Remote Reminiscence Talking and Scheduling Prompter for Individuals with Dementia Using Video Phone

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Abstract. Caring for individuals with dementia is very difficult and frustrating task, especially for home caregivers. We have created two remote assisting systems, the remote reminiscence talking and scheduling prompter using video phone, and used them with four individuals with dementia living in their homes. For two out of four individuals, reminiscence talking and scheduling prompter are effective respectably, compared to TV watching and care giver's instructions. The psychological stability of one individual has continued for three hours even after the remote reminiscence talking finished. We suggest that remote reminiscence talking and scheduling prompter are very promising for caring individuals with dementia, although further revisions are required.

Keywords: Remote, reminiscence, scheduling, dementia, video phone.

1 Introduction

The onset of dementia usually starts with mild anterograde amnesia and proceeds to develop a variety of behavioral disturbances such as wandering, agitation, illusions, and incontinence [1]. These behavioral disturbances arise from inactivity, discomfort, and a need for social contact [2]. Since individuals with dementia and their caregivers bear a heavy burden, they urgently need rest time [3]. To reduce their stress, various interventions have been introduced, such as memory training, music therapy, validation therapy, and behavioral therapy, as well as pharmacotherapy [4].

1.1 Reminiscence Video

Reminiscence therapy is reported to stabilize individuals with dementia and to help reduce behavioral disturbances [4]. Despite its effectiveness, reminiscence therapy is difficult to perform at home. This is because a reminiscence therapy session is usually conducted in a group led by experienced staff at institutions, using various items such as old tools, toys, photos, and paintings. Therefore, we have explored the personal reminiscence photo videos [5].

This photo video is a kind of slideshow produced from their personal photos. The video includes background music, comfortable narration to make the video more

engaging, and panning/zooming effects to the regions which the individual with dementia is interested in. Through our experiments, family caregivers were very pleased that individuals' utterances increased when they watched this reminiscence video [5]. Since creating such personal reminiscence photo videos requires much labour, we have introduced a simple way to make the videos by connecting a digital video camera to a TV set with an integrated VCR function. With this system, the photo video can be made on the spot without any editing time and labor [6]. We also explored an half automatic authoring tool for easily producing by simply choosing the set of photos [7].

1.2 Networked Interaction Therapy for Memory-Impaired and Dementia Individuals

Recently, the use of computer-based intervention is also being explored for individuals with dementia [8]. We are currently proposing *a networked interaction therapy,* intended to provide various types of communicative intervention such as talking on video phones, providing appropriate contents, and managing daily-life scheduling through a TV monitor [9]. This system uses a set-top box with a camera and microphone for monitoring the user's status and controls various types of intervention. If these forms of intervention can increase individuals' quality of life and reduce behavioral disturbances, caregivers will be able to gains some respite while individuals with dementia are engaged in the networked interaction therapy.

1.3 Experiment for Face to Face Talking and Video Phone Talking

Communication, especially verbal conversation, is an easy, common, and enjoyable activity for most of us. Individuals with dementia, however, tend to be alone and poorly informed, with few chances to talk. One of the most important interventions in the networked interaction therapy is to provide them with talking partners on the Internet, such as friends, partners, and family members living in remote locations. A simple interface would thus enable individuals with dementia to talk with partners on the video phone whenever they want [9].

   However, there were no studies on how long and how eagerly individuals with dementia could talk with a partner on the video phone, in comparison with the face to face settings. Yasuda et al. have conducted an experiment in which nine individuals with dementia talked with a partner on a video phone and in a face-to-face session [10]. The individuals were requested to reply to 20 questions asked by a partner. The results revealed that there was no difference in the total response time and in the eagerness observed between the two sessions. This suggested that the video phone talking could potentially have the same effects as face-to-face talking.

2   Two Remote Assisting Systems

2.1   Remote Reminiscence Talking System

The researches discussed so far suggest that the combination of video phone and reminiscence interventions would be effective for psychological stability. Kuwahara et al.

[11] created a system to incorporate video phone and reminiscence photo sharing. In this system, the start of intervention is triggered by operation of a remote partner. The size of the photos on the monitor is manipulated by the partner. The part of photos pointed by an individual or partner is also shown as a red small circle in the same picture on both monitors. Kuwahara et al [11] conducted an experiment on effectiveness of this system in an institution for elderly residents. A satisfactory result was gained from individuals with severe dementia.

2.2 Scheduling Prompter System

Recently, we have also developed the scheduling prompter system. This system is to deliver individuals video contents for prompting the individual's willingness to keep the schedule, such as medicine dosing, hospital visits, and so on.

