

# REMINISCENCE VIDEO

## *Helping At-Home Caregivers of People with Dementia*

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**Abstract:** Providing good care to people with dementia at home is becoming an important issue as the size of the elderly population increases. One of the main problems in providing such care is that it must be constantly provided without interruption, and this places a great burden on caregivers who are often family members. *Networked Interaction Therapy* is what we call the methods designed to relieve the stress of people suffering from dementia as well as that of their family members. This therapy aims to provide a system that interacts with people with dementia by utilizing various engaging stimuli. One such stimulus is a reminiscence video created from old photo albums, which is a promising way to hold a person's attention for a long time. In this paper, we first present an authoring tool to assist in the production of a reminiscence video and then discuss the effectiveness of presenting such a video to people with dementia.

**Key words:** Dementia, home care, therapy.

## 1. INTRODUCTION

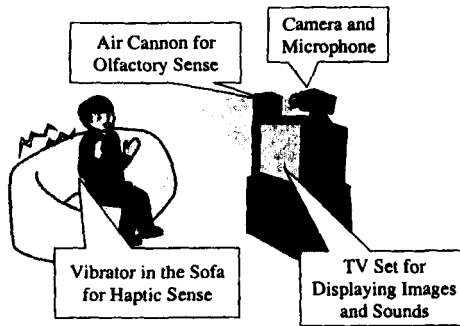
As the size of the elderly population increases, the number of people with dementia inevitably increases. Providing good care to these people at home is becoming an important issue. One of the main problems in providing this care is that it must be constantly provided without interruption, and this

places a great burden on caregivers, who are often family members. *Networked Interaction Therapy* is our name for the proposed methods to relieve the stress of both people with dementia (users) and their family members. These methods use a system that interacts with the users to hold their attention. The human caregivers can thus rest while the user is engaged in the system. We also assume that the user receives a positive stimulus from the system.

In this paper, we first introduce the overall concept of Networked Interaction Therapy and the issues involved in designing such a system. Then, we present a reminiscence video as a promising stimulus for people with dementia, and we propose an authoring tool to support production of the video. Finally, we discuss the effectiveness of presenting the reminiscence video to people with dementia along with the results of experiments conducted at their homes.

## 2. NETWORKED INTERACTION THERAPY

A system for Networked Interaction Therapy needs to get people with dementia (users) involved and keep their attention. Figure 1 illustrates an example of the home terminal for Networked Interaction Therapy. Currently, we plan to provide our service by using a large-screen TV and a set-top box that controls network communication along with a camera and microphone for monitoring the user's status. We are also considering using an air cannon and a vibrator in the sofa to activate the olfactory [1] and haptic senses [2] in addition to the audio and visual stimuli.



*Figure 1. Example of Home Terminal for Networked Interaction Therapy*

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When designing a system for Networked Interaction Therapy and the services provided by the system, it is important to take into consideration the needs of the potential users, in this case people with dementia. However, it is difficult for them to directly participate in the design process. Goodman *et al.* conducted interviews with professional caregivers to assess their patients' needs in a report on designing a health care system for the elderly and disabled [3]. Similarly, we have involved the caregivers, including family and support group members, in our design process. Specifically, we presented our service scenarios in short video clips, which were presented to the caregivers. After the presentation, the caregivers discussed whether our scenarios satisfied their needs and whether they could accept the technology with which we plan to implement the services [4].

