

# Aiding everyday activities with prompting technology: A qualitative analysis of dementia participants' experiences

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## INTRODUCTION

- Older adults with dementia have a harder time completing instrumental activities of daily living (IADLs), such as cooking and managing finances.
- This has caused a higher demand for the development of tools, including in-home prompting devices, that can assist older adults in completing these activities and aid in prolonging independent living.
- Prior research has focused heavily on the successful implementation of prompting technologies in helping older adults complete activities; however, little is known about the participants' full experience with the prompting system.
- This project aimed to find out how a person with dementia responds to smart home voice prompting by identifying what behaviors follow and precipitate a prompt.

## METHODS

### Participants

- The study included five older adults randomly selected from a larger sample of fifteen participants with a diagnosis of dementia ranging in severity from mild to moderate/severe (see Table 1 for demographic information).

Table 1: Sample demographics (N=5).

	Mean	Standard Deviation
<b>Demographics</b>		
Age (in years)	72.2	7.7 (65 - 80)
Education (in years)	17	2.7 (14 - 20)
Gender	2 F; 3 M	--
Ethnicity	Caucasian	--
<b>Cognitive Status</b>		
TICS total score	25.4 (mildly impaired)	5.1 (20 - 31)

### Procedure

- Participants performed eight IADL-like tasks in a smart home environment (See Table 2 for a description of these tasks).

Table 2: Descriptions of eight IADL-like activities.

<b>1. Household Chore: Change light bulb</b>	Change a light bulb making sure to select the correct wattage light bulb from the storage drawer.
<b>2. Hygiene: Wash hands (Basic ADL)</b>	Wash hands in the kitchen sink choosing correct soap and using towel to dry.
<b>3. Household Chore: Clean countertops</b>	Use soap and a sponge to wash kitchen countertops.
<b>4. Telephone use: Use telephone and phonebook to record a recipe</b>	Look up a specified number in the yellow pages of a phone book, operate a telephone, call the number, and write down a message, press a button to repeat the message if necessary.
<b>5. Household chore: Sort and fold laundry</b>	Fold and sort a basket that is full of laundry for a man, woman, and small child.
<b>6. Meal preparation: Cook oatmeal on the stove</b>	Boil water on the stove and cook oatmeal according to the recorded directions, which also includes the addition of brown sugar and raisins.
<b>7. Organization: File mail into mail organizer</b>	Sort and organize bill statements correctly into filing drawer.
<b>8. Hobby: Give instructions how to play a card game</b>	Retrieve a deck of playing cards, set up a chosen card game, and tell experimenter how to play the card game.

- Participants' completion of each task was recorded by three stationary cameras placed throughout the lower level of the smart home (locations included the living room, kitchen, and dining area). No audio was recorded. Examiners observed the participants from the upper level of the smart home as they completed the tasks (see Figure 1 for Smart Home visual).
- Upon making a mistake during task execution, the examiner provided a pre-recorded prompt to assist the individual with completing the task through a set of computer speakers located in the living room and kitchen. There were 3 prompting levels that provided an increasing amount of direction (see Table 3 for prompt level descriptions).

Table 3: Prompt Level Description

<b>1. Indirect Verbal Prompt</b>	Gently orients the participant back to the task (e.g. "The oatmeal may burn if the stove is left on").
<b>2. Direct Verbal Prompt</b>	Assists activity step completion by directly saying what needs to be done (e.g. "You can turn the stove off now").
<b>3. Multimodal Prompt (Verbal Direct &amp; Video)</b>	A direct verbal prompt was given, along with a visual prompt of a person completing the step of the activity in which the error occurred (e.g. a video clip appears on a computer screen of a person in the apartment turning the knob on the stove to the off position and a direct verbal prompt is delivered).

### Analysis

- Two students viewed the footage of participants attempting the eight IADLs and made detailed observations of what was happening in the videos and summaries of their experience.
- A content analysis was performed in an inductive and iterative fashion on the students' observations and summaries to extract themes associated with how the participant reacted to prompting and completed each IADL.

## RESULTS

### 1. What behaviors precipitated a prompt?

- **Confusion:** Some participants wandered around aimlessly, making no progression in the task, and sometimes interacting with items that were unrelated to the activity. This was usually accompanied by frustration.
  - "[Participant] takes a few steps out toward living room away from closet, pointing at the closet, then turns back and stands in front of the closet again."
- **Apprehension:** Some level of hesitation and a lack of confidence was consistently present in every participant through their actions (e.g., indecisiveness when reaching for an object).
  - "Holds [file statement] over a slot, lowers it half way in, then pulls it out and sets it on the table. Lifts next paper and puts it down in slot, still holding it, then lifts it back out and sets it somewhere else on the table."

### 2. What behaviors followed a prompt?

- **Attitude:** Gestures, such as throwing hands in the air and rolling eyes, were sometimes made in response to prompting instruction. This was viewed as a sign that the participant was unappreciative of the direction, seeming to take offense to it. However, one participant was very receptive to the prompts and did not show disdain for being corrected. This particular participant expressed confidence and accomplishment following the successful completion of a task.
  - "Lifts arm up, shrugging shoulder, and says something. Looks down at [clothing] piles for a few seconds. Looks toward TV, rolls eyes, and exhales."
  - "Leans forward and smiles, then looks down again and gathers together the rest of the cards, still smiling. Leans out and looks out to living room and says something with a smile."

- **Frustration:** Prompts did not help lessen the confusion of some participants, but rather magnified frustrated feelings.
  - "Glances up, then looks down with a grumpy face still wiggling pen. Shakes head, still looking down."

### 3. When were prompts most helpful in leading to successful completion of the IADL?

- Participants responded less effectively to prompts when they were given during more complex activities (e.g., record recipe using telephone).
- Prompts directing a participant to locate an item were easier to understand and respond to.
- When the participant was not in a state of extreme negative emotion (e.g., anger, frustration, confusion) they responded most positively to the prompts.

### 4. What was the overall experience for the participants?

- **Uneasy:** There was an overall sense of discomfort exhibited from most participants. This was manifested through a variety of nervous movements such as fidgeting, nail biting, and shifting of weight. Participants seemed to be hyperaware of their surroundings and uncomfortable in a new environment such as the smart home.

## CONCLUSIONS

- These results indicate that prompting technologies are most helpful when providing assistance during less complex activities and when locating items, however, instances of extreme emotion can diminish a person's ability to benefit from and appreciate this technology.

### Limitations

- The participants were unfamiliar with the smart home environment and had no prior experience with or exposure to the prompting technology.
- The sample size was relatively small (N=5).

### Future Implications

- Future research could analyze how responses to prompting varies according to the severity of dementia in older adults.
- Implementing motivational phrases into prompting technology (e.g., "well done!", "keep trying") could help instill more confidence into older adults and negate the tendency for participants to feel unsure of themselves during completion of IADLs.
- Comfort with the prompting technology could likely be improved if it was implemented early in the disease process in a more familiar environment such as the participant's own home.
- In addition to increasing independence of the person with dementia, the technology should decrease caregiver burden. Future research is needed to determine caregiver involvement and response to the technology.

Figure 1: Washington State University Smart Home model



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