Figure 1 illustrates an overview of the scheduling prompter system. Our system is implemented via a server on the Internet. An individual or caregiver can ask a volunteer to input their schedule time if she/he is having difficulty in operating their PC. After the volunteer inputs the schedule time (① in Fig. 1), the server delivers the video content in which a memory clinic therapist explains and encourages to perform a scheduled task on the individual's PC (②). We have prepared more than ten kinds of video contents, including dosing, meals, bathing, and so on. The length of video content was about one minute.

The five-minute automatic recording system was also installed. Since some scheduled tasks such as, medicine dosing, are important for maintaining the individual's health, the "dosing" video content includes a portion of asking an individual to take her/his medicine in front of the PC. After the video presentation, the system shoots video for five minutes with the Web camera as the evidence of the individual's taking the medicine. Then, this video is sent to the server (③), allowing the caregiver (who is out of home) to check it (④). If the individual does not take her/his medicine, the caregiver, or the volunteer can make a call to the individual by using the IP video phone or a cellular phone (⑤, ⑥).

Usually, the present time, date, the day of the week, year are always shown on the monitor. These presentations automatically disappear when the video contents begin.
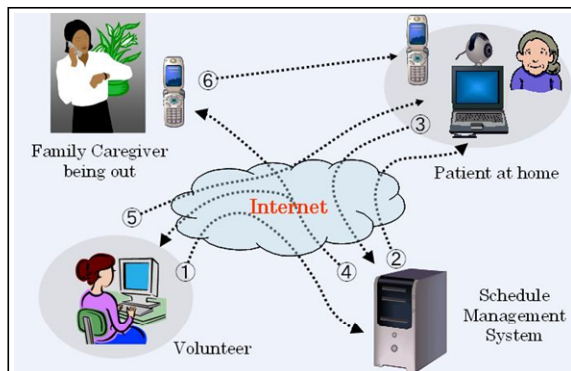

Fig. 1. The overview of schedule management system

3   Field Experiment for Individuals with Dementia

There have been no reports using video phone to assist individuals with dementia living in their home. We conducted the experiment to evaluate the above two systems, the remote reminiscence talking and the scheduling prompter systems for individuals with dementia living in their home, although this field experiment may be more challenging in the way that various factors will affect the results.

3.1   Subjects

The inclusion criteria for subjects were as follows: (1) the subject who was considered to be able to sit and watch the TV monitor for 45 minutes, (2) the subject who had an appropriate number of old photos, and agreed to use them for remote reminiscence talking. The subjects with hearing and vision impairment to watch the TV monitors were excluded from this experiment. Four subjects with moderate and mild dementia had satisfied these criteria. They were outpatients in a hospital's memory clinic. The Mini Mental State Examination (MMSE)[12] was performed to determine their dementia severity. Table 1 shows the demographic and assessment data for the four subjects. Figure 2 (left) shows the scheduled tasks for the subject 1, Figure 2 (right) shows that the subject 1 is talking with a partner, while watching her own old photos.

Table 1. Subjects

Subject	Age	Gender	MMSE	Etiology	Behaviors
1	86	F	27	AD	frequently forgets to take medicines, to eat meals, and what she was just told, living alone
2	74	M	16	AD	forgetful, easily excited or gets angry at his wife, living with his wife
3	72	F	23	unknown	visual illusions, asks the same questions, sometimes uneasiness, doubtful, living alone
4	84	F	22	AD	dislikes taking a bath, asks the same questions, forgets neighbors' faces, living with her son's family

Note: F=female;   M=male;   AD=Alzheimer's   disease;   unknown=unknown   dementia   type
Behaviors=behaviors reported by caregivers at their home

3.2   Procedures and Evaluation

A system engineer has set up a PC at subject' home, and a talking partner's home, respectively. He has also set up the terminal PC at the hospital. These three PCs were connected by Internet with the optic fiver cables or ADSL (Subject 4). During the experiment, the engineer maintained these PCs and above two systems. A special key board cover was attached to the subject's PC, in order to prevent the subject from
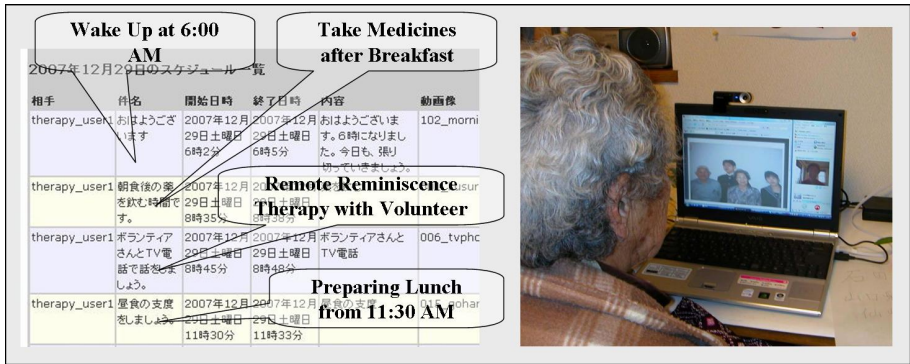
Fig. 2. Example of scheduled tasks and remote reminiscence talking scene