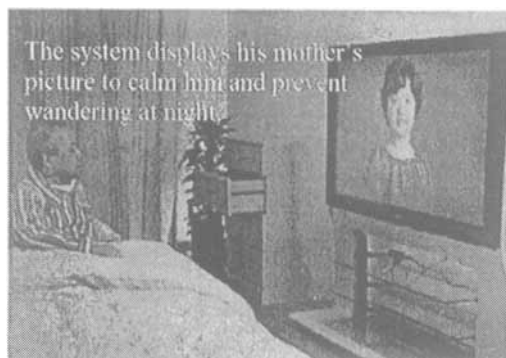


Figure 2. Example of 'Coping with Behavioral Problems' Scenario

Our service scenarios cover issues of Internet communication support between people with dementia and support group members, their daily life support, coping with behavioral problems, and so on. Figure 2 shows a scene of the 'coping with behavioral problems' scenario. There are many kinds of behavioral problems affecting people with dementia. Here, we introduced a scenario that addresses wandering at night. This type of behavioral problem is often caused by the anxiety people with dementia feel when they wake up

during the night. They may think that they are in a strange place and feel alone because their memories have deteriorated and they do not recognize that they are in their bedroom. In the proposed service scenario, the system detects when they wake up at night and displays an image of a familiar person who talks to them gently to help them cope with problems. In addition, music and aroma may be presented to keep their attention on the system and to offer reassurance.

By using such video clips showing our service scenarios, we studied the need and acceptance of our services. We asked four support groups for people with dementia in Chiba Prefecture, Japan, to watch the video clips and make comments through interviews. According to the results, we found that the caregivers strongly need a system that holds the attention of people with dementia in order to prevent their behavior problems and that they think an audio-visual stimulus is the most effective way to do this [4]. Then, the next question for designing the system is what kind of audio-visual stimulus should be presented to people with dementia in order to hold their attention for enough time to allow the caregivers to rest.

### **3. REMINISCENCE VIDEO**

There has been much research on presenting audio-visual stimuli to people with dementia (users). For example, the concept of ‘video respite’ was proposed [5], in which a video was created to capture and maintain the attention of people with dementia while giving caregivers time to rest. The respite video often contains a character who talks to the viewer (person with dementia) in a way that attracts his or her attention. Furthermore, Project CIRCA utilized multimedia technology to stimulate the long-term memory of people with dementia [6]. People with dementia have problems with short-term memory even while they often retain long-term memory. This project, in a sense, augments reminiscence therapy with multi-media technologies.

From the viewpoint of stimulating the long-term memory of people with dementia, we selected the so-called ‘reminiscence video’ as an audio-visual stimulus. This is a slide show video produced from the user’s old photo albums. Its effectiveness was experimentally shown [7]. In addition, it is relatively easier for caregivers to use the video once the video is created.

Making a reminiscence video, however, is not an easy task. It involves many steps: first, the photo albums are collected from the user’s family. Next, photos are selected from the photo albums. The photos to be used should invoke distant memories of the user. Then, the photos are shot with a

video camera, possibly using panning and zooming effects (so-called ‘Ken Burns effect’ [8]). Finally, a narration is added to get the user more involved in the video. These processes are usually performed by skillful volunteers. They are not the kinds of tasks the family caregivers can do while they look after people with dementia. Moreover, for some users, showing the same reminiscence video again and again may wear off the original effects of the video. Thus, a method for easily making different reminiscence videos from the same set of photos is needed. In order to solve this problem, we have developed an authoring tool that makes use of photo annotations [9]. The annotation attached to a photo includes the theme of the photo, such as ‘travel’ or ‘school’, and the date the photo was taken. In addition, ‘region’ in the photo can be specified by annotations. Each region represents an area of the person’s face or interesting objects in the photo. The regions are later used when panning and zooming effects are added. These features are popular for making an attractive slide show video from a set of still photos.

The proposed authoring tool contains a database that stores the scanned photos taken from the user’s album. The annotations to the photos are made with the authoring tool. Once we have the annotated photos in the database, we can produce a video as follows. First, we search for the photos to be used in the video by using the annotation data attached to each photo as search keys. Then, the panning and zooming effects are added semi-automatically by using the region data in the photo annotation. Finally, background music can be specified to form a play list.

It is rather time-consuming to add annotations to each photo. However, once we have annotations, we can create various videos from an existing set of photos. This is a very useful capability, especially when the user gets bored easily after viewing the video only once. Photo annotations are mainly used for efficient image retrieval from the image database [10]. In this system, however, annotations are used not only for image retrieval but also for adding suitable visual effects to a reminiscence video.

