virtual assistant, it would increase acceptability if the assistant could be at the beginning for example designed together with the user; with a set of pre-defined features (ex. young looking, old looking, male, female, blond, brown hair, blue eyes, etc.). Certain residents reported the preference of just being prompted by images or movies showing the steps, or by the voice of their caregiver, or a photo of a caregiver talking to them. Important as well is, that they experience the benefit and even fun by interacting with the system by integrating jokes, personal greetings, etc.

Non-adoption of the developed technology by the user seems mainly caused by the misalignment with the image they still try to preserve of themselves such as 'healthy, active, busy'.

Once the offered technology confronts or even threatens this image, it leads to non-adoption and comments such as “I don't need this, I am still doing fine”.

Important factor was underlined, to have a system that learns the personal rhythm of each user carrying out the activity different and prompts should be only provided if it is really necessary. One prompt too much provided, could be perceived immediately as annoying and intrusive. Therefore, since every individual has a different pace in doing things, it would be important that the systems take this aspect into consideration. How to overcome the non-adoption due to misalignment with self perceived image, seems to be by bypassing this conflictual situation and make the user experience only benefits from using the technology (for example providing the prompts coupled with information such as 'By washing your hands you decrease up to 98% of disease contamination'). Also to provide user adapted prompting for example more suggestive style ('You can use the soap if you want', 'You may want to use the soap?') rather than an 'ordering' style ('Use the soap').

Acknowledgements

This work was supported by AGE-WELL NCE Inc., a member of the Networks of Centres of Excellence program and Alzheimer's Association grant ETAC-14-321494. University of Colorado contributions in part by Nattawut Ngampatipatpong and Robert Bowen. Animation prompting platform supported in part by grant 90RE5019 from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), a Center within the Administration for Community Living (ACL), Department of Health and Human Services (HHS).

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