As the preparation of the remote reminiscence talking, the subjects and caregiver submitted their old photos. Then, the engineer digitized them on the terminal PC. The subject, caregiver and talking partner decided on the time for remote talking. In order to check the effect of psychological stability of the remote talking, we used the D section of the GBS check sheet [13]. In this sheet, psychological status was evaluated with 0-7 grading points by the care giver, while the subject was talking with the partner. The score 7 was the worst psychological status, and score 0 was the most concentrated and stabilized status.

The first week was the A period. In this period, the subject was requested to see the TV programs which they like. The next week was the B period. In this period, the partner made a call to the subject PC (video phone), asked the subject to sit in front of the PC, and had some conversation. The partner was asked to use the photos when she could not find any topics to talk.

The subject 1 talked for 60 minutes with the partner, and other three subjects talked for 45minutes. The conversation started at 9:00 for Subject 1, at 12:30 for Subject 2, at 18:00 for Subject 3, and at 16:00 for Subject 4. For both periods, the care giver was asked to fill out a GBS check sheet. We compared the grades of GBS between watching TV and talking with a partner.

Table 2. Scheduled tasks for subjects

Subject	Tasks
1	Take medicine, write on accounting note, prepare for meals
2	Take medicine, throw garbage away, take a walk, do gardening
3	Take medicine, throw garbage away, hang out washing, boiling water, shutting the window
4	Take medicine, write diary, washing her hair, informing her why family member are absent

For the scheduling prompter, subject, caregiver, and therapist in the hospital's memory clinic decided on the daily tasks which the video contents would support. They also decided on the timing of the video contents to be shown automatically on the PC monitor (table 2). They were several tasks which were carried out every day such as taking medicine, or output on several days on week.

The first week was the A period. In this period, the caregiver asked in the usual manner the subject to carry out the above tasks. The next week was the B period. The video content for scheduled task was output automatically. The subject was also asked to carry out the tasks. In order to evaluate the effects of this video content, the caregiver was required to check whether the subject successfully fulfilled the task or not in the A and B periods. If the subject performed the task without any further instructions by the caregivers, 1 point was given to the task. If the tasks were followed by any additional instruction by the caregivers, 0.5 point was given to the task. If the task was not completed, 0 was given.

4   Results

4.1   Results of Remote Reminiscence Talking

The psychological stability was compared between the watching the TV program and remote talking with the video phone on the GBS check sheets observed by the caregivers. In this check sheets, lower points mean more psychological stability. The psychological stability while talking with partner was apparently effective in subject 2 and 4 (Fig.3). The psychological stability continued for even three hours after the remote talking in the subject 4 (* in Fig. 3). The subject 1 got the score 0 in the both periods. The subject 2 refused to talk on the second day. The experiment was cancelled. .
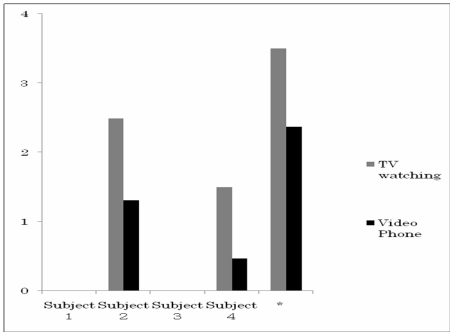

Fig. 3. The points of psychological stability between TV watching and remote talking
note: * = the psychological stability of subject after three hours.

4.2   Summary of Observation by Care Givers

Subject 1: She was at the beginning strained to talk on the video phone. She would also be worried about who the partner was, although the partner introduced herself

every time. She was also wondered why her photos were shown on the monitor. If this talking will continue, the psychological effects will be increased.

Subject 2: He was worried about the cost when he would continue the remote talking, although he enjoyed the talking very much.