#### **4. PRODUCING REMINISCENCE VIDEO**

Here, we describe how the caregivers (creators) produce the reminiscence video, beginning with attaching annotations to photos. We used the following vocabularies to describe annotations: Dublin Core [11], FOAF [12], and Image Regions [13]. Dublin Core is used to describe various properties of the photo itself. FOAF is mainly used to describe a person included in the photo. Image Regions are used for storing the region data of each photograph. In Figure 3, three regions are defined by using the pointing device, and FOAF attributes for each region are specified via the text dialog.

Dublin Core attributes of each photo can also be added via the text box. The user (video creator) searches for the photos to be used in the video by specifying the keywords that describe the ‘theme’ of the reminiscence video being produced.

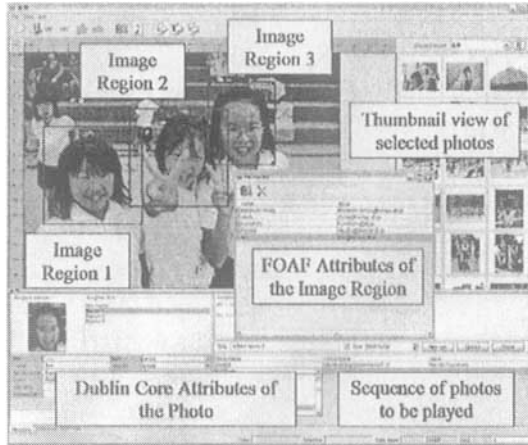


Figure 3. GUI Example of Annotating the Photo

The query can contain regular expressions supported in RDQL [14]. Selected photos are displayed as thumbnail images at the right side of the GUI panel. The creators can drag and drop these images to the list box, where photos for the reminiscence video are listed in the order to be played. There is a template for specifying the kinds of effects and transitions between the photos. We implemented a simple template that uses a zooming effect to a particular region, panning effects between regions, and fade-in, fade-out transitions. In addition, background music (BGM) can be added as a play list. We defined SSVML (Slide Show Video Markup Language), which is a compact representation of a slide show video. With SSVML, we can specify the photos to be used in the video, effects and transitions to be used, and the order of photos to be presented. We also implemented player software that directly interprets the SSVML format.

## 5. EXPERIMENTS AND RESULTS

We conducted preliminary experiment at users’ homes in order to evaluate the effectiveness of the reminiscence video generated by the proposed system. Three male individuals with dementia took part in the

experiment. Table 1 shows the users' brief profiles. We prepared four kinds of video clips for each user. The first one is a reminiscence video that is semi-automatically generated from the old photos provided by the family members, and the other videos relate to their hobbies and news clips. Each video clip is about seven minutes long, and we showed these video clips to the users in this order. The BGM (old Japanese nursery songs) was played during each reminiscence video. In order to evaluate the effects of narration, we added narrations only to the first half of each reminiscence video. We used two cameras to monitor the user in this experiment. One is used for recording the user's entire body movement to monitor his overall behavior. The other is for taking the face image of the user to monitor the changes in his facial expression.

	Age	Gender	Patient's History	Problems	Patient's Preference
User A	62	Male	Cerebral Contusion by Accident	*Memory impaired *Verbal Aphasia *Bad-tempered	*Igo (Japanese table game) *Songs of Misora Hibari (Famous Japanese singer)
User B	69	Male	Multiple Cerebral Infarct	*Memory impaired *Bad-tempered	*Watching Baseball Games *Japanese Nursery Songs
User C	81	Male	Alzheimer's Dementia	*Memory impaired *Bad-tempered	*Traveling by Train *Japanese Nursery Songs

Table 1. Users' Brief Profiles

By using these recorded images of the users, we evaluated how much the user was concentrating on the video clip displayed and how he was amused by the video clip. In order to analyze these recorded images, we asked five people, who were not related to the users, to judge each user's levels of concentration and amusement. A subjective scale of one to five was used for scoring. Each subject watched the first minute of the recorded images of the users as well as the last minute and then scored the degree of the user's concentration and amusement for each recorded image.