Subject 3: She became uneasy in talking with the partner   She doubted as if she was questioned on her personal matter by "an stranger", although she had met the partner in the hospital a month ago. On the next day, she refused to talk on the video phone.

Subject 4: She enjoyed talking on the video phone, looked energetic for 45 minutes. The care giver could get a respite time. This chatting kept her from become uneasy in the evening.

4.3   Results of the Scheduling System

The figure 4 is the average percentage of accomplished scheduled tasks observed by the care giver. Compared to the care giver's usual instruction, the automatic output of the video content was more effective in subject 1 and 3. On the other hand, it was completely ineffective for the subject 4.
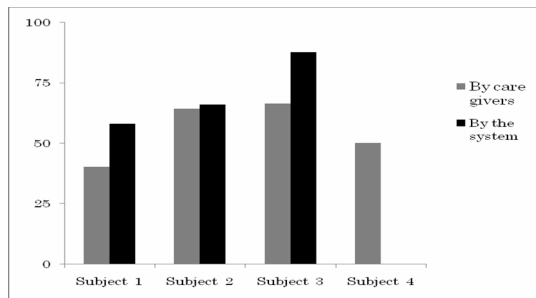

Fig. 4. The percentage of scheduling accompleshment

4.4   Summary of Observation by Care Givers

Subject 1: The audio part of the video content were not heard in the kitchen, or during watching the TV. Sometime she looked the video contents as if the content was given to the other person. If this presentation will continue for longer periods, the effects will increase. After the video content was provided, she was easy to accept the caregiver's additional instructions.

Subject 2: His daily activities were irregular, and did not follow the given time table. So, the automatic output of prompter did not often match his actual activities. At first, he replied to the video content, but he stopped replying to the video afterwards.

Subject 3.(We asked her daughter to appear in the video) She was glad to see her daughter on the monitor, and replied to her in the monitor by saying "thank you for

your advice". The video content such as shutting the door did not match the weather of the day.

Subject 4. Continual presentation of the present time and day was helpful to give her time orientation. She was deeply involved into watching the video content, saying "it is helpful for me", but she did not carry out the scheduled tasks as instructed by the video contents. When we used an IC recorder for automatic verbal reminder, the effect was higher than that of the video content.

5   Discussion

The remote reminiscence talking was effective for the subject 2 and 4 in the terms of psychological stability. As the subject 4 sometime becomes uneasy in the evening, the remote talking in the evening could stabilize her and give the caregiver the respite. This system will have possibility to prevent the syndromes such as wandering in evening, agitation etc. Furthermore, she was stable even for three hours after the talking. This may be the most valuable finding in this experiment, and for future research.

For the subject 1, there was no difference in psychological stability between the watching TV and the remote talking. Her dementia was still mild so she could also enjoy the usual TV programs. This might be a reason why there was no difference in the psychological stability. According to the daughter of the subject 3, her skeptical attitude was maintained, though. She felt as if her personal matter was asked by "stranger".

The scheduling prompter was effective for subject 1 and 3. Both of them were living alone. This might be the reason why the automatic and regular output of video content worked well. The subject 3 enjoyed to see her daughter on the monitor. This video content may have lessened her loneliness. On the other hand, the subject 2 and 4 were living with their wife or, family. Since the instructions usually were given to them by their caregivers, the additional effect from the video content was less than those of subject 1 and 3.

The scheduling prompter was completely ineffective for the subject 4, although she was deeply interested in watching the video content. She may have regarded the video content as something like TV commercial.

As indicated in the results of the subject 2, automatic prompting of the scheduled tasks often did not match his actual time table and the day's weather. For example, the individual would not go out for walking when it was raining. It is better to take the individual's behavior and weather into consideration when the prompt is given.

Though the number of subjects was limited in this experiment, our remote reminiscence talking and scheduling prompter system seems to be promising. The experiment also revealed several points for further improvements.

In this experiment, we used only subjects' old photos. However, individuals with severe dementia have difficulty in comprehending verbal stimulus. These impairments often prevent continued talking. To cope with this problem, presentation of emotional contents is required. Yasuda et al [10] have created the "Talk Video," in which a woman talks on various topics such as hometowns, old customs etc, and sings

old songs. Several DVD movies on the markets can also be used as additional contents, such as the short movies depicting old foods, traditional events etc., or broadcasted social news movies [10].

Yasuda et al. also developed a conversation-support system consists of three electronic resources: a vocabulary data file, an encyclopedia, and homepages on the Internet [14]. This system is now converted into a remote conversation system by Aye et al. [15]. These contents will strengthen the function of remote assisting systems.

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