Figure 4 and Figure 5 show the average scores of users' concentration and amusement for each recorded image of the first and last one-minute segments. As shown in both graphs, the reminiscence video made users more concentrated and amused than any other type of video clips for the first one minute. On the other hand, during the last one minute there seems to be no outstanding difference between the reminiscence video and other types of video materials. One possible reason for this result involves the effects of the narrations attached to the reminiscence video. Users often smiled, nodded, and replied in response to the narrations attached to the reminiscence videos. As mentioned above, no narration was added to the latter half of the

remembrance videos in this experiment. Thus, there is no narration in the last one minute, which resulted in a smaller difference between the remembrance video and other types of video. It seems that the narration can get the users more involved in the remembrance video.

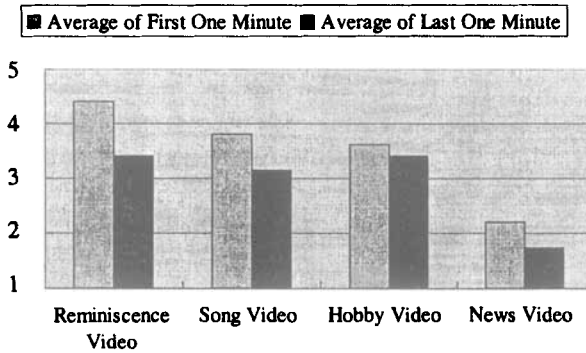


Figure 4. Results of Experiment (Concentration)

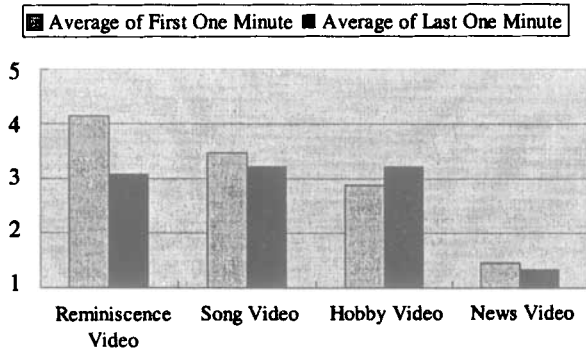


Figure 5. Results of Experiment (Amusement)

## 6. CONCLUSIONS AND FUTURE WORKS

We introduced a remembrance video authoring tool that makes use of photo annotations. We also showed how a creator who may not have know-how of video editing could select photos based on the theme of the video to be produced and then create the remembrance video using a pre-defined



template. In the current implementation, we defined only a very simple template. We plan to add various kinds of templates. Also in the current implementation, a creator is required to add each annotation (such as regions in a photo) manually. There have been several research efforts on (semi-) automatic annotation of images (for example [15]). We plan to utilize existing techniques such as face detection algorithms to help a creator specify regions.

In addition, we conducted preliminary experiments to evaluate the effectiveness of a reminiscence video produced by the proposed authoring tool for people with dementia (users). The results show that the reminiscence video made users more concentrated and amused than other types of video clips used in our experiments. The results also indicate that the narration attached to the video may be important. Though further studies are needed, the reminiscence video seems to be a promising stimulus for holding users' attention and for preventing users' behavior problems. We are now conducting a further experiment to evaluate the long-term effects of the reminiscence video. In this latest experiment, caregivers monitor and record the users' behaviors on a regular basis as the users watch the reminiscence video. In this experiment, we will also evaluate how narrations, BGM, and visual manipulations such as the Ken Burns effect influence the ability to hold users' attention and the ability to prevent users' behavior problems. We hope that the reminiscence video will help family members take care of their loved ones and that the proposed authoring tool will make it easier to create the video